The Impact of Delinquent Friendship Networks and Neighborhood Context on Suicidal Ideation among South Korean Youths[1]

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ABSTRACT

In this study we examine the association between ties to delinquent friends and suicidal ideation among adolescents, and whether this association varies across neighborhoods. We analyze two waves of data from the Korean Youth Panel Survey, which comprise nationally representative samples of high school students in South Korea, a country with the highest suicide rate in the developed world. Results from hierarchical linear models show that, net of individual and contextual-level variables, connections to delinquent peers significantly raise the odds of adolescent suicidality. We also find this relationship to be stronger in more affluent and better quality neighborhoods. We draw on the concept of the "black sheep effect" to discuss the implications of these findings.

INTRODUCTION

Suicide is a main cause of death among young people in the world today. According to a large cross-national study, about one in ten adolescents (9.7%) will attempt suicide at some point in their lives (Evans et al. 2005). The US Centers for Disease Control and Prevention estimate that with approximately 4,600 lives lost every year, suicide is the third leading cause of death for American youths between the ages of 10 and 24. Indeed, across the globe suicide is a major public health concern demanding the attention of both policy makers and researchers. The gravity of the situation motivates the current preventive framework created by the World Health Organization (2012) under the rubric of "Public Health Action for the Prevention of Suicide."

Reflecting the legacy of Durkheim's ([1897] 1951) classic work, social integration continues to inform contemporary studies of suicide. Past research has confirmed the role of social integration as a protective force against both suicidal thoughts and suicide attempts. Increasingly, however, studies have shown that the characteristics of the networks in which individuals are embedded matter as much as the extent of integration. In particular, scholars have identified relationships with delinquent peers as a potent mechanism through which harmful behaviors, such as alcohol and drug abuse, are diffused across social networks (Haynie 2002; Haynie and Osgood 2005; Kreager and Haynie 2011; Kreager, Rulison, and Moody 2011). Negative "friendship environments" (Bearman and Moody 2004) can facilitate suicide as well, prompting some researchers to characterize the spread of suicidal thoughts through networks as the "dark side" of social integration (Baller and Richardson 2009).

In addition to examining individual-level networks, recent research has emphasized the importance of structural or contextual-level variables when

understanding mental and physical health generally, and suicidality specifically (Wray et al. 2011). A burgeoning interdisciplinary literature has shown that residential characteristics – such as neighborhood cohesion and stability, social trust between neighbors, dense civic participation, collective efficacy, and the proportion of religious adherents – can influence a variety of health related outcomes including substance abuse, depression, physical well-being, crime and victimization, delinquency, and suicidality (Aminzadeh et al. 2013; Fagan, Wright, and Pinchevsky 2013; Dupere, Levanthal and Vitaro 2012: Browning, Feinberg, and Dietz 2004; Haines, Beggs, Hurlbert 2011; Maimon, Browning, and Brooks-Gunn 2010; Mohnen, Groenewegen, Volker, and Flap 2011; Snedker, Herting, and Walton 2009; Sampson, Raudenbush, and Earls 1997; Tomita and Burns 2013; van Tubergent, te Grotenhuis, and Ultee 2005; Zimmerman and Messner 2010). Building on these two separate but related developments in suicide research, one conceptual and the other methodological, we focus on interpersonal connections and suicidality across different neighborhood contexts. Specifically, we assess the extent to which ties to delinquent friends are associated with adolescent suicidal ideation, and whether this association is moderated by residential characteristics.

Our empirical focus is South Korea (hereafter Korea), a country with the highest suicide rate among OECD member nations and one of the highest in the world (Corks 2013; Jung and Olson 2014; Park, Im, and Ratcliff 2014). Between 2001 and 2011, when the OECD average dropped for young people between the ages of 10 and 24, the suicide rate among Korean teenagers increased by 74.9% from 3.19 to 5.58 persons (per 100,000). Notably, starting in 2007 suicide became the number-one cause of death for Koreans between the ages of 15 and 24 (Statistics Korea). Despite massive government intervention, suicide continues to account for more teenage mortalities than

any other cause of death (Korean Association of Health Promotion).

Drawing on the Korean Youth Panel Survey (KYPS), a government-funded multi-year data collection effort, we offer a more nuanced analysis of the factors associated with adolescent suicidality. Because prior research on the relationship between social capital and health mainly deals with advanced Western societies (Habibov and Afandi 2011; Kumar et al. 2012), one of our aims is to extend the generalizability of past findings to an important non-Western case. Also, most analyses in the suicide literature are based on cross-sectional data and thus face the thorny issue of endogeneity (see Abrutyn and Mueller 2014). We alternatively analyze two waves of longitudinal data, which allows us to minimize this methodological challenge and thereby establish a more conclusive temporal causal order between suicidality and its covariates.

We focus on how and to what extent ties to delinquent friends are associated with adolescent suicidal ideation. By doing so, we contribute to a growing literature that challenges the dominant conceptualization of interpersonal ties in functional terms, i.e., as a protective force against suicidal thoughts and behaviors. In line with those who are "rethinking integration" (Abrutyn and Mueller 2016: 58), we identify specific contexts within which "social ties have the power to harm" (Mueller et al. 2015: 204). The majority of existing research also rests on the general assumption that "better" neighborhoods, by definition, shield residents from such harmful health risks as suicidality. We contribute to the extant scholarship by demonstrating that good neighborhoods, defined subjectively and objectively, can penalize nonconforming members by accentuating the deleterious effects of delinquent peers on individual propensity toward suicidal thought. Lastly, there has been a growing call to incorporate "both micro and macro predictors" in suicide research (Maimon et al. 2010: 319). In a

comprehensive review, Wray et al. (2011) also highlight multilevel approaches as providing new avenues of inquiry in the sociology of suicide (see also Pescolido 1994). By applying hierarchical linear modeling to assess both individual and neighborhood-level factors affecting youth suicidality, this study explicitly moves in that direction.

SOCIAL INTEGRATION AND HEALTH OUTCOMES

Interpersonal relations, and the social capital they provide, significantly shape various health outcomes (Berkman et al. 2000; Ferlander 2007; Hawe and Shiell 2000; Seeman 1996; Schaefer, Kornienko, and Fox 2011; Song 2010; Song and Lin 2009; Smith and Christakis 2008; Thoits 2011; Umberson and Montez 2010). Integration is broadly conceptualized in terms of social ties, social networks, and social capital (Berkman and Syme 1979; Shaefer, Kornienko, and Fox 2011; Verhaeghe and Tampubolon 2012). Past studies have repeatedly found that proper connections lead to substantial health benefits, while social isolation can have deleterious consequences (Cornwell and Waite 2009, Cornwell and Laumann 2015, Giodarno and Linstrom 2010).

Similarly, the bulk of research on suicidality emphasizes the benefits of network-mediated integration and support (Whitlock et al. 2014). Indeed, as Haynie et al. (2006: 694) argue, social networks may very well be the "key link between large-scale meso- and macrolevel processes and individual behavior, including suicide." For adolescents in particular, explications of the "social structure of suicide" show that suicidality is significantly shaped by friendship patterns (Bearman 1991; Bearman and Moody 2004). Attributes of friendship networks, including density, are important contextual factors as loose connections to peers (i.e., intransitivity) raise the odds of suicidal ideation, especially among girls. Further research has converged on this theme by showing how embeddedness – measured in terms of network size, frequency, density,

etc. – serves to protect individuals from suicidal thoughts and attempts (Kuramoto, Wilcox, and Latkin 2013; Maimon and Kuhl 2008; Maimon et al. 2010; Seeman 1996; Thorlindsson and Bjarnason 1998).

The Negative Consequences of Connectedness

In recent years, several studies have challenged the conventional idea that interpersonal relationships necessarily promote health. Falci and McNeely (2009), for example, show that having *too many* friends may lead to higher rates of depression. That is, there may be an optimal range between "under-integration" and "over-integration" where social support can most effectively protect individuals. Others argue that certain behavioral patterns negatively affecting health are a function of the diffusion of network characteristics. Thus, for example, people who smoke (Haas and Schaefer 2014), individuals who are overweight (Christakis and Fowler 2007), and those who suffer from loneliness (Cacioppo, Fowler, and Christakis 2009) tend to be connected with others who display similar behavioral and/or emotional attributes.

This growing trend in mental health and suicide research is an important corrective to a literature that "has generally ignored the negative side of social interaction" (Rook 1984: 1097). In an insightful reimagining of Granovetter's (1973) strength of weak ties argument, Baller and Richardson (2009) explore the "dark side" of indirect linkage to friends-of-friends who are suicidal. They conclude that suicide is subject to network-facilitated contagion, with ties to suicidal others substantially raising the probability of thinking about suicide oneself. In their investigation of adolescent suicide, Abrutyn and Mueller similarly argue that, "suicidality can spread through the very ties that Durkheim theorized as protective" (2014: 211).

Particularly relevant to teenage suicide is the impact of delinquent friendships.

Teenagers are especially vulnerable to peer influence, as friends are thought "to be the major socializing agent" during adolescence (Haynie 2002: 100). Because friendship groups quite possibly constitute the most "prominent," "salient," and "emotionally charged" social context for high school students, they can exert significant integrative pressure (Abrutyn and Mueller 2016: 59). Delinquent friends, for their part, are relatively more likely to provide incentives and opportunities to engage in delinquent acts (Haynie and Osgood 2005). Past research has shown that a higher proportion of delinquent friends is associated with a greater likelihood of consuming alcohol, smoking tobacco, and engaging in violent altercations (Haas and Schaefer 2014; Haynie 2002; Kreager, Rulison, and Moody 2011; Kreager and Haynie 2011; Zimmerman and Messner 2010). In the case of adolescents, then, friendship networks can be a conduit of not only social support but also pressure toward delinquency and even self-harm.

We conjecture that ties to delinquent friends can increase adolescent suicidality in two related but distinct ways. The influence can take place directly and indirectly. First, there may be a direct influence of suicidal friends on youth suicidality. Prior research has shown that engaging in delinquent acts is a powerful predictor of one's own suicidal ideation and behavior (Bearman and Moody 2004; Brent 1995; Espelage and Holt 2013; Karch et al. 2013; Schilling et al. 2009; Xing et al. 2010). According to a US-based study, substance use is associated with an 80% higher probability of thinking about suicide (Borges et al. 2011). That is, friends who are "delinquent," compared to "non-delinquent" peers, are more likely to be suicidal. As such, a greater number of suicidal friends may directly increase a focal actor's suicidality since self-harm is especially contagious among adolescents via peer-mediated social learning and role modeling (Abrutyn and Mueller 2014; see also Bernburg et al. 2009; Bjarnason and Thorlindsson 1994; Bridge et al. 2006; Evans et al. 2004; Thompson and Light

2011).

Surrounding oneself with delinquent peers can also elevate one's suicidality indirectly. As noted, delinquency and risk behavior are network-embedded phenomena (Kramer and Vaquera 2011; Kreager and Haynie 2011). The probability of engaging in delinquent activities is a function of ties to friends who are similarly predisposed (Haas and Schaefer 2014; Haynie 2002; Haynie and Osgood 2005) and, given the homophily principle, students with delinquent friends are more likely to be delinquent themselves. Alcohol abuse (Pompili et al. 2010) and violence (Zimmerman 2013; Lubell and Vetter 2006), to name two examples, are strongly correlated with adolescent suicidality. In other words, in addition to directly modeling the suicidal behavior of friends, the increased potential for engaging in delinquent behaviors, supported by associations with delinquent friends, is an indirect mechanism that contributes to adolescent suicidality.[i] We attempt to tease out these distinct pathways by testing the following hypothesis while controlling for the focal actor's own delinquency:

Hypothesis 1: Ties to delinquent peers, net of other individual and contextual factors, increase the odds of suicidal ideation.

Neighborhood Effects

There is a growing interest in multilevel modeling in social epidemiology that takes into account both micro and macro determinants of health and health related behaviors (Browning et al. 2013; Browning et al. 2006; Cagney et al. 2014; Haines, Beggs, and Hurlbert 2011; Tomita and Burns 2013; Verhaeghe and Tampubolon 2012; Zimmerman 2013). Several studies have shown that residential contexts affect a wide range of outcomes, including both perceived and actual health (Aminzadeh et al. 2013; Browning et al. 2013; Browning and Cagney 2003; Mohnen, Groenewegen, Volker, and

Flap 2011; Snedker and Herting 2016). One mechanism by which better-quality and resource-rich neighborhoods contribute to the health of their residents is the ability to attenuate risk factors. Maimon and Browning (2010) argue that collective efficacy – social solidarity among neighbors and community capacity for collective action – can buffer the negative impact that unstructured socializing has on adolescent violent behavior (see also Sampson et al. 1997). Furthermore, Fagan et al. (2014) demonstrate that neighborhood collective efficacy reduces the effects of exposure to violence on subsequent adolescent substance abuse.

Studies of Korean neighborhoods have yielded results that mirror the interrelated inequalities found across American neighborhoods. Resource-rich Korean neighborhoods are associated with a wide variety of advantages for children, including higher investment in schooling (Kim 2013) and more after-school programming (Jang and Park 2016). This has led to significant disparities in educational outcomes between students residing in rich versus poor neighborhoods (Yang 2013). More relevant for the present study, greater opportunities for structured socialization in richer Korean neighborhoods have also been shown to be correlated with mental wellbeing (Kim 2010; Kim 2008; Rho and Kwak 2005) and good physical health (Kim, Kwon, and Lee 2012; Lee 2016; Yoon 2010).

The theoretical imperative to consider both individual proclivities and contextual effects simultaneously has motivated novel avenues in suicide research. For instance, van Tubergen, te Grotenhuis, and Ultee (2005) report that after controlling for individual-level church membership, Dutch municipalities with greater proportions of religious adherents generally display lower rates of suicide. Conversely, using a probability sample of Icelandic students, Bernburg et al. (2009) show that community-level household poverty significantly raises the odds of adolescent suicidal behavior.

According to their "'epidemic' explanation," youths living in economically disadvantaged communities have more opportunities to interact with suicidal others. Recent work has further shown that resource-poor neighborhoods tend to be less stable as measured by higher rates of residential mobility, greater proportion of rented versus owned properties, and higher rates of eviction (Desmond 2012, 2016). Residential stability is also important for individual outcomes and particularly relevant for our study, as Haynie, South, and Bose (2006: 695, 698) have found that female adolescents who move to a new neighborhood are not only "more likely to experience a lack of social integration [but also] … exhibit higher rates of deviant and delinquent behavior."

Despite the advantages of considering explanatory variables at different levels, studies that employ multilevel analysis in suicide research are still "hard to come by" (Wray et al. 2011: 519). A welcome exception is a study by Maimon and Kuhl (2008), which shows that the well-known relationship between depression and suicide attempts is moderated by higher levels of neighborhood religiosity. Similarly, Maimon, Browning, and Brooks-Gunn (2010) argue that the protective effects of family attachment and support on lowering suicidal ideation are greater for students who believe their own respective neighborhood to be more collectively efficacious. Using the negative example of Chicago residents, Zimmerman (2013) corroborates these earlier findings by showing how neighborhood violence amplifies the association between depression and attempted suicide.

We seek to contribute to this new direction in the sociology of suicide by considering the differential impact of individual-level predictors of suicidal ideation in varying macro contexts. Specifically, while controlling for a number of factors – socioeconomic, psychological, family, and interpersonal characteristics – we investigate whether the possible association between delinquent ties and suicidality

varies across different types of residential neighborhoods as defined by four objective (household income, homeownership, suicide prevalence, divorce rate) and two subjective (quality/safety and collective efficacy) measures. Because resource-rich and higher-quality neighborhoods have been found to protect residents from a general set of risk factors associated with suicide, we explore whether these buffering qualities are also applicable to the potential influence of delinquent peers on suicidal ideation:

Hypothesis 2a: The effect of delinquent peer networks on suicidal ideation is lower in neighborhoods with higher levels of aggregate social capital.

Hypothesis 2b: The effect of delinquent peer networks on suicidal ideation is lower in better-quality (safer and cleaner) neighborhoods.

Hypothesis 2c: The effect of delinquent peer networks on suicidal ideation is lower in neighborhoods with higher average household income.

Hypothesis 2d: The effect of delinquent peer networks on suicidal ideation is lower in neighborhoods with a higher proportion of homeownership.

Conversely, recent work has shown that resource-poor or lower-quality neighborhoods can detrimentally affect residents' susceptibility to suicide. If individuals are likely to adopt self-destructive thoughts and behaviors through social learning and role-modeling, as discussed above, neighborhoods that have a higher prevalence of suicide would constitute a residential context that exposes individual members to more incidents of suicide attempts, both successful and unsuccessful, as well as more people contemplating suicide. This, in turn, can present suicide as a justifiable (normatively "acceptable") option for individuals struggling with mental illness, social isolation, and other related factors.

Admittedly, the relationship between exposure to examples of suicide and subsequent modeling is complex and may involve a feedback process. Mueller (2017) suggests that high numbers of suicide can fuel media reporting of them, which then may signal to local community members that certain social factors are acceptable motives for suicide (e.g. academic pressure), which then may encourage modeling behavior. Although "media's irresponsible reporting" (2017: 157) is only one factor contributing to the possible normalization of suicide, along with other independent community characteristics (e.g. stigma surrounding mental health), this study highlights the importance of local community contexts in facilitating members' suicidality. If delinquent friendships contribute to adolescent suicidality, there is the possibility that this relationship may be accentuated in "suicide-prone" neighborhoods as self-harm is a more salient behavior in those communities (Mueller 2017).

Neighborhood disadvantages are also consequential in other ways. We consider, in particular, the effects of overall divorce rate based on past studies that confirm a strong relationship between socioeconomic disadvantage and marital instability (Bramlett and Mosher 2002; South 2001). Divorce, in turn, can compromise children's wellbeing as it is associated with a variety of negative outcomes, including lower educational attainment (Potter 2010) and poorer housing opportunities (South, Crowder, and Trent 1998). Across nations divorce is not only directly related to aggregate youth suicide rates (Messner et al. 2006), but also associated with a greater likelihood of delinquency (Petts 2009). Consequently, neighborhoods with higher prevalence of divorce may exacerbate the negative effect of delinquent peers on suicidality. To account for the potential moderating effects of suicide and divorce rates at the residential level, we test the following two additional hypotheses:

Hypothesis 3a: The effect of delinquent peer networks on suicidal ideation is greater in neighborhoods with a higher suicide rate.

Hypothesis 3b: The effect of delinquent peer networks on suicidal ideation is greater in neighborhoods with a higher divorce rate.

DATA AND METHODS

Data for our investigation come from the Korean Youth Panel Survey (KYPS), a longitudinal study funded by the Korean government and conducted by a state-run research center, the National Youth Policy Institute (www.nypi.re.kr). Based on a prospective panel survey design, two cohorts were initially selected to be included in the KYPS. Cohort 1 consists of 8th graders (N = 3,449) first surveyed in 2003, and Cohort 2 comprises 4th graders (N = 2,844) sampled in 2004. We use data based on the first (older) cohort. Stratified multi-stage cluster sampling was used to collect nationally representative samples of Korean students. The neighborhood cluster in the dataset constitutes the primary sampling unit. The questionnaire has two parts: one for students and another for parents (guardians). The student survey was administered in class by an interviewer, while the parent survey was conducted through telephone interviews.

The KYPS based on the first cohort consists of six waves (2003-2008). The data for this study are specifically drawn from Wave 4 (2006) and Wave 5 (2007), which consist of high school students only. Wave 6 was not used since by that time many of the participants had graduated from high school and were either working or attending college. The W4 dataset has a valid sample size of 3,121 (with a response rate of 88.6%), out of which 154 students dropped out of school the following year, reducing the effective size to 2,967 for the W5 sample (an attrition rate of 5%). The dependent variable is measured based on the survey item from Wave 5; all other time-lagged

independent and control variables are taken from the earlier Wave 4 data, a strategy consistent with prior suicide research using longitudinal data (see Abrutyn and Mueller 2014). After accounting for cases with missing values, the current study is based on a final probability sample of 2,643 respondents embedded in 142 residential neighborhoods throughout the country. In models not shown, multiple imputations were used to address cases with missing values, which constitute about 10 percent of the sample (Allison 2001; King et al. 2001). The main results from analyzing the imputed dataset did not differ substantially from the models reported below using the reduced sample.[ii]

Dependent Variable

The KYPS asked students whether and to what extent they agreed with the following statement: "Sometimes I feel suicidal for no apparent reason." The answers were originally coded on a 5-point Likert scale (1 = "strongly disagree, 3 = "neither disagree nor agree," 5 = "strongly agree"). We recoded the variable so that "strongly agree" and "agree" were given the value of 1, and 0 otherwise. This dichotomous variable, *Suicidality*, is the main outcome measure, and 9% of our sample agreed or strongly agreed with the statement at the time of the survey in 2007 (W5).[iii]

Independent Variables

Survey respondents were asked how many of their close friends have engaged in a series of delinquent behaviors, including drinking, smoking, cutting school, physical altercations, and stealing from others.[iv] They were also asked how many of their friends had been either "disciplined, suspended or expelled from school" or "arrested by the police." Answers to these multiple items varied greatly from 0 to as

many as 40 friends. Most respondents (83% of the sample) stated that they did not have any such "delinquent" friends. Because of the severely skewed (right-tailed) distribution of the data, the original responses to these multiple items from W4 were summed (alpha = .89), transformed using a log metric, and converted into standardized values (z scores). The resulting main independent variable is *Delinquent Peers*.[v]

In addition to this individual-level main predictor, we operationalize a number of contextual-level variables that may influence suicidal thoughts (Fagan et al. 2014; Snedker, Herting, and Walton 2009; Zimmerman 2013). The concept of collective efficacy, a subjective measure, has been widely used as a proxy to capture neighborhood effects on health and behavioral outcomes (Browning and Cagney 2003; Maimon and Browning 2010; Maimon, Browning, and Brooks-Gunn 2010; Sampson et al. 1997). In keeping with the extant literature, we constructed a composite measure based on five survey items about the quality of interpersonal relations and informal social control at the community level (e.g., "My neighbors have close relationships with each other."; "My neighbors will intervene or report to the police if I am assaulted by other kids in the neighborhood"). This variable, *Social Capital*, is calculated by adding up individual responses within each neighborhood unit and taking the average value (alpha = .82). The KYPS gives additional information on how respondents view the physical attributes and safety levels of where they live. Consistent with prior research on the effects of residential structural characteristics on health (for a critical review, see Sharkey and Faber 2014), a subjective variable (*Residential Quality*) was calculated based on averaged responses to four separate statements (alpha = .78), including "My neighborhood is dirty because of litter." and "There are many places that are dark and secluded in my neighborhood."

Objective or structural dimensions of neighborhoods such as economic

resources are also important determinants. We thus include a variable (*Average Income*) calculated as the mean monthly household earnings for each neighborhood based on the individual-level figures provided in the KYPS. Also included is the proportion of people who own their homes (*Homeownership*) for each neighborhood cluster as a proxy for residential stability.[vi] Lastly, since neighborhood clusters in the KYPS have unique identifiers (geocodes), we are able to track government census data and merge them with the student-level data. Specifically, we incorporated two neighborhood measures: the number of suicide deaths per 100,000 residents (*Suicide Prevalence*) and the percentage of divorced residents (*Divorce Rate*). Both variables were constructed by using information retrieved from the Korea Social Science Data Archive (www.kossda.or.kr). As was the case with our main individual-level predictor variable (*Delinquent Peers*), the values for all six neighborhood-level variables were converted into z scores. Table 1 provides descriptive statistics. Definitions and coding schemes for all variables are summarized in the Appendix.

Control Variables

As is the case with the independent variables, all control variables were measured using the earlier wave (W4) of data collection. Because the number of delinquent ties may depend significantly on overall friendship size, we control for the total number of close friends, which allows us to assess a more accurate relationship between the relative number (i.e., proportion) of delinquent friends and suicidal ideation (see Haynie 2002). Also, since friendship choice is not a random process (i.e., "birds of a feather flock together"), it is necessary to control for an individual's own level of delinquency when analyzing the hypothesized deleterious effects of delinquent friends. To that end, we include a measure (*Self-delinquency*) based on the subjective

evaluation of one's own delinquent identity (e.g., "I regard myself as a juvenile delinquent") and perceived evaluations from others (e.g., "People around me regard me as a problem youth"). Answers to four survey items are summed (alpha = .92) to create an index. We include this control to tease out the unique contribution of delinquent ties versus engaging in delinquent behaviors on suicidality.[vii]

Past studies have shown that a number of other factors are associated with suicidality. First, to control for preexisting variations in suicidality and to further isolate the effects of our independent and control variables, we take into account students' baseline suicidal tendencies measured from the earlier Wave 4 data (*W4 Suicidality*).[viii] Also considered in the analysis are the student's gender (*Female*) and self-rated health status (*SRH*). To control for family economic background, we include an objective measure, logged monthly household earnings reported by the parent or guardian (*Household Income*),[ix] and a subjective measure of family-related financial hardship (*Economic Difficulty*). The quality of within-family relations (*Family Relations*) may also influence the mental health of adolescents. As such, we created a log-transformed composite score (alpha = .86) based on four items that tap the quality of the relationship between parents (e.g., "I frequently see my parents verbally abuse each other") as well as the parent-child relationship (e.g., "I am often severely beaten by my parents"). In addition to the family, school context plays a key role in the mental life of youths (Bearman and Moody 2004; Whitlock, Wyman, and Moore 2014). To account for this, an index (*School Detachment*) was created based on answers to a number of questions about attitudes toward school and relationships with peers and teachers: e.g., "I am not interested in school work and find it difficult to catch up," "I am not in good terms with friends at school," and "I am not in good terms with school teachers" (alpha = .79).

Lastly, two protective factors are included, *Mental Health* and *Club*

Membership. The former is based on responses to three psychological survey items (e.g., "I think that I am a worthy person"). Responses to individual items were averaged to create a single scale (alpha = .89*).* We consider a student's mental health because of the possibility of a spurious relationship between maintaining delinquent friendships and suicidality, where general levels of psychological distress motivate both. Although the KYPS survey did not include explicit measures of mental health, general belief in self-worth and various operationalizations of self-esteem are strongly correlated with mental health indicators such as depression (Bolognini et al. 1996; Croker and Wolfe 2001). By including the *Mental Health* variable, we hope to assess the unique influence of delinquent networks on suicidality in addition to the individual-level effects of psychological well-being. Finally, based on the literature documenting the importance of social integration for suicide we include *Club Membership*, which is a measure of the degree of involvement in social (organizational) life. This variable is based on counts of three different types of extracurricular club activities: school-related, outside the school, and online.

[Table 1 here]

Analytical Strategy

The KYPS draws on individual respondents (students) nested in higher-level units (neighborhoods), which poses a statistical problem when estimating Ordinary Least Squares regression models because of the violation of the independence assumption (Raudenbush and Bryk 2002; Snijders and Bosker 2011). To address this methodological issue, and simultaneously test the effects of individual and contextual-level variables, we ran two-level random effects models using the maximum likelihood

estimation. Because the dependent variable is dichotomous, we estimated Hierarchical Generalized Linear Models with a Bernoulli logit function using HLM 7 (Raudenbush et al. 2011). To address the problem of collinearity, all non-dummy level-1 (individual-level) variables are centered at the group mean. The level-2 (neighborhood-level) variables are grand-mean centered. The analysis also uses recommended weights to account for the unequal probability of selection of individual subjects across neighborhood clusters. The model specification is as follows:

$$\log\left(\frac{\Phi_{ij}}{1-\Phi_{ij}}\right) = \beta_{0j} + \sum_{q=1}^{Q} \beta_{qj} X_{qij}$$

where β_{0j} is the intercept, X_{qij} is the value of covariate q associated with respondent i in neighborhood j, and β_{q} is the partial fixed effect of that covariate on the log odds of adolescent suicidality. The level-two model is denoted:

$$\beta_{0j} = \gamma_{00} + \sum_{S=1}^{S} \gamma_{S} W_{Sj} + u_{0j} \quad u_{0j} \sim N(0, \tau_{00}),$$

where γ_{00} is the intercept and γ_{S} are the level-two coefficients for the effects of s covariates W on the log odds of suicidal ideation (u_{0j} is the neighborhood level error term, with a normal distribution and variance of τ_{00}).

RESULTS

The findings from nested multilevel logit models are presented in Table 2. We initially estimated the null or unconditional model (Model 1) without the covariates to

gauge the magnitude of variation in suicidality among students across different neighborhoods. Examination of the variance component from that model ($\tau_{00} = .164$, $p < .05$) reveals that there is significant variation in the outcome variable, validating the use of hierarchical linear modeling.

[Table 2 here]

Model 2 contains only the control variables (excluding the baseline suicidality measure), many of which are statistically significant. Two variables are moderately related to adolescent suicidality, gender and extracurricular activities. Female students exhibit higher levels of suicidal ideation (OR = 1.27, $p < .1$), and membership in after-school clubs is associated with lower odds of suicidality (OR .83, $p < .1$). At the conventional level of significance ($p < .05$), students with greater self-esteem and better mental health are less likely to have suicidal thoughts (OR = .76), as are those who are physically heathier (OR = .79). Corroborating a common finding in the delinquency literature discussed above, individuals who identify themselves as being "delinquent" are more likely to be suicidal as well (OR = 1.63). And one's attitude toward academic work and quality of relationship with peers and teachers are also significant predictors of suicidality. As the coefficient for *School Detachment* (OR = 1.93) indicates, greater detachment from school life is associated with a higher propensity toward thinking about suicide. Financial hardship at home also contributes to higher odds (OR = 1.26), while the likelihood of adolescent suicidality (OR = 1.51) is also surprisingly higher for students from more affluent families.

Model 3 introduces the key independent variable, *Delinquent Peers*. Net of the psychological, physical, sociodemographic, and family-related controls, we find that

delinquent ties from the previous year are positively related to suicidality in the following year. Specifically, one standard-deviation increase in the number of delinquent friends raises the odds by about a quarter (OR = 1.24, $p < .05$). Adding this variable also raises the gender effect to the conventional level of significance. Participating in student clubs, on the other hand, becomes insignificant. The total number of friends also emerges as a significant factor: more friends reduce the odds of suicidal ideation.

To perform an even more stringent test of our main hypothesis, we incorporate a time-lagged measure for baseline suicidality. According to Model 4, inclusion of this variable (*W4 Suicidality*) washes away the gender effect, while the parameter estimate for *Club Membership* becomes once again significant. The magnitude and significance level of other control variables are more or less the same. Importantly, after controlling for baseline suicidal ideation, the effect of delinquent ties on the outcome variable is consistently robust. The odds ratio drops slightly but remains statistically significant (OR = 1.21, $p < .05$). With cross-sectional data, it would not be possible to rule out reverse causation here, namely that suicidal students tend to gravitate toward delinquent friends. By controlling for the initial state of suicidal proclivity, our analysis using longitudinal data thus provides a more definitive temporal (causal) order between suicidal ideation and its covariates.

Our last model (Model 5) introduces the six neighborhood-level variables (household income, homeownership, residential quality, social capital, divorce rate and suicide prevalence). As the results show, however, none of them has a significant direct effect on teenage suicidality. The absence of main effects is consistent with some studies that examined contextual-level factors on adolescent suicide, where neighborhood characteristics such as residential stability, collective efficacy, and

objective measures of disadvantage were shown to be unrelated to suicidality (Maimon, Browning, and Brooks-Gunn 2010; Maimon and Kuhl 2008). The residual variance component for this model's intercept ($p < .001$) indicates that after including the six neighborhood measures, there is still significant variation in adolescent suicidality that can be explained at the neighborhood level. What is important for the current study is that even with the inclusion of neighborhood characteristics, the relationship between ties to delinquent friends and suicidality remains significant.

We are especially interested in the question of whether the association between delinquent friends and suicidality is constant across different types of neighborhoods. Although we did not find direct main effects of neighborhood characteristics, based on the conventional wisdom in the literature, we hypothesized that "better" neighborhoods should buffer the detrimental effect of delinquent peer networks on suicidality. We estimated additional models to check for possible cross-level interactions. The findings are reported in Table 3. Among the six cross-level interaction terms, three are significant but all in the opposite direction (nonsignificant coefficients are not reported in the table). According to Model 1, the association between delinquent friends and suicidal thought is *more pronounced* in neighborhoods with higher average household income (OR = 1.44; $p < .01$). Second, as Model 2 similarly illustrates, the relationship is also *heightened* in better quality neighborhoods (OR = 1.24; $p < .01$). Lastly, Model 3 shows that the linkage between delinquent peers and adolescent suicidality is *weaker* in neighborhoods with a higher suicide rate.[x]

[Table 3 here]

These findings stand in contrast to our expectations that resource-rich and higher-

quality neighborhoods provide protections against factors facilitating suicidal ideation. Indeed, results contrarily indicate that these neighborhoods actually reinforce the detrimental influence of interacting with delinquent friends. To better visualize the cross-level interaction effects, we graph the relationships between the probabilities of suicidal ideation and ties to delinquent friends across the three neighborhood characteristics (*Average Income*, *Residential Quality*, *Suicide Prevalence*), while holding other variables in the statistical model at their means. Figures 1, 2, and 3 highlight the central finding that the number of delinquent friends is positively associated with adolescent suicidal ideation, an association that is more acute in "better" neighborhoods.

[Figures 1 – 3 here]

DISCUSSION

That suicidal ideation and behavior are socially embedded is a sociological axiom. Even a cursory review of the literature suggests that social integration and, to a lesser extent, moral regulation have become the twin conceptual pillars on which the bulk of prior research on suicide rests. While previous studies provide a great deal of insight into the health benefits of social integration, "researchers have urged greater attention to the negative, as well as the positive, side of informal social ties" (Rook 1997: 167). Our study sought to contribute to the literature by emphasizing the potential liability of connections to delinquent friends. Findings revealed that adolescents with a greater number of delinquent ties are more likely to entertain suicidal thoughts.

Because "multilevel research on suicide and suicidal behavior has been limited" (Bernburg 2009: 381), we also investigated neighborhood-level effects on suicidal

ideation among one of the most vulnerable populations in the world: Korean adolescents. We found the positive effect of delinquent peer networks on suicidal thoughts to be greater in resource-rich and higher-quality neighborhoods. These unexpected results diverge from the mainstream view that better neighborhoods tend to be health-promoting. Based on past findings, we initially hypothesized that neighborhoods with more resources or perceived by residents to be of higher quality will act as buffers against risk factors, including ties to delinquent friends. Contrary to our expectations, we discovered that richer and cleaner/safer residential communities with lower aggregate suicide rates actually accentuate the detrimental impact of delinquent networks on adolescent suicidality, providing novel evidence for the contingent effects of relational embeddedness.

To make sense of our findings that sharply deviate from, if not contradict, conventional wisdom about neighborhood effects, we draw on social psychology research on the so-called "black-sheep effect" (Marques, Yzerbyt, and Leyens 1988; Marques and Yzerbyt 1988). We know that members of social groups are more likely to hold favorable attitudes about, and share more resources with, other ingroup members compared to outgroup members, which is a central thesis in Social Identity Theory (SIT; Tajfel 1982). Evidence from experimental research has also shown that members are more critical of fellow ingroup members who deviate from group norms. That is, likeable and unlikeable ingroup members are judged more extremely compared to outgroup members. And deviant ingroup members, in particular, face the harshest criticisms (Marques, Yzerbyt, and Leyens 1988). This occurs because ingroup members, as opposed to outsiders, have greater relevance for the group's identity construction and preservation, hence raising the stakes for their deviance. This black-sheep effect has been found to be robust across a wide range of group-types, including in the original

"minimal group paradigm" used in SIT research – when groups are arbitrarily constructed – and groups that are based on substantive categories (e.g. race, nation, religion, political ideology, etc.; Santuzzl and Ruscher 2006). In addition, there is evidence that even young children are guided by the black-sheep logic when critically judging ingroup members who deviate from group norms and behavior (Abrams, Rutland, and Cameron 2003).

There are several implications we can derive from the literature on the black-sheep effect to help elucidate why the impact of maintaining delinquent friends on suicidal thoughts is greater in neighborhoods that are deemed to be higher-quality and endowed with more economic resources. In these neighborhoods delinquents (roaming drunkards and loitering teenagers) and delinquent behaviors are, by definition, less frequently observed. Because of the higher costs associated with delinquency and its lower frequency as a result, the youths who do engage in deviant behaviors or have delinquent friends (i.e., black sheep) are likely to "stand out." The increased saliency could then make it easier to identify and penalize members of delinquent networks in "better" residential contexts. Consequently, youth who associate with delinquent peers may experience higher rates of "negative social exchanges" in the form of parental and community criticisms specifically related to these friendship ties (Rook 1997). It is worth noting that prior research has shown that resource-rich communities enjoy higher collective efficacy and, consequently, have a greater capacity for collective action when monitoring and punishing wrongdoers (Maimon and Browning 2010; Papachristos et al. 2012; Sampson, Morenoff and Raudenbush 2005; Sampson, Morenoff, and Gannon-Rowley 2002).

Relevant for adolescents, past studies have shown that "high achievement expectations and academic pressure" are especially powerful in affluent neighborhoods

(Cicolla, Curlee, Karageorge, and Luthar 2016). If ties to delinquent friends are construed by family and community members as compromising the dominant norm of academic achievement in these neighborhoods, membership in delinquent networks can lead to negative social exchanges, which then can adversely affect psychological well-being (Newsom, Mahan, Rook, and Krause 2008; Rook 2001; Rook 1984). Given this line of argument, our results can be interpreted as confirming a scenario articulated by Haynie et al. (2006: 715), who raised the possibility that ties to delinquent peers mediate other factors influencing adolescent suicidality as it "negatively affects, for example, their parental relationships, school attachment, or victimization risk." This interpretation is also consistent with a recent study that showed that highly integrated and regulated communities do not protect but rather punish youth who do not properly conform to communal norms. In this case study of a "small, privileged community" (Mueller and Abrutyn 2016: 882), constant pressures to succeed academically and powerful control mechanisms that monitor failures created tremendous emotional distress for both students and parents. Ironically, the norms and characteristics of this otherwise desirable and prestigious community perpetuated adolescent suicides. Finally, the surprising result that at the individual-level, students from households with higher incomes think about suicide more than peers from less affluent families is also consistent with this line of reasoning.

Conflated with these external pressures are internal psychological factors as delinquent acts may carry stronger stigma in resource-rich neighborhoods, where negative social comparisons to the mainstream conforming reference group are clearer. In a study that delineates unique mechanisms driving different types of suicide as originally outlined by Durkheim ([1897] 1951), Abrutyn and Mueller argue that, "the regulative aspects of shame are important . . . for understanding fatalism" (2014: 332-

333). Shame is potentially one of the "heightened problems among affluent youth" (Coren and Luthar 2014: 931) as parental criticism for not meeting social and academic expectations are likely to be greater in resource-rich neighborhoods. Luthar and colleagues have thus warned of the unique risks associated with these "privileged but pressured" youth in rich neighborhoods (Luthar, Barkin, and Crossman 2013: 1529). In short, having delinquent friends can augment other issues that are already associated with suicidality, including stress from school and studying, especially in neighborhoods where the pressure to conform and compete are already high (Park 2013). This, in turn, can lead to greater feelings of fatalism or hopelessness among youths with more delinquent friends who find themselves being compared to the "good kids," a comparison that is more pronounced in better neighborhoods.

Consider the opposite scenario. In a worse-off neighborhood characterized by physical decay and low income – where crime and delinquency are generally more prevalent – there may be lower expectations for "proper behavior" (Papachristos, Braga, and Hureau 2012; Sampson et al. 1997). Our measure of *Residential Quality* is partly based on answers to the following two statements: "Many drunkards are roaming around at night in my neighborhood" and "Teenagers are often seen wandering around in groups in my neighborhood." In neighborhoods described as such, there may be relatively higher tolerance for maintaining and interacting with delinquent friends, hence inviting less social disapproval or sanction. In fact, having such friends may be construed as nothing more than adhering to existing behavioral norms.

Relevant to this line of argument is a study on adolescent substance abuse by Snedker, Herting, and Walton (2009). They report that the influence of delinquent friends on alcohol and drug abuse is stronger in good neighborhoods and conversely, that neighborhood disadvantage reduces the influence of deviant peers on adolescent

substance use. According to the authors, "it could be that adolescents in more advantaged and stable neighborhoods have fewer risk factors associated with living in that space so that the presence of a deviant peer network generates substance using behaviors at greater levels because those deviant peers provide learning, access, and opportunity structures that might otherwise not be available" (Snedker et al. 2009: 1289). Applied to the topic at hand, this logic may explain why the impact of delinquent peers on suicidal thoughts is weaker in neighborhoods with a high prevalence of suicide. Although high rates of suicide in a community may make suicide a more salient option, there may be a wider range of factors driving suicidal behavior. This is not to say that delinquent behaviors do not invite negative social exchange in low-income and lower-quality neighborhoods but rather, that delinquency is one of several risk factors relevant for mental health, thus diluting its unique contribution to suicidality.

In a comprehensive review of previous research on social relationships and health behaviors, Umberson and Montez (2010) reiterate the simple yet powerful observation about the paradoxical nature of relational connections: people can be a source of support as well as stress. However, even if it is unsurprising that "social interaction entails both rewards and costs" (Rook 1984: 1097), most studies, as several scholars have pointed out, focus on the functional nature of interpersonal ties. The main purpose of our study was to add to the understanding of the potential downside of social relationships, i.e., how and why delinquent peer networks contribute to adolescent suicidality.

Our study further advances the work on delinquent networks (Haynie 2002; Haynie and Osgood 2005; Haynie et al. 2006) and the negative side of social relations (Rook 1984, 1997; Umberson et al. 2010) by highlighting the differential consequences of negative ties in varying macro contexts. The unexpected role of "better"

neighborhoods in exacerbating, not ameliorating, the deleterious effect of delinquent ties, suggests that the same negative relationships may not have consistent consequences for individual health across neighborhood types. This, in turn, points to the importance of considering the larger implications for neighborhood inequality. Although the dominant norms and values associated with good neighborhoods, in addition to material assets, are largely construed as cultural resources, it is important to remember that neighborhood advantages are not uniformly applicable to all residents. Furthermore, if there is less tolerance for deviance in high resource and good quality neighborhoods it is possible that our findings may be relevant for an assortment of other potential outcomes, including, for example, career choices (e.g. lower proportion of youth pursuing non-traditional lower-status occupations) and assortative mating (e.g. limited allowance for non-traditional unions).

Our findings should be interpreted in light of some data limitations and unique attributes of the Korean case. Most notably, the outcome measure was based on a single survey item. Multiple questions probing respondents' level of suicidal ideation can produce more accurate information about their mental and psychological state. Concerning the main predictor variable, unlike the Add Health data which is based on sociocentric friendship networks among American students, the KYPS does not contain information on the overall friendship network structure. That is, the survey did not ask about the interrelationships among one's friends. As a result, we relied only on network size. Information about the broader structural foundation of suicide (Bearman 1991) might offer more interesting insights and results. As noted, another shortcoming is that our main predictor variable, *Delinquent Peers*, is based on respondents' subjective evaluations of friends, not objective measures of their delinquency.

It is also important to acknowledge that unique attributes associated with the

Korean case may limit the generalizability of our findings. Alluded to above, relative to America and Europe, South Korea and its regional neighbors are stereotyped as educationally hypercompetitive societies (Park 2013). This, coupled with the fact that half of the Korean population resides in the greater Seoul metropolitan area, one of the most densely populated cities in the world (Kim and Choe 2011: 58), may contribute to the capacity of "good neighborhoods" to monitor and discipline adolescent residents who do not conform to dominant norms and values. It is uncertain how much of the neighborhood effects we observed in our study are a function of heightened urban density. Despite these and other less significant shortcomings related to measurement and generalizability, our study offers novel findings identifying the conditions under which certain adolescents are more prone to suicidal thought. Future research based on comparative longitudinal data with more precise variables is needed to tease out the complex relationships between suicidality and its predictors at both individual and contextual levels.

Table 1: Descriptive Statistics

	Mean/Proportion	S.D.	Min.	Max.
Outcome Measure				
W5 Suicidality	.09	__	0	1
Individual Level (N=2,643)				
W4 Suicidality	.11	__	0	1
Female	.50	__	0	1
SRH	4.15	.95	1	5
Economic Difficulty	2.04	1.03	1	5
Household Income	5.64	.60	0	8.41
Family Relations	.45	.41	0	1.61
Friendship Size	1.90	.51	0	4.11
Club Membership	.48	.61	0	3
School Detachment	1.85	.70	0	4.33
Self-delinquency	1.81	.76	1	5
Mental Health	3.26	.77	1	5
Delinquent Peers	0	1	-.48	16.22
Neighborhood Level (N=142)				
Social Capital	0	1	-4.28	2.31
Average Income	0	1	-5.02	3.06
Homeownership	0	1	-2.86	1.15
Residential Quality	0	1	-2.46	6.20
Divorce Rate	0	1	-1.45	3.69
Suicide Prevalence	0	1	-2.61	4.34

Source: Korean Youth Panel Survey (2006 & 2007)
Note: Original values for the variables *Family Income, Parental Abuse,* and *Friendship Size* are log-transformed due to (right-tailed) skewed distribution. Values for *Delinquent Peers* and all the neighborhood-level variables are standardized.

Table 2: Hierarchical Logit Models Predicting Adolescent Suicidality

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio
(Student Level)										
Delinquent Peers					0.21 (.08)	1.24*	0.19 (.10)	1.21*	0.19 (.10)	1.21*
W4 Suicidality							1.82 (.20)	6.20***	1.83 (.20)	6.20***
Female			0.24 (.14)	1.27#	0.27 (.14)	1.32*	0.17 (.15)	1.18	0.19 (.15)	1.20
SRH			-0.23 (.07)	0.79**	-0.24 (.07)	0.79**	-0.23 (.08)	0.79**	-0.24 (.08)	0.79**
Economic Difficulty			0.23 (.07)	1.26***	0.24 (.07)	1.28***	0.18 (.07)	1.20**	0.18 (.07)	1.20*
Household Income			0.41 (.17)	1.51*	0.42 (.18)	1.52*	0.43 (.18)	1.53*	0.42 (.18)	1.52*
Family Relations			0.19 (.22)	1.21	0.18 (.22)	1.20	0.12 (.24)	1.13	0.13 (.24)	1.14
Friendship Size			-0.26 (.18)	0.77	-0.45 (.19)	0.64*	-0.44 (.19)	0.64*	-0.45 (.19)	0.64*
Club Membership			-0.19 (.11)	0.82#	-0.18 (.11)	0.83	-0.24 (.12)	0.79*	-0.25 (.12)	0.78*
School Detachment			0.66 (.07)	1.93***	0.63 (.12)	1.87***	0.59 (.13)	1.80***	0.58 (.13)	1.79***
Self-delinquency			0.49 (.11)	1.63***	0.42 (.12)	1.52***	0.32 (.12)	1.37**	0.31 (.12)	1.36**
Mental Health			-0.28 (.11)	0.76*	-0.29 (.11)	0.75**	-0.22 (.11)	0.80*	-0.22 (.11)	0.81#
(Neighborhood Level)										
Social Capital									-0.13 (.14)	0.88
Average Income									-0.20 (.14)	0.78#
Homeownership									-0.03 (.17)	0.97
Residential Quality									-0.27 (.17)	0.77
Divorce Rate									-0.12 (.10)	0.89
Suicide Prevalence									0.10 (.10)	1.09
Constant	-2.30*** (.08)	0.10	-2.77*** (.10)	0.07	-2.80*** (.13)	0.06	-3.09*** (.14)	0.05	-3.10*** (.13)	0.04
Tau *intercept*	.164		.208		.212		.216		.152	
Reliability ***intercept***	.197		.213		.215		.204		.155	
ICC (%)	4.8		5.9		6.1		6.2		4.4	

Source: Korean Youth Panel Survey (2006 & 2007)

Note: Results are adjusted using person-weights to account for selection probability. Parameter estimates are from unit-specific models with robust standard errors.
Dummy variable for missing income is not shown.
# p < .1, * p < .05, ** p < .01, *** p < .001 (two-tailed tests)

Table 3. Cross-level Interaction Effects between Neighborhood Characteristics and Delinquent Peers

Source: Korean Youth Panel Survey (2006 & 2007)

	Model 1		Model 2		Model 3	
	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio	Coef. (SE)	Odds Ratio
(Neighborhood Level)						
Social Capital	-0.15 (.14)	0.86	-0.12 (.14)	0.89	-0.13 (.17)	
Average Income	-0.21 (.14)	0.81	-0.20 (.14)	0.82	-0.20 (.11)	
Homeownership	-0.05 (.17)	0.95	-0.02 (.17)	0.98	-0.04 (.17)	
Residential Quality	-0.26 (.17)	0.77	-0.31 (.16)	0.73#	-0.27 (.17)	
Divorce Rate	-0.12 (.10)	0.89	-0.12 (.10)	0.89	-0.12 (.10)	
Suicide Prevalence	0.11 (.11)	1.11	0.09 (.10)	1.10	0.12 (.11)	
(Cross-Level Interactions)						
Average Income × *Delinquent Peers*	0.36 (.09)	1.44***				
Residential Quality × *Delinquent Peers*			0.21 (.08)	1.24**		
Suicide Prevalence × *Delinquent Peers*					-0.19 (.07)	.831**
Constant	-3.12*** (.13)	0.04	-3.11*** (.14)	0.04	-3.11*** (.13)	0.04
Tau *intercept*	.169		.146		.156	
Reliability ***intercept***	.168		.150		.158	
ICC (%)	4.9		4.2		4.5	

Note: Results are adjusted using person-weights to account for selection probability. Parameter estimates are from unit-specific models with robust standard errors. Dummy variable for missing income is not shown. Above models control for all the individual-level covariates shown in Table 2.
# p < .1, * p < .05, ** p < .01, *** p < .001 (two-tailed tests)

Figure 1. Cross-level Interaction Involving Neighborhood Quality

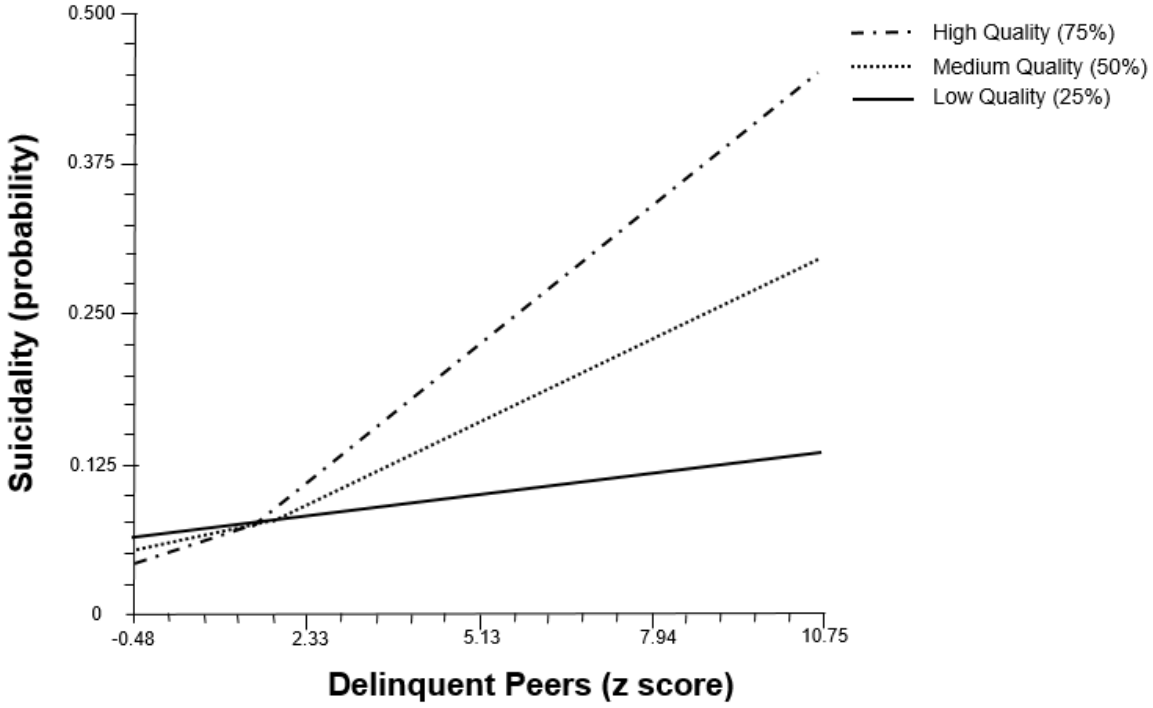


Figure 2. Cross-level Interaction Involving Neighborhood Income

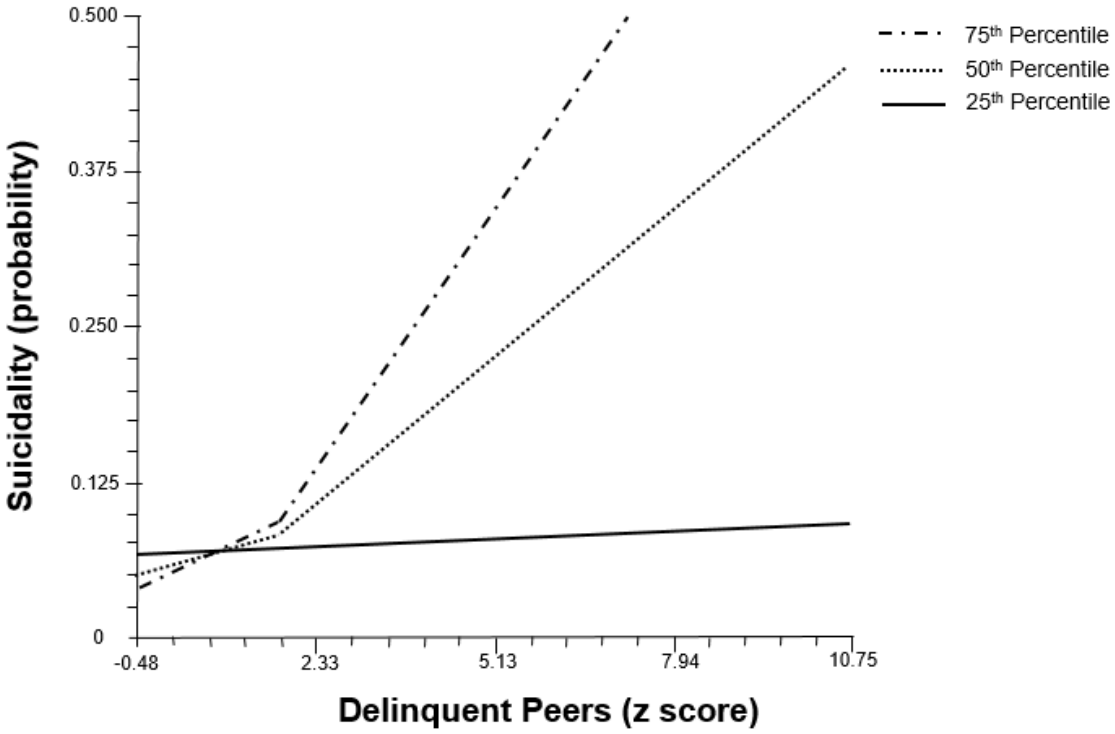
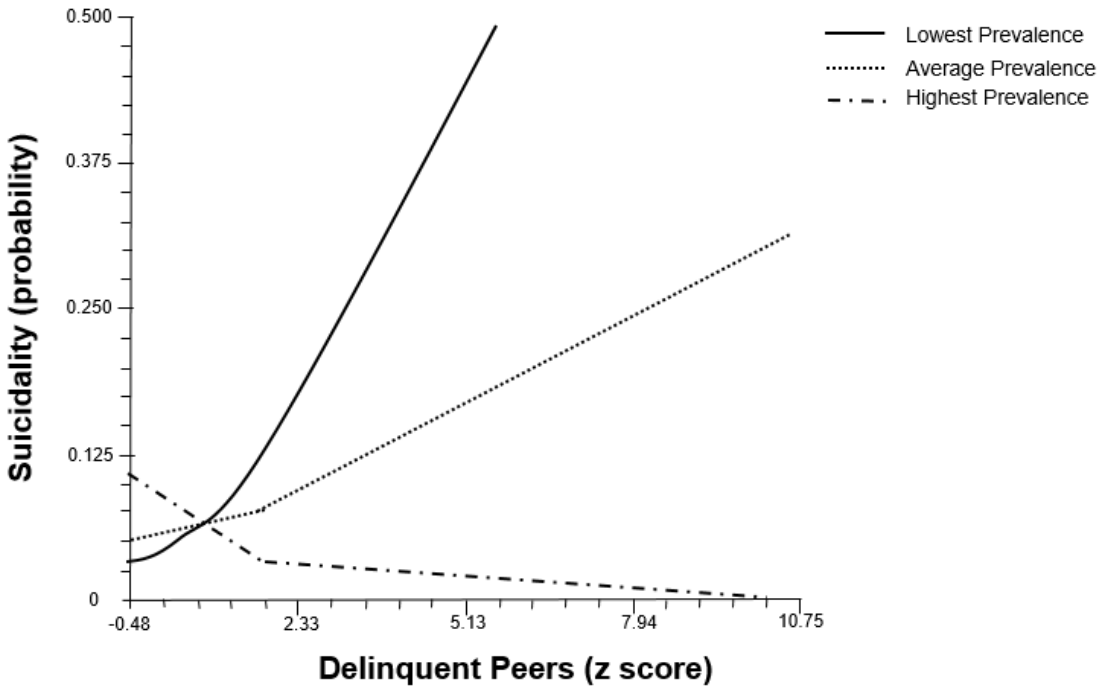


Figure 3. Cross-level Interaction Involving Neighborhood Suicide Prevalence



Appendix: Variable Definition and Coding Scheme

Variable	Survey Item and Coding
Outcome Measure	
W5 Suicidality	"Sometimes I feel suicidal for no apparent reason" (1 = strongly disagree; 3 = neither disagree nor agree; 5 = strongly agree); Dichotomized so that "strongly agree" and "agree" are assigned as 1 and 0 otherwise. Data are based on W5 (2007) of KYPS
Student Level (N=2,643)	
	All control variables are measured using Wave 4 (2006) of KYPS
W4 Suicidality	Same dichotomous coding scheme as the one used for *W5 Suicidality*
Female	Female = 1
SRH	"I am not in good health" (e.g., 1 = very untrue, 3 = neither true nor untrue, 5 = very true) The original answers reverse-coded so that a higher number indicates better health.
Economic Difficulty	"I have experienced serious family related financial difficulties in the past year" (5 = strongly agree, 3 = neither agree nor disagree, 1 = strongly disagree")
Household Income	Logged monthly household income reported in the Parental Survey of KYPS
Family Relations	"I frequently see my parents verbally abuse each other"; "I frequently see one of my parents beat the other one"; "I am often verbally abused by my parents"; "I am often severely beaten by my parents" (e.g., 1 = very untrue, 5 = very true) A composite score transformed using a log metric (Cronbach's alpha = .86)
Friendship Size	"How many close friends do you have?"(Original answers log-transformed)
Club Membership	Number of extracurricular club memberships: school-related, outside school, online (values ranging from 0 to 3)
School Detachment	"I find it difficult to follow school rules and regulations"; I am not interested in school work and find it difficult to catch up"; "My school is not known for sending its graduates to a good school"; "I find it hard to develop myself in terms of talents and abilities in the school that I currently attend"; "I am not in good terms with friends at school"; "I am not in good terms with school teachers" (e.g., 5 = very true, 1 = very untrue) Cronbach's alpha = .79
Self-delinquency	"I regard myself as a problem youth"; "I regard myself as a juvenile delinquent"; "People around me regard me as a problem youth"; "People around me regard me as a juvenile delinquent" (e.g., 5 = strongly agree, 1 = strongly disagree) Values averaged to create a single index (Cronbach's alpha = .92)
Mental Health	"I think that I have a good character"; "I think that I am a competent person"; "I think that I am a worthy person" (e.g., 1 = strongly disagree, 5 = strongly agree) Values averaged to create a single index (Cronbach's alpha = .89)
Delinquent Peers	"Among your friends, how many were 1) disciplined, suspended, or expelled from school; 2) arrested by the police?" "During the last year, how many of your close friends engaged in following activities? 1) drinking; 2) smoking; 3) cutting school; 4) beating up on others; 5) robbing others; 6) stealing from others" A summary

	measure based these 8 items (Cronbach's alpha = .80) converted into z-scores.
Neighborhood Level (N=142)	
Social Capital	"Elderly neighbors will scold me if I smoke or drink in the neighborhood"; "My neighbors will intervene or report to the police if I am assaulted by other kids in the neighborhood"; "I will let elderly neighbors (teachers) know if my friends smoke or drink in the neighborhood"; "I will intervene or report to the police (teachers) if my friends are assaulted in the neighborhood"; "My neighbors have close relationships with each other." (e.g., 5 = very true, 3 = neither true nor untrue, 1 = very untrue) Answers averaged and standardized into z-scores (Cronbach's alpha = .82)
Average Income	Mean value of logged family income at the neighborhood level (converted into z-scores)
Homeownership	Neighborhood-level proportion of homeownership (converted into z-scores)
Residential Quality	"My neighborhood is dirty by litter"; "There are many places that are dark and secluded in my neighborhood"; "Many drunkards are roaming around at night in my neighborhood"; "Teenagers are often seen wandering around in groups in my neighborhood" (e.g., 5 = "very untrue," 3 = "somewhat true," 1 = "very true") Answers averaged and standardized into z-scores (Cronbach's Alpha = .78)
Divorce Rate	Standardized neighborhood-level divorce rate (number of divorced families/population size x 1,000)
Suicide Prevalence	Standardized proportion of neighborhood-level suicide (number of suicides per 100,000)

Source: Korean Youth Panel Survey (2006 & 2007)

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NOTES

[i] We thank an anonymous reviewer for noting that "having delinquent peers is not directly associated with suicidality independent of one's own delinquency."

[ii] The original sample size for KYPS (2007) is 3,121 (students). Of those, 243 (7.8 percent) had missing values for the DV (suicidality) and only 4 had missing values for the main IV (delinquent peers). We checked to see whether the 243 with missing information on the DV are systematically different from the rest of the sample. To that end, we created a dummy variable (coded 1 if missing on DV, 0 otherwise) and ran a logit model predicting the odds of being one of the 243 students as a function of all of the variables used in our analysis in predicting W5 suicidality. None was statistically significant, indicating that those students who did not provide an answer concerning W5 suicidality are not systematically different from those who did. We are thus confident that the missing cases did not lead to biased parameter estimates, and as a result, present and discuss findings using the reduced dataset.

[iii] The 9 percent suicidal ideation rate may appear "relatively low" compared to US samples (roughly 14-15 percent). This may partly stem from the fact that the KYPS asked respondents about feeling suicidal "for no apparent reason," whereas US surveys mainly inquire about feeling suicidal "in general." We also believe that suicidality in the KYPS was underreported, due to the cultural taboo against publicly professing one's mental problems in Korea's conservative Confucian society. This underreporting, however, does not belie the gravity of the situation. According to data provided by the Korea Health Promotion Foundation (KHPF), a state-run agency, the number of suicides per 100,000 among Korean youth (ages 10 to 19) rose 57.2 percent in 2011 from the previous decade. Between 2000 and 2010, the suicide rate for the 10 to 24 age group in OECD countries fell to 7.7 percent (per 100,000), while the figure for Korea rose to 9.4 percent.

[iv] The KYPS data did not include objective measures for (third-party assessment of) friends' delinquency and we only have respondents' subjective perceptions of their delinquency. We acknowledge this is a limitation of our study.

[v] In models not shown, we also used the proportion of delinquent friends, instead of the raw count. Using the alternative measurement did not significantly alter the main findings. We opted to use the number of delinquent friends since it allows for a clearer substantive interpretation of statistical results. In the models estimated, we included the variable *Friendship Size*, which controls for the size of overall friendship network. We are thus examining the relationship between the quantity of delinquent peers and suicidal ideation, net of the total number of friends.

[vi] We were unable to use official administrative data for neighborhood income, since these are only available at a larger geographical unit of analysis (similar to counties in the U.S.). The contextual unit we used in our study are closer to census tracts, which are smaller and serve as a more accurate proxy for neighborhoods. Data on homeownership are also not available for this unit of analysis.

[vii] In models not shown, as suggested by one anonymous reviewer, we also operationalized respondents' delinquent behavior using alternative (objective) measures such as drinking, smoking, running away from home, missing school, etc., none of which was found to be significantly related to the outcome variable. As one of the reviewers suggested, we used the delinquent *identity* variable because of the importance of respondents' perceptions of their position in their communities.

[viii] By controlling for baseline suicidality, we partly address the problem of endogeneity. A major concern here is that social homophily, rather than social influence, is driving our results (Mouw 2006,McPherson, Smith-Lovin, and Cook 2001). By using this measure and other time-lagged control variables, our study seeks to minimize, though not resolve, the thorny issue of reverse causation.

[ix] The household income variable had the highest percentage of missing values (about 5% of the dataset). Instead of introducing bias through listwise deletion, we mean-replaced them and included a dummy variable in the regression models to indicate missing cases (King et al. 2001). The coefficients for the dummy variable are not reported in the output tables since they are arbitrary depending on the values used to replace missing cases (Powell and Tucker 2013, Vaccari et al. 2015).

[x] In response to one of the reviewers, we also estimated our original full models containing the cross-level interaction terms between delinquent peers and neighborhood characteristics (e.g., overall suicide rate, average household income, neighborhood quality), along with those between self-delinquency and the three contextual-level variables. For models involving neighborhood income and quality, including both interaction terms (one for self-delinquency and one for delinquent peers) does not make any difference. For the third model, the p-value for the *delinquent peers* X *suicide rate* interaction term drops to .057. Despite this slight decline, the general tendency strongly points to the effect heterogeneity we originally discussed: the impact of delinquent friends on suicidality is stronger in better neighborhoods.