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Delinquency and Peer Acceptance in Adolescence: A Within-Person Test of Moffitt's Hypotheses

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Abstract

We tested two hypotheses derived from Moffitt's (1993) taxonomic theory of antisocial behavior, both of which are central to her explanation for the rise in delinquency during adolescence. Specifically, we tested whether persistently delinquent individuals become more accepted by their peers during adolescence and whether individuals who abstain from delinquent behavior become less accepted. Participants were 4,359 adolescents from 14 communities in the PROSPER study, which assessed friendship networks and delinquency from 6th ($M = 11.8$ years) to 9th ($M = 15.3$ years) grade. We operationalized peer acceptance as: number of nominations received (indegree centrality), attractiveness as a friend (adjusted indegree centrality), and network bridging potential (betweenness centrality) and tested the hypotheses using multilevel modeling. Contrary to Moffitt's hypothesis, persistently delinquent youth did not become more accepted between early and middle adolescence, and although abstainers were less accepted in early adolescence, they became more accepted over time. Results were similar for boys and girls; when differences occurred, they provided no support for Moffitt's hypotheses for boys and were opposite of her hypotheses for girls. Sensitivity analyses using alternative strategies and additional data to identify persistently delinquent adolescents produced similar results. We explore the implications of these results for Moffitt's assertions that social mimicry of persistently antisocial adolescents leads to increases in delinquency and that social isolation leads to abstention.

Keywords

social networks; peer acceptance; taxonomic theory of antisocial behavior; delinquency

Moffitt's (1993, 2006) taxonomic theory of antisocial behavior is one of the most frequently cited and tested theories of crime, yet few studies have had the data required to fully test two of its central hypotheses. The first hypothesis is that a small subset of individuals who are antisocial across the lifespan (physically aggressive as children, delinquent as adolescents, career criminals as adults) become influential social magnets during adolescence. These "life-course-persistent" antisocial individuals are expected to be rejected by their peers during childhood, but increasingly accepted during adolescence when their delinquent behavior emerges as a desirable social resource. The second hypothesis is that individuals who persistently abstain from antisocial behavior are excluded from most peer group

activities during adolescence. These “abstainers” are accepted by their peers during childhood but are then pushed to the margins of the peer network as antisocial behavior takes center stage during adolescence.

These two hypotheses are part of Moffitt’s (1993) explanation for her largest subset of individuals: those whose antisocial behavior begins and ends during adolescence. Moffitt’s theory suggests that such “adolescence-limited” antisocial behavior is driven by a maturity gap, in which adolescents experience a mismatch between their biological maturity and their limited role in modern Western societies. In response, these adolescents become attracted to, and begin mimicking, their persistently antisocial peers, whose delinquency appears to conquer the maturity gap. The net result is that persistently antisocial individuals should shift from the periphery of the peer network in childhood to more influential positions in adolescence.

We test two hypotheses within a large sample of male and female adolescents from 14 communities. We extend past studies by using behavioral and network measures obtained from five waves to establish within-person change in peer acceptance. We also use three social network measures – number of nominations received (indegree centrality), attractiveness as a friend (adjusted indegree centrality), and network bridging potential (betweenness centrality) – to differentiate multiple dimensions of peer acceptance.

Peer Acceptance of Persistently Antisocial Adolescents

Results from multiple studies appear to support the argument that persistently antisocial individuals become social magnets during early adolescence. One study found that physical aggression was negatively correlated with being liked by peers in 5th and 6th grade, but not in 7th-9th grade (Cillessen & Mayeux, 2004). Another study found that “pseudomature” behavior (e.g., minor delinquency) was positively correlated with being liked at age 13, but not age 15 (Allen, Schad, Oudekerk, & Chango, 2014). Other studies suggest that seriously delinquent adolescents are not without friends (e.g., Goldweber, Dmitrieva, Cauffman, Piquero, & Steinberg, 2011) and that adolescents low in self-control (a trait highly correlated with persistent offending) may be more peer-involved (but not more central in the network) than other youth (McGloin & Shermer, 2009). These studies and others (e.g., Juvonen, Wang, & Espinoza, 2012; Luthar & McMahon, 1996; Rodkin, Farmer, Pearl, & Van Acker, 2006) suggest that the negative association between antisocial behavior and peer acceptance during childhood (Bierman, 2004) disappears as youth transition into middle school and may even briefly reverse by high school (e.g., Dijkstra et al., 2010) before fading again in later adolescence (e.g., Allen et al, 2014).

Importantly, these studies provide only indirect evidence that persistently antisocial individuals become social magnets during adolescence. As noted by Young (2014), Moffitt’s theory focuses on *within-person* changes – whether the peer acceptance of persistently antisocial individuals increases during adolescence – and not the changing association between antisocial behavior and peer acceptance over age. Testing within-person hypotheses requires identifying groups with different behavioral trajectories and testing how their peer acceptance changes over time. Several of the cited studies (Luthar & McMahon,

1996; Rodkin et al., 2006) used cross-sectional data, so they could not identify groups that followed different behavioral trajectories or test how the peer acceptance of individuals in these groups changed over time. Other studies (Allen et al., 2014; Cillessen & Mayeux, 2004) used longitudinal data, but focused on changes in the association of *between-person* differences in antisocial behavior with *between-person* differences in peer acceptance (e.g., whether the cross-sectional association between antisocial behavior and peer acceptance differed over time). Still others used longitudinal data but did identify individuals who were persistently antisocial (e.g., Dijkstra et al., 2010; Juvonen et al., 2012) to test whether they followed different trajectories of peer acceptance than their peers.

To our knowledge, only Young (2014) has tested Moffitt's hypotheses using dynamic peer network and delinquency data. Using latent trajectory analysis, he identified three groups of males: a persistently violent group, a group with adolescence-limited violence, and a low aggression group. Consistent with Moffitt's theory, during adolescence, the chronically violent group experienced the greatest increases in how often they were named as a friend. This study was an important starting place for testing Moffitt's hypothesis; however, the sample included only 44 persistently antisocial males (2.4% of the sample). Further, given that adolescents were in 7th-12th grade at wave 1 (mean age = 15 years), only a fraction of this group had friendship and offending data in early adolescence, the period most relevant for establishing a correlation between life-course-persistent offending and increased peer acceptance. In addition, the data only included three waves of network data using a single measure of peer acceptance and the study did not test Moffitt's complementary hypothesis about the peer acceptance of abstainers.

Peer Acceptance of Abstainers

Evidence is less consistent for Moffitt's (1993) hypothesis that adolescents who abstain from antisocial behavior become less accepted. Determining whether abstention is linked to isolation is important because not having friends and low peer acceptance are linked to a range of negative consequences (e.g., Parker & Asher, 1987). In one study, Allen, Weissberg, and Hawkins (1989) found that valuing conformity was negatively correlated with being well-liked in a sample of 65 7th and 8th graders. Though supportive of Moffitt's hypothesis, this study was cross-sectional, relied on a small sample, and examined the association of peer acceptance with values rather than behavior. Other studies have found that during adolescence, abstainers spent an average of six hours per week with friends (Brezina & Piquero, 2007), received almost as many friendship nominations as their peers (4.32 vs. 4.84 nominations; Chen & Adams, 2010), and had dated at least a few times in the past year (Piquero, Brezina, & Turner, 2005).

Together, these studies suggest that, even if abstainers are somewhat less accepted than their peers during adolescence, they are not isolated. Indeed, the peer networks of abstainers may even grow during adolescence as they gain access to other prosocial peers through school-supported activities (Kinney, 1993; Piquero et al., 2005). As with persistently antisocial adolescents, testing if the association between delinquency abstention and peer acceptance changes over age is best accomplished using within-person analyses.

Operationalizing Peer Acceptance

In Moffitt's (1993) theory, the growing peer acceptance of persistently antisocial individuals enables them to influence most other adolescents toward engaging in antisocial behavior. The theory is less specific, however, about how to measure the peer acceptance that creates this influence potential. Research on peer influence almost universally focuses on friendships as the source of influence. Most studies measure influence by asking "How often have your friends..." committed specific behaviors (e.g., Patterson, Forgatch, Yoerger, & Stoolmiller, 1998) or asking adolescents to name their friends and obtaining the friends' reports about their own behavior (e.g., Dijkstra et al., 2010). Therefore, we used friendship connections or "ties" to create three measures that captured different dimensions of peer acceptance.

Our first measure follows directly from approaches that assume influence flows from people chosen as friends to the people who choose them. In this case, each adolescent has the potential to influence those peers who name him or her as a friend. Thus, we use the number of friendship nominations received, or indegree centrality, which is a standard measure of peer acceptance in network analysis (Kreager, 2007; Wasserman & Faust, 1994).

Our second measure adjusts this count of friendship nominations received to capture the attractiveness to others that is the focus of Moffitt's (1993) hypotheses. Being selected as a friend not only reflects one's general appeal, but due to reciprocity (Newcomb & Bagwell, 1995) and transitivity (Heider, 1958), it also depends on one's behavior as a friend. Apart from the appeal of their deviant behavior, Moffitt's theory portrays persistently antisocial adolescents as unskilled at developing and maintaining friendships. Their problematic relationships may reduce the number of friendships they pursue and reduce the likelihood that any perceived friendships are reciprocal. Therefore, we capture whether adolescents elicit more friendship nominations than would be expected based on their own friendship choices using Holland and Leinhardt's (1981) measure of "attractiveness." This measure adjusts the number of nominations received for how many nominations people make and what proportion of their nominations are reciprocated.

Our final measure corresponds to a very different conception of influential peers. Recent research suggests that adolescents whose friendships bridge multiple, otherwise disconnected groups will be highly visible to their peers and in a strong position to influence them (Faris, 2012). We capture the degree to which adolescents occupy such network "bridging" positions through betweenness centrality (Freeman, 1979), which indicates the extent to which an individual's connections create links between peers who are otherwise more remotely connected.

Gender Moderation

Much of the literature on which Moffitt (1993) drew for her theory focused only on boys. Nevertheless, Moffitt (2006) argued that the developmental taxonomy applies to both genders and that the root causes of adolescence-limited antisocial behavior – the maturity gap and antisocial role models – are the same across gender. Therefore, Moffitt's theory

suggests that both life-course-persistent antisocial boys and life-course-persistent antisocial girls should experience an increase in peer acceptance during adolescence.

By contrast, Silverthorn and Frick (1999) proposed an alternative taxonomy for girls in which there is no analogous group of adolescent-limited girls. Instead, girls with risk factors similar to Moffitt's life-course-persistent boys exhibit "delayed-onset": they initiate antisocial behavior in adolescence and then continue these behaviors into adulthood. During childhood, these girls suppress their antisocial tendencies due to factors such as societal pressure to avoid stereotypically male behavior. During adolescence, this pressure weakens as antisocial behavior becomes more normative (although Silverthorn and Frick argue that adolescent girls' antisocial behavior is still viewed as aberrant). They do not make any specific hypotheses about changes in peer acceptance of antisocial girls during adolescence, but it is likely that continued pressure to adhere to gender-appropriate scripts would translate into a much smaller increase (or even a decline) in peer acceptance for persistently delinquent girls and sustained high peer acceptance for "good" girls who abstain from delinquent behavior.

Empirical findings regarding these divergent taxonomies for girls and boys are mixed. Most studies that included non-institutionalized girls found evidence of both early and late onset female categories (Bergman & Andershed, 2009; Chung, Hill, Hawkins, Gilchrist, & Nagin, 2002; D'Unger, Land, & McCall, 2002; Moffitt & Caspi, 2001; White & Piquero, 2004). In addition, some studies found that girls had similar characteristics and risk factors as boys on the same antisocial trajectory (e.g., Bergman & Andershed, 2009; Moffitt & Caspi, 2001), whereas other studies found some gender differences (e.g., D'Under et al., 2002; White & Piquero, 2004). Few studies have tested gender differences in the link between antisocial behavior and peer acceptance. Studies that did (e.g., Allen et al., 2014; Juvonen et al., 2012), found few gender differences, although one study found that by high school, the negative link between physical aggression and social preference disappeared for boys, but not girls (Cillessen & Mayeux, 2004).

Present Study

We test two primary research questions: (1) Do persistently antisocial adolescents become more accepted by their peers during adolescence? and (2) Do adolescents who abstain from antisocial behavior become less accepted by their peers during adolescence? We build on past research in four important ways. First, we use five waves of longitudinal survey data to classify student's behavioral trajectories and test how the peer acceptance of adolescents in each group changes over time. The time frame in our study (mean ages 11.8-15.3) captures the most critical developmental period for testing Moffitt's hypotheses, allowing us to identify adolescents who initiated delinquent behavior early and persisted over time. In addition, because this time frame covers most of the upswing in delinquency, changes in peer acceptance should be concentrated during our observation window. Second, we use three related, but distinct measures of peer acceptance to provide a more complete picture of adolescents' involvement in their peer network. Third, our sample includes both girls and boys, so we can extend previous work which often focused exclusively on boys. Finally, we

conduct sensitivity analyses to demonstrate that our results are robust across alternative approaches to classifying persistent antisocial behavior.

Method

Setting, Design, and Sample

We test our hypotheses using data from the PROMoting School-community-university Partnerships to Enhance Resilience (PROSPER) project (Spoth, Greenberg, Bierman, & Redmond, 2004). PROSPER is a longitudinal, cohort-sequential randomized control trial of 28 rural towns and small cities in Pennsylvania and Iowa. When the study began (Fall 2002) the average community population was 19,000 residents, each community had a public school district with 1,300-5,200 students and the median household income was \$37,000. Within each state, researchers randomly assigned seven communities to an intervention condition. We use data only from the 14 communities assigned to the control condition.¹

At each wave, university-based researchers administered paper-and-pencil surveys to students during a single classroom period. Two successive cohorts of students completed surveys in the fall and spring of 6th grade. Students again completed surveys in the spring of 7th, 8th, and 9th grade. The PROSPER project used passive consent procedures: only students whose families indicated that their child should not participate and students who declined to participate did not complete surveys. Across waves, 86-90% of eligible students completed the survey.

A total of 5,796 students participated in 6th grade. Because of our focus on *persistent* antisocial behavior, our analyses only included students who completed surveys at either four (N = 1,278) or five (N = 3,135) waves. Our final analytic sample was 4,359 adolescents who had complete student-level data (75.2% of the initial sample of 6th grade students). Sample loss was primarily due to students leaving the school and thus no longer being relevant to the school's peer network. The mean age at wave 1 was 11.8 years (*SD* = 0.43) and 52.2% of the students were girls. Participant demographics reflected the communities in which they lived and are typical of many non-metropolitan U.S. communities: students described themselves as White (80.3%), Latino/ Hispanic (6.3%), Black/African-American (3.5%), Asian (1.5%), Native American/American Indian (0.4%), or Other (8.0%). At each wave, 23-29% of the students received free or reduced price lunch and 77-80% of the students lived in a two parent family.

Measures

Peer network measures—Students named up to two best friends and up to five other close friends who were in the same grade and attended the same school. We used data provided by *all* students who participated at a given wave to compute the network measures (N = 7,702 students participated at one or more waves). Across waves, 93.9% of

¹In eight communities, students transitioned from one middle school to one high school between 6th and 7th grade (2 communities) or 8th and 9th grade (6 communities). In three communities, students from multiple middle schools merged into one high school between 8th and 9th grade. In the other three communities, students merged into one middle school between 6th and 7th grade and transitioned into one high school between 8th and 9th grade.

respondents named at least one friend (see Seinnick & Osgood (2012) for details about coding). Using the friendship nominations, we computed the following measures:

Number of friendship nominations received: We counted the number of times a student was named as a friend (i.e., indegree centrality).

Attractiveness as a friend: We used Holland and Leinhardt's (1981) attractiveness, or adjusted indegree centrality, measure to estimate the extent to which students attracted friendship nominations without having many reciprocal friends or making many nominations themselves. To compute this measure, we conducted a logistic analysis for each network, using the following equation, which modeled the logs odds of a friendship nomination from student i to student j :

$$\ln \left(\frac{p(y_{ij}=1)}{p(y_{ij}=0)} \right) = \delta + \alpha_i + \beta_j + \rho y_{ji} \quad (1)$$

In this equation, y_{ij} is an $n \times n$ matrix in which the values indicated whether student i named student j as a friend ($y_{ij} = 1$) or not ($y_{ij} = 0$). The α_i coefficients captured student i 's tendency to name others as friends and the β_j coefficients captured student j 's tendency to attract friendship nominations from others. The δ parameter controlled for the total number of friendship nominations made compared to the total number of possible nominations and the ρ parameter controlled for the tendency of friendship nominations to be reciprocated. We saved the value of β_j as the *attractiveness as a friend* score for student j . Thus, β_j captures student j 's tendency to attract friendship nominations after controlling for the number of nominations he or she made and the percentage of these nominations that were reciprocated. For a given number of friendship nominations received, attractiveness as a friend was higher for students who named fewer friends and who had a higher percentage of unreciprocated friendship nominations. Attractiveness as a friend could not be estimated for students who were not named as a friend. In principle, their score should be very low, so we assigned them a score that was the minimum observed score within their network at that wave, minus .25*SD of the observed scores.

Network bridging potential: We defined network bridging potential as betweenness centrality, which is the proportion of shortest paths between every pair of students in the network that pass through a given student (Freeman, 1979). Students with high betweenness centrality are "bridges", connecting students who would otherwise be less connected to each other.

Delinquency Groups—Given the developmental period of our study, we operationalized antisocial behavior using a measure of delinquency. We used a theory-based approach to classify each adolescent as an abstainer, inconsistently delinquent, or persistently delinquent. This approach allowed us to test Moffitt's hypotheses using groups that closely matched her theory.²

Persistently delinquent adolescents: Students reported how many times in the past 12 months they had engaged in each of 12 delinquent behaviors, ranging from 1 (*Never*) to 5 (*Five or more times*). Example items included “Taken something worth \$25 or more that did not belong to you” and “Beat up someone or physically fought with someone because they made you angry (other than just playing around).” Based on their responses, we computed a delinquency score for each student at each wave, using item response theory scaling (Osgood, McMorris, & Potenza, 2002). We then determined whether each score was in the top 20% of the distribution at a given wave, using delinquency scores from *all* students participating in the PROSPER study at that wave. We classified $N = 141$ adolescents (3.2% of the sample) whose scores were in the top 20% at every wave as *persistently delinquent* ($n = 94$ boys, $n = 47$ girls). One advantage of using a percentile cut-off is that this approach allows the *form* of antisocial behavior to change over time: persistently antisocial adolescents should be among the most delinquent youth in the sample at every wave, regardless of the specific behavior in which they engage.

Abstainers: We classified the $N = 1167$ adolescents (26.8%) who never reported engaging in *any* of the 12 delinquent behaviors at any wave as delinquency *abstainers*.

Inconsistently delinquent adolescents: We classified the remaining $N = 3051$ (70%) adolescents as *inconsistently delinquent*. These students reported engaging in at least one delinquent act over the course of the study but they were not consistently in the top 20% of the distribution. Thus, this group included adolescents whose delinquency was never at a high level as well as adolescents whose delinquency was sometimes, but not always, at a high level.

Demographic characteristics—Students self-reported their *gender* (1 = male; 0 = female), the *racial / ethnic group* that best described them, whether they normally received *free or reduced price lunch* on school days (1 = typically receive free or reduced price lunch; 0 = other), and whether they primarily lived in a *two-parent family* most of the year (1 = lived with two parents or parent and stepparent; 0 = other).

Behavioral characteristics—*Grades* were from students’ self-report of their typical grades at school (1 = “Mostly lower than D’s” to 5 = “Mostly A’s (90-100)”). *Sensation seeking* was the average of three items (e.g., if they had the money and the chance, how likely they would be to go parachute jumping) rated from 1 (*definitely would not*) to 5 (*definitely would*). *Family relationships* was the mean of five standardized subscales that captured affective quality between adolescents and their parents, parent-child activities, parental, inductive reasoning and family cohesion. *Discipline* was the average of 5 items that captured consistent and non-harsh discipline (e.g., “When my parents discipline me, the kind of discipline I receive depends on their mood” [reversed item]), rated from 1 (*Never*) to 5

²Many studies that test Moffitt’s theory use exploratory approaches to identify groups (e.g., latent group-based trajectory modeling), and such approaches are useful for determining whether the theoretical types are consistent with the dominant longitudinal offending patterns. For our purpose of testing for hypothesized differences between groups, however, it is more appropriate to classify cases into the groups by directly applying the theory’s criteria.

(*Always*). The average reliability of all three multi-item measures – sensation seeking ($\alpha = 0.82$), family relationships ($\alpha = 0.75$), and discipline ($\alpha = 0.78$) – was acceptable.

Results

Validation of Classification Approach

To validate that our classification approach resulted in distinct groups that correspond to those identified in Moffitt's theory, we compared students in each group across a range of variables. According to Moffitt's theory (2006), life-course-persistent individuals tend to exhibit cognitive deficits and hyperactivity, which are often exacerbated by family risk factors. We compared the groups across all of our non-network variables and found significant differences in these variables between all three groups at each wave in the expected directions (see Appendix Table 1). Specifically, a higher percentage of persistently delinquent adolescents were male and received free or reduced price lunch; students in this group were least likely to live with two parents, had the lowest grades, the weakest family relationships, the highest sensation seeking, and the most harsh / inconsistent discipline. By contrast, a lower percentage of abstainers were male and received free or reduced price lunch; they were the most likely to live with two parents and they had the highest grades, the strongest family relationships, the lowest sensation seeking, and the least harsh / inconsistent discipline.

Descriptive Results

The trajectories for mean number of friendship nominations received (Figure 1a) were not consistent with Moffitt's (1993) hypotheses. In 6th and 7th grade, when the trajectories should diverge, the mean number of friendship nominations received was remarkably similar across all three groups (we provide statistical tests in Appendix Table 2). Starting in 8th grade, persistently delinquent adolescents received *fewer* friendship nominations than other adolescents, whereas abstainers received *more* friendship nominations. By 9th grade, abstainers received significantly *more* friendship nominations than other adolescents. So, increases in delinquency during mid-adolescence coincided with decreases in friendship nominations to persistently delinquent adolescents, rather than the hypothesized growth. At the same time, friendship nominations to abstainers remained relatively constant, rather than the hypothesized steep decline.

By contrast, the trajectories for attractiveness as a friend (adjusted indegree centrality; Figure 1b) were somewhat more consistent with Moffitt's hypotheses. Persistently delinquent adolescents had higher mean attractiveness as a friend at the first four waves, although the difference never reached statistical significance. Abstainers had lower mean attractiveness as a friend at the first four waves but this difference essentially disappeared by 9th grade.

The trajectories for network bridging potential (betweenness centrality) were identical for all three groups (Figure 1c). There were no statistically significant differences among the groups in terms of network bridging potential at any wave. Thus, we see little support for Moffitt's hypotheses in terms of peer acceptance in the form of connecting disparate peers.

Testing the Association between Delinquency Group and Peer Acceptance

Analytic approach—Next, we turn to more formal statistical tests of the hypotheses. This study's longitudinal design results in a hierarchical data structure, in which time is nested within students. The multi-cohort, community-based sampling strategy results in students being nested within community-cohorts. To accommodate this data structure, we estimated a series of multilevel models with three levels using HLM 6.06 (Raudenbush, Bryk, & Congdon, 2004).

Dependent variables: We analyzed number of friendship nominations received as a discrete count variable using a hierarchical generalized linear model with an overdispersed Poisson probability distribution and natural log link function. We estimated standard hierarchical linear models for network bridging potential and attractiveness as a friend because these outcomes were approximately normally distributed. Number of friendship nominations received and attractiveness as a friend were strongly correlated ($r = .85$), but network bridging potential was only moderately correlated with number of friendship nominations received ($r = .52$) and attractiveness as a friend ($r = .38$).

Fixed Effects: Primary predictors: We included dummy variables for persistently delinquent adolescents and abstainers at level 2 to test whether the average peer acceptance for these adolescents was significantly different from the average peer acceptance of inconsistently delinquent adolescents (reference group). To test the differential change hypothesized by Moffitt's (1993; 2006) theory, we included cross-level interactions between these level 2 dummy variables and linear time at level 1 (centered at Spring of 7th grade).

Fixed Effects: Control variables: At level 1, our models included dummy variables for each wave to control for any curvilinear change in peer acceptance. We also included time-varying effects of network size (after applying a natural log transformation) to control for between-school differences in size. In addition, we controlled for the time-varying effects of receiving free or reduced price lunch and living within a two-parent family. Finally, we controlled for within-person differences in delinquency to isolate the effect of being in a specific delinquency group from the effect of any time-varying association between delinquency and peer acceptance. To accomplish this, we subtracted students' average delinquency (averaged across waves) from their observed delinquency score at that wave. At level 2, we controlled for gender and race / ethnicity. Preliminary models indicated that the association between gender and peer acceptance changed over time, so we added a cross-level interaction between gender and an indicator for later waves (i.e., wave 3, 4 or 5). At level 3, we controlled for state. Network size, state, and all demographic variables were grand mean centered; time was group mean-centered.

Peer acceptance of persistently delinquent adolescents—We first consider the link between persistent delinquency and peer acceptance, attending to both the overall difference in peer acceptance (first row of Table 1) and to the hypothesized patterns of change (second row of Table 1). After controlling for demographic characteristics, persistently delinquent adolescents did not receive any more friendship nominations than their inconsistently delinquent peers in 7th grade, where time was centered. Contrary to

Moffitt's hypothesis, persistently delinquent adolescents did not become more accepted over time. Persistently delinquent adolescents *did* attract significantly more friendship nominations compared to inconsistently delinquent adolescents, but again there was no change in this measure of peer acceptance across time. The results for network bridging potential were consistent with the results for friendship nominations received: there was no difference in bridging nor was there any change in bridging over time.

Peer acceptance of abstainers—We next consider the results for abstainers (third and fourth rows of Table 1). After controlling for demographic characteristics, abstainers received significantly *fewer* friendship nominations, were significantly *less* attractive as friends, and were significantly *less likely* to form bridging relationships than inconsistently delinquent adolescents in spring of 7th grade, where time was centered. Still, the magnitude of these differences was small. Abstainers received only 7% fewer friendship nominations than inconsistently delinquent adolescents; this translates into a difference of only 0.23 friendship nominations for the average adolescent (i.e., assuming all other values were at their mean). Furthermore, some of these differences lessened over time, as indicated by significant, positive abstainer \times time interactions for friendship nominations received and network bridging potential. Thus, at the same time that delinquency was becoming more normative (Appendix Table 1), abstainers were *gaining* more peer acceptance, rather than becoming pushed to the periphery of the network.

Testing Whether the Results Hold for Both Genders

We next re-estimated our models across the male and female samples (Table 2). In general, the pattern of results was similar for boys and girls. When differences did occur, they provided no support for Moffitt's (1993) hypotheses for boys and were in the opposite direction of Moffitt's hypotheses for girls. Specifically, there were no significant interactions with time for boys: persistently delinquent boys did not gain peer acceptance during adolescence nor did abstaining boys lose peer acceptance during adolescence. By contrast, there was a trend such that, compared to inconsistently delinquent girls, persistently delinquent girls received *fewer* friendship nominations over time ($p = 0.095$) whereas abstaining girls became *more* accepted over time (across all three peer acceptance measures).

Sensitivity Analyses

To demonstrate that our results were not distorted by using data from early adolescence to identify offending type, we repeated our analyses using a classification that incorporated both the original data and delinquency data collected in the spring of 10th, 11th, and 12th grade. These analyses included $N = 3,810$ students who provided behavioral data for at least six of the eight waves (i.e., everyone participated in at least 7th to 12th grade or 6th to 10th grade) to ensure that persistently delinquent youth both started early and persisted across adolescence.³ The results for the $N = 52$ persistently delinquent adolescents (Appendix

³Because of this requirement, the persistently delinquent group ($N = 52$) now only made up 1.3% of our sample. This decrease reflects heavy attrition among the most delinquent adolescents: 48% of individuals originally in the persistently delinquent group did not meet the criterion of 6+ waves, compared to 21% of inconsistently delinquent adolescents and 13% of abstainers.

Table 3) were consistent with our original results: Contrary to Moffitt's hypothesis, they did not become more accepted over time. The results were, however, different for the $N = 664$ abstainers (who made up only 17% of the new sample compared to 27% of the original sample). In the new analyses, abstainers no longer became more accepted over time, although they still were not socially isolated; the average number of friendship nominations received by abstainers ranged from 3.4 to 4.2 at each wave.

To demonstrate that our results did not depend on the specific cut-off scores that we used to identify persistently delinquent adolescents, our second set of sensitivity analyses used an alternative classification approach. We identified adolescents who reported engaging in one or more serious delinquent behaviors (i.e., being picked up by the police, being in a physical fight, carrying a weapon) at *every* wave that they participated in the study. The results from this alternative approach (Appendix Table 4) were identical to our original results for number of friendship nominations received and generally similar for the other two outcomes. The most notable changes were that in the new models, persistently delinquent adolescents were not significantly more attractive as friends (adjusted indegree) and, consistent with Moffitt's (1993) hypothesis, they became more attractive as friends across adolescence.

Discussion

We found only modest support for two hypotheses derived from Moffitt's (1993; 2006) taxonomic theory of antisocial behavior. Clearly, the observed trajectories plotted in Figure 1 do not fit Moffitt's hypotheses that persistently delinquent adolescents become more accepted by their peers and delinquency abstainers become less accepted by their peers between early and middle adolescence, the developmental period when average delinquency increases most rapidly. Results from our HLM multivariate analyses provided a more nuanced picture. There was some evidence that persistently delinquent adolescents became more attractive as friends over time, relative to what would be expected from their own friendship choices. This increase was consistent with Moffitt's hypotheses, yet the significance of the persistently delinquent by time interaction depended on the classification criterion that we used. Even when it was significant, it was not sufficient to gain these adolescents more total friendship nominations or to move them into more network bridging positions. With few exceptions, results from our sensitivity analyses were identical to our primary results; in the few instances when results did change, it was the significance of the effects, rather than the direction or magnitude of the effects, that changed.

Peer Acceptance of Persistently Antisocial Adolescents

We found little support for Moffitt's (1993; 2006) hypothesis that the peer acceptance of persistently antisocial individuals increases during adolescence. Our results differ from Young (2013), who found that the number of friendship nominations received increased fastest for violent males. The different results may reflect our larger sample of persistently delinquent adolescents, our definition of persistent delinquency that required early involvement in delinquency for all adolescents, or our use of more waves of network data. Notably, both studies found that persistently delinquent adolescents had no more total

friends on average than their peers. Therefore, regardless of whether their peer acceptance increases, persistently delinquent adolescents do not become particularly central members of their school networks. As a result, even with their greater attractiveness as friends, they have only an average level of integration in the network, giving them less influence potential than they might otherwise gain from their ability to attract friendship nominations. Our results highlight the potential limits of attractiveness as a mechanism for expanding antisocial adolescents' influence over their peers. Even if they do attract more friendship nominations, the number of peers subject to their influence remains limited by the number of friendships they actually form and maintain.

Their peer acceptance might not have increased over time, but compared to their inconsistently delinquent peers, persistently delinquent adolescents were at least as accepted as friends for all three measures that we studied. What is unclear is *who* named them as friends. According to Moffitt's (1993) theory, the peer acceptance of persistently antisocial adolescents increases as adolescence-limited adolescents are drawn to and begin imitating their behavior. It is possible, however, that most friendship nominations to persistently delinquent adolescents came from adolescents who were already relatively delinquent. Consistent with this possibility, Rodkin et al. (2006) found that popular, aggressive children tended to be named as "cool" by peers in aggressive groups and not peers in non-aggressive groups. In addition, Cusick (1973) observed fragmented cliques of adolescents with few inter-clique connections. In particular, the two most delinquent cliques were relatively isolated; because they were not involved in conventional activities (e.g., sports, student government, drama), members of these cliques rarely interacted with members of other cliques. These results suggest that it would be unlikely for adolescents in non-delinquent cliques to imitate the behavior of those in the most delinquent groups. Future studies should examine who names persistently delinquent adolescents as friends to identify who might be at the greatest risk of initiating or escalating delinquent behavior during adolescence.

Peer Acceptance of Abstainers

A corollary of Moffitt's (1993; 2006) theory of antisocial behavior is that adolescents who abstain from antisocial behavior are socially isolated. At first glance, results from our HLM models provide some support for this hypothesis: abstainers received fewer friendship nominations, were less attractive as friends, and were less likely to occupy bridging positions. These differences were small, however, and became *smaller* over time for number of nominations received and network bridging potential. Furthermore, abstainers were not socially isolated. On average, they received 3 to 4 friendship nominations and they received significantly more friendship nominations in 9th grade than adolescents in either of the other groups.

Notably, the results from our HLM models suggested a different picture than the observed trajectories plotted in Figure 1. These differences can be explained by the controls for demographic characteristics presented in Appendix Table 1: Abstainers were less likely than their peers to receive free or reduced price lunch and to be male and more likely to live with two parents; in turn, these demographic characteristics are associated with receiving more friendship nominations. Our results thus suggest that the observed differences in raw number

of nominations received between abstainers and inconsistently delinquent adolescents can be explained by differences in demographic characteristics rather than their behavior per se.

Operationalizing Peer Acceptance

Our results suggest that the three measures in our study capture different dimensions of peer acceptance. Although attractiveness as a friend is just an adjusted measure of number of friendship nominations received, these measures yielded different results: persistently delinquent adolescents did not receive more friendship nominations than their inconsistently delinquent peers, but they were more attractive as friends, considering their own behavior in choosing friends. In addition, attractiveness as a friend was the only measure that provided any support for Moffitt's (1993) hypothesis. By contrast, number of friendship nominations received and network bridging potential were only moderately correlated ($r = .52$), so consistent with past research (Faris, 2012), these measures appeared to capture distinct dimensions of peer acceptance. Yet despite their distinctiveness, these measures yielded nearly identical results, providing stronger evidence that persistently delinquent adolescents are not thrust upward in status and that abstainers do not become socially isolated during adolescence.

Using friendship-based measures was an appropriate starting place for testing Moffitt's (1993; 2006) hypotheses, but there are other important dimensions of peer acceptance that should be considered in future studies. For example, adolescents who are perceived as popular are often visible members in the network (e.g., Cillessen & Rose, 2005; Lease, Musgrove, & Axelrod, 2002; Parkhurst & Hopmeyer, 1998). Because persistently delinquent adolescents appear to have conquered the maturity gap, their peers may view them as popular and worthy of imitation, in which case their peers might not have to be friends to be influenced by them. We expect that a perceived popularity measure would lead to similar conclusions as the attractiveness as a friend measure, which gave us a network-based index that differentiated connectedness from attraction as a friend. Future research should test whether operationalizing peer acceptance as perceived popularity provides more support for Moffitt's hypothesis than measures derived from friendship ties. Including other measures may also clarify how delinquency is evaluated by peers at each developmental period. For example, persistently delinquent youth may be rejected (but not friendless) during childhood and become popular (without gaining friends) during adolescence.

Gender Moderation

We found little support for Moffitt's hypotheses for either boys or girls. Indeed, we found that persistently delinquent girls received significantly *fewer* friendship nominations over time. Our results were more consistent with Silverthorn and Frick's (1999) view of antisocial girls as becoming marginalized due to their violations of gender-appropriate scripts. Notably, however, we found that abstaining girls (arguably the girls whose behavior most aligned with gender scripts) were less accepted in early adolescence than their delinquent peers. Therefore, more work is needed to explore how gender impacts the link between antisocial behavior and peer acceptance. For example, Silverthorn and Frick argued that girls may follow different behavioral trajectories than boys. Future studies should test whether using alternative classification strategies for boys and girls leads to different results.

Stronger evidence for Silverthorn and Frick's taxonomy would occur if girls who follow a delayed onset trajectory experience higher peer acceptance in childhood (when they suppress their antisocial behavior), followed by rapid declines in adolescence as they initiate antisocial behavior.

Gender may impact peer acceptance in other ways as well. For example, cross-gender friendships become more common during adolescence (e.g., Mehta & Strough, 2009; Poulin & Pedersen, 2007). It is possible that persistently delinquent youth begin romantic and sexual relationships at earlier ages (e.g., Tubman, Windle, & Windle, 1996; Zimmer-Gembeck & Helfand, 2008) and are perceived as attractive by peers of the opposite sex (e.g., Rebellon & Manasse, 2004; Weerman & Bijleveld, 2007). If so, it may be that persistently delinquent youth experience a greater increase in peer acceptance among cross-gender than same-gender peers.

Limitations and Future Directions

Our results should be interpreted within the context of our study's limitations. First, Moffitt's theory specifies patterns of antisocial behavior from middle childhood throughout adulthood, but our sample only covered ages 11-16. Accurately identifying *life-course*-persistent offenders is difficult precisely because few studies follow individual offending from birth to death. With that said, we improve on past studies by using five waves of data collected during the critical developmental period for distinguishing behavioral trajectories: our study began at an age when few respondents had initiated delinquent behaviors and extended to middle adolescence, a period when offending and criminal arrests begin to peak (Snyder, 2012). Our approach is also consistent with other studies that have used offending prior to age 14 to identify life-course-persistent – or chronic – offenders (e.g., Moffitt & Caspi, 2001; Patterson et al., 1998). Furthermore, our results in Appendix Table 1 validate our classification approach, as they are consistent with past studies, which have found that life-course-persistent individuals often experience a range of social and biological risk factors, whereas adolescence-limited adolescents do not (Bergman & Andershed, 2009; Moffitt, 2006). Importantly, our sensitivity analyses demonstrated that results were similar when we used behavioral data through the end of high school (approximately age 18) to classify adolescents into delinquency groups.

Because we lacked data from adulthood, we could not distinguish between *life-course*-abstainers and “late-onset” (or escalating) individuals or between *life-course*-persistent offenders and “desisters.” Indeed, studies that follow individuals from childhood into adulthood (e.g., Chung et al., 2002; Piquero, 2008; Thornberry, 2005) often identify more than the three groups posited by Moffitt's (1993) theory. Some researchers have even suggested that a taxonomic approach may have limited utility because even most “persistent” offenders eventually desist with advanced age (e.g., Thornberry, 2005). Although our goal was to test the link between peer acceptance and Moffitt's taxonomic groups, future studies should explore whether trajectories of peer acceptance are different for adult-specific trajectory groups. Alternatively, future studies might avoid using categorical approaches and explore how peer acceptance is linked to initiating, maintaining, and desisting antisocial behavior at different developmental periods.

Another limitation is that adolescents could name only same-grade peers at their school. Although adolescents' friends are generally same-grade peers at the same school (Ennett & Bauman, 1993), other friends may be particularly influential for some students (Kiesner, Kerr, & Stattin, 2004). Opportunities for friendships with peers at other schools were likely limited in many of PROSPER's communities because only one school served the community and by 9th grade, all students living in the same community attended the same school. In addition, although adolescents completed the surveys at school, they could name peers with whom they only spent time outside of school. Indeed, by 9th grade, 85% of adolescents reported spending at least one hour per week outside of school with one or more of the friends they nominated. By contrast, not having data about out-of-grade friendships could challenge our conclusions if persistently delinquent adolescents become more accepted by younger or older peers. Overall, these data are an important starting point for testing Moffitt's hypotheses. If persistently delinquent youth gain acceptance by their peers, this should be most apparent in the group that has been and continues to be their peers: adolescents who are in the same school and grade. Still, future research should measure out-of-grade and out-of-school friendships; gains in peer acceptance among these peers could provide a more nuanced view than that implied by Moffitt's hypotheses.

Conclusions

There are several important implications arising from our results. First, future studies should reexamine Moffitt's (1993; 2006) hypothesis that initiation of delinquent behavior during adolescence can be attributed to veneration of persistently delinquent peers. Instead, adolescents who experience the maturity gap may be influenced by other sources, such as cultural figures or popular older adolescents. Alternatively, adolescent-limited individuals may begin spending more unsupervised time hanging out with their peers, providing them with more opportunities to experiment with delinquent behaviors (Osgood, Wilson, O'Malley, Bachman, & Johnston, 1996)

Second, future studies should re-examine Moffitt's hypotheses that abstaining from delinquency during adolescence can be attributed to social isolation. Instead, the characteristics of abstainer's friends and the nature of their friendships might be different. For example, abstainers may befriend prosocial peers who encourage further conformity (Thornberry, 2005) and they may spend more time with their friends in structured, adult-supervised activities, providing fewer opportunities for delinquent behavior. Indeed, individuals who abstain from delinquency typically have fewer delinquent peers and spend less time with their peers than other individuals (Barnes, Beaver, & Piquero, 2011; Brezina & Piquero, 2007; Chen & Adams, 2010; Johnson & Menard, 2011; Piquero et al., 2005). Furthermore, the shift from elementary to middle school and high school may facilitate interactions with more conventional youth (Kinney, 1993). Thus, their opportunities to make friends in school-based activities or other organizations may increase, creating pockets of conformity in the overall school network. This "nerds to normal" hypothesis deserves greater attention with network data.

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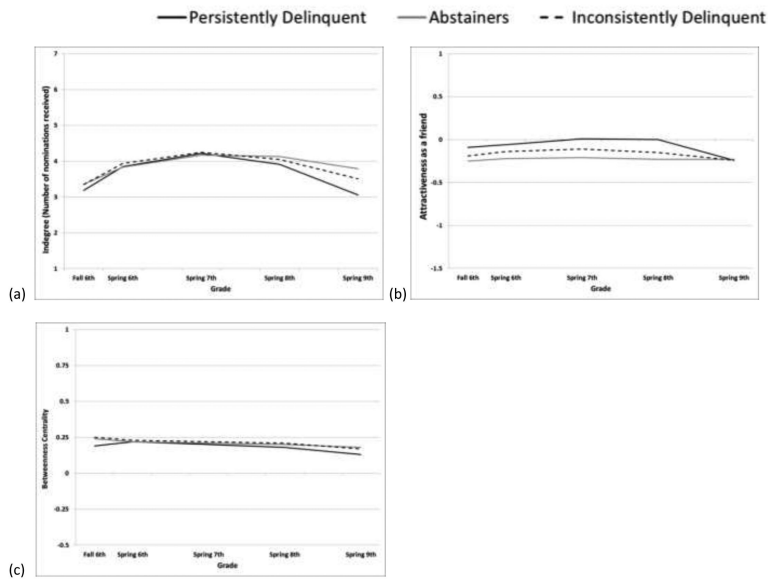


Figure 1. The lines indicate the observed trajectories of peer acceptance from fall of 6th grade to spring of 9th grade. The plots are for (a) number of friendship nominations received (indegree centrality), (b) attractiveness as a friend (adjusted indegree centrality), and (c) network bridging potential (betweenness centrality). The small “dip” in number of friendship nominations received between 8th and 9th grade may be due to structural changes (e.g., school transitions) that occurred in 12 of the 14 communities during this period. However, there is no reason to suspect that these changes disproportionately impacted any of the three behavioral groups.

Table 1

HLM Analyses Predicting Peer Acceptance as a Function of Delinquency Group

	Friendship Nominations Received (Indegree Centrality)		Attractiveness as a Friend (Adjusted Indegree Centrality)		Network Bridging Potential (Betweenness Centrality) ^a	
	Coeff	SE	Coeff	SE	Coeff	SE
Fixed Effects: Primary Predictors						
Persistently Delinquent	0.03	0.04	0.15	0.07*	-0.004	0.008
Per. Delinquent × Time	-0.01	0.03	0.00	0.07	0.004	0.006
Abstainer	-0.07	0.02**	-0.13	0.03***	-0.019	0.005***
Abstainer × Time	0.02	0.01*	0.01	0.02	0.005	0.002*
Fixed Effects: Controls						
Spring 6 th Grade	0.16	0.03***	0.05	0.03	0.015	0.009
Spring 7 th Grade	0.23	0.04***	0.08	0.03**	0.034	0.010**
Spring 8 th Grade	0.18	0.04***	0.03	0.03	0.030	0.010**
Spring 9 th Grade	0.06	0.04	-0.02	0.04	0.026	0.012*
Network Size (ln)	-0.05	0.02*	-0.08	0.02***	-0.126	0.012***
Free or Reduced Lunch	-0.10	0.01***	-0.16	0.02***	-0.021	0.003***
Two-parent Family	0.06	0.01***	0.04	0.02	0.007	0.005
Delinquency	0.01	0.01	0.04	0.01**	-0.001	0.003
Male	-0.17	0.03***	-0.16	0.03***	-0.028	0.006***
Male × Later Wave ^b	-0.06	0.02**	-0.08	0.03*	-0.009	0.008
Hispanic	-0.20	0.06**	-0.11	0.05*	-0.014	0.006*
Black	-0.08	0.08	-0.02	0.08	0.001	0.012
Native American	-0.44	0.13**	-0.50	0.17**	-0.048	0.019*
Asian	-0.21	0.05***	-0.25	0.09**	-0.004	0.014
Other Race/Ethnicity	-0.09	0.03**	-0.12	0.04**	-0.006	0.007
Pennsylvania	0.06	0.02***	0.04	0.03	0.009	0.013
Intercept	1.22	0.04***	-0.19	0.03***	0.143	0.011***
Variance Coefficients						
	Var.	χ²	Var.	χ²	Var.	χ²
Between School (L3)	0.005	98***	0.000	17	0.000	192***
Time (L3)	0.002	221***	0.000	31	0.000	128***
Between Student (L2)	0.287	32937***	0.628	19909***	0.001	8906***
Time (L2)	0.019	7113***	0.066	6842***	0.000	5095***
Within (L1)	0.768		0.736		0.004	

Note:

*
 $p < .05$,**
 $p < .01$,

 $p < .001$

^a Coefficients for betweenness centrality were multiplied by 10 for presentation purposes

^b Later wave = indicator for wave 3, 4, and 5

Table 2
HLM Analyses Predicting Peer Acceptance as a Function of Delinquency Group, Separately by Gender

	Friendship Nominations Received (Indegree Centrality)				Attractiveness as a Friend (Adjusted Indegree Centrality)				Network Bridging Potential (Betweenness Centrality) ^a			
	Boys		Girls		Boys		Girls		Boys		Girls	
	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE	Coeff	SE
Fixed Effects: Primary Predictors												
Persistently Delinquent	0.00	0.05	0.10	0.07	0.16	0.10	0.13	0.11	-0.011	0.010	0.014	0.019
Per. Delinquent × Time	0.03	0.03	-0.07	0.04 [†]	0.03	0.07	-0.05	0.08	0.005	0.006	-0.001	0.013
Abstainer	-0.11	0.03 ^{**}	-0.04	0.02	-0.19	0.05 ^{***}	-0.09	0.04 [*]	-0.005	0.007	-0.027	0.006 ^{***}
Abstainer × Time	0.01	0.02	0.03	0.01 ^{**}	-0.02	0.03	0.03	0.02 [†]	0.000	0.003	0.008	0.004 [*]
Fixed Effects: Controls												
Spring 6 th Grade	0.18	0.04 ^{***}	0.15	0.04 ^{***}	0.06	0.04	0.03	0.02	0.009	0.011	0.020	0.006 ^{**}
Spring 7 th Grade	0.22	0.05 ^{***}	0.24	0.05 ^{***}	0.09	0.04 [*]	0.07	0.03 ^{**}	0.023	0.010 [*]	0.042	0.008 ^{***}
Spring 8 th Grade	0.17	0.04 ^{***}	0.20	0.04 ^{***}	0.02	0.04	0.05	0.03	0.020	0.011	0.037	0.010 ^{***}
Spring 9 th Grade	0.04	0.05	0.07	0.04	-0.07	0.06	0.02	0.03	0.015	0.012	0.037	0.010 ^{***}
Network Size (ln)	-0.010	0.03 ^{**}	-0.02	0.02	-0.12	0.04 ^{**}	-0.05	0.02 ^{**}	-0.117	0.013 ^{***}	-0.137	0.008 ^{***}
Free or Reduced Lunch	-0.11	0.02 ^{***}	-0.10	0.02 ^{***}	-0.12	0.04 ^{**}	-0.20	0.03 ^{***}	-0.017	0.006 ^{**}	-0.026	0.006 ^{***}
Two-parent Family	0.06	0.02 ^{**}	0.06	0.02 ^{**}	0.00	0.04	0.06	0.02 ^{**}	0.008	0.007	0.008	0.006
Delinquency	0.01	0.01	0.02	0.01	0.02	0.02	0.006	0.02 ^{**}	0.000	0.005	-0.001	0.005
Hispanic	-0.19	0.06 ^{**}	-0.21	0.06 ^{**}	-0.15	0.07 [*]	-0.07	0.06	-0.07	0.008	-0.020	0.011
Black	0.01	0.09	-0.16	0.08 [*]	0.13	0.11	-0.13	0.10	-0.002	0.016	0.007	0.015
Native American	-0.27	0.17	-0.71	0.18 ^{***}	-0.29	0.24	-0.77	0.28 ^{**}	-0.008	0.024	-0.091	0.044 [*]
Asian	-0.18	0.07 [*]	-0.22	0.09 [*]	-0.21	0.12	-0.28	0.14 [*]	-0.004	0.019	-0.005	0.023
Other Race/Ethnicity	-0.06	0.05	-0.11	0.04 ^{**}	-0.11	0.07	-0.15	0.07 [*]	-0.015	0.008	0.004	0.011
Pennsylvania	0.07	0.04	0.05	0.02 [*]	0.07	0.04	0.01	0.03	0.012	0.015	0.008	0.011
Intercept	1.13	0.05	1.30	0.04 ^{***}	-0.28	0.05	-0.11	0.03	0.127	0.012	0.148	0.008
Variance Coefficients	Var.	χ²	Var.	χ²	Var.	χ²	Var.	χ²	Var.	χ²	Var.	χ²

	Friendship Nominations Received (Indegree Centrality)			Attractiveness as a Friend (Adjusted Indegree Centrality)			Network Bridging Potential (Betweenness Centrality) ^a						
	Boys	Girls		Boys	Girls		Boys	Girls					
	Coeff	SE		Coeff	SE		Coeff	SE	SE				
Between School (L3)	0.007	65****	0.003	0.000	52**	0.000	17	0.000	10	0.000	139****	0.000	99****
Time (L3)	0.003	130****	0.002	0.000	126****	0.000	33	0.000	19	0.000	98****	0.000	95****
Between Student (L2)	0.38	17990****	0.21	14726****	0.76	9977****	0.50	9659****	0.000	4606****	0.000	4225****	
Time (L2)	0.02	3428****	0.02	3633****	0.07	3210****	0.06	3581****	0.000	2523****	0.000	2514****	
Within (L1)	0.78		0.75		0.82		0.66		0.003		0.004		

Note:

^b Later wave = indicator for wave 3, 4, and 5

* $p < .05$,

** $p < .01$,

*** $p < .001$

^a Coefficients for betweenness centrality were multiplied by 10 for presentation purposes

Appendix Table 1

Validation of Delinquency Classifications

	Abstainers		Inconsistently delinquent		Persistently delinquent		χ^2 or F
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	
<i>Proportion Male</i>	1167	0.34	3051	0.52	141	0.67	125.20
<i>Proportion Free or reduced lunch</i>							
Fall 6th	1092	0.20	2842	0.31	130	0.42	64.95
Spring 6th	1108	0.21	2834	0.32	128	0.38	55.63
Spring 7th	1115	0.19	2842	0.30	134	0.36	55.92
Spring 8th	1071	0.18	2777	0.28	129	0.33	46.53
Spring 9th	1054	0.17	2644	0.25	111	0.36	42.35
<i>Proportion Two-parent family</i>							
Fall 6th	1111	0.87	2887	0.78	131	0.59	76.60
Spring 6th	1123	0.86	2893	0.77	129	0.58	72.02
Spring 7th	1120	0.86	2870	0.78	129	0.61	67.10
Spring 8th	1091	0.86	2830	0.76	133	0.53	89.29
Spring 9th	1067	0.84	2691	0.75	113	0.64	50.16
<i>Delinquency</i>							
Fall 6th	1118	-0.34 (0.01)	2905	0.09 (0.58)	132	1.39 (0.48)	858.18
Spring 6th	1134	-0.34 (0.00)	2930	0.14 (0.62)	133	1.54 (0.49)	877.77
Spring 7th	1122	-0.34 (0.01)	2889	0.32 (0.72)	134	1.78 (0.49)	947.25
Spring 8th	1103	-0.34 (0.01)	2868	0.51 (0.79)	135	1.91 (0.52)	1035.14
Spring 9th	1075	-0.34 (0.00)	2711	0.61 (0.85)	112	1.95 (0.55)	967.12
<i>Grades</i>							
Fall 6th	1090	4.46 (0.68)	2791	4.20 (0.80)	127	3.87 (0.98)	59.21
Spring 6th	1097	4.43 (0.67)	2790	4.12 (0.83)	124	3.75 (0.99)	78.33
Spring 7th	1110	4.43 (0.71)	2827	3.99 (0.90)	131	3.43 (0.94)	144.68
Spring 8th	1067	4.41 (0.71)	2755	3.95 (0.90)	127	3.25 (1.04)	164.36
Spring 9th	1048	4.34 (0.78)	2637	3.83 (0.93)	110	3.11 (1.03)	171.51
<i>Sensation seeking</i>							
Fall 6th	967	1.59 (0.70)	2447	1.98 (0.90)	110	3.01 (1.03)	166.77
Spring 6th	1045	1.56 (0.73)	2695	2.05 (0.95)	117	2.96 (1.06)	186.86
Spring 7th	1086	1.57 (0.70)	2767	2.27 (0.99)	124	3.22 (1.04)	315.88
Spring 8th	1081	1.72 (0.81)	2790	2.42 (1.01)	130	3.39 (1.02)	308.03
Spring 9th	1064	1.82 (0.84)	2659	2.49 (1.00)	111	3.26 (1.02)	239.47
<i>Family relationships</i>							
Fall 6th	1094	0.32 (0.32)	2843	0.17 (0.40)	129	-0.20 (0.48)	140.17
Spring 6th	1119	0.32 (0.35)	2889	0.08 (0.44)	131	-0.29 (0.44)	206.37
Spring 7th	1119	0.23 (0.40)	2869	-0.07 (0.48)	132	-0.52 (0.52)	258.91
Spring 8th	1098	0.15 (0.41)	2856	-0.18 (0.49)	135	-0.58 (0.51)	266.14
Spring 9th	1071	0.04 (0.44)	2684	-0.28 (0.50)	110	-0.57 (0.50)	200.54

	Abstainers		Inconsistently delinquent		Persistently delinquent		χ^2 or F
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	
<i>Discipline</i>							
Fall 6th	1052	3.91 (0.90)	2742	3.55 (0.95)	122	3.22 (0.89)	67.50
Spring 6th	1104	4.01 (0.89)	2832	3.60 (0.97)	125	3.27 (0.77)	89.59
Spring 7th	1108	3.95 (0.93)	2834	3.48 (0.97)	130	3.25 (0.87)	106.87
Spring 8th	1084	3.91 (0.88)	2831	3.46 (0.93)	129	3.27 (0.87)	100.74
Spring 9th	1065	3.84 (0.85)	2665	3.44 (0.88)	111	3.15 (0.88)	92.93

Appendix Table 2

Descriptive Information for Peer Acceptance Measures

	Abstainers		Inconsistently delinquent		Persistently delinquent		F-test
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)	
Friendship Nominations Received (Indegree Centrality)							
Fall 6th	1157	3.36 (2.54)	3009	3.35 (2.63)	137	3.19 (2.66)	0.26
Spring 6th	1166	3.84 (2.70)	3044	3.94 (2.93)	141	3.85 (2.84)	0.57
Spring 7th	1164	4.17 (2.88)	3029	4.25 (3.03)	140	4.22 (2.87)	0.33
Spring 8th	1161	4.13 (2.73)	3021	4.05 (2.81)	138	3.91 (2.54)	0.59
Spring 9th	1136	3.79 (2.62) ^a	2901	3.51 (2.57) ^b	129	3.06 (2.57) ^b	7.29 ^{***}
Attractiveness as a Friend (Adjusted Indegree Centrality)							
Fall 6th	945	-0.25 (1.21)	2442	-0.19 (1.27)	112	-0.09 (1.25)	1.08
Spring 6th	1055	-0.22 (1.25)	2700	-0.14 (1.33)	122	-0.06 (1.09)	1.92
Spring 7th	1092	-0.21 (1.12) ^a	2799	-0.11 (1.15) ^b	129	0.01 (1.06) ^{a, b}	4.01 [*]
Spring 8th	1091	-0.23 (1.16)	2829	-0.15 (1.19)	131	0.00 (1.07)	3.11 [*]
Spring 9th	1036	-0.23 (1.22)	2610	-0.24 (1.27)	105	-0.24 (1.27)	0.00
Network Bridging Potential (Betweenness Centrality)							
Fall 6th	950	0.24 (0.35)	2454	0.25 (0.36)	112	0.19 (0.30)	1.81
Spring 6th	1055	0.22 (0.31)	2700	0.23 (0.32)	122	0.22 (0.25)	0.88
Spring 7th	1092	0.21 (0.27)	2799	0.22 (0.28)	129	0.20 (0.23)	0.48
Spring 8th	1091	0.20 (0.25)	2829	0.21 (0.27)	131	0.18 (0.25)	0.27
Spring 9th	1071	0.18 (0.28)	2684	0.17 (0.23)	109	0.13 (0.19)	2.54

Note:

Not: Different subscripts within the same row indicate statistically significant differences, $p < .05$, between groups. Identical subscripts within the same row indicate no differences.

* $p < .05$,

*** $p < .001$

Appendix Table 3

HLM Analyses Predicting Peer Acceptance as a Function of Delinquency Group using Behavioral Data from 6th – 12th Grade

	Friendship Nominations Received (Indegree Centrality)		Attractiveness as a Friend (Adjusted Indegree Centrality)		Network Bridging Potential (Betweenness Centrality) ^a	
	Coeff	SE	Coeff	SE	Coeff	SE
Fixed Effects: Primary Predictors						
Persistently Delinquent	-0.05	0.08	0.02	0.11	-0.029	0.015*
Per. Delinquent × Time	-0.04	0.04	-0.09	0.09	0.010	0.008
Abstainer	-0.09	0.02***	-0.15	0.03***	-0.026	0.005***
Abstainer × Time	0.01	0.01	0.01	0.02	0.002	0.003
Fixed Effects: Controls						
Spring 6 th Grade	0.16	0.03***	0.04	0.03	0.014	0.010
Spring 7 th Grade	0.23	0.04***	0.06	0.03*	0.032	0.010***
Spring 8 th Grade	0.19	0.04***	0.03	0.03	0.031	0.009***
Spring 9 th Grade	0.07	0.04	-0.01	0.04	0.027	0.011*
Network Size (ln)	-0.05	0.02*	-0.11	0.02***	-0.133	0.012***
Free or Reduced Lunch	-0.09	0.01***	-0.12	0.03***	-0.019	0.004***
Two-parent Family	0.05	0.02***	0.04	0.02	0.007	0.006
Delinquency	0.01	0.01	0.04	0.02*	0.000	0.004
Male	-0.17	0.03***	-0.17	0.04***	-0.029	0.006***
Male × Later Wave ^b	-0.07	0.03**	-0.08	0.04*	-0.004	0.009
Hispanic	-0.24	0.06***	-0.19	0.06**	-0.008	0.006
Black	-0.09	0.08	-0.05	0.10	0.007	0.016
Native American	-0.48	0.18**	-0.65	0.22**	-0.048	0.025
Asian	-0.23	0.04***	-0.28	0.09**	-0.002	0.014
Other Race/Ethnicity	-0.04	0.03	-0.05	0.04	-0.001	0.009
Pennsylvania	0.05	0.03	0.03	0.02	0.016	0.011
Intercept	1.26	0.04***	-0.16	0.03***	0.139	0.010***
Variance Coefficients						
	Var.	2	Var.	χ²	Var.	χ²
Between School (L3)	0.004	79***	0.000	10	0.000	152***
Time (L3)	0.002	211***	0.001	45*	0.000	104***
Between Student (L2)	0.278	28436***	0.638	18210***	0.001	7757***
Time (L2)	0.018	6127***	0.065	5997***	0.000	4486***
Within (L1)	0.766		0.700		0.004	

Note:

* $p < .05$,

**
 $p < .01$,

 $p < .001$

^a Coefficients for betweenness centrality were multiplied by 10 for presentation purposes

^b Later wave = indicator for wave 3, 4, and 5

Appendix Table 4

HLM analyses Predicting Peer Acceptance as a Function of an Alternative Delinquency Classification

	Friendship Nominations Received (Indegree Centrality)		Attractiveness as a Friend (Adjusted Indegree Centrality)		Network Bridging Potential (Betweenness Centrality) ^a	
	Coeff	SE	Coeff	SE	Coeff	SE
Fixed Effects: Primary Predictors						
Persistently Delinquent ^b	-0.01	0.04	0.06	0.05	0.002	0.010
Per. Delinquent × Time	0.01	0.01	0.06	0.03*	-0.002	0.006
Abstainer	-0.07	0.02**	-0.13	0.03***	-0.018	0.005***
Abstainer × Time	0.02	0.01**	0.02	0.02	0.004	0.002
Fixed Effects: Controls						
Spring 6 th Grade	0.16	0.03***	0.05	0.03	0.015	0.009
Spring 7 th Grade	0.23	0.04***	0.08	0.03**	0.034	0.010**
Spring 8 th Grade	0.18	0.04***	0.03	0.03	0.031	0.001**
Spring 9 th Grade	0.05	0.04	-0.03	0.03	0.027	0.011*
Network Size (ln)	-0.05	0.02*	-0.08	0.02***	-0.126	0.012***
Free or Reduced Lunch	-0.10	0.01***	-0.16	0.02***	-0.021	0.004***
Two-parent Family	0.06	0.01***	0.04	0.02	0.008	0.005
Delinquency	0.01	0.01	0.04	0.01**	-0.001	0.003
Male	-0.17	0.03***	-0.15	0.03***	-0.029	0.005***
Male × Later Wave ^c	-0.06	0.02**	-0.08	0.03**	-0.009	0.008
Hispanic	-0.20	0.06**	-0.11	0.05*	-0.014	0.006*
Black	-0.08	0.08	-0.02	0.08	0.001	0.012
Native American	-0.44	0.13**	-0.50	0.17**	-0.048	0.019*
Asian	-0.21	0.05***	-0.25	0.09**	-0.004	0.014
Other Race/Ethnicity	-0.09	0.03**	-0.12	0.04**	-0.007	0.007
Pennsylvania	0.06	0.03*	0.04	0.03	0.009	0.013
Intercept	1.23	0.04***	-0.19	0.03***	0.142	0.011***
Variance Coefficients						
	Var.	2	Var.	χ²	Var.	χ²
Between School (L3)	0.005	98***	0.000	17	0.000	192***
Time (L3)	0.002	222***	0.000	31	0.000	128***
Between Student (L2)	0.287	32931***	0.629	19924***	0.001	8906***
Time (L2)	0.019	7111***	0.066	6835***	0.000	5096***
Within (L1)	0.768		0.736		0.004	

Note:

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

 $p < .001$

^a Coefficients for betweenness centrality were multiplied by 10 for presentation purposes

^b Individuals who reported engaging in one or more of the following serious delinquent acts at each wave that they participated in the study: “Been picked up by the police for breaking a law,” “Beat up someone or physically fought with someone because they made you angry (other than just playing around),” or “carried a hidden weapon.” We selected these items because they were the most consistent with manifestations of life-course-persistent antisocial behavior: aggression, violence, and early arrest (Moffitt, 1993). This approach identified $N = 220$ persistently delinquent adolescents (5.0%): $n = 87$ adolescents were identified as persistently delinquent by both approaches, $n = 54$ were identified as persistently delinquent using only our initial approach and $n = 133$ were identified as persistently delinquent using only our alternative approach. On average, the group identified using our initial approach was more delinquent, which suggests that the adolescents identified by our initial approach exhibit more extreme forms of delinquency than adolescents classified as persistently delinquent in the alternative approach.

^c Later wave = indicator for wave 3, 4, and 5