

# THE EFFECTS OF SOCIAL TIES ON CRIME VARY BY CRIMINAL PROPENSITY: A LIFE-COURSE MODEL OF INTERDEPENDENCE\*

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*Previous studies have explained the transition from criminal propensity in youth to criminal behavior in adulthood with hypotheses of enduring criminal propensity, unique social causation, and cumulative social disadvantage. In this article we develop an additional hypothesis derived from the life-course concept of interdependence: The effects of social ties on crime vary as a function of individuals' propensity for crime. We tested these four hypotheses with data from the Dunedin Study. In support of life-course interdependence, prosocial ties, such as education, employment, family ties, and partnerships, deterred crime, and antisocial ties, such as delinquent peers, promoted crime, most strongly among low self-control individuals. Our findings bear implications for theories and policies of crime.*

Nearly all serious, persistent criminals start out life as impulsive, antisocial children (Robins, 1978), and so the study of crime necessarily must account for the transition from early criminal *propensity* to later criminal *behavior*. Theoretical perspectives on this transition have typically

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\* This research was supported by the National Consortium on Violence Research (NCOVR) and by grants from the National Institute of Mental Health (MH49414, MH45070, and MH56344), the University of Wisconsin Graduate School, and the Medical Research Council of the United Kingdom. NCOVR is supported under Grant SBR 9513040 from the National Science Foundation. The Dunedin Multidisciplinary Health and Development Research Unit is supported by the New Zealand Health Research Council. We are grateful to the Dunedin Unit investigators and staff and to the study members and their families. We thank David Weakliem, Chris Uggen, Dan Nagin, Rob Sampson, HonaLee Harrington, Colin Baier, Robert Bursik, and several anonymous reviewers for their input into this article.

emphasized processes of either social selection or social causation, and they can be organized into three general hypotheses: (1) enduring criminal propensity, according to which criminal propensity remains stable from youth into adulthood; (2) unique social causation, according to which social ties formed in adulthood deter criminal behavior; and (3) cumulative social disadvantage, according to which criminal propensity brings about crime by disrupting the formation of prosocial ties. Previous studies, including our own, have found evidence in support of each one of these hypotheses such that the most compelling explanations appear to be those that incorporate elements from all three (e.g., Evans et al., 1997; Moffitt et al., 1996; Sampson and Laub, 1993; Wright et al., 1999a).

In this article, we advance this line of thought by developing an additional hypothesis to link criminal propensity to criminal behavior: (4) life-course interdependence, according to which the effects of social ties on crime vary as a function of criminal propensity. This hypothesis contains two predictions. First, those prosocial ties that deter crime, such as to education, should deter it most strongly among individuals already prone to crime. We term this a "social-protection" effect. Second, those antisocial ties that promote crime, such as delinquent peers, should promote it most strongly among the same, criminally prone individuals—a "social-amplification" effect.

This model of interdependence matters for several reasons. First, this model underscores the potential of conventional social ties to serve as "turning points" for antisocial young people. Second, it also warns of the possible reverse process, what we might call "amplification" points, in which antisocial ties exacerbate individuals' existing antisocial tendencies. Third, it delineates potential limits for social-tie-based theories, such as social control (Hirschi, 1969) and differential association theories (Sutherland, 1947). They should fit best, and perhaps even solely, among individuals with some preexisting disposition toward criminal behavior. Fourth, the possibility of social-protection effects would provide fresh impetus for intervention planning, for it suggests that those youth most prone to criminal behavior should respond most strongly to effective intervention programs.

We proceed, then, by presenting each of the four hypotheses examined in this article. Because the hypotheses of enduring criminal propensity, unique social causation, and cumulative social disadvantage have been widely discussed previously, we give the most attention to the hypothesis of life-course interdependence.

## CRIMINAL PROPENSITY, SOCIAL CAUSATION, AND CUMULATIVE DISADVANTAGE

Psychological criminology traditionally has explained crime in terms of behavioral propensities. These propensities develop in childhood from both social and biological origins, and they endure into adulthood when they motivate criminal behavior. Conceptualizations of criminal propensity include low self-control, aggressiveness, high testosterone levels, negative emotionality, and impaired neuropsychological functioning (e.g., Black, 1999; Booth and Osgood, 1993; Caspi et al., 1994). In this article, we examine low self-control because of its long history in developmental psychology and its increasingly wide acceptance in general criminology (Eysenck, 1977; Gottfredson and Hirschi, 1990; Robins, 1978; Wright et al., 1999a). Low self-control manifests itself as impulsivity, lack of persistence in tasks, high activity levels, physical responses to conflict, and risk-taking behavior (Gottfredson and Hirschi, 1990:89–94).

Sociological criminology, in contrast, has explained crime with reference to individuals' social environment, ranging from momentary situations to enduring social structures (e.g., Birkbeck and LaFree, 1993; Sampson and Groves, 1989). Social relationships can provide opportunity, motivation, and knowledge for criminal behavior. In this article, we examine midlevel social relationships of education, employment, family relationships, partnerships, and delinquent peers because of their theoretical centrality and empirical support in the sociological literature on crime (e.g., Hirschi, 1969; Sampson and Laub, 1990; Sutherland, 1947).

Various criminal theories have linked criminal propensity and social ties by specifying mediational processes through which antisocial dispositions alter the formation of social relationships and thus influence criminal behavior. For example, antisocial behavior during youth can disrupt later employment and romantic relationships and, in turn, increase criminal behavior (Laub et al., 1998; Sampson and Laub, 1990, 1993). High testosterone levels can increase aggression, which can fracture individuals' social integration and bring about criminal behavior (Booth and Osgood, 1993). Childrens' oppositional, defiant behavior reduces parenting quality and school commitment and increases deviant friendships, all of which lead to conduct problems (Simons et al., 1998). Neuropsychological impairments in childhood can ensnare individuals in failed schooling and unemployment and so produce persistent criminal behavior (Moffitt et al., 1996). These theoretical perspectives represent processes of *cumulative social disadvantage*, in which antisocial psychological dispositions sabotage the formation of strong prosocial relationships over time (Caspi, 1998).

To be clear, the mediational model does not imply that antisocial children cannot form prosocial ties, but that they have more difficulty doing

so (i.e., probabilistic, not deterministic, causation). Previous studies have documented the potential of even the most antisocial of children to form some prosocial ties. For example, Rutter et al. (1990) found that high-risk children raised in group homes experienced high levels of adult problems, including crime, but some of them also formed prosocial ties, such as positive school experiences and supportive marriages. Likewise, Sampson and Laub (1990) found that persistent delinquents developed many family, educational, and economic troubles later in life, but some of them also acquired stable jobs and strong marriages that turned them from their life-course trajectories of crime.

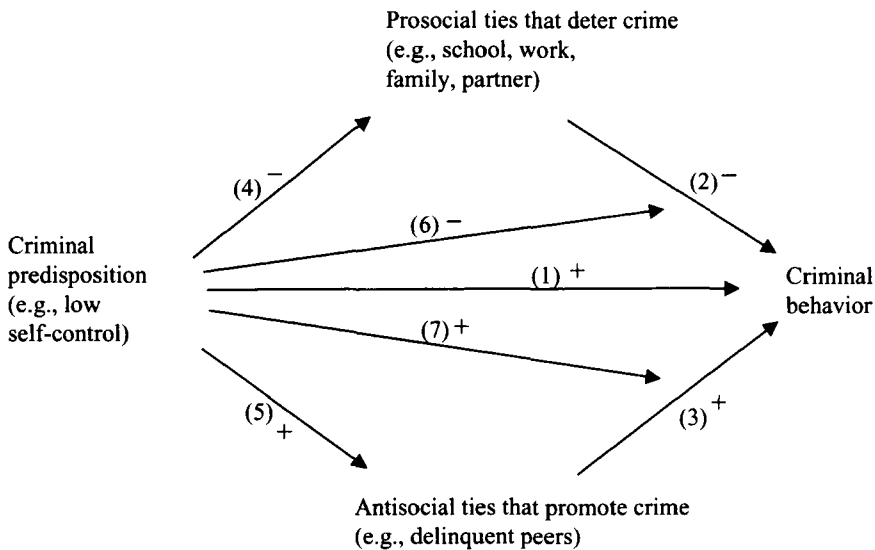
We illustrate these previously hypothesized causal linkages in Figure 1. Arrow 1 represents the effects of enduring criminal propensity, directly linking early criminal predisposition to later criminal behavior. Arrows 2 and 3 represent unique social deterrence and social causation, directly linking social ties to crime. Arrows 4 and 5 represent the indirect effect of criminal predispositions through social ties. Criminal propensity hinders the formation of prosocial social ties, thus, lessening social deterrence (Arrows 4 + 2). It also fosters the formation of antisocial, criminogenic ties, thus increasing social causation of crime (Arrows 5 + 3).

From these causal hypotheses, we expect to observe that low self-control has a direct effect on crime (enduring criminal propensity), that social ties have direct effects on crime (social causation and deterrence), and that low self-control has indirect effects on crime through levels of social ties (cumulative social disadvantage).

## INTERDEPENDENCE IN THE LIFE COURSE

We propose an additional causal linkage between criminal predisposition and criminal behavior based on the concept of life-course interdependence, which traces back to Lewin's field theory. In a nutshell, behavior (B) is a function of the person (P) and that person's environment (E) or  $B = F(P, E)$  (Lewin, 1951). Interdependence refers to the person and the social environment coming together as "*one* constellation of interdependent factors" to produce behavior (Lewin, 1946:792). From the concept of interdependence, Lewin extrapolated that "in reality, the dynamics of environmental influences can be investigated only simultaneously with the determination of individual differences and investigation of general psychological laws" (1933:594). In short, the impact of the social environment on behavior varies by individual differences, and so the comma in the equation  $B = F(P, E)$  can signify interaction effects (e.g.,  $P * E$ ) as well as additive effects (e.g.,  $P + E$ ).

Figure 1 Criminal Predisposition, Social Ties, and Crime



Type of causal effect:

- (1) Enduring criminal propensity — main effect
- (2) Social deterrence — main effect
- (3) Social causation — main effect
- (4) Less cumulative social advantage — mediation effect
- (5) Cumulative social disadvantage — mediation effect
- (6) Social protection — moderation effect
- (7) Social amplification — moderation effect

The concept of interdependence figures prominently in life-course sociology and in developmental psychology. Within sociology, “interdependence is the interlocking nature of trajectories and transitions, within and across life stages” (Elder, 1985:32). It implies that the meaning and form of any given transition can be fully understood only in the context of its overarching trajectory (Elder, 1985:31). Within psychology, the interactional perspective in developmental studies holds that the influence of social situations on behavior varies as a function of individuals’ perceptions, interpretations, and reactions. Seemingly “identical” situations, thus, have “differential” effects on behavior, a concept explicitly derived from field theory (Magnusson, 1988:25).

## LIFE-COURSE INTERDEPENDENCE AND CRIME

Several lines of thought in criminology support the possibility of life-course interdependence by positing that the influence of the social environment on crime varies across individuals. Building on this evidence, we conceptualize two types of interdependence: social protection and social amplification.

### SOCIAL-PROTECTION EFFECTS

Prosocial ties, such as education, employment, the family, and partnerships, that deter criminal behavior should do so most strongly for the criminally prone for a simple reason: These individuals have more potential antisocial behavior in need of deterrence. By definition, criminal propensity increases individuals' likelihood of committing crime, and, logically, the presence of effective social deterrents should bring about the greatest behavioral change among those most likely to commit crime. In the reverse case, less crime-prone individuals should commit less crime regardless of their social environment, and so their environment is less predictive of their criminal behavior. We term this a "social-protection" effect in that conventional social ties "protect" individuals from their criminal tendencies.

The logic of social-protection effects is found, implicitly, in the life-course theory of Sampson and Laub (1990, 1993). This theory identifies "turning points," such as employment and marriage, that redirect individuals from previously established "pathways" into crime. A turning point, however, assumes something from which to be turned, i.e., previous antisocial behavior or criminal propensity. Without such a trajectory toward crime, turning points become simply less relevant. (In this article, we emphasize the transition from criminal propensity to criminal behavior. Other studies, such as Sampson and Laub's work, emphasize the continuity of antisocial behavior over time. The logic of social-protection effects, however, applies to either case.)

The logic of social-protection is also found in effective rehabilitation programs. All else being equal, rehabilitation programs work best when they adhere to the "risk principle" in which those offenders at the highest risk of reoffending receive the most treatment resources, and those at the lowest risk receive the fewest (Andrews et al., 1990a; Andrews et al., 1990b). Although this risk principle raises other issues, especially the accurate prediction of reoffending, its logic mirrors that of social-protection effects—social deterrents most affect individuals most at risk of committing crime.

## SOCIAL-AMPLIFICATION EFFECTS

Antisocial ties that promote crime, such as delinquent peers, should also do so most strongly for the criminally prone because criminal propensity alters their experience of the social environment in a way that is more conducive, supportive, and even demanding of criminal behavior (Caspi and Moffitt, 1995). For example, antisocial individuals more often attribute hostile intentions to ambiguous events; they expect hostility from others in their social environment; they use physical means to resolve conflict; and they initiate escalating, angry social exchanges (Cairns and Cairns, 1993; Crick and Dodge, 1994). Because criminal propensity heightens awareness of and inclination toward criminal opportunities, social ties that provide such opportunities, such as delinquent peers, should most affect the criminally prone. We term this a "social-amplification" effect in that criminogenic social ties amplify existing criminal tendencies.

The interdependence hypothesis formulated contrasts with the expectation of previous studies that prosocial—rather than antisocial—individuals are most influenced by social relationships. For example, Nagin and Paternoster (1994) argue that present-oriented and self-centered individuals accumulate relatively less personal capital in their prosocial relationships. As a result, they have less to lose when such relationships are damaged, such as happens with criminal behavior, and so prosocial ties have a less deterrent effect on these low self-control individuals. Likewise, Zimring and Hawkins (1973) argue that "strongly socialized" individuals are the most sensitive to the social disapproval associated with criminal behavior, and so they are most deterred by strong, conventional social ties. These other studies differ from our approach in their assessment of the relevance of social ties to different individuals. If, hypothetically, both high and low self-control individuals were equally likely to commit crimes, then perhaps those with higher self-control would be more responsive to social deterrents, as is assumed in these other studies. In fact, however, high self-control individuals have less inclination toward crime, and so external deterrents simply matter less for them and, consequently, are less predictive of their criminal behavior.

From the above discussion, we hypothesize that prosocial ties, such as to education, employment, family ties, and partnerships, deter criminal behavior most strongly among low self-control individuals (social protection), and antisocial ties, such as delinquent peers, promote criminal behavior most strongly among low self-control individuals (social amplification). We predict a significant statistical interaction between measures of low self-control and social ties, with social ties predicting criminal behavior most strongly among low self-control individuals.

In conceptualizing the four hypotheses discussed above, we view them as complements rather than as substitutes. For example, the cumulative social disadvantage and interdependence hypotheses attend to different aspects of the social world of troubled young people. Although cumulative social disadvantage highlights the relative infrequency of prosocial relationships, social protection emphasizes the highly beneficial effect of these relationships, when they exist. As such, these hypotheses offer correspondingly pessimistic and optimistic views about the futures of young people at risk of committing crime. These two hypotheses also use different causal mechanisms to link criminal propensity to criminal behavior: mediational processes (with cumulative disadvantage) versus moderational processes (with interdependence). We illustrate how all four of the hypotheses come together in Figure 1. Arrows 1 through 5 represent causal processes discussed earlier. In addition, Arrow 6 represents a social-protection effect, with criminal propensity increasing the deterrent (i.e., negative) effect of prosocial ties on crime. Arrow 7 represents a social-amplification effect, with criminal propensity increasing the criminogenic (i.e., positive) effect of antisocial ties.

## THE DUNEDIN STUDY

We tested these four hypotheses with data from the Dunedin Multidisciplinary Health and Development Study (Silva and Stanton, 1996), in which a multidisciplinary team gathered age-appropriate measures of low self-control, social ties, and crime in a longitudinal study spanning from childhood to young adulthood. The study members were born in Dunedin, New Zealand, between April 1972 and March 1973. Of these boys and girls, 1037 (91% of the eligible births) participated in the first follow-up assessment at age 3, and they constitute the base sample for the remainder of the study. These study members have been followed since, with high levels of participation, ages 5 ( $N = 991$ ), 7 ( $N = 954$ ), 9 ( $N = 955$ ), 11 ( $N = 925$ ), 13 ( $N = 850$ ), 15 ( $N = 976$ ), 18 ( $N = 1008$ ), and 21 ( $N = 992$ ). Throughout the study, data were collected from multiple sources, including the study members, parents, teachers, peer informants, and trained observers.

Various cross-national comparisons have established that findings about crime, as well as other social problems, found in the Dunedin study generalize to other industrialized countries (e.g., Caspi et al., 1994; Caspi et al., 1998; Wright et al., 1998). The rates of self-reported property, violent, and drug offending in the Dunedin sample approximate those found in other western countries, including the United States (Junger-Tas et al., 1994). In addition, the predictors of criminal behavior in the Dunedin Study closely



match those found in American and English samples (Farrington and Loeber, 1999).

## MEASURES OF LOW SELF-CONTROL, SOCIAL TIES, AND CRIME

Our empirical analyses examined measures of low self-control, social ties, and crime. Because these measures comprise a considerable number of separate items, we briefly describe them here and place a fuller description of their content in Appendix 1 and of their statistical properties and intercorrelations in Appendix 2.

We measured low self-control with three variables. The first self-control variable, "low self-control in childhood," measures low self-control from ages 3 to 11, as reported by the study members' parents, teachers, trained observers, and the study members. This variable measures lack of control, irritability, lack of persistence, inattention, hyperactivity, and antisocial behavior. The second self-control variable, "low self-control in adolescence," was collected at ages 15 and 18 from study members, parents, and peers. It measures impulsivity, hyperactivity, inattention, physical response to conflict, and risk-taking. The third self-control variable, "low self-control, overall," simply sums the first two variables into an overall, summary measure of childhood and adolescent self-control.

We analyzed both childhood and adolescence measures because childhood low self-control allowed for self-control to temporally precede social ties, as, for example, hypothesized by Gottfredson and Hirschi (1990), whereas adolescent low self-control allowed us to estimate how much levels of self-control altered the concurrent effects of social ties on criminal behavior, as would be of interest for policy matters. We assume that self-control is highly stable over the life course but not perfectly stable. As discussed in Wright et al. (1999b:496), individuals' relative low self-control levels can change over time, and so later measures of low self-control would more strongly predict crime than would earlier measures. For a more general discussion of the rank-order consistency of personality traits over time, see Roberts and DelVecchio (2000).

We measured prosocial ties with four variables collected from ages 15 to 21. "Educational achievement" measures educational aspirations, months of full-time education, educational attainment, and dropping out early (reverse-coded). "Employment" measures months of unemployment (reverse-coded), months of full-time employment, occupational aspirations, and job desirability. "Family ties" measures months living with parents, involvement with parents, and intimacy with parents. "Partnerships" measures cohesiveness, intimacy, time spent together, and shared interests with romantic partners (among the 84% of study members who had them).

For most of our analyses, we combined education, employment, family ties, and partnerships into a summary measure of "prosocial ties."

We measured antisocial ties with a variable collected at ages 18 and 21, "delinquent peers," that measures the portion of study members' friends who commit crimes, whether study members have friends with whom to get into trouble or break the law, and the portion of friends who study members rate as good citizens (reverse-coded).

We standardized the low self-control and social tie variables (mean of zero, standard deviation of one) for two reasons. First, standardizing these variables facilitates substantive interpretation of regression coefficients (i.e., a one standard deviation in change in X produces some change in Y). Second, centering these main effects at zero addresses the possibility of multicollinearity in interactive models (Jaccard et al., 1990:31).

We analyzed two measures of criminal behavior. The first is a self-reported, standardized instrument developed by Elliott and Huizinga (1989). It reports how many different types of illegal acts the study members committed at least once in the 12 months prior to their age-21 interview. This 48-item variety scale covers a wide range of offenses, including theft, burglary, assault, fraud, and drug offenses. Variety scales have been widely used in criminological research, and they have been described as the best operational measure of a general propensity to offend (Hirschi and Gottfredson, 1995:134). This variable has a mean of 4.7 and a standard deviation of 4.4. It ranges from 0 to 29, and 92% of the study members had committed at least one type of criminal act. The distribution of this variable approximates a normal distribution with some skew to the right (skewness statistic = 1.9).

The second criminal behavior measure is study members' criminal convictions (logged) by age 21. This variable was created by searching through police records of the age-21 study members. Of the 997 study members, 141 had been convicted of at least one crime (ranging up to 81 crimes), and 46 study members had been convicted of at least one violent crime.

In addition to the above variables, we used gender and social class as control variables in our analyses. Social class measured the average socioeconomic status (SES) level (occupational status) of study members' families across the first 15 years of the Dunedin Study (Wright et al., 1999b).

By and large, these data from the Dunedin Study had few missing cases; most variables had missing data for only 2% to 3% of the study members. For any variable in the regression equations that had missing data, we created a dummy variable indicating which cases were missing. We then recoded the substantive variable to its mean and included both it and the dummy variable in the regression equation.

## RESULTS

With data from the Dunedin Study, we analyzed the four hypotheses presented above that link criminal propensity, social ties, and criminal behavior, and we gave the most attention to the novel hypothesis of life-course interdependence. In presenting these analyses, we reference our previous use of the Dunedin data in testing social selection versus social causation processes of crime (Wright et al., 1999a).

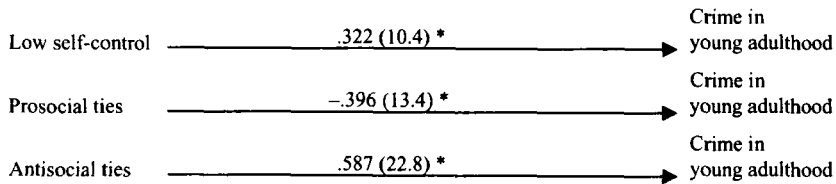
## CRIMINAL PROPENSITY, SOCIAL CAUSATION, AND SOCIAL DISADVANTAGE

Relevant to the hypothesis of enduring criminal propensity, Wright et al. (1999a) found that measures of childhood and adolescent self-control predicted crime while controlling for multiple measures of social ties. Here, we tested enduring criminal propensity using an overall measure of low self-control that combined both childhood and adolescent measures, and we examined which type of social ties most attenuated the effects of low self-control. Figure 2 reports a series of path analyses that regress self-reported crime at age 21 on "overall low self-control" plus prosocial and antisocial ties. (We also controlled for gender and social class in these equations as well as in those presented hereafter.) As predicted by the hypothesis of enduring criminal propensity, low self-control influenced study members' criminal participation above and beyond their formation of social ties. As shown in Figure 2, the zero-order effect of overall low self-control on crime was statistically significant and positive at (standardized ordinary least-squares (OLS) coefficient)  $\beta = .322$ . The partial effect of low self-control on crime, when controlling for prosocial ties, was  $\beta = .192$ . It dropped further when controlling for antisocial ties,  $\beta = .177$ , and further still when controlling for both prosocial and antisocial ties,  $\beta = .139$ . Nonetheless, the effect of overall low self-control on crime was statistically significant in all of the equations.

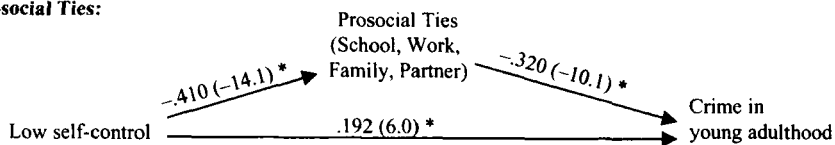
Relevant to unique social causation, Wright et al. (1999a) found that the effect of individual social tie measures (such as months of employment) on crime attenuated somewhat, but remained statistically significant, when controlling for childhood and adolescent low self-control. Here, we tested how much summary measures of prosocial and antisocial ties attenuated when controlling for low self-control. As shown in Figure 2, the zero-order effect of prosocial ties on crime (controlling for gender and social class) was  $\beta = -.396$ . When controlling for overall low self-control, the effect of prosocial ties on crime dropped somewhat to  $\beta = -.320$ , a 19% reduction. The effect of antisocial ties dropped even less when controlling

Figure 2 The Effects of Low-Self-Control on Crime via Social Ties

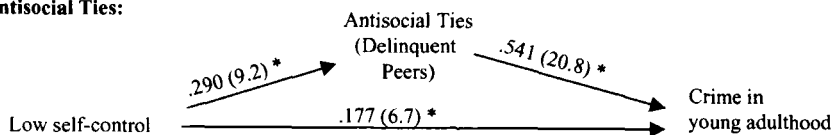
**Zero-Order Effects:**



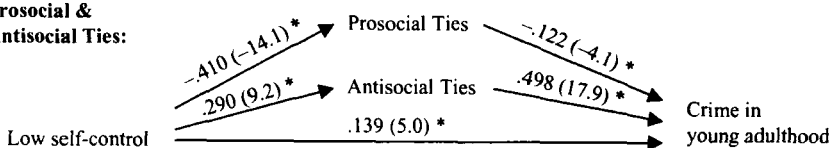
**Prosocial Ties:**



**Antisocial Ties:**



**Prosocial & Antisocial Ties:**



NOTE: Numbers report standardized regression coefficients (*t*-values in parentheses).

All equations control for gender and social class.

\*  $p < .01$

for low self-control, from  $\beta = .587$  to  $.541$ , an 8% reduction. As hypothesized, both prosocial and antisocial ties had unique causal effects on criminal behavior.

Relevant to cumulative social disadvantage, we found that study members with low self-control had significantly fewer prosocial ties ( $\beta = -.410$ ) and significantly more antisocial ties ( $\beta = .290$ ). Prosocial and antisocial

ties, in turn, resulted in significantly less and more crime, respectively; thus, they each mediated some of the effect of low self-control on crime. These findings held up even when we entered both prosocial and antisocial ties in the same path analysis. In fact, the *indirect effect* of low self-control through antisocial ties ( $\beta = .144, .290 \times .498$ ) was greater than was its *direct effect* ( $\beta = .139$ ).

### LIFE-COURSE INTERDEPENDENCE

We tested the interdependence hypothesis with two measures of low self-control (childhood and adolescence) and two measures of criminal behavior (self-reported variety scale and number of convictions). From these measures, we created four interaction terms by multiplying "prosocial ties" and "antisocial ties" each by both "childhood low self-control" and "adolescent self-control," and we tested the significance of these interaction terms in the analyses discussed below.

The analyses in Table 1 test for interaction effects using measures of childhood low self-control and self-reported crime. The first equation, a main-effects model, regressed self-reported "criminal behavior at age 21" on "childhood low self-control," "prosocial ties," and "antisocial ties" (again, controlling for gender and social class). Prosocial ties and antisocial ties each significantly predicted criminal behavior in the expected directions, and the effect of childhood low self-control was only marginally significant ( $t = 1.8$ ). The second equation, a social-protection model, added an interaction term of "prosocial ties" by "childhood low self-control." As hypothesized, it was negative, and it was statistically significant ( $\beta = -.311, t = -3.4$ ). The negative sign of this interaction effect indicates that prosocial ties deterred crime more strongly (i.e., they had a more negative effect on crime) among study members with less self-control. The third equation, a social-amplification model, substituted in an interaction term of "antisocial ties" by "childhood low self-control." As hypothesized, it was positive and statistically significant ( $\beta = .392, t = 4.3$ ). The positive sign of this interaction term indicates that delinquent peers promoted crime more strongly among low self-control study members. In the fourth, and final, equation, we added both interaction effects into the same equation. When we did this, the social-protection interaction effect remained negative but dropped to below standard significance levels ( $\beta = -.146, t = -1.4$ ), whereas the social-amplification interaction effect remained positive and significant ( $\beta = .315, t = 2.9$ ).

In Table 2, we repeat the analyses of Table 1 using a measure of adolescent self-control. The first equation shows that "adolescent low self-control," "prosocial ties," and "antisocial ties" each significantly predicted criminal behavior in the expected direction. In the second equation, the interaction term of "prosocial ties" by "adolescent low self-control" was

Table 1. Interactions between Social Ties and Childhood Low Self-Control—Self-Reported Crime

Independent Variables	Dependent Variable = Self-Reported Criminal Behavior at Age 21			
	Main-Effects Model	Social-Protection Model	Social-Amplification Model	Combined Model
Childhood Low Self-Control	.210 + (1.8, .047)	.089 (.7, .020)	.158 (1.3, .036)	.111 (.9, .025)
Prosocial Ties (School, Work, Family, Partner)	-.695* (-5.3, -.157)	-.654* (-5.0, -.147)	-.672* (-5.2, -.151)	-.657* (-5.1, -.148)
Antisocial Ties (Delinquent Peers)	2.288* (18.4, .515)	2.260* (18.2, .509)	2.191* (17.4, .493)	2.196* (17.5, .495)
Prosocial Ties * Childhood Low Self-Control		-.311* (-3.4, -.088)		-.146 (-1.4, -.041)
Antisocial Ties * Low Self-Control			.392* (4.3, .106)	.315* (2.9, .085)
R-squared	.445	.452	.456	.457

NOTE: Cells report unstandardized ordinary least-squares regression coefficients (*t*-values and standardized coefficients in parentheses). All equations control for gender and social class. Data from the Dunedin Study. *N* = 956.

+ *p* ≤ .10; \* *p* ≤ .05 (two-tailed tests).

negative and statistically significant ( $\beta = -.386$ ,  $t = -4.3$ ), again showing that prosocial ties deter crime most strongly among low self-control individuals. In the third equation, the interaction term of “antisocial ties” by “adolescent low self-control” was positive and statistically significant ( $\beta = .519$ ,  $t = 5.3$ ). In the fourth, combined equation, the social protection interaction effect was negative and marginally significant ( $\beta = -.179$ ,  $t = -1.7$ ). The social amplification interaction effect was positive and significant ( $\beta = .412$ ,  $t = 3.5$ ).

In both Tables 1 and 2, the magnitude of the social-protection effects attenuated when we controlled for the social-amplification effect. Methodologically, this could result from the high correlation between the two interaction terms, because they both include the same measure of self-control. Conceptually, prosocial ties could protect individuals, in part, by keeping them away from delinquent peers (Warr, 1998), and so controlling for the latter would diminish the effect of the former.

To test the robustness of the analyses in Tables 1 and 2, we redid them several times using different model specifications. We describe these reanalyses in the following text, but due to space limitations, we only present one of them in tabular form.

We estimated the equations in Tables 1 and 2 using OLS regression to facilitate the interpretation of them; however, 8% of the study members

Table 2. Interactions Between Social Ties and Adolescent Low Self-Control—Self-Reported Crime

Independent Variables	Dependent Variable = Self-Reported Criminal Behavior at Age 21			
	Main-Effects Model	Social-Protection Model	Social-Amplification Model	Combined Model
Adolescent Low Self-Control	.800 * (6.6, .180)	.739 * (6.1, .166)	.771 * (6.4, .174)	.748 * (6.2, .169)
Prosocial Ties (School, Work, Family, Partner)	-.524 * (-4.1, -.118)	-.444 * (-3.5, -.100)	-.447 * (-3.5, -.101)	-.426 * (-3.3, -.096)
Antisocial Ties (Delinquent Peers)	2.098 * (16.8, .472)	2.046 * (16.4, .461)	1.955 * (15.5, .440)	1.960 * (15.5, .441)
Prosocial Ties * Adolescent Low Self-Control		-.386 * (-4.3, -.105)		-.179 + (-1.7, -.049)
Antisocial Ties * Adolescent Low Self-Control			.519 * (5.3, .131)	.412 * (3.5, .104)
R-squared	.468	.478	.483	.485

NOTE: Cells present unstandardized ordinary least-squares regression coefficients (*t*-values and standardized coefficients in parentheses). All equations control for gender and social class. Data from the Dunedin Study. *N* = 956.

+ *p* ≤ .10; \* *p* ≤ .05 (two-tailed tests).

reported no self-reported crimes, and this slight truncation of our dependent variable may have influenced our findings. We tested this possibility by reestimating the equations in Tables 1 and 2 using tobit regression, and we got results nearly identical to those in Tables 1 and 2. For example, with adolescent self-control, the prosocial ties by the adolescent self-control interaction term was significant at (tobit coefficient)  $\beta = -.353$  (S. E. = .097). The antisocial ties interaction term was significant at  $\beta = .432$  (S. E. = .106). When the two interaction terms were included in the same equation, the prosocial ties interaction term was marginally significant at  $\beta = -.197$  (S. E. = .115), and the antisocial ties interaction effect was significant at  $\beta = .314$  (S. E. = .126).

In Tables 1 and 2, for parsimony, we combined measures of education, employment, family, and partnerships into a global measure of prosocial ties. As a more rigorous test, however, we reestimated the social-protection equations in Tables 1 and 2 using each of these component measures by themselves. All four of these separate variables significantly interacted with both childhood and adolescent low self-control in predicting self-reported crime.

We also reestimated the analyses of Tables 1 and 2 using (log) official convictions as the dependent variable rather than self-reported crime. Given the strong, left-censored distribution of this variable (86% of the

study members scored zero), we estimated only tobit regression equations. We found that childhood low self-control significantly interacted with both prosocial ties and antisocial ties in predicting study members' official convictions. In the social-protection model, the prosocial ties interaction was significant at (tobit coefficient)  $\beta = -.043$  (S. E. = .015). In the social-amplification model, the antisocial ties interaction effect was significant at  $\beta = .063$  (S. E. = .018). In the combined model, the prosocial ties interaction effect was marginally significant at  $\beta = -.028$  (S. E. = .016), and the antisocial ties interaction effect was significant at  $\beta = .050$  (S. E. = .019).

As shown in Table 3, adolescent low self-control also significantly interacted with both types of social ties in predicting official convictions. The prosocial ties by adolescent self-control interaction term was significant at  $\beta = -.069$  (S. E. = .015). The antisocial ties interaction term was significant at  $\beta = .100$  (S. E. = .018). In the combined model, the prosocial ties interaction term was significant at  $\beta = -.040$  (S. E. = .017), and the antisocial-ties interaction effect was significant at  $\beta = .076$  (S. E. = .020). These findings, then, replicated our original findings with a different measure of criminal behavior.

Table 3. Interactions Between Social Ties and Adolescent Low Self-Control—Official Convictions

Independent Variables	Dependent Variable = Official Convictions by Age 21			
	Main-Effects Model	Social-Protection Model	Social-Amplification Model	Combined Model
Adolescent Low Self-Control	.070* (.024)	.044* (.025)	.057* (.024)	.045* (.025)
Prosocial Ties (School, Work, Family, Partner)	-.163* (.025)	-.144* (.025)	-.154* (.024)	-.145* (.025)
Antisocial Ties (Delinquent Peers)	.129* (.025)	.125* (.025)	.093* (.026)	.099* (.026)
Prosocial Ties * Adolescent Low Self-Control		-.069* (.015)		-.040* (.017)
Antisocial Ties * Adolescent Low Self-Control			.100* (.018)	.076* (.020)
Log Likelihood	-990.3	-979.6	-975.7	-972.8

NOTE: Cells present tobit coefficients (standard errors in parentheses). All equations control for gender and social class. Data from the Dunedin Study.  $N = 997$ .  
+  $p \leq .10$ ; \*  $p \leq .05$  (two-tailed tests).

A reviewer of this article pointed out that study members' IQ might affect both their self-control and education levels and thus introduce spuriousness into our findings. To test this possibility, we reran the analyses presented in Tables 1, 2, and 3 while controlling for IQ measured at ages 7,



9, and 11 with the Wechsler Intelligence Scale for Children. Our results controlling for IQ were virtually indistinguishable from those presented in Tables 1–3.

As another way of looking at interaction effects, we examined low self-control, social ties, and criminal behavior using the following nonparametric method. We divided the study members into three equal groups—low, medium, and high levels of adolescent self-control. For each of these groups, we plotted the relationship between prosocial ties and criminal behavior using a loess smoothing procedure, which allows for nonlinear relationships. We then combined all three plotted lines (for the low, medium, and high self-control groups) onto one figure and compared them. The resulting figure (not shown here) demonstrated that increased prosocial ties decreased levels of criminal behavior most strongly for low self-control study members. Informatively, this smoothing procedure produced relatively straight lines for each group, supporting our use of linear interaction models in the prior analyses. We redid this smoothing procedure with antisocial bonds and found similar results, with increased antisocial ties increasing criminal behavior most strongly for low self-control study members.

#### THE VARYING EFFECTS OF SOCIAL TIES

To facilitate interpretation of the above interaction effects, we estimated the effects of prosocial and antisocial ties at different levels of self-control with the following approach. In the equation  $Y = B_1X_1 + B_2X_2 + B_3X_1 \cdot X_2$ , the coefficient  $B_2$  represents the effect of  $X_2$  on  $Y$  when  $X_1$  is set at zero (Jaccard et al., 1990:26). To estimate the effects of  $X_2$  at other levels of  $X_1$ , one can simply recenter  $X_1$ . We did this by recentering “adolescent self-control” five different times, to levels corresponding to the ninetieth percentile of low self-control (i.e., “very low” self-control), the seventieth percentile (“low” self-control), the fiftieth percentile (“average” self-control), the thirtieth percentile (“high” self-control), and the tenth percentile (“very high” self-control). We then estimated interaction effects among adolescent “low self-control” and “education,” “employment,” “family ties,” “partnerships,” and “delinquent peers” five times, each time using each new scaling of adolescent self-control. To be clear, this approach does not change the estimated interaction effect, but it changes the estimated effects of social ties at specified levels of self-control.

We present our results in Table 4. This table reports only the main effects of each social tie on self-reported crime, not reporting the other coefficients estimated in each equation (i.e., low self-control, interaction terms, gender, and SES). At “very low” levels of self-control (shown in the first column of numbers), each of the five social ties variables had strongly significant effects on crime. For example, the unstandardized

effect of education at the ninetieth percentile of low self-control was  $\beta = -1.247$  ( $t$ -value =  $-6.4$ ). Each social tie had reduced, although still significant, effects at "low" and "median" levels of self-control. For example, the effect of education dropped to  $\beta = -.820$  and  $\beta = -.648$ , respectively. At "high" levels of self-control, education no longer significantly predicted crime ( $\beta = -.207$ ,  $t$ -value =  $-1.2$ ). At "very high" levels of self-control, education, employment, family ties, and partnerships did not significantly predict crime. The delinquent peers variable remained significant at all levels of self-control, but its effect size dropped substantially when self-control increased.

Table 4. The Effects of Social Ties on Crime by Levels of Self-Control

Type of Social Tie	Dependent Variable = Self-Reported Criminal Behavior at Age 21				
	Very Low Self-Control (90 percentile)	Low Self-Control (70 percentile)	Median Self-Control (50 percentile)	High Self-Control (30 percentile)	Very High Self-Control (10 percentile)
Education	-1.247 * (-6.4)	-.820 * (-5.6)	-.648 * (-4.6)	-.207 (-1.2)	.034 (.2)
Employment	-1.292 * (-7.5)	-.913 * (-7.0)	-.761 * (-5.9)	-.369 * (-2.2)	-.155 (-.8)
Family Ties	-1.440 * (-7.8)	-1.029 * (-7.6)	-.863 * (-6.7)	-.438 * (-2.8)	-.206 (-1.1)
Partnerships	-.909 * (-4.8)	-.687 * (-2.3)	-.598 * (-4.3)	-.370 * (-2.1)	-.245 (-1.1)
Delinquent Peers	2.843 * (18.5)	2.376 * (20.2)	2.188 * (18.6)	1.705 * (11.1)	1.442 * (7.7)

NOTE: Cells present unstandardized ordinary least-squares regression coefficients ( $t$ -values in parentheses). All equations control for gender and social class. Data from the Dunedin Study.  $N = 956$  ( $N = 775$  for partnership equation).

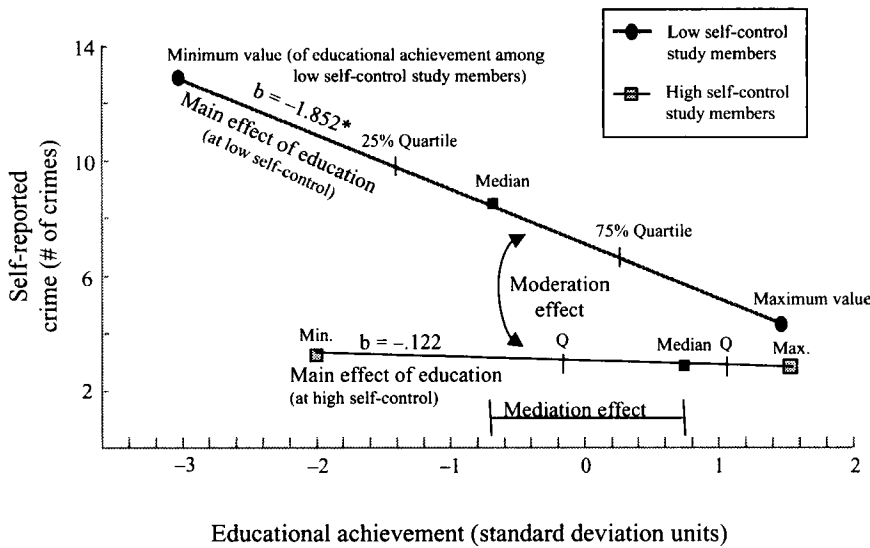
\*  $p \leq .05$  (two-tailed tests).

## PLOTS OF LIFE-COURSE INTERDEPENDENCE

Our theoretical model, as summarized in Table 1, holds that life-course interdependence exists concurrently with processes of criminal propensity, social causation, and cumulative social disadvantage. We illustrate the concurrence of these causal processes in Figures 3 and 4. We created these figures by first ranking the Dunedin study members by their levels of adolescent low self-control. We then extracted the 10% of the study members with the highest self-control scores and the 10% with the lowest scores and placed them into two groups of about 100 study members each. We then regressed self-reported criminal behavior at age 21 on education and delinquent peers separately for each group (again, controlling for gender and social class).

Figure 3 plots the interaction between education and low self-control in predicting crime. (This figure is representative of similar figures for employment, family ties, and partnerships.) The x-axis measures educational achievement in standard deviations, and the y-axis measures criminal behavior in number of self-reported types of crime. The slope of the top line,  $\beta = -1.852$ , represents the coefficient obtained by regressing self-reported crime on education for only the low self-control group of study members. The slope of the bottom line,  $\beta = -.122$ , represents the education coefficient for the high self-control members. Both lines slope downward, showing that education deters crime for both groups, but their slopes vary greatly ( $-1.852$  versus  $-.122$ ), demonstrating a strong, moderating social-protection effect.<sup>1</sup>

Figure 3 The Effects of Education on Crime Vary by Self-Control



\*  $p < .05$

Figure 3 also demonstrates the mediational processes that link low self-

1. These coefficients correspond closely to those estimated in Table 4 for very high and very low self-control. They are not identical, however, because the estimates in Table 4 were at the ninetieth or tenth percentile of self-control, and the estimates here were of all study members ranked greater than the ninetieth percentile or less than the tenth percentile.

control and education by using the plotted regression lines as box-whisker plots. Each of the regression lines indicates the median, quartiles, minimum, and maximum values of education for that particular group of study members. (We used penultimate values for the minimums and maximums to avoid outliers.) As shown in Figure 3, the median education level of low self-control study members was much lower than that of the high self-control members ( $-.68$  versus  $+.78$  standard deviations). Similar differences occurred with the quartiles and endpoints. This unequal distribution of education, combined with the general deterrent effect of education on crime (i.e., the downward slopes of the plotted regression lines), demonstrates the indirect effect of low self-control on crime, as per the hypothesis of cumulative social disadvantage.

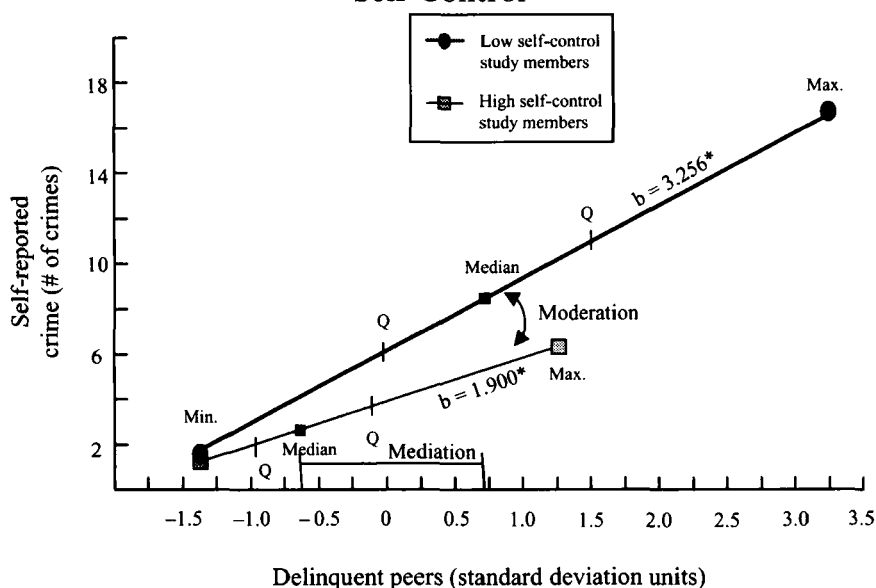
Figure 4 plots the interaction between delinquent peers and self-control. Because delinquent peers promote, rather than deter, criminal behavior, these regression lines slope upward rather than downward. Again, however, the regression line for the low self-control study members slopes more steeply ( $\beta = 3.256$  versus  $\beta = 1.900$ ), demonstrating a social-amplification effect. Low self-control study members also had overall more delinquent peers, indicating cumulative social disadvantage.

## DISCUSSION

In this article, we have brought together and tested four hypotheses linking criminal propensity, social ties, and criminal behavior. Analyzing data from the Dunedin Study, we found empirical evidence to support each hypothesis. Attesting to enduring criminal propensity (Hypothesis 1), the study members who displayed the lowest self-control went on to commit the most crime, even when controlling for the social ties that they formed. Attesting to unique social causation (Hypothesis 2), the social ties formed by study members significantly deterred (or promoted in the case of delinquent peers) their criminal behavior, even when controlling for their levels of self-control. Attesting to the process of cumulative social disadvantage (Hypothesis 3), study members with low self-control experienced significantly less education, employment, family ties, and partnerships and more delinquent peers. Each of these changes in social ties, in turn, increased criminal behavior. Finally, attesting to life-course interdependence (Hypothesis 4), prosocial ties deterred crime, and antisocial ties promoted crime, most strongly among the low self-control study members. The evidence for life-course interdependence proved to be robust, holding up across different measures of self-control, social ties, and criminal behavior.

Our findings bear upon several specific issues in the study of crime. First, they suggest conceptual refinements to the sociological theories of

Figure 4 The Effects of Delinquent Peers on Crime Vary by Self-Control



\*  $p < .05$

social control and differential association. According to social control theory (Hirschi, 1969), all people possess the necessary motivation for crime, but some people are deterred by strong social bonds. Prosocial bonds, then, should significantly and equally decrease criminal behavior across the whole population. We found otherwise, for bonds to education, employment, family, and partners deterred crime most strongly, and in some cases only, for study members with low-to-moderate levels of self-control. Social control theory thus appears to vary in fit across segments of the general population.

According to differential association theory, delinquent peers draw people into criminal behavior. We found general support for this assumption in that delinquent peers predicted increased criminal behavior among all study members. Nonetheless, the criminogenic effect of delinquent peers decreased in magnitude as study members increased in self-control, and so differential association theory also varies in fit across the general population.

Second, our findings provide evidence for discussions that pit enduring criminal propensity against cumulative social disadvantage (e.g., the exchange between Hirschi and Gottfredson, 1995, and Sampson and Laub,

1995). We found that low self-control's indirect effect on crime (through social ties) exceeded its direct effect, as shown in Figure 2. Criminal propensity brings about criminal behavior mainly through its effects on social relationships. As such, propensity theories that dismiss these indirect effects as inconsequential, as does self-control theory (Gottfredson and Hirschi, 1990), appear to do so in error.

Third, our findings suggest two modifications to the life-course perspective on criminal behavior. Previous life-course theories have proposed that conventional social ties deter criminal behavior among all individuals, including antisocial individuals (Sampson and Laub, 1990). We add two modifications to this approach. First, we view prosocial, conventional social ties, such as employment and partnership formation, as having their strongest deterrent effect among antisocial individuals. Second, antisocial, unconventional social ties, such as delinquent peers, can also serve as negative turning points, as they exacerbate and amplify antisocial individuals' tendencies.

More generally, our findings identify multiple developmental processes that produce stability or change in antisocial behavior over time. Some developmental processes promote the stability of antisocial behavior over time, as criminal propensity becomes criminal behavior. These processes include enduring criminal propensity, cumulative social disadvantage, and social amplification. Other processes, however, stimulate change in antisocial behavior. These include social deterrence and social protection. Whether stability or change in antisocial behavior occurs depends on individuals' experience of these social-psychological processes.

How do the findings of this article fit with previous studies of the stability of antisocial behavior? Some studies, such as those of life-course persistence (Moffitt et al., 1996; Moffitt et al., 2001), have emphasized the stability of antisocial behavior over time. Life-course persistence holds that childhood antisocial behavior begets adolescent antisocial behavior through various mechanisms, such as contemporary continuity and cumulative continuity (Moffitt, 1993). Life-course interdependence suggests another mechanism of stability—social amplification. Not only do low self-control, antisocial children have more delinquent friends than do prosocial children, as per cumulative continuity, but also these friends more strongly influence them. As such, delinquent peers play a significant, criminogenic role with those individuals on a life-course-persistent developmental pathway.

Other studies have emphasized change in antisocial behavior over time. For example, Farrington et al. (1988) found that at-risk boys with fewer friends (and therefore fewer delinquent friends) and with stronger relationships to their mothers had less criminal outcomes in early adulthood. These findings also fit with the concept of life-course interdependence,

which holds that delinquent peers are especially harmful, and strong ties especially beneficial, for at-risk children.

In sum, the concept of life-course interdependence fits well with the idea that some, although not most, antisocial children change their behavior over time. Moffitt and colleagues have identified a developmental pathway in which antisocial children later become less-antisocial adolescents and adults. Originally, Moffitt et al. (1996) optimistically labeled this group "recoveries," but a later study found that more than one-fourth of them were convicted of crime as young adults. Still, this group self-reported only about half as much crime as study members who were antisocial as adolescents (i.e., those on "life-course-persistent" and "adolescent-limited" pathways). Perhaps, then, the best label for them is "low-level chronic offenders" (Moffitt et al., 2001), and their experience, of showing some, but not total, change fits with the concept of life-course interdependence.

In thinking about future research on antisocial behavior, an important implication of our findings concerns the formation of strong, prosocial ties by antisocial individuals. Given the significant impact, yet diminished frequency, of these ties, a critical issue is how some antisocial individuals form prosocial bonds. Do antisocial individuals form such bonds in a similar, or different, manner as prosocial individuals? Are there specific characteristics or circumstances that aid in the formation of these bonds? Answers to these questions, although outside of the scope of this current paper, would shed light on the continuation and change of antisocial behavior.

Another issue for the future concerns the causal processes underlying social-protection and social-amplification effects. Although we found strong evidence for the existence of these effects, we did not test the processes through which they operated. For example, does education deter criminal behavior by removing individuals from criminogenic situations? By exposing them to conventional role models? By giving them the formal credentials necessary for conventional success? By improving their standing in the marriage market? Identifying underlying causal mechanisms such as these informs us both how and why social ties influence different types of individuals.

Practically, despite the push toward crime by criminal propensity, and its damaging effect on social relationships, our data provide a solid empirical foundation for optimism, for the data show that it is possible for severely crime-prone youth to be successfully deterred from crime by strong, prosocial ties. As such, programs that effectively create such ties for crime-prone adolescents should be able to deter crime among the very individuals who are most in need of deterrence. However, creating healthy social bonds for crime-prone youth is not a trivial task. In the

Dunedin Study, only about one-quarter of the study members with the least self-control had scores above average for their cohort on the social ties that deterred crime, compared with about three-quarters of those study members with the most self-control. These data tell us that although they are potentially effective, intervention programs will require both firm resolve and generous resources to battle the forces of cumulative social disadvantage.

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## Appendix 1. Description of Self-Control, Social Ties, and Criminal Behavior Variables

Variable Name • Items	Collected When, from whom	Content
<b><i>Childhood Low Self-Control:</i></b>		
• Lack of Control	Ages 3 & 5 from observers	Impulsive, extremely overactive, emotionally labile, withdraws from difficult tasks, brief attention to tasks.
• Impulsivity	Ages 9 & 11 from parents and teachers	Acts before thinking, difficulty waiting turn, needs supervision (DSM-III, McGee et al., 1992).
• Impulsivity	Age 11 from study member	Impulsive behavior (from Diagnostic Interview Schedule for Children (DISC), Costello et al., 1982).
• Lack of Persistence	Ages 9 & 11 from parents and teachers	Fails to finish tasks, easily distracted, does not stick to activity (DSM-III).
• Inattention	Age 11 from study member	Inattentive (DISC).
• Hyperactivity	Ages 5, 7, 9 & 11, parents and teachers	Runs and jumps about, squirmy, fussy, cannot settle (from Rutter Behavioral Scales, Moffitt et al., 1996).
• Hyperactivity	Ages 9 & 11 from parents and teachers	Runs and climbs about excessively, difficulty sitting still, as if "driven by a motor" (DSM-III).
• Hyperactivity	Age 11, study member	Extremely active (DISC).
• Antisocial Behavior	Ages 5, 7, 9 & 11 parents and teachers	Fights, bullies, steals things, destroys things, disobedient (Rutter Behavioral Scales).
<b><i>Adolescent Low Self-Control:</i></b>		
• Impulsive	Age 18 from study member	Not planful, reflective, or rational (Multidimensional Personality Questionnaire, Caspi et al., 1994).
• Impulsive	Age 18 from informant	Impulsive, rushes into things without thinking about consequences.
• Hyperactive	Age 15 from study member	Restless, unable to sit still, hyperactive, always on the go (DISC).
• Inattention	Age 15 from parent	Short attention span, lacks perseverance, easily diverted (Peterson-Quay Checklist; Quay and Peterson, 1987).
• Inattention	Age 18 from informant	Problems with concentration, problems with keeping mind on work and other important things.
• Physical Response	Age 18 from study member	Responds to conflict physically, ready to fight when angry, does not "turn other cheek." (MPQ).
• Risk-Taking	Age 18, study member	Prefers exciting, dangerous activities (MPQ).

## Appendix 1 (Continued)

Variable Name • Items	Collected When, from whom	Content
<b>Educational Achievement:</b>		
• Educational Aspirations	Age 15 and 18 from study member	Plans for education, from secondary school to university.
• Months Education	Age 21 from study member	Months full-time education from ages 15 and 21 (from Life History Calendar (LHC). See Caspi et al., 1996).
• Educational Achievement	Age 18 and 21 from study member	Level of education achieved, from secondary school to university.
• Left School	Age 18, study member	Left school because they did not like it, reverse coded.
<b>Employment:</b>		
• Months Unemployment	Age 21 from study member	Months unemployed between ages 15 and 21, reverse coded (LHC).
• Months Full-Time Work	Age 21 from study member	Months of full-time employment between ages 15 and 21 (LHC).
• Occupational Aspirations	Age 18 and 21 from study member	Vocational aspirations for age 25, coded into scale of SES.
• Job Desirability	Age 21 from study member	Job quality of current or most recent job (from Index of Job Quality. See Jencks et al., 1988).
<b>Family Ties:</b>		
• Living with Parents	Age 21 from study member	Number of months lived with parents between ages 15 and 21 (LHC).
• Involvement with Parents	Age 18 from study member	Involved with and attached to parents.
• Intimacy with Parents	Age 18 from study member	Can talk to parents about a problem or when feeling upset.
<b>Partnerships:</b>		
• Intimacy with Partner	Age 21 from study member	Cohesive, intimate romantic partnership in current or most recent partnership.
• Companionship with Partner	Age 21 from study member	Spend time together, enjoy doing things together, share interests and hobbies.
<b>Delinquent Peers:</b>		
• Friends are Delinquent	Age 18 and 21 from study member	Portion of friends who do things that are against the law.
• Companion for Delinquency	Age 21 from study member	Have someone with whom to get in trouble or to break the law.
• Friends are Good Citizens	Age 18 and 21 from study member	Portion of friends who are thought of as good citizens, reverse coded.
<b>Criminal Behavior</b>	Age 21 from study member	Variety scale of criminal acts including assault, armed robbery, gang fighting, illegal gambling, drunk driving, theft, embezzlement, public drunkenness, welfare fraud, drug use, drug dealing, rape, prostitution, hitting others, cheating others, passing bad checks, car theft, selling stolen goods, shoplifting, breaking and entering, arson, vandalism, public disorder (Elliott and Huizinga, 1989).

## Appendix 2. Univariate Statistics and Intercorrelations

	Mean	St. Dev.	Range	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Male	.51	.50	0 to 1	1.0	—	—	—	—	—	—	—	—	—	—	—
(2) Social Class	3.79	1.12	1 to 6	.01	1.0	—	—	—	—	—	—	—	—	—	—
(3) Childhood Low Self-Control	0	1	-1.45 to 5.03	.25	-.24	1.0	—	—	—	—	—	—	—	—	—
(4) Adolescent Low Self-Control	0	1	-2.04 to 4.30	.27	-.05	.45	1.0	—	—	—	—	—	—	—	—
(5) Prosocial Ties	0	1	-3.56 to 2.15	-.07	.30	-.34	-.39	1.0	—	—	—	—	—	—	—
(6) Education	0	1	-3.07 to 1.95	-.03	.40	-.34	-.30	.71	1.0	—	—	—	—	—	—
(7) Employment	0	1	-3.95 to 1.97	-.08	.18	-.27	-.24	.65	.32	1.0	—	—	—	—	—
(8) Family Ties	0	1	-3.74 to 2.17	-.02	.12	-.13	-.30	.66	.32	.17	1.0	—	—	—	—
(9) Partnerships	0	1	-4.40 to 1.64	-.07	.06	-.15	-.18	.60	.16	.21	.16	1.0	—	—	—
(10) Antisocial Ties	0	1	-1.58 to 3.47	.28	-.08	.16	.40	-.44	-.26	-.35	-.28	-.27	1.0	—	—
(11) Self-Reported Crime	4.72	4.44	0 to 29	.32	-.02	.21	.45	-.39	-.23	-.28	-.29	-.22	.63	1.0	—
(12) Official Convictions†	.88	4.80	0 to 81	.16	-.16	.23	.28	-.40	-.36	-.33	-.23	-.10	.35	.48	1.0

NOTE: Correlations  $\geq .07$  are statistically significant at  $p \leq .05$  (two-tailed).

†Logged in all analyses.

