EXPLAINING THE ACADEMIC PERFORMANCE-DELINQUENCY RELATIONSHIP

RICHARD B. FELSON*
JEREMY STAFF
The Pennsylvania State University
Department of Sociology

KEYWORDS: delinquency, academic performance, self-control, social bonds

We use data from the National Education Longitudinal Survey to examine the relationship between academic performance and delinquency. We estimate the effects of grades in tenth grade on delinquency in twelfth grade, and then introduce controls for social bonds and self-control (teacher-rated effort). Our evidence suggests that the feedback that adolescents receive in the form of grades does not affect their delinquent behavior, that academic performance and delinquency have instead a spurious relationship. Our evidence suggests that this relationship is attributable primarily to the effects of individual differences in self-control, not to those of social bonds.

Academic performance is one of the strongest and most consistent correlates of delinquency (for a review, see Maguin and Loeber, 1996). In this research, we attempt to find out why. Using longitudinal data, we attempt to determine whether academic performance affects delinquency or whether the two behaviors have a spurious relationship. Most major criminological theories imply hypotheses about why academic performance and delinquency are related. We begin with a discussion of those hypotheses and the relevant empirical literature.

Strain theory suggests that academic performance has a causal effect on delinquency. In one interpretation, delinquency is an adaptation to school failure. Weak students turn to crime for enjoyment, money, status, and

* We would like to thank George Farkas, Jeffery Ulmer, and D. Wayne Osgood for helpful comments and advice on an earlier draft of this paper.

self-esteem because they cannot or do not obtain these rewards in school (see Merton, 1957; Cohen, 1955; Cloward and Ohlin, 1960). General strain theory, on the other hand, posits a frustration-aggression mechanism: low grades are negative experiences that lead to criminal behavior (Agnew, 1985a, 1992). Whatever the mechanism, from a strain perspective, it is the social evaluations that adolescents receive in the form of grades that have a causal effect on whether they engage in delinquency. Whether for rational or irrational reasons, poor academic performance motivates them to commit crime.[1]

Longitudinal research supports, to some extent, the idea that academic grades affect later delinquency (Maguin and Loeber, 1996). For example, Agnew (1985b, 1991) reports small but statistically significant negative effects of self-reported grades on delinquency using data from the Youth in Transition Survey and the National Youth Survey (see also Wiatrowski et al., 1982). On the other hand, a study of middle-school students based on official transcripts did not find a significant effect of grades on delinquency (McCarthy and Hoge, 1984). The results raise the possibility that the observed relationships between self-reported grades and self-reported delinquency are due to shared method variance. Controlling for a lagged variable measuring delinquency reduces the likelihood of this type of spuriousness but does not eliminate it.

Some studies of intervention programs aimed at improving academic performance, such as the Perry Preschool Project and the Abecedarian childhood intervention project, have also examined their long-term effects on delinquency. Although these programs have been shown to affect academic performance for high-risk students, the evidence of their effect in reducing delinquency is mixed (Clarke and Campbell, 1998; Berrueta-Clement et al., 1987; Schweinhart and Weikart, 1995; Gottfredson, 1986). More supportive evidence comes from a meta-analysis of studies of intervention programs aimed at preventing delinquency and other problem behavior (Najaka, Gottfredson, and Wilson, 2001). The results suggested that programs that led to improvements in academic performance also led to moderate reductions in problem behavior.

Control theory (for example, Hirschi, 1969) suggests that the relationship between academic performance and delinquency is spurious. Both are a function of weak bonds to conventional others, which lower an adolescent's "stake in conformity" (Hirschi, 1969; Toby, 1957). Adolescents with weak bonds to school and parents are more likely to

1. Note that strain theory implies that children from disadvantaged families are less likely to have the intellectual and social resources necessary to succeed in school (for example, Cohen, 1955). Thus, strain theory predicts that academic skills mediate the effect of socioeconomic status on delinquency.

engage in delinquency because the costs of transgression are lower. For example, they have less attachment to teachers and parents, and thus are not particularly concerned about alienating either if they get into trouble. Also, because they have less commitment to academic pursuits, the costs of delinquency and punishment are lower. Control theory thus explains the relationship between academic performance and delinquency in terms of adolescent attitudes toward family and school.

Cross-sectional studies suggest that commitment and attachment to school are related to delinquency, whereas longitudinal studies do not (Wiatrowski, Griswold, and Roberts, 1981; Agnew, 1985b; Paternoster et al., 1983). On the other hand, Najaka and colleagues' (2001) meta-analysis suggested that intervention programs that increased commitment and attachment to school also led to reductions in problem behavior.

Where control theory emphasizes attitudes reflecting social bonds, Gottfredson and Hirschi's (1990) general theory of crime focuses on self-control. They suggest that individual differences in self-control produce a spurious relationship between poor grades and delinquency. Adolescents with low self-control are unable to get good grades because they lack the self-restraint necessary to study and pay attention in class. They are more likely to commit delinquency because they are less likely to consider the costs when opportunities to commit crime arise. It is not the adolescents' attitudes toward school and parents that cause them to engage in delinquency, but rather their ability to regulate their behavior.

Some of these theoretical arguments have been used to explain why adolescents with low scores on standardized tests are more likely to engage in delinquency (Hirschi and Hindelang, 1977; Cullen et al., 1997). Longitudinal studies show that test scores at ages 3 and 4 predict future criminal behavior (for example, Lipsitt, Buka, and Lipsitt, 1990). Stattin and Klackenberg-Larsson (1993) found that assessments of babbling and vocalizations at 6 months were associated with later official criminality.

Hirschi (1969) argues that ability is related to delinquency because of its association with school failure (see also Ward and Tittle, 1994). The literature is not clear as to whether test scores and delinquency are related when academic performance is controlled. Lynam, Moffitt, and Stouthamer-Loeber (1993) found that the relationship between IQ test scores and delinquency disappeared when school performance was controlled for blacks but not for whites.

THE PRESENT STUDY

In this study, we attempt to determine why academic performance in high school is related to delinquency. In our main analysis, we examine the effects of grades, social bonds, test scores, and effort on delinquency. We

use a lagged regression analysis in which our independent variables are measured in the tenth grade and delinquency is measured in the twelfth grade. Including a measure of delinquency in tenth grade as a lagged variable increases confidence in causal inferences because the likelihood that the relationships observed can be attributed to some omitted third variable or the effects of delinquency on school behavior is reduced. However, it may still be that some third variable associated with grades also contributes to a change in delinquency over time. The effects of grades may be a function of some individual characteristic underlying academic performance, such as attitudes toward school or self-control. Therefore, we include variables in some equations that may produce spuriousness and examine whether the grades-delinquency relationship is reduced or eliminated.

The criminological theories mentioned make generally different predictions about what effects should be observed. Strain theory implies that grade point average (at tenth grade) should have a direct effect on delinquency (at twelfth grade). When adolescents receive negative evaluations in the form of grades, that is, when they experience failure at a key activity in their lives, they are more likely to turn to delinquency. Control theory, on the other hand, implies that students who have weak bonds to school and parents are less likely to get good grades and more likely to commit crime because those social costs are low. Specifically, if they have negative attitudes toward their teachers and parents, think grades are unimportant, and have limited educational and occupational aspirations, then the costs of transgression are lower.[2] These conventional bonds produce a spurious relationship between academic performance and delinquency, and when they are added to the equation, that relationship should disappear or be reduced. Finally, Gottfredson and Hirschi's general theory implies that adolescents with low self-control are likely to do poorly in school and to engage in delinquency. When a measure of self-control is added to the equation, the relationship between academic performance and delinquency should disappear or be reduced.

METHOD

THE NATIONAL EDUCATION LONGITUDINAL STUDY

To assess the relationship between academic performance and delinquency, we use longitudinal data from the National Education Longitudinal Study (U.S. Department of Education, 1992a, 1992b).

2. Note that strain theory would also predict that low educational expectations should lead to delinquency.

During the spring of 1988, 24,599 eighth-grade students were randomly selected from more than 1,000 private and public schools across the United States. The student sample was surveyed again in the tenth (1990) and twelfth grades (1992), and included those who had dropped out of high school. Follow-up surveys were conducted 2 (1994) and 8 years (2000) after the scheduled date of high school graduation, though our analyses rely only on the first three waves of data collection. Official transcripts were collected from school administrators and information on socioeconomic status was obtained from parents. Our sample includes students who responded to the initial survey (1988) and the first two follow-up surveys (1990 and 1992), and who had official transcripts of their grades. Because of budget constraints and administrative reasons, transcripts were not collected for all students. In addition, some students were lost because of attrition. These losses reduce the sample size to 14,282 respondents. The National Center for Education Statistics (U.S. Department of Education, 1995) provides a weight that adjusts for this data loss and for the fact that the sample design involved stratification, disproportionate sampling of certain strata, and clustered probability sampling.

School-related information was also collected from teachers. During the tenth-grade survey, two teachers were surveyed by mail regarding the behavior of students in their classes. We lost an additional 14 percent of cases in this phase because some teachers did not complete the survey (U.S. Department of Education, 1992a). We also lost a significant number to student nonresponse on the parental attachment item (9 percent) and the school attachment items (5 percent). To determine whether these missing cases might have affected our results, we examined whether students with missing data on teacher-rated effort or the attachment items had different levels of delinquency than students with valid data. The correlations between these indicators of missing data and delinquency during the tenth or the twelfth grade were all close to zero (less than .02). After list-wise deletion for missing data, our final sample for all analyses is 10,439 students.

MEASURES

Our measures include official grades and test scores, self-reported bonds to school and parents, teacher-reported effort, demographic variables, and self-reported delinquency. Table 1 provides descriptive statistics for all our variables, which are weighted to account for survey nonresponse and design effects.

Table 1. Descriptive Statistics (N=10,439)

Variable	Mean	SD
Delinquency (12th grade)	.096	.625
Delinquency (10th grade)	.103	.617
Grade point average	2.676	.580
Effort	.133	2.328
Attachment	-.027	.797
Commitment	-.040	.746
Test Scores	.108	.884
SES	-.030	.742
Male	.476	.499
White	.755	.430
Black	.114	.318
Hispanic	.086	.280
Asian	.035	.185
American Indian	.010	.097

DELINQUENCY

Because classroom misbehavior may influence school performance, we base our delinquency measure on problem behaviors occurring outside the classroom. During the sophomore and senior year, respondents reported on four behaviors:

- the number of times they consumed five or more alcoholic beverages in a row during the previous two weeks (a six-point scale from "none" to "ten or more times")
- the number of occasions they used marijuana in the last 30 days (a four-point scale from "none" to "twenty or more occasions")
- the number of times in the prior semester they were in a physical fight either on or off school grounds (a three-point scale from "never" to "more than twice")
- how often they were arrested (a five-point scale from "never" to "ten or more times")

We use item response theory (Hambleton and Swaminathan, 1985) to create a delinquency scale based on the students' responses to the four items. Item response theory (IRT) assumes that responses on a set of items reflect an underlying latent measure. It uses a maximum likelihood procedure to estimate individual scores on the latent construct based on the pattern of responses to the delinquency items. IRT scaling is especially useful for studies of criminal behavior (see Osgood, McMorris, and Potenza, 2002), because composite measures of delinquency often include items that have highly skewed distributions, the intervals between self-reported delinquent behaviors are not always equal, and criminal offenses tend to range in seriousness. Item response theory overcomes these

limitations by providing latent scores that are continuous, equal in interval, and have an approximately normal distribution.

We create our measures of delinquency during the tenth and twelfth grade using Thissen's (1991) MULTILOG program. Because the categories for the delinquency items are categorical rather than continuous, we use Samejima's (1969) graded response model to estimate the latent delinquency measure. To avoid a significant loss of data, respondents who answered at least two of the delinquency items are included in IRT scale. Respondents who did not attend school during the senior year of high school were not asked about their violent behavior. Some respondents also did not answer the questions on substance use.[3] As shown in table 1, respondents report a slightly higher rate of delinquency in the tenth grade than in the twelfth. However, more than half the respondents did not report any delinquency during either.

Evidence not presented show that the IRT model provides a good fit to the data. The observed probabilities of the delinquency items are very similar to the fitted probabilities derived from our IRT model (see Osgood, McMorris, and Potenza, 2002: 282–83). We also found evidence that a single latent trait underlies the relationship between the response items (see Hambleton and Swaminathan, 1985). A principle components factor analysis of the twelfth-grade delinquency items showed that approximately 42 percent of the variance is accounted by one factor. Furthermore, the loadings for this factor range from .55 to .70.

GRADES AND TEST SCORES

We draw our measure of grades from the students' official transcripts (U.S. Department of Education, 1995). Official transcripts regarding course content and grades were requested from school principals for students who graduated by the end of the spring term of 1992, or who had dropped out of school, fallen behind, or were enrolled in a special education program. We calculated the grade point average for all ninth and tenth-grade classes using the standard grading scale (from A to F).

In addition to the questionnaire, respondents completed a series of standardized tests. The reading comprehension test consisted of twenty-one questions regarding the content of five short reading passages. The mathematics test consisted of forty questions regarding word problems, graphs, equations, quantitative comparisons, and geometric figures (for more detail, see the U.S. Department of Education, 1994). Our measure is

3. The survey questionnaire informs students that responses to substance use "are voluntary" and adds "we hope you will answer every question, but you may skip any question you do not wish to answer." This message does not precede the questions regarding arrest and fighting.

based on the scores from these two tests, which were first standardized and then averaged.

CONVENTIONAL BONDS

According to control theory, youth with strong attachment to school and parents will be less likely to engage in delinquency. Our measure of attachment is based on attachment to teachers and parents, both measured in the tenth grade. Attachment to teachers is an additive scale based on three items: whether the students believed that the teaching at their school is good, that teachers are interested in students, and that most teachers listen to the respondent. The student could "strongly disagree," "disagree," "agree," or "strongly agree." Attachment to parents is an additive scale based on four items: whether students feel their parents treat them fairly and understand them, whether they get along well with their parents, and whether they like their parents very much. There were six possible responses to each item, anchored by "false" and "true." Our measure of attachment is based on these two constructs, which we first standardized and then averaged.

We also measure school commitment during the tenth grade across several dimensions. Educational expectations is a single item based on a question asking respondents how much education they think they will attain (coded as a nine-point scale from "less than high school" to "PhD or MD"). Consistent with the high aspirations of many youth today (Schneider and Stevenson, 1999), 67 percent of our sample expected to earn a college degree or higher. Respondents were also asked to pick among sixteen broad occupational categories, such as clerical worker, schoolteacher, and homemaker that "come closest to describing the job or occupation that you expect or plan to have when you are 30 years old." Our measure of occupational aspirations is coded "1" if the youth aspired to a professional or teaching job and "0" if the youth aspired to another type of job or was uncertain of his or her future occupation. Almost half (47 percent) aspired to a professional job in adulthood. We also included a measure of the importance of grades based on their responses to the question "how important are good grades to you?" Responses ranged on a four-point scale from "not important" to "very important." Educational expectations, occupational aspirations, and the importance of good grades were standardized, then averaged to measure school commitment.

SELF-CONTROL

The main source of controversy in the study of self-control, and the challenge for research, has been over how it is measured. Scholars have criticized the theory for being tautological, that is, for not measuring self-

control independently of the tendency to commit crime (for example, Akers, 1991). Much research measures the concept indirectly. For example, researchers have attributed the relationship between criminal behavior and the commission of noncriminal but analogous acts (for example, smoking and drinking) to the effects of self-control (Paternoster and Brame, 1998). Others use more direct measures, such as self-reports of risk taking and temper control (Grasmick et al., 1993). However, these measures may suffer from reporting bias, and there are alternative interpretations of their correlations with crime (Wright et al., 1999).

We measure self-control using teacher ratings of student effort in school. Our measurement follows from Gottfredson and Hirschi's (1990) description.

> Criminal acts provide immediate gratification of desires. A major characteristic of people with low self-control is therefore a tendency to respond to tangible stimuli in the immediate environment, to have a concrete 'here and now' orientation. People with high self-control, in contrast, tend to defer gratification.... People lacking self-control also tend to lack diligence, tenacity, or persistence in a course of action. (89)

We believe that effort in school clearly reflects the ability to defer gratification, diligence, tenacity, and persistence. In addition, our use of teacher-rated evaluations of effort follows Wright et al.'s (1999) suggestions about how to measure self-control.

> the best measures would be other-reported, direct measures of self-control; for example, a teacher or parent assessing a child's impulsivity or lack of persistence... because such measures are reported by others, they do not suffer from low self-control reporting bias, and because they measure self-control directly, their use to predict delinquency avoids potential tautology... other-reported, direct measures should be used whenever possible, and the findings produced by them should be deemed trustworthy. (490)

There is another reason to prefer teacher ratings of effort to self-ratings. Self-reports are problematic in part because different students have different ideas of what it means to work hard, and in part because of social desirability and other biases (Carbonaro, 2005). Teachers are better able to make social comparisons and less likely to have biased judgments.

Two teachers were asked whether the student "usually works hard in class" (responses were "yes" or "no"), how often they complete homework assignments, and how often the student is "attentive in class" (responses ranged on a five-point scale from "never" to "all of the time"). After standardization, we averaged the items to form a scale. Note that

some students' scores were based on a single teacher. The effort scale has high reliability for both teachers (Cronbach's alpha range from .849 to .851). The correlation between the ratings of different teachers is also high ($r = .531$; $p < .001$), given that they are rating students in different classes.

Effort is a function of both attitudes and the ability to regulate behavior. A critic might therefore argue that effort in school also reflects a student's aspirations and attitudes toward school, that is, the social bond that Hirschi (1969) labels commitment. In our analyses, however, we control for these attitudes as well as for past grades and standardized test scores. We think it is reasonable to attribute the net effect of teacher-rated effort to the effects of self-control. It is otherwise difficult to explain why effort in the classroom would be related to delinquency outside the classroom, when attitudes related to school are controlled.

BACKGROUND MEASURES

Finally, we include controls for gender, race and ethnicity, and socioeconomic status during the eighth grade, as these variables may be related to both academic success and delinquency. Race and ethnicity is based on a series of dummy variables indicating whether the respondent is black, Hispanic, Asian, American Indian, or white (reference category). Socioeconomic background is a composite measure created by the National Center for Educational Statistics (U.S. Department of Education, 1992b). It is based on measures of father's education level, mother's education level, father's occupation, mother's occupation, and family income obtained from the 1988 parents' survey.

DATA ANALYSIS

Following Osgood, Finken, and McMorris (2002), we use tobit regression models to estimate equations. Tobit regression models provide consistent estimates of parameters when some of the cases fall below a certain threshold on the outcome variable and thus are considered censored (see Long, 1997). For measures of self-reported offending that use IRT scaling, Osgood, Finken, and McMorris (2002) find that tobit regression models are an improvement over ordinary least squares regression because they appropriately handle the large proportion of nondelinquent respondents. In our study, approximately 65 percent of respondents did not commit any delinquency during the senior year of high school.

Because the study is based on a multistage cluster sample, we also use the survey command in Stata 8 (StataCorp, 2003) to correct for design effects in our equations. This estimation command takes complex sample designs into account when calculating standard errors.

RESULTS

Table 2 presents correlations for our predictor variables. The table shows that the bivariate relationships between effort and grades (r = .66), test scores and grades (r = .65), and commitment and grades (r = .50) are substantial, but not so high as to create a multicollinearity problem. The measures of conventional bonds are also correlated (r = .27). The table also shows that girls work harder and get higher grades than boys. Socioeconomic background is related to effort (r = .20), grades (r = .37), test scores (r = .45), and commitment (r = .30).

Table 3 presents the multivariate results. In model 1 we examine the effects of grades with measures of self-control (effort) and conventional bonds left out of the equation. Model 2 includes measures of social bonds, but not self-control, and model 3 includes self-control but not the social bonds. In model 4, we include all variables.

The results from model 1 show that students who have high grade point averages in tenth grade are less likely to engage in delinquency in twelfth grade. We find a few other statistically significant effects. Boys are much more likely to engage in delinquency. Blacks, Asians, and American Indians are less likely to engage in delinquency than whites, controlling for earlier delinquency. Finally, test scores and the lagged measure of delinquency have statistically significant effects on delinquency in the twelfth grade.

The results from model 2 show that the effects of grades are reduced by 24 percent when the five measures of conventional bonds are controlled (b = -.163 to b = -.124), but the effect remains statistically significant ($p < .01$). Attachment to parents and teachers predicts delinquency, but commitment does not. The effects of gender, race, and prior delinquency remain statistically significant.

Model 3 shows that effort in the tenth grade has a significant negative effect on delinquency. In addition, the effect of grades on delinquency is reduced by 44 percent from model 1 to model 3. The results suggest that self-control explains a good deal of the grades-delinquency relationship.

In model 4 we include all variables. The effect of grades is reduced compared to model 3 and becomes statistically nonsignificant. The effects of social bonds and effort are similar to those in the earlier models, suggesting that the effect of social bonds and the effects of effort are largely independent of each other.

We also assessed the robustness of the observed relationships using alternative specifications of our model (not shown). First, we examined whether the effects from model 4 varied by gender and race. Specifically, we examined gender and race interactions involving grades, test scores, effort, attachment, and commitment. We find few statistically significant

table 2 landscape

interactions, no clear patterns, and nothing with any implications for our conclusions. Second, we assessed whether the relationship between grades and delinquency would change if the measures of conventional social bonds (that is, teacher attachment, parental attachment, educational expectations, the importance of grades, and occupational aspirations) were included as separate variables in the analyses, or if attachment and commitment were combined together to form one variable. In both specifications, the pattern of findings remained the same.

Table 3. Estimates for Tobit Models Predicting 12th-Grade Delinquency

	Model 1 *b* SE	Model 2 *b* SE	Model 3 *b* SE	Model 4 *b* SE
Grade point average	-.163***	-.124**	-.092*	-.071
	(.035)	(.037)	(.043)	(.044)
Attachment		-.102***		-.098***
		(.017)		(.017)
Commitment		-.012		-.006
		(.021)		(.021)
Effort			-.026**	-.021*
			(.008)	(.008)
Male	.292***	.300***	.277***	.288***
	(.028)	(.028)	(.028)	(.028)
Black	-.227***	-.207**	-.217**	-.203**
	(.063)	(.062)	(.063)	(.062)
Hispanic	.005	.025	.015	.031
	(.042)	(.042)	(.043)	(.042)
Asian	-.312***	-.306***	-.314***	-.308***
	(.061)	(.059)	(.062)	(.060)
American Indian	-.267*	-.224	-.250	-.214
	(.131)	(.134)	(.130)	(.133)
SES	.060**	.061**	.059**	.060**
	(.021)	(.021)	(.021)	(.021)
Test scores	-.080***	-.082***	-.081***	-.084***
	(.022)	(.023)	(.022)	(.023)
Delinquency (10th grade)	.565***	.538***	.555***	.531***
	(.021)	(.021)	(.020)	(.021)
Intercept	.155	.043	-.023	-.089
	(.099)	(.106)	(.118)	(.121)
N	10,419	10,419	10,419	10,419
# left censored	6,694	6,694	6,694	6,694

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

DISCUSSION

Our study has a number of favorable features that are missing in most previous research on the relationship between academic performance and delinquency. First, we are better able to address causality issues because we use longitudinal data and include a lagged variable measuring delinquency. Second, we use a large nationally representative sample. Third, we examine the role of effort in school, an important but neglected variable. Fourth, because we use transcripts rather than self-reported grades, the relationship between grades and delinquency cannot be attributed to shared method variance.

Our results suggest that the relationship between academic performance and delinquency is spurious, not causal. When we introduce controls, the effect of grade point average on later delinquency is substantially reduced and becomes statistically nonsignificant. Delinquency does not appear to be a response to the negative social evaluations that adolescents receive in the form of grades, as suggested by a strain perspective. We do not find support for the hypothesis that adolescents turn to delinquency because of failure in the academic domain. However, lagged regression is a conservative test. It may be that over a more extended period poor grades do have some causal effect on delinquency.

An important variable accounting for the relationship between academic performance and delinquency is teacher-rated effort. We interpreted this pattern as a reflection of the effects of self-control and as supporting Gottfredson and Hirschi's theoretical approach (1990). Adolescents with less self-control are more likely to engage in delinquency and more likely to do poorly in school because they do not work as hard.

Our results suggest that a small portion of the grades-delinquency relationship is attributable to the effects of social bonds. Adolescents with strong attachments to parents and teachers are less likely to engage in delinquency, and when these attitudes are controlled the effect of grades decreases slightly. The conclusion that social bonds help explain this relationship is tentative, however, as school commitment is not significantly related to later delinquency.

As indicated earlier, some readers might view effort as a measure of social bonds rather than self-control. Our preference for the self-control explanation is based on two arguments. First, the effort measure is faithful to Gottfredson and Hirsch's description of self-control as involving diligence, tenacity, persistence, and the ability to defer gratification (1990). In addition, our use of teacher-rated evaluations of effort follows Wright and colleague's suggestion that self-control be measured by the reports of others to avoid self-reporting bias (1999). Second, we assume that the net

effects of effort when attitudes are controlled reflect the effects of self-control. The pattern suggests that the effect of effort reflects the adolescent's ability to regulate behavior, not attitude. Third, the effects of the social bond variables hardly change when the effort measure is introduced, and that of effort hardly changes when the social bond measures are. The results suggest that the effect of social bonds and the effects of effort are largely independent, and that they are different constructs.

It is still possible, however, that our measure of effort reflects some unmeasured attitude reflecting the student's social bonds. Because we controlled for five different attitude measures we think this is unlikely. One could argue, on the other hand, that effort is a better indicator of attitudes than the attitude measures, even though it is more indirect. Perhaps self-reports are more subject to a social desirability bias and the teacher's effort rating better taps the adolescent's true attitudes.

We would have come to a different conclusion if we had included effort and the attitude measures together in a scale and interpreted the scale as a measure of social bonds. Analyses not presented show that this scale mediates the effect of grades as well as the measure of effort does alone. When effort is left out of the scale, the scale works less well: the effect of grades is similar to when we include the items individually. Clearly, the effort measure is the key mediator. In addition, recall that previous longitudinal studies do not find much support for the hypothesis that attitudes toward school affect delinquency (Wiatrowski, Griswold, and Roberts, 1981; Agnew, 1985b; Paternoster et al., 1983).

Our self-control interpretation also assumes that teacher ratings of effort reflect student behavior, not some teacher prejudice. Teachers are, after all, professionals, and students are their business. It is possible, however, that our effort measure reflects the attitudes of teachers toward students and that these negative attitudes lead students to engage in delinquency (Menard and Morse, 1984). A strain theorist could argue that teachers criticize students when they think they are not working hard enough and this aversive experience causes students to commit crime. A labeling theorist could argue that the teacher attaches a negative label to the student and the student fulfills the prophecy. However, it seems unlikely that students engage in crime in response to teacher criticism, but not in response to low grades. In addition, we include a control for the adolescents' attitudes toward their teachers. Presumably, negativity on the part of teachers would be reciprocated. Finally, we suspect that high school sophomores who are not doing much schoolwork are not particularly concerned with their teachers' opinions of them, because if they were, they would do their work.

Another possibility is to interpret teacher-rated effort as a measure of school deviance. Perhaps students who do not pay attention in class or do their homework are breaking school rules rather than the law, and some omitted variable accounts for both types of deviance. If this effect reflects the versatility of offenders, however, it still points to a self-control interpretation (Gottfredson and Hirschi, 1990); the relationship between effort and delinquency is otherwise difficult to explain.

Finally, it may be that students who work hard have less time available to engage in delinquency (Hirschi, 1969). To examine this possibility, we included in our equations a measure based on how often respondents visited with friends at a local hangout or drive or rode around alone or with friends. This variable was associated with delinquency, but did not affect the other results.[4]

It is also noteworthy that we find a strong relationship between test scores and delinquency. Our results suggest that the effect cannot be attributed to attitudinal differences, because these are controlled for in our equations. Moffitt (1990) might attribute the effect to neuropsychological deficits in "executive functioning" among life-course persistent offenders. She argues that these offenders are unable to regulate their attention and consider the future consequences of their behavior. Because individuals use language to mentally represent alternatives and imagine future consequences, those with verbal deficits find it more difficult to regulate their behavior.[5] Moffitt's approach is similar to Gottfredson and Hirschi's, but she assigns a prominent role to biological differences, whereas they emphasize socialization (see Cauffman, Steinberg, and Piquero, 2005).

Of course, causal inference without experimental data is always tentative. We may have omitted variables that are associated with effort and changes in delinquency over time. Although we can not completely rule out alternative interpretations of our findings, we believe it is striking that teacher-rated effort predicts delinquency but that grades do not. Information that students do not know, and that is obtained from independent sources, has effects, but information they know well does not. In addition, the self-reported attitudinal measures of social bonds are only weak mediators in spite of the fact that they share method variance with self-reported delinquency. One could argue that effort won a race despite being handicapped at the start.

4. We also included a measure of participation in extracurricular activities. It had no effect on delinquency.
5. Note that the evidence is mixed as to whether criminal behavior is more strongly related to scores on tests of verbal skills than scores on other types of standardized tests (Walsh, 1992).

We did not examine the possibility of a reciprocal relationship between academic outcomes and delinquency. For example, Thornberry's interactional theory suggests that delinquency weakens bonds to school and parents and that weakened bonds interfere with school performance (Thornberry et al., 1991; see also Sampson and Laub, 1993). Previous research provides some support for the hypothesis that delinquency affects academic performance (Tremblay et al., 1992; Farnworth, Schweinhart, and Berrueta-Clement, 1985). In analyses not presented, we estimated the effects of delinquency in tenth grade on grades in twelfth grade. The results showed that delinquency has a significant negative effect on grades unless effort was included in the equation. The interpretation, however, is not clear. It may be that the relationship is spurious due to the effects of self-control, but it could also mean that delinquency leads adolescents to exert less effort and that their grades suffer as a result.

In sum, our evidence suggests delinquency is not a response to academic failure. Rather, adolescents differ in their ability to regulate their behavior and these differences affect their behavior inside and outside the classroom. Those with low self-control find it difficult to get good grades and to regulate their impulses. Good students may also be less delinquent because of their strong conventional bonds. Because of these processes, weak students are more likely to be delinquents.

REFERENCES

Agnew, Robert. 1985a. A revised strain theory of delinquency. *Social Forces* 64:151–67.

Agnew, Robert. 1985b. Social control theory and delinquency: A longitudinal test. *Criminology* 23:47–61.

Agnew, Robert. 1991. A longitudinal test of social control theory and delinquency. *Journal of Research in Crime and Delinquency* 28:136–56.

Agnew, Robert. 1992. Foundation for a general strain theory of crime and delinquency. *Criminology* 30:47–87.

Akers, Ronald. 1991. Self-control as a general theory of crime. *Journal of Quantitative Criminology* 7:201–11.

Berrueta-Clement, John R., Lawrence J. Schweinhart, W. Steven Barnett, and David P. Weikart. 1987. The effects of early educational intervention on crime and delinquency in adolescence and early adulthood. In *Primary Prevention of Psychopathology: Prevention of Delinquent Behavior,* eds. John D. Burchard and Sara N. Burchard. Newbury Park, CA: Sage Publications.

Carbonaro, William. 2005. Tracking, students' effort, and academic achievement. *Sociology of Education* 78:27–49.

Cauffman, Elizabeth, Laurence Steinberg, and Alex R. Piquero. 2005. Psychological, neuropsychological and physiological correlates of serious antisocial behavior in adolescence: The role of self-control. *Criminology* 43:133–76.

Clarke, Stevens, and Frances Campbell. 1998. Can intervention early prevent crime later? The Abecedarian project compared with other programs. *Early Childhood Education Quarterly* 13:319–43.

Cohen, Albert K. 1955. *Delinquent Boys: The Culture of the Gang.* New York: Free Press.

Cloward, Richard A., and Lloyd E. Ohlin. 1960. *Delinquency and Opportunity: A Theory of Delinquent Gangs.* New York: Free Press.

Cullen, Francis T., Paul Gendreau, G. Roger Jarjoura, and John Paul Wright. 1997. Crime and the bell curve: Lessons from intelligent criminology. *Crime & Delinquency* 43:387–411.

Farnworth, Margaret, Lawrence J. Schweinhart, and John R. Berrueta-Clement. 1985. Preschool intervention, school success and delinquency in a high-risk sample of youth. *American Educational Research Journal* 22:445–64.

Gottfredson, Denise C. 1986. An empirical test of school-based environmental and individual interventions to reduce the risk of delinquent behavior. *Criminology* 24:705–31.

Gottfredson, Michael, and Travis Hirschi. 1990. *A General Theory of Crime.* Stanford, CA: Stanford University Press.

Grasmick, Harold G., Charles R. Tittle, Robert J. Bursik, Jr., and Bruce J. Arneklev. 1993. Testing the core empirical implications of Gottfredson and Hirschi's general theory of crime. *Journal of Research in Crime and Delinquency* 30:5–29.

Hambleton, Ronald K., and Hariharan Swaminathan. 1985. *Item Response Theory: Principles and Applications.* Hingham, MA: Kluwer, Nijhoff.

Hirschi, Travis. 1969. *Causes of Delinquency.* Berkeley: University of California Press.

Hirschi, Travis, and Michael Hindelang. 1977. Intelligence and delinquency: A revisionist review. *American Sociological Review* 42:571–87.

Lipsitt, Paul D., Stephen L. Buka, and Lewis P. Lipsitt. 1990. Early intelligence scores and subsequent delinquency: A prospective study. *The American Journal of Family Therapy* 18:197–208.

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables.* Thousand Oaks, CA: Sage Publications.

Lynam, Donald, Terrie E. Moffitt, and Magda Stouthamer-Loeber. 1993. Explaining the relation between IQ and delinquency: Class, race, test motivation, school failure, or self-control? *Journal of Abnormal Psychology* 102:187–96.

Maguin, Eugene, and Rolf Loeber. 1996. Academic performance and delinquency. *Crime and Justice* 20:145–264.

McCarthy, John D., and Dean R. Hoge. 1984. The dynamics of self-esteem and delinquency. *American Journal of Sociology* 90:396–410.

Menard, Scott, and Barbara J. Morse. 1984. A structuralist critique of the IQ-delinquency hypothesis: Theory and evidence. *American Journal of Sociology* 89:1347–78.

Merton, Robert K. 1957. *Social Theory and Social Structure.* New York: Free Press.

Moffitt, Terrie E. 1990. The neuropsychology of delinquency: A critical review of theory and research. In *Crime and Justice: An Annual Review of Research,* vol. 12, eds. Michael Tonry and Norval Morris. Chicago: University of Chicago Press.

Najaka, Stacy S., Denise C. Gottfredson, and David B. Wilson. 2001. A meta-analytic inquiry into the relationship between selected risk factors and problem behavior. *Prevention Science* 2:257–71.

Osgood, D. Wayne, Laura L. Finken, and Barbara J. McMorris. 2002. Analyzing multiple-item measures of crime and deviance II: Tobit regression analysis of transformed scores. *Journal of Quantitative Criminology* 18:319–47.

Osgood, D. Wayne, Barbara J. McMorris, and Maria T. Potenza. 2002. Analyzing multiple-item measures of crime and deviance I: Item response theory scaling. *Journal of Quantitative Criminology* 18:267–96.

Paternoster, Raymond, and Robert Brame. 1998. The structural similarity of processes of a generation of criminal and analogous behaviors. *Criminology* 36:633–69.

Paternoster, Raymond, Linda Saltzman, Gordon Waldo, and Theodore Chiricos. 1983. Perceived risk and social control: Do sanctions really deter? *Law and Society Review* 17:457–79.

Samejima, Fumiko. 1969. Estimation of latent ability using a response pattern of graded scores. *Psychometrika Monograph Supplement* No. 17:1–100.

Sampson, Robert J., and John H. Laub. 1993. *Crime in the Making: Pathways and Turning Points through Life.* Cambridge, MA: Harvard University Press.

Schneider, Barbara, and David Stevenson. 1999. *The Ambitious Generation: America's Teenagers, Motivated but Directionless.* New Haven, CT: Yale University Press.

Schweinhart, Lawrence J., and David P. Weikart. 1995. The High/Scope Perry preschool study through age 27. In *Going Straight: Effective Delinquency Prevention and Offender Rehabilitation,* eds. Robert R. Ross, Daniel H. Antonowicz, and Gurmeet K. Dhaliwal. Ottawa: Air Training Publications.

StataCorp. 2003. *Stata Statistical Software: Release 8.0.* College Station, TX: Stata Corporation.

Stattin, Håkan, and Ingrid Klackenberg-Larsson. 1993. Early language and intelligence development and their relationship to future criminal behavior. *Journal of Abnormal Psychology* 102:369–78.

Thissen, David. 1991. *MULTILOG User's Guide, Version 6.0.* Chicago: Scientific Software.

Thornberry, Terence, Alan Lizotte, Marvin Krohn, Margaret Farnworth, and Sung Joon Jang. 1991. Testing interactional theory: An examination of reciprocal causal relationships among family, school, and delinquency. *Journal of Criminal Law and Criminology* 82:3–35.

Toby, Jackson. 1957. Social disorganization and stake in conformity: Complementary factors in the predatory behavior of hoodlums. *Journal of Criminal Law, Criminology, and Police Science* 48:12–17.

Tremblay, Richard E., Benoit Masse, D. Perron, Marc Le Blanc, Alex E. Schwartzman, and Jane E. Ledingham. 1992. Early disruptive behavior, poor school achievement, delinquent behavior, and delinquent personality: Longitudinal analysis. *Journal of Consulting and Clinical Psychology* 60:64–72.

U.S. Department of Education. 1992a. *National Education Longitudinal Study of 1988 First Follow-Up Teacher Component Data File User's Manual.* Washington, DC: National Center for Educational Statistics.

U.S. Department of Education. 1992b. *National Education Longitudinal Study of 1988 First Follow-Up Student Component Data File User's Manual.* Washington, DC: National Center for Educational Statistics.

U.S. Department of Education. 1994. *National Education Longitudinal Study of 1988 Second Follow-Up Student Component Data File User's Manual.* Washington, DC: National Center for Educational Statistics.

U.S. Department of Education. 1995. *National Education Longitudinal Study of 1988 Second Follow Up: Transcript Component Data File User's Manual.* Washington, DC: National Center for Educational Statistics.

Walsh, Anthony. 1992. Genetic and environmental explanations of violent juvenile delinquency in advantaged and disadvantaged environments. *Aggressive Behavior* 18:187–99.

Ward, David A., and Charles R. Tittle. 1994. IQ and delinquency: A test of two competing explanations. *Journal of Quantitative Criminology* 10:189–212.

Wiatrowski, Michael D., David Griswold, and Mary K. Roberts. 1981. Social control theory and delinquency. *American Sociological Review* 46:525–41.

Wiatrowski, Michael D., Stephen Hansell, Charles R. Massey, and David L. Wilson. 1982. Curriculum tracking and delinquency. *American Sociological Review* 47:151–60.

Wright, Bradley R. Entner, Avshalom Caspi, Terrie E. Moffitt, and Phil A. Silva. 1999. Low self-control, social bonds, and crime: Social causation, social selection, or both. *Criminology* 37:479–514.

Richard B. Felson is professor of Crime, Law, and Justice and of Sociology at Pennsylvania State University. He is currently researching domestic violence, race differences in assault, alcohol use by offenders and victims, and the response of the criminal justice system to different types of assault. His most recent book, *Violence and Gender Reexamined,* was published in 2002 by the American Psychological Association.

Jeremy Staff is assistant professor of Crime, Law and Justice in the Pennsylvania State University Department of Sociology. He is currently studying the short- and longer-term consequences of paid work during adolescence for delinquent behavior, social development, and socioeconomic achievement.