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Academic Performance and Delinquency

ABSTRACT

A meta-analysis of naturalistic studies of the academic performance-delinquency relationship and of intervention studies aimed both at improving academic performance and reducing delinquency found that children with lower academic performance offended more frequently, committed more serious and violent offenses, and persisted in their offending. The association was stronger for males than females and for whites than for African Americans. Academic performance predicted delinquency independent of socioeconomic status. Some intervention and prevention programs, using law-related or moral education components with adolescent children and self-control, social skills, and parent training components with young school-age children, were found to effect significant improvements in academic performance and delinquency.

This essay presents the findings of a meta-analysis of quantitative relations between educational success and delinquency. It has three aims: first, to provide a quantitative summary of the magnitude of the cross-sectional and longitudinal association between academic performance

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and delinquency and to determine whether this association is different for persons of different ages, gender, or ethnicity; second, to determine which variables have common relationships with both academic performance and delinquency and which variables are related either to academic performance or delinquency but not to both; third, to determine the magnitude of improvement in academic performance and delinquency that intervention studies have shown, which program components were most likely responsible for these improvements, and whether improvements in academic performance lead to improvements in offending or vice versa.

Section I presents a brief summary of previous reviews of the academic performance and delinquency relationship and then gives an overview of several current theories of delinquency as they relate to the role of academic performance. This section then concludes with a discussion of the method of meta-analysis, which will be used to summarize relevant studies. Section II presents the results of the meta-analysis and narrative review of naturalistic studies reporting cross-sectional and longitudinal bivariate relationships or multivariate relationships. This section also includes the common causes analyses for both cross-sectional and longitudinal data. Section III presents results of the meta-analysis of prevention and intervention studies to reduce delinquency or improve academic performance. Finally, Section IV presents the conclusions and policy implications for future work.

I. Research on Education and Delinquency

Belief is widespread that educational success is an important suppressor of involvement in delinquency by children and adolescents. These beliefs have deep historical roots. What may be one of the first published "natural experiments" took place in early-nineteenth-century Ireland at a time when a large proportion of the population was illiterate. Advocates of universal education argued that with universal education crime would diminish and eventually cease. The large increase in the number of schools in Ireland at that time made it possible to examine the effects of education on the delinquency of juveniles. Publications in 1811 to 1812 claimed that out of seven thousand children educated in particular schools over a period of twenty years, only one juvenile had been "charged in any court of justice with any offence"

(Lunny 1990). The schooling consisted of training in basic academic skills and religious precepts with, presumably, strong moral overtones.

Although the results of universal education as regards crime may not have turned out as well as its advocates hoped, the two basic questions embodied in those hopes are as relevant today as they were then: is poor academic performance related to delinquency, and can intervention programs bring about reductions in delinquency and improvements in academic performance? Empirical studies on the first of these questions date from the early part of the twentieth century (e.g., Burt 1931; Bond and Fendrick 1936; Kvaraceus 1945; Glueck and Glueck 1950). These studies and later, more sophisticated studies (e.g., Rhodes and Reiss 1969; Broder et al. 1981; Hughes et al. 1991; Lynam, Moffitt, and Stouthamer-Loeber 1993) have verified that an association exists.

Yet, a key question remains unanswered. Rutter, Tizard, and Whitmore (1970) suggested three possible relationships between academic performance and delinquency: that low academic performance precedes delinquency, that delinquency precedes low academic performance, or that both academic performance and delinquency are related through a common antecedent variable. Which of these possibilities is correct will have great impact in both theoretical and applied criminology as well as in education. The resolution of this question is the overall purpose of this essay.

Four principal findings emerge from the research on educational success and delinquency. First, poor academic performance is related to the prevalence and onset of delinquency, whereas better academic performance is associated with desistance from offending. The results of the studies examined in this essay showed that the odds of delinquency for children with low academic performance is 2.07–2.11 times higher than for children with high academic performance. Both males and females with a higher frequency of offenses, more serious offenses, or violent rather than nonviolent offenses had lower levels of academic performance. Some evidence was found that low academic performance is related to an early onset of offending and its escalation in seriousness and persistence. Conversely, higher academic performance was associated with desistance from offending.

Second, intelligence and attention problems both act as a common cause of both academic performance and delinquency for males. When variation in either intelligence or attention problems is taken into ac-

count, the association between academic performance and delinquency is reduced to the extent that knowledge of academic performance adds almost nothing to predictions of the likelihood of delinquency. By contrast, neither socioeconomic status (SES) nor conduct problems appears to act as a common cause. When variation in either SES or conduct problems is taken into account, academic performance continued to add to predictions of the likelihood of delinquency.

Third, intervention studies show that improvements in academic performance co-occur with improvements in the prevalence of delinquency. Among the intervention programs that showed significant effects for either academic performance or delinquency, improvement in either or both outcome variables was equally likely. This was true of intervention studies with high-risk children and of prevention studies with community samples of children.

Fourth, effective intervention studies differed for children of broadly different ages. When the participants were adolescents, the more successful intervention programs employed law-related or moral education components. Among children of elementary school age, intervention programs that employed self-control and social skills training combined with parent training were more effective. These types of interventions tended to produce improvements in both academic performance and delinquency at termination rather than one or the other outcome measure.

A. Existing Reviews

Three major reviews of the relationship between academic performance and delinquency have been published in the past quarter century (Silberberg and Silberberg 1971; Gottfredson 1981; Hawkins and Lishner 1987). What progress have these reviews made in answering questions about academic performance and delinquency, and what criteria are available to evaluate the reviews? Data from two types of studies are needed. The first are naturalistic studies, both cross-sectional and longitudinal. These studies contribute estimates of the association between academic performance and delinquency and the data for computing the partial association between academic performance and delinquency with respect to a common variable. The second are experimental intervention studies that measure both academic performance and delinquency. These studies can establish three things: first, whether improvement on a variable having a common relationship

with academic performance and delinquency leads to improvement in *both* academic performance and delinquency; second, whether academically focused interventions can improve academic performance and whether improvements in delinquency also occur either simultaneously or later; and third, whether and how delinquency-focused interventions affect academic performance and delinquency.

The review by Silberberg and Silberberg (1971) is very complete. It reviewed naturalistic studies (i.e., studies in which subjects did not receive interventions) pertaining to the bivariate academic performance and delinquency relationship. It discussed academically focused intervention studies but did not include any intervention studies focused on reducing delinquency. It included an extensive review of "correlated etiological phenomena" of physiological variables such as central nervous system disorders and genetic factors.

Gottfredson's (1981) review represented a major advance and improvement on several fronts. First of all, it explicitly recognized and addressed the relationships among social economic status, ability or intelligence, academic performance, and delinquency. It summarized in a tabular format the principal data on the quantitative bivariate relationships of academic performance, SES, and intelligence with delinquency. Thus for the first time it was possible to see at a glance the magnitudes of the relations of these variables with delinquency. It did not examine intervention studies.

Hawkins and Lishner (1987) produced a comprehensive and far-ranging review of both naturalistic and intervention studies pertaining to delinquency. They included naturalistic studies of the wide range of individual level variables that have been found to be correlated with delinquency. In addition, they reviewed studies linking school level variables such as school climate or school size to delinquency. They concluded with an extensive review of school-based delinquency intervention and prevention strategies. The range of programs reviewed included early educational (preschool) programs, behavior management and curriculum enhancements, and classroom management and instructional practices. The strength of their review is its completeness and breadth of coverage.

Knowledge concerning the relationship between academic performance and delinquency when we began work on this essay can be summarized in the following three statements. First, academic performance and delinquency are, almost without doubt, inversely related

to each other. However, the past reviews did not clarify the strength of this relationship and whether the magnitude of association is the same for males and females and for younger and older children.

Second, a considerable number of other variables, but in particular SES and intelligence, are related to both academic performance and delinquency. However, only a few studies have tested whether intelligence might be a cause of both academic performance and delinquency.

Third, a wide variety of intervention programs of different theoretical orientations have been implemented to attempt to reduce delinquency. However, reviews of intervention programs have not summarized the results quantitatively in even tabular fashion. Thus it is difficult to establish what intervention programs worked because the statistical significance of the result depended on both the sample size and the magnitude of the treatment effect.

The important weaknesses of these previous reviews are methodological and conceptual. The methodological weakness stems from relying on a narrative review format to summarize the literature. The narrative review format (Hunter and Schmidt 1990) lists studies reporting significant or nonsignificant results and attempts to reconcile differing results on the basis of design characteristics (e.g., type of measures or sex of subjects) to arrive at a synthesis. The drawback of the narrative review approach is that it can not provide quantitative answers to what are, after all, quantitative questions. In addition to the central substantive question of overall relationships, these reviews have also not considered whether the quantitative relationships vary with gender or ethnicity. In addition, the literature exhibits considerable methodological variability relative to types of measures of delinquency (e.g., official records). The effects of this methodological variability have also not been considered.

Prior reviews have conceptualized delinquency as a unitary phenomenon. Past reviews have used what is essentially a trait perspective, in which some children display delinquency while others do not. Such a perspective neglects the developmental aspects of delinquency shown by the many studies of age and delinquency and life span studies of crime, which indicate that delinquency, like educational performance, is not constant over time. Furthermore, from the point of view of interventions, the more fruitful questions to ask are whether the onset of offending can be delayed, its severity minimized, or its cessation hastened. Such questions require a developmental framework.

This essay uses the quantitative methodology of meta-analysis to

assess the strength of the academic performance-delinquency relation-ship. The source materials include both cross-sectional and longitudi-nal naturalistic studies and intervention studies. Where possible we examined the possibility that the relationship between academic perfor-mance and delinquency was due to common causal variables such as intelligence, attention problems, or SES. Although many of the princi-pal analyses reported were conducted within the trait perspective, we attempted to apply a developmental perspective to both the phenome-non of delinquency and its relationship with academic performance.

B. Academic Performance and Theories of Delinquency

A considerable number of theories have been developed to explain delinquency (see Siegel [1992] for an overview). Several include aca-demic performance directly or indirectly. In this section, we briefly examine these theories and highlight their differences and similarities. Theoretical predictions made by these theories that are testable by this meta-analysis are identified. However, before turning to theories, we first highlight recent developments in the conceptualization of delin-quency.

1. *Conceptual Perspectives.*   Most often, delinquency has been con-ceptualized as a measure of the prevalence of violations by adolescents of laws applicable to adolescents. Although some investigators have focused on adolescents who committed particular types of crimes (e.g., Tarter et al. 1983; Busch et al. 1990), such investigators are in a minor-ity. The principal theoretical interest has been in explaining the preva-lence of delinquency or, less often, the frequency of its occurrence by resort to such concepts such as differential association, commitment, intelligence, or SES. Work based on this perspective has yielded much information on the correlates of crime using both cross-sectional and longitudinal frameworks.

An alternative conceptualization of delinquency is embodied in the perspective of developmental criminology (Loeber and Le Blanc 1990). This perspective argues that delinquent behaviors, starting with prede-linquent problem behaviors, are continuous with adult offending. De-linquent individuals are thought to progress along a developmental continuum of delinquency, and types of delinquents can be distin-guished accordingly. The terminology of onset, escalation, and de-sistance is used to study the development of delinquent offending in individuals. Thus one can investigate, for example, questions of when the onset of offending occurs and whether the correlates (such as poor

academic performance) of early onset are the same as those of later onset.

2. *Delinquency Theories.*   Theories of delinquency are traditionally separated into three groups in which constitutional factors, psychological factors, or social factors are seen as the principal causes of delinquency. Such theories are variously relevant to understanding the connection between poor academic performance and delinquency.

a. Psychological theories.   Low intelligence was, perhaps, the first variable to be linked to offending. Although the writings of early criminologists mention the apparent low intelligence of criminals, it was not until intelligence tests were developed and employed as research tools in the early 1900s that quantitative measures became available. After a time, however, intelligence fell into disrepute as an explanation of crime, and it was not until Hirschi and Hindelang's (1977) review that low intelligence was reestablished as a cause of crime. Although the mechanism of how low intelligence leads to crime is not clearly understood, current explanations concentrate on the role of intelligence in learning, abstract thought, and problem solving.

Attention and hyperactivity problems are a much more current variable—having been implicated since 1950 (Glueck and Glueck 1950). Since that time, follow-up studies of hyperactive or attention deficit children have relatively consistently identified an excess of delinquency and academic problems in children with these problems compared with control children (e.g., Satterfield, Hoppe, and Schell 1982; McGee and Share 1988; Mannuzza et al. 1989). The mechanism of attention and activity regulation deficits also is not clearly understood; most likely, there is a disruption of processes related to learning and other cognitive/emotional processes.

Recently, Moffitt (1990) has integrated intelligence and attention problems into a model of executive functioning deficits as a causal factor for delinquency. Moffitt's work takes as its starting point the well-known differential in verbal and performance IQ scores and other neuropsychological tests, which measure the abilities to learn and evaluate. She argues that these neuropsychological tests indicate a possible deficit in the ability of the person to use verbal strategies to regulate behavioral production. The key element, she proposes, is the regulation of attention. Thus delinquency is seen as a consequence of the person's inability to modulate their behavior on the basis of past experience and present conditions. Although Moffitt has not extended her analysis to education, other studies have identified attention problems

as an important correlate of poor reading (e.g., Rowe and Rowe 1992). Thus it is possible that children who display executive function deficits will also display reading problems.

   b. Integrated social theories.   Integrated social theories of delinquency developed from efforts to integrate strain-based theories (e.g., Cohen 1955; Cloward and Ohlin 1960), social control theories (e.g., Hirschi 1969), and social learning theories (Burgess and Akers 1966; Akers 1977).

Strain theory contributes the idea that individuals with lower SES lack the social and intellectual resources successfully to enter the middle-class culture that is identified as a goal. Thus when low SES children enter the middle-class institution of school they fail because they lack the necessary socialization that middle-class children have had to succeed in school. Strain theory implies that these children turn to delinquency because of frustration with their failure in school.

Control theory, as articulated by Hirschi (1969), proposes that social relations (bonds) between an individual and others constrain and prevent delinquent behavior. Hirschi's formulation of the social bond consists of an affective attachment to others, a commitment to socially approved courses of action, involvement in those courses of action, and belief in the legitimacy of conventional order. Hirschi's theory emphasizes a developmental-like progression in the scope of the social bond as children move from the bond with their parents to a bond with the school and then to other, larger social institutions. Implicit is the assumption that events weakening these relationships increase the likelihood of delinquency. The role of academic performance in control theory is not clear. Although Hirschi recognized that doing poorly in school would likely weaken all aspects of the social bond, he treated academic performance as a measure of attachment. However, others (e.g., Cernkovich and Giordano 1992) have disagreed and treated academic performance as a measure of commitment.

Social learning theory (Burgess and Akers 1966; Akers 1977) is an application of Skinnerian learning theory to the development of delinquency. Akers proposed that children learn all behavior including delinquent behavior from social interaction with others. Specifically, the twin processes of reinforcement and punishment drive the acquisition and maintenance of behaviors and the supporting beliefs, attitudes, and values.

Integrations of concepts from some or all of the preceding three theories have been offered by Weis and Sederstrom (1981), Elliott,

Huizinga, and Ageton (1985), Hawkins and Weis (1985), Thornberry (1987), and Catalano and Hawkins (forthcoming). These theories are discussed briefly in terms of their conceptualization of academic performance.

Social development theory (Weis and Sederstrom 1981; Hawkins and Weis 1985; Catalano and Hawkins, forthcoming) hypothesizes that involvement and interaction with prosocial others (e.g., family, peers, teachers) interacts with the presence of sufficient skills to produce perceived rewards. Rewards from prosocial involvements lead to an attachment to these prosocial persons and, ultimately, the formation of prosocial beliefs. The presence of prosocial beliefs is believed to reduce the likelihood of delinquency. Academic performance is conceptualized as a measure of a "skills for interaction/involvement" construct. Children displaying high levels of academic performance would be hypothesized to receive substantial rewards from prosocial others in the schools and elsewhere, which would then lead to prosocial attachments and beliefs. Factors such as intelligence are hypothesized to affect delinquency only through their effects on the level of skills for interaction, perceived rewards of prosocial interactions, and opportunities for interaction.

Interactional theory (Thornberry 1987; Thornberry et al. 1991) hypothesizes that attachment to others such as parents, peers, or teachers leads to a commitment to socially endorsed modes of behavior and the development of beliefs that inhibit participation in delinquent behavior. Furthermore, interactional theory posits that attachment and commitment are also affected by current delinquent behavior. Academic performance is considered to be a component item of the "commitment to school" construct. Other items in this construct include how well students like school and how hard they work in school (Thornberry et al. 1991). Thus children with poor academic performance are conceptualized as displaying low commitment to school, which affects delinquency through beliefs. Structural factors such as SES affect the individual's level of attachment and commitment. Finally, this theory recognizes the roles of individual factors such as intelligence or attention problems.

Elliott, Ageton, and Canter (1979) and Elliott, Huizinga, and Ageton (1985) have developed an integrated social theory that emphasizes the role of bonds to both conventional persons and institutions such as schools, and to delinquent peers, as the variables directly predicting delinquency. Weak bonds to conventional persons and institutions are

seen as leading to stronger bonds to delinquent peers. The presence of bonding either to conventional others or to delinquent peers is hypothesized to consist of the attachment, commitment, involvement, and belief components identified by Hirschi (1969). Both types of bonding are hypothesized to be influenced by strain theory variables that measure the dislocations between aspirations and attainment such as in educational or occupational areas. Academic performance is viewed as an indicator of the commitment aspect of the social bond. That is, low performance is a measure of low commitment and acts on delinquency through bonds to delinquent peers. Structural variables such as SES do not appear to enter directly but rather through their expressions as strains between aspiration and attainment. Individual level variables such as intelligence have not been included in the theory.

3. *Quantitative Implications.*   The theories of delinquency causation just reviewed imply two quantitative models (see fig. 1). The first is the common cause model and is implied by psychological theories. Basically, these theories propose that delinquency is caused by a factor or set of factors such as intelligence, attention problems, or executive function deficits. From reviews of the literature on learning in the field of education (e.g., Wang, Haertel, and Walberg 1993), we know that intelligence is an important correlate of academic performance. There is also considerable evidence that attention problems and hyperactivity are also important correlates of academic performance (e.g., Hinshaw 1992). Thus to the extent that academic performance and delinquency share common causes, it is possible that their association is solely spurious.

The key implication of each of the integrated theories of delinquency is that structural variables such as SES have their only effects on the strength of the social bond (Elliott, Huizinga, and Ageton 1985; Thornberry et al. 1991) or on skills for interaction, opportunities for interaction, and perceived rewards (Catalano and Hawkins, forthcoming). This is also true for psychological variables such as intelligence or attention regulation in the case of social development theory (Catalano and Hawkins, forthcoming). Since neither Elliott, Huizinga, and Ageton (1985) nor Thornberry et al. (1991) consider psychological factors, it is not clear how these variables should be modeled. Thus each of these theories implies a mediated model without direct effects. To the extent that the data are available, meta-analytic techniques can be used to summarize the data necessary for testing each of these models.

Common Cause Model
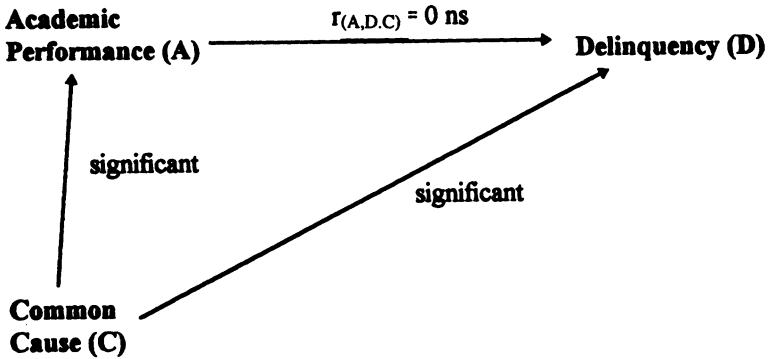
Noncommon Cause Model
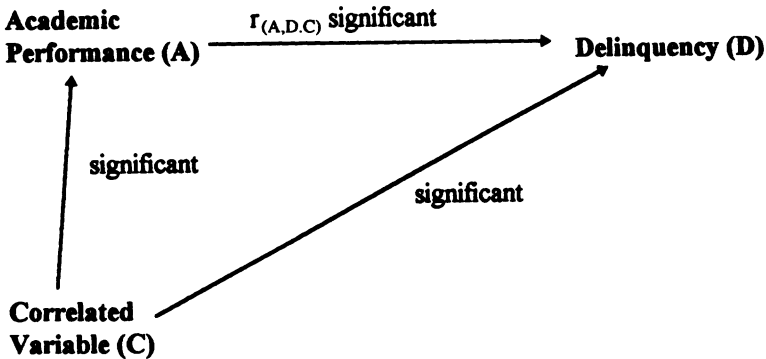
Fig. 1.—Quantitative models implied by theories of delinquency

C. Meta-analysis

Meta-analysis is a method for summarizing the relationship between two variables reported by a set of studies to arrive at a quantitative statement of the strength of that relationship. Meta-analysis uses the information from the statistical tests conducted in each study to generate a measure of the average strength of the bivariate relationships found across the studies (Hunter, Schmidt, and Jackson 1982; Hedges and Olkin 1985; Hunter and Schmidt 1990). By averaging the effect

sizes together, an estimate of the magnitude of the relationship is formed. Under the hypothesis that each study in the meta-analysis has the same effect size, the mean effect size is the best estimate of the population value. Where significant variation in the mean effect size remains after removal of the variation due to sampling error, potential moderator variables (e.g., gender, ethnicity, type of measure) can be tested to determine if they can account for the variation. Thus the analyst can report an estimate of the overall relationship and then test hypotheses that may explain variations in the overall relationship.

Conducting a meta-analysis consists of four relatively straightforward steps: locate potential studies, select the studies according to some selection criteria, compute effect sizes for each bivariate relationship, and analyze the resulting effect sizes (Hunter, Schmidt, and Jackson 1982; Hunter and Schmidt 1990).

1. *Locating Potential Studies.*   Several strategies were used to locate potential studies. First, previous reviews of the correlates of delinquency and of delinquency interventions (e.g., Silberberg and Silberberg 1971; Logan 1972; Lundman, McFarlane, and Scarpitti 1976; Gagne 1977; Wright and Dixon 1977; Romig 1978; Gendreau and Ross 1979; Gottfredson 1981; Hawkins and Lishner 1987) were located, and studies cited there were collected. Second, the reference lists of existing and located studies were themselves scanned, and the citations to new studies were collected. Third, database searches of Psychological Abstracts, Social Work Abstracts, Educational Resources Information Center (ERIC), Public Affairs Information Service, and Sociological Abstracts were undertaken to locate previously unknown studies. The terms used in these searches were developed from our knowledge of the area and from the descriptor terms and related synonyms used by ERIC and Psychological Abstracts. A pool of over one thousand potential studies resulted.

2. *Selecting Studies.*   Each study in the pool was evaluated to determine if it met the criteria for inclusion. Each study, regardless of whether it was a naturalistic study or an intervention study, had to meet the following four criteria: one or more measures of delinquency, one or more academic performance measures, an upper age cutoff of eighteen years, and sufficient data to permit the computation of a usable effect size.

Delinquency was defined on the basis of face validity—that is, whether the measure referred to behaviors that violated the criminal code. Thus measures derived from official records such as police con-

tacts, arrests, convictions, findings of guilt, adjudications, and correctional placement were used. Measures based on the self-reports of the subjects, their parents, or other knowledgeable adults were used if the instrument also contained criminal code violations. To maintain the clarity of the delinquency construct, measures of psychological constructs such as aggression or externalizing behavior or psychiatric diagnoses such as conduct disorder or antisocial personality disorder were not used even though they may overlap with delinquency. Studies that reported composite or "construct" measures labeled as delinquency were used only if one of the component measures met our inclusion criteria.

Academic performance was also based on a face validity definition—whether the measure referred to an evaluation of knowledge that might be gained through formal education or an outcome based on such an evaluation. Thus we used subject-specific and composite measures of performance whether made by teachers, the subjects themselves, or other knowledgeable adults or derived from standardized tests (e.g., California Achievement Tests). Measures such as grade retention or special class placement were also used since these outcomes are the outcomes of more direct performance measures. Measures of ability, such as intelligence or aptitude, were not included as academic performance measures but were considered as potential antecedent variables.

To be included, a study had to report sufficient data to compute an effect size statistic, which measures the degree to which one variable is related to another. Because meta-analysis techniques are based on either the d-statistic, which expresses effect size as the ratio of the difference between group means to the pooled group standard deviation (Glass 1977), or the algebraically equivalent correlation coefficient (Hunter and Schmidt 1990), only studies that presented these statistics directly, or their equivalents (i.e., phi coefficients or t-test values), or presented sufficient data to compute these statistics could be used. Thus studies that reported Yule's Q or the gamma coefficient could not be used.[1]

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[1] Each of the statistics mentioned, including the t-test, which is algebraically equivalent to a correlation coefficient, measures the degree to which one variable is related to another on a scale of -1 to $+1$, where $+1$ indicates a perfect correspondence, -1 indicates a perfect inverse correspondence, and 0 indicates no relationship. Because the computational formulae for the correlation or phi coefficient, Yule's Q, and the gamma coefficient differ from one another, the same data would yield different numerical values of the degree of association for each of these statistics. Since meta-analysis is based on averaging the association across studies, all studies must use the same measure of association.

In addition to the aforementioned requirements, which applied to both naturalistic and intervention studies, intervention studies had to include a control or comparison group of subjects that did not receive an intervention so that other causes of any change might be ruled out. The two groups of subjects could be formed using several methods: random assignment of subjects or groups of subjects (e.g., schools or school classrooms) to groups, matching of treated and untreated subjects on plausibly relevant dimensions (e.g., academic performance or intelligence) when some evidence of the groups' equivalence at assignment also existed, or identification of a comparison group that had not received the intervention but also may not have been equivalent to the intervention subjects (i.e., a nonequivalent comparison group). An example of this last method would be a group of students from the same school who did not receive the intervention. Intervention studies had to report, at a minimum, data on both academic performance and delinquency at the conclusion of the intervention. The analyses of the resulting data had to be appropriate to the type of design used. Random assignment or matching designs could use t-tests of postintervention means, but nonequivalent comparison group designs had to use analysis of covariance or repeated measures, which take into account preexisting differences. The reason for these differing requirements is that the purpose of a nonintervention group is to rule out other causes of any observed improvement in academic performance or delinquency. Although random assignment almost perfectly rules out other explanations, more complex statistical methods can, in principle, compensate for the use of post hoc matching or nonequivalent comparison groups.

At the conclusion of the selection of the studies for the meta-analysis, a number of studies remained that were unsuitable because they did not report usable bivariate measures of association. Those studies that reported multivariate analyses involving academic performance as a predictor of delinquency were retained for presentation in sections for such analyses.

All told, a total of 106 naturalistic studies and twelve intervention studies were selected either for the meta-analysis or the sections on multivariate analysis. The data to be used in the meta-analysis and the supplementary narrative reviews come from several types of designs: cross-sectional, prospective longitudinal, and intervention. The following description of a few selected studies illustrates the range of the research projects.

Among the larger and better-known of the cross-sectional design research projects was the Richmond Youth Project (Hirschi 1969; Jen-

sen and Eve 1976). This study consisted of a stratified probability sample of seventh- through twelfth-grade youth in the Richmond, California, schools in 1964. Participants were assessed once by means of a self-report questionnaire asking about family background and child-rearing practices, attitudes toward delinquency, school, and community institutions (e.g., police and school), and involvement in delinquency. In addition, police records were collected for boys in the sample. Significant associations were found between the educational measures and the delinquency measures.

In contrast, several research projects used prospective longitudinal designs, in which a sample is selected and then followed over time during which one or more assessments are conducted. The sample selected may be a true birth cohort such as the Dunedin Multidisciplinary Health and Development Study (e.g., Moffitt and Silva 1988; Williams and McGee 1994), whose sample consists of all children born in Queen Mary Hospital in Dunedin, New Zealand, in the one-year period beginning April 1, 1972. Children in this study were assessed at two-year intervals beginning at age three until age fifteen and then again at age eighteen. Parents and teachers completed behavior rating scales, and children were tested with standardized tests of intelligence and academic achievement. Studies found that school performance at younger ages was somewhat less strongly associated with delinquency than school performance at older ages.

The Philadelphia Collaborative Perinatal Project (Denno 1990) used a variation of this type of design. This project used a subsample of women who were enrolled in the Philadelphia branch of the Collaborative Perinatal Project, which was a national study of biological influences on pregnancy, child health, and child mortality. Children were included if they had resided in Philadelphia from age ten to seventeen and had received intelligence tests at age seven and achievement tests at ages thirteen to fourteen. Data were taken from the Perinatal Project records, school records, and police records. Here again, significant associations between school achievement tests and later delinquency were found.

Other research projects selected subjects when they were older and followed them at more closely spaced intervals. One example was the Youth in Transition project (e.g., Bachman 1970; Wiatrowski et al. 1982; Lipton and Smith 1983; Wells and Rankin 1983; Agnew 1985). This project involved a nationally representative probability sample of 2,213 tenth-grade boys (both African American and white) who were

selected in 1966. Participants were assessed four times: tenth grade, fall semester; eleventh grade, spring semester; twelfth grade, spring; and thirteenth grade, summer. In addition to standardized intelligence, cognitive ability, and reading tests, and other background measures that were collected only at the first assessment, participants completed measures of delinquency and prosocial behavior, academic perfor- mance, aspirations, and expectations at each assessment. The studies have reported significant associations between academic performance and delinquency during the high school years.

Another example is the Pittsburgh Youth Study (Loeber et al. 1991; Lynam, Moffitt, and Stouthamer-Loeber 1993; Maguin, Loeber, and LeMahieu 1993). This project consists of separately selected samples of first-, fourth-, and seventh-grade boys who were attending the Pitts- burgh Public Schools at the time of their selection in 1987 and 1988. On the basis of an antisocial risk score constructed from parent and teacher reports collected at the screening assessment, high-risk boys were oversampled for subsequent follow-up. Follow-up assessments were conducted at twice yearly intervals for the first five follow-ups and at yearly intervals thereafter. At each assessment, the child and his caretaker complete an extensive interview about pro- and antisocial behavior, beliefs, and attitudes and about family functioning and parent-child relationships. In addition, the child's teacher completes a behavior questionnaire, and data are collected from school, police, and court records. Studies from this project have also confirmed the associ- ation between academic performance and delinquency.

3. *Computation of Effect Sizes.*   In naturalistic studies, an effect size was computed for each academic performance-delinquency measure pair. In intervention studies, an effect size was computed for each academic performance or delinquency comparison between interven- tion and nonintervention groups. The measure of effect size used was the correlation coefficient.[2] A positive sign for the effect size means that a high score on the first variable was associated with a high score

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[2] Although Hedges and Olkin (1985) have proposed remedies to the bias in the sample correlation coefficient as an estimator, the correction is small (.008 for $r = .40$ and $N = 23$, the worst case in these data) in relation to other possible corrections, and it was not used. Hunter and Schmidt (1990) have argued that effect sizes should be corrected for study artifacts (e.g., error of measurement, dichotomization effects, range variation effects, construct validity deviations). However, these corrections could not be made because the necessary data (i.e., reliabilities, ranges, and validity coefficients) have gener- ally not been reported in the literature. Thus the meta-analyses conducted here assume that variables are perfectly measured and are not attenuated by any measurement arti- facts.

on the second variable. Variables measuring retardation or retention in grade (e.g., held back) were reverse coded so that a higher score indicated promotion.

Phi coefficients were computed for 2×2 tables. Tables with more than two levels of the delinquency measure, as would be the case if the delinquency measure were categorized by frequency or seriousness, were collapsed to form a nondelinquent-delinquent dichotomy. If a reasonable scale could be applied to the academic performance categories (e.g., $A = 4$, $B = 3$, etc.), point-biserial correlations were computed based on the assigned scale values. This was done to minimize attenuation due to the dichotomization of academic performance. This procedure was justified, we believe, by analyses to be reported that show consistent evidence of a linear relationship between academic performance and delinquency. Point-biserial correlations were also computed where t-tests were given or where the means, standard deviations, and N's were given. Finally, paired t-test values from matching designs were recomputed as independent groups t-tests. In the one case where the standard deviations were not given, values in the literature were used to estimate these values.

4. *Analysis of Effect Sizes.*   The analysis of the study effect sizes (i.e., correlations) consisted of three steps. The first step is computation of the mean effect size (i.e., correlation) and its variance. The mean effect size is computed as the average of the study effect sizes after weighting by the sample size (i.e., it is N-weighted). Thus the effect size from a large study was given more weight than that from a small study. The variance of the mean effect size is the variance of the N-weighted study effect sizes. The observed variance of the mean effect size is the sum of the variance of the population effect size, which is unknown but can be calculated, and the variance due to sampling error, which is extraneous and can be removed. The second step is the removal of the variance due to sampling error, which was computed from Hunter and Schmidt (1990) from the variance of the study effect sizes. Preplanned analyses of moderator variables (e.g., gender, ethnicity) were conducted in the third step of the analysis. Both substantive (sex or ethnicity of sample) and methodological features (e.g., type of delinquency measure) were used to form homogenous subgroups for which effect sizes were compared to determine whether variation in the population effect size was related to that moderator variable.

5. *Linearity of Academic Performance with Delinquency.*   Because meta-analysis is based on averaging measures of association across studies,

it is assumed that the relationship between academic performance and delinquency is linear. Using data from a number of studies to be included in the main body of the results, we were able to test the following form of this assumption: academic performance is linearly related to the likelihood of delinquency.

Data were available from six studies with seventeen sets of subjects (three sets of females and fourteen sets of males; eight sets of white subjects, seven sets of African American or nonwhite subjects, and two sets of predominant white subjects).[3] Due to the presence of multiple measures of either academic performance, delinquency, or both, a total of thirty-eight tests were possible. The academic performance data were categorized into quartiles, if possible, or were used as presented in the reports. Delinquency was dichotomized. Linear, quadratic, and, if present, cubic and quartic terms were entered simultaneously in a logistic regression of delinquency on academic performance.

The results showed that quadratic, cubic, or quartic terms were significant ($p < .05$) in only two of the thirty-eight analyses. More than this number would have been expected on the basis of chance alone. Thus we concluded that academic performance was linearly related to the likelihood of delinquency and, therefore, that measures of association such as correlations were appropriate.

II. Naturalistic Studies

There are two very important but basic questions about the academic performance-delinquency relationship. First, what is the magnitude of the association between academic performance and delinquency? Second, does the association remain after controlling for other variables? Within the first major question, we address the related questions of whether the association is the same for males and females or for persons of different ethnic backgrounds.

As noted earlier, the magnitude of the association is a measure of the strength of the relationship between two variables, such as academic performance and delinquency. The association can range from -1.0 through $+1.0$. In this essay, we have oriented the academic performance-delinquency effect data so that a negative association means that persons who have a low score on academic performance have a high

[3] The studies were Hathaway and Monachesi (1963); Hirschi (1969); Wolfgang, Figlio, and Sellin (1972); Jensen and Eve (1976); Tracy, Wolfgang, and Figlio (1990); and Maguin, Loeber, and LeMahieu (1993).

score on delinquency. An association of -1.0 means that low academic performance is perfectly associated with high delinquency. If the association were 0.0, this would indicate that no relationship exists between academic performance and delinquency. At several places, we also present some of the conclusions in terms of odds ratios, which are another measure of the association. We have oriented these data so that the odds ratio presents the likelihood of delinquency for children with low academic performance relative to children with high academic performance. An odds ratio greater than 1.0 indicates that children with low academic performance are more likely to be delinquent than those with high performance.

To begin the analysis, effect sizes were first categorized into three possible groups based on the timing of the academic performance assessment relative to the delinquency assessment. Effect sizes that were based on academic performance assessments collected at the same time as the delinquency assessment were labeled as "cross-sectional." A total of 145 raw effect sizes from forty-two studies were classified as cross-sectional. Effect sizes that were based on academic performance assessments collected prior to the delinquency assessment were labeled as "longitudinal." One hundred-seventeen effect sizes from twenty-seven studies were classified as longitudinal. Although effect sizes could also be based on academic performance assessments that were collected *after* the delinquency assessments, these were not included because only two studies reported them (Wiatrowski et al. 1982; McCarthy and Hoge 1984).

Note, however, that in many delinquency studies the period of time covered by the delinquency assessment is the lifetime of the subject in the case of self-report measures, or since the age of legal responsibility, where measures are drawn from official records such as those of police departments or juvenile courts. Thus even in studies we have labeled as "longitudinal" the period covered by academic performance assessment almost always overlapped with the period covered by the delinquency assessment.

A. Cross-sectional Bivariate Analyses

The results of the meta-analysis of association between academic performance and delinquency clearly indicate three points. First, the poorer the academic performance, the worse the delinquency. A mean effect size of $-.149$ was found, which is equivalent to an odds ratio of 2.07, and applies across males and females and across the two ethnic

groups examined. The association was significantly larger for males than for females ($-.151$ vs. $-.094$). It was also larger for whites than for African Americans ($-.185$ vs. $-.134$), but this difference was not significant. Unfortunately, the subjects' ages were all in the range of mid- to late adolescence, meaning it was impossible to explore age as a substantive factor. The magnitude of the association did not depend on whether delinquency was measured by self-reports or from official records.

The 145 effect sizes identified as cross-sectional constituted the sample for this analysis. These effect sizes and the forty-two studies that reported them are presented in table 1. For each study, base population, sample selection method, and sample demographics are presented, followed by the data for specific associations reported. The sex, ethnicity, and size of the analysis sample are given. The academic performance measure used is briefly described by its type, sources (e.g., self, parent, or school record), period of coverage (e.g., past year), and age or grade of the subjects at the time of collection. Similar data are then presented for the delinquency measure. The effect size between the two measures and its statistical significance level is presented in the last column.

The forty-two studies in table 1 do not correspond to forty-two distinct, nonoverlapping groups of subjects. A particular group of subjects may be described in several studies. For example, Kelly (1971) and Polk, Frease, and Richmond (1974) both reported on subjects from the Marion County Youth Study. Likewise, Lynam, Moffitt, and Stouthamer-Loeber (1993) and Maguin, Loeber, and LeMahieu (1993) both reported on subjects from the Pittsburgh Youth Study. Several studies reported on the same group of subjects but at different times (e.g., Lynam, Moffitt, and Stouthamer-Loeber 1993; Maguin, Loeber, and LeMahieu 1993). Finally, a number of studies reported several effect sizes for a single group of subjects.

The problem that each of these arrangements poses to the meta-analysis is that of independence. Meta-analysis is based on the assumptions that each sample contributes one effect size to the meta-analysis, and samples do not have members in common. Neither of these conditions is met in this set of studies. Our approach to treating these violations of independence was to group effect sizes into sets whose subjects did not overlap as recommended by Hunter and Schmidt (1990). Each set, thus, consisted only of those effect sizes that were, in principle, based on the same group of subjects. A composite effect size for each

TABLE 1

Studies Reporting Cross-Sectional Associations between Academic Performance and Delinquency

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Bachman (1970)	Youth in Transition Study, national sample of tenth-grade males in public high schools (11 percent African American) at wave 1	2,213	M		SR GPA past year GATB-J vocabulary Gates reading	SRD frequency past 3 years	−.21*** −.03 −.03
Bazemore and Noblit (1978)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade + all delinquents from wave 1)	452	M		OSR cumulative GPA at grade 12	OR lifetime prevalence at grade 12	−.25***
Broder et al. (1981)	628 adjudicated males (14.8 years old, 41.2 percent white, 41.7 percent African American) + 968 nonadjudicated males (14.1 years old, 61.1 percent white, 27.8 percent African American)	1,596 1,542	M		LD classification (reversed)	OR adjudication SRD frequency	−.20*** −.12***

Study	Sample	N	Sex		Achievement measure	Delinquency measure	r
Cochran and Bo (1989)	Boys in ninth grade in Stavanger, Norway	92	M		OSR grade 9 GPA	SRD frequency at grade 9	$-.28$**
Davis, Sanger, and Morris-Friehe (1991)	One-to-one matching sample of boys in placement and nonadjudicated peers on age (range: 14–17 years) and Full-Scale IQ (range: 90–109)	48	M	W	Achievement: Reading Math Language	OR prevalence	$-.46$**** $-.45$**** $-.40$****
Dishion et al. (1984)	Self-selected tenth-grade boys ($N = 60$) and 10 boys with multiple offenses	69 67	M	W	WRAT reading achievement Parent academic rating (CBCL)	OR lifetime prevalence	$-.29$ $-.33$
		69 67			WRAT reading achievement Parent academic rating (CBCL)	SRD delinquent life-style past year	$-.30$ $-.37$
Donovan and Jessor (1985)	Random sample of junior high students in Colorado school district; year 3 (grades 9–11) data Year 4 (grades 10–12) data	102 141 102 141	M F M F		SR GPA past semester SR GPA past semester	SRD frequency past year SRD frequency past year	$-.06$ $-.30$*** $-.28$** $-.15$*
Elliott and Voss (1974)	Ninth-grade students in two suburban California districts (73 percent white, 14 percent Hispanic, 8 percent African American)	1,338 1,279	M F		Composite of GPA, teacher rating, and achievement	SRD frequency, past 3 years	$-.13$*** $-.08$**

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Empey and Lubeck (1971)	Unmatched groups of persistent delinquent boys (N = 233) and nondelinquent peers (N = 85) aged 15–18 years from Los Angeles area	298	M		School grades	OR conviction	−.41***
	Same selection but from Utah; 249 delinquents and 100 nondelinquents	296	M		School grades	OR conviction	−.43***
Ferguson (1952)	Males who left school legally at age 14 in Glasgow in 1947	1,349	M		OSR GPA at age 14	OR conviction age 8–14	−.10**
Glueck and Glueck (1950)	Matched sample of non–African American, nondelinquent, and delinquent boys on neighborhood, age, ethnicity, and IQ (delinquents: age: 14 years, 8 months, IQ: 92.3; nondelinquents: age: 14 years, 6 months, IQ: 94.2	999	M		Grades repeated (reversed)	OR conviction	−.24***
		1,000			Years retarded (reversed)		−.27***
		1,000			Special class placement (reversed)		−.16***
					Scholastic Aptitude Test achievement:		
		958			Reading		−.17***
		959			Math		−.37***
		999			Last year's GPA		−.37***

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Study	Sample	N	Sex	Race	Measure of ability/achievement	Measure of delinquency	Correlation
Gold (1963)	Matched white boys aged 12–16 years with >1 serious offenses in the past 3 years and nondelinquent boys on IQ, age, socioeconomic status, and school type	120	M		Fifth-grade GPA	OR adjudication	−.10
		148	M		Seventh-grade GPA		−.30***
Hathaway and Monachesi (1963)	Sample of ninth-grade Minnesota students followed to twelfth grade	4,404	M		OSR class rank at grade 11 or 12	OR lifetime prevalence at grade 12	−.16***
		4,637	F				−.09***
Hindelang (1973)	Sixth–twelfth-grade students in rural New York district (98 percent white)	380	M		SR academic ability	SRD variety, past year	−.08
		395	F				−.08
Hirschi (1969)	Richmond Youth Project, random sample of seventh–twelfth grade Richmond, California, public school students	1,156	M	W	DAT scores at grade 8	SRD frequency past year	−.11**
		1,183	M	W		OR frequency police contact	−.15***
		936	M	W		OSR English grade	SRD frequency past year	−.09**
		970	M	W			OR frequency police contact	−.21***
Jensen and Eve (1976)	Richmond Youth Project, random sample of seventh–twelfth grade Richmond, California, public school students	643	M	AA	OSR GPA	SRD frequency	−.14***
		528	F	AA			−.08*
		1,052	M	W			−.14***
		444	F	W			−.16***

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Jerse and Fakouri (1978)	Matched sample of 108 adjudicated and nondelinquents by sex, grade level, and school	216	M + F		Sixth-grade reading grade	OR adjudication	−.28***
					Sixth-grade math grade		−.31***
Kelly (1971)	Marion County Youth Study, wave 1; All tenth-grade male students in Oregon county (99+ percent white)	1,211	M		OSR cumulative GPA at grade 10	OR lifetime court contact, grade 10	−.17***
						OR lifetime frequency > 1 contact, grade 10	−.20***
						OR lifetime felony prevalence, grade 10	−.13***
Kelly and Pink (1973)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	223	M		Commitment at grade 12 (GPA, college plans, homework time, and club membership)	OR lifetime court contact, grade 12	−.25**
						OR lifetime frequency > 1 contact, grade 12	−.17**
						OR lifetime felony prevalence, grade 12	−.19**
Krohn and Massey (1980)	Random sample of seventh–twelfth-grade students in six midwestern districts	3,065	M + F		SR GPA	SRD frequency, minor delinquency	−.33***
						SRD frequency, serious delinquency	−.27***
Lawrence (1985)	Unmatched samples of sixth–twelfth-grade students in juvenile programs or regular Texas schools	171	M + F		GPA	OR adjudication	−.42***
						SRD theft past 3 years	−.25***
						SRD burglary past 3 years	−.15*
						SRD vandalism past 3 years	−.07

Study	Sample	N	Sex	Race	Predictor	Outcome	r
Le Blanc, Vallieres, and McDuff (1992)[a]	Francophone students aged 12–16 years at wave 1	454	M		SR GPA (French + math)	SRD past year at wave 1	−.06
					Years delayed (reversed)		+.01
	Wave 2 sample 2 years later (aged 14–18 years)	379			SR GPA (French + math)	SRD past year at wave 2	−.10
		455			Years delayed (reversed)		−.04
	Wave 1 sample	454	F		SR GPA (French + math)	SRD past year at wave 1	−.04
					Years delayed (reversed)		+.04
	Wave 2 sample	379			SR GPA (French + math)	SRD past year at wave 2	−.26***
		455			Years delayed (reversed)		+.01
Lynam, Moffitt, and Stouthamer-Loeber (1993)	Pittsburgh Youth Study sample of fourth-grade males at age 12–13 (N = 508, 53.5 percent African American, remainder white)	181–218	M	W	Composite teacher rating of reading, math, writing, and spelling at age 12–13	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 12–13	−.21**
		214–67	M	AA			−.33***
Maguin, Loeber, and LeMahieu (1993)[a]	Pittsburgh Youth Study sample of first-grade males at age 6–7	199–208	M	W	Teacher rating grades 1 and 2: Reading	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 6–7	−.21**
					Math		−.11
					CAT achievement grade 1: Reading		−.20**
					Math		−.09
					Parent report *never* held back		−.25****
					In expected grade for age		−.19**

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
		264–87	M	AA	Teacher rating grades 1 and 2:	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 9–10	
					Reading		−.06
					Math		−.08
					CAT achievement grade 1:		
					Reading		−.02
					Math		−.01
					Parent report *never* held back		−.07
					In expected grade for age		−.04
	Pittsburgh Youth Study sample of fourth-grade males at age 9–10	212–18	M	W	Teacher rating grades 4 and 5:		
					Reading		−.34***
					Math		−.31***
					CAT achievement grade 4:		
					Reading		−.27***
					Math		−.26***
					Parent report *never* held back		−.27***
					In expected grade for age		−.27***

	N	Sex	Race	Measure	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 12–13
	256–72	M	AA	Teacher rating grades 4 and 5:	
				Reading	−.28***
				Math	−.33***
				CAT achievement grade 4:	
				Reading	−.13*
				Math	−.16**
				Parent report *never* held back	−.19**
				In expected grade for age	−.21***
Pittsburgh Youth Study sample of seventh-grade males at age 12–13	174–90	M	W	Teacher rating grades 7 and 8:	
				Reading	−.21**
				Math	−.26***
				CAT achievement grade 7:	
				Reading	−.13
				Math	−.16*
				Parent report *never* held back	−.13
				In expected grade for age	−.15*
	221–51	M	AA	Teacher rating grades 7 and 8:	
				Reading	−.23***
				Math	−.19**
				CAT achievement grade 7:	
				Reading	−.09
				Math	−.19**

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Mann (1976)	National sample of boys aged 11–18: younger group age 11–14	316	M		Parent report *never* held back In expected grade for age OR current GPA age 11–14	SRD frequency, past 3 years age 11–14	− .26*** − .23*** − .12
	Older group aged 15–18	290	M		OR current GPA age 15–18	SRD frequency, past 3 years age 15–18	− .19*
McCarthy and Hoge (1984)[a]	Students in seventh, ninth, and eleventh grades of public and parochial schools in two Mid-Atlantic cities, 55 percent male, 49 percent white at time 1)	1,360	M + F		OSR grades past year at wave 1	SRD theft + vandalism frequency past year, wave 1	− .15***
		1,460			OSR grades past year at wave 2	SRD theft + vandalism frequency past year, wave 2	− .14***
		1,313			OSR grades past year at wave 3	SRD theft + vandalism frequency past year, wave 3	− .13***
Meltzer et al. (1984)	Boys aged 13–16, one group in placement (N = 53), and the other group (N = 51) from similar socioeconomic status areas	104	M	W	Achievement (current): Math Spelling Reading comprehension Reading accuracy	OR placement	− .52*** − .28** − .44*** − .43***

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Study	Sample	N	Sex	Race	Academic measure	Delinquency measure	Correlation
Menard and Morse (1984)	25 percent random sample of Elliott and Voss's (1974) sample of ninth-grade students in two California school districts, time 1 data only	257	M + F		OR GPA, past year DAT score	SRD frequency nonserious delinquency past 3 years	− .16*
							− .05
					OR GPA, past year DAT score	SRD frequency serious delinquency past 3 years	− .16*
							− .16*
Noblit (1976)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	261	M		OR cumulative GPA	OR adjudication	− .22**
Palmore and Hammond (1964)	Children whose caretaker received Aid to Families with Dependent Children payments in 1950	52	M	AA	OSR GPA	OR police or court contact	− .26**
		50	F	AA			− .17
		98	M	W			− .22*
		119	F	W			− .40***
Patterson and Dishion (1985)	Oregon Youth Study sample of seventh- and tenth-grade boys at wave 1	133	M		WRAT reading achievement	SRD variety	− .07
		133				OR lifetime police contact	− .11
		115			OSR GPA past 2 years	SRD variety	− .24**
		115				OR lifetime police contact	+ .04
Polk (1969)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	260	M		OSR GPA at grade 12	OR lifetime prevalence at grade 12	− .23***

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Polk (1975)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	260	M		OSR cumulative GPA	OR adjudication	−.23***
Polk, Frease, and Richmond (1974)	Marion County Youth Study, wave 1, all tenth-grade students in Oregon County (99 + percent white)	1,000	M		OR cumulative GPA	OR adjudication	−.26***
Polk and Halferty (1966)	Lane County Youth Study 50 percent sample of ninth–twelfth-grade males in Oregon school	410	M		OSR cumulative GPA	OR adjudication	−.23***
Senna, Rathus, and Siegel (1974)	Suburban New York males aged 14–18 years (88 percent white)	296	M		Composite of SR modal grade, courses failed, and time spent studying	SRD frequency aggression past year	−.15**
						SR frequency theft + vandalism past year	−.21***
						SR frequency shakedown past year	−.16**

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Study	Sample	N	Sex	OSR current GPA	OR current placement	Effect
Swift, Spivack, and Back (1973)	Unmatched groups of seventh–twelfth-grade girls in placement (N = 123) or attending public schools in low socioeconomic status areas (N = 201)	324	F	OSR current GPA	OR current placement	+ .18**
Tygart (1988)	Seventh–twelfth-grade students in California school district	171	M + F	OSR high academic track	SRD frequency school vandalism past 6 months	– .51***
Walker et al. (1993)	Randomly selected sub-samples of low antisocial risk (N = 41) and high antisocial risk (N = 39) from Oregon Youth Study	64 67 65 73	M	Achievement grade 7: Total Reading Math Special class placement (reversed)	OR arrest frequency to grade 7	– .28* – .26* – .22 – .27*
Wells and Rankin (1983)	Youth in Transition Study, national sample of tenth-grade males in public high schools (11 percent African American) at wave 1	1,691	M	SR GPA past year	SRD frequency past 3 years: Total Aggression Theft + vandalism	– .22*** – .23*** – .10***
Wiatrowski et al. (1982)	Youth in Transition Study, national sample of tenth-grade males in public high schools (11 percent black) at wave 1	1,000	M	SR GPA past year	SRD frequency past 3 years	– .17***
	Youth in Transition data at wave 3 (twelfth grade)	1,000		SR GPA past year	SRD frequency past year	– .26***

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TABLE 1 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Williams and McGee (1994)	Dunedin Multidiscipli- nary Health and Devel- opment Study, birth cohort of Dunedin, New Zealand, children (98 percent European background) at age 15	364	M		Burt reading test age 15	SRD frequency age 15	−.17***
		334	F				+.01

NOTE.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; AA = African American; W = white; M = male; F = female; GPA = grade point average; WRAT = Wide Range Achievement Test; CAT = California Achievement Test; LD = learning disabled; GATB-J = General Aptitude Test Battery-Part J; CBCL = Child Behavior Checklist; and DAT = Differential Aptitude Test.

[a] This entry also reports data provided to the current investigators by the original authors.

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

set then was computed by taking the sample-size-weighted average of the effect sizes in that set. The sample size of the set was computed as the average of the sample size of each effect size in the set. Treating the data in this manner resulted in the formation of fifty-one nonoverlapping sets of subjects.[4] Each set of subjects represented a demographically distinct and nonoverlapping group whose data had yielded one or more effect sizes of the association between academic performance and delinquency. It is this collection of effect sizes that was used in the meta-analysis.

Thirty-five sets of subjects were drawn from sampling frames defined by a small political subdivision (e.g., city, county, or school district), and three were from statewide or multistate sampling frames. Three sets of subjects were selected from a nationally representative sampling frame. Only a few studies reported using special techniques to contact all children in the sample frame. Whereas the putative population frame may have been, for example, adolescents in a particular county, the de facto population frame for the majority of studies was adolescents *who were in school on the day of testing*. As a result, there is likely to be a nonresponse bias for studies using self-report data, which is likely to underestimate the true effect size because students who were both unsuccessful students and delinquent are disproportionately represented among those not included in the samples.

The remaining ten sets of subjects (hereafter referred to as nonrepresentatively sampled sets) were composed of approximately equal-sized groups of delinquents and nondelinquents (Broder et al. [1981], an exception, sampled at about 1.5 nondelinquents per delinquent). In all cases, the delinquent subjects were recruited from juvenile correctional facilities, and the nondelinquent subjects were recruited from local school populations. Some means of verifying a subject's official nondelinquent status was employed by all studies. In addition, in four of the data sets, delinquent and nondelinquent subjects were matched to each other on variables such as ethnicity, grade level, sex, or intelligence. Thus these sets of subjects tended to represent extreme groups.

[4] In the course of forming sets of subjects, we removed two studies. The first was Bazemore and Noblit (1978), who used a sample from the Marion County Youth Study that was defined differently from the sample used by Kelly and Pink (1973) as well as several other investigators who used data from this research project. Menard and Morse (1984) was removed because they pooled the sample of males and females that Elliott and Voss (1974) had analyzed separately by sex. Thus the sample from the Menard and Morse (1984) study partially overlapped both the Elliott and Voss (1974) male and female samples.

A preliminary inspection of the effect size data identified one set of subjects (Swift, Spivack, and Back 1973), which was a nonrepresentatively sampled set, as a likely outlier. Its effect size, $+.18$, was distinctly beyond the range of the remaining effect sizes (from $+.04$ to $-.51$). This study was removed, reducing the sample to fifty sets of subjects. Another likely outlier set of subjects (Tygart 1988; $r = -.51$ vs. $r = -.395$ for the next largest effect size) was identified and removed.

A preliminary analysis of the remaining forty-nine sets showed that the mean effect size for nonrepresentatively sampled sets was $-.249$, whereas that for representatively sampled sets was $-.149$. The difference was significant ($z = 2.97, p < .005$, two-tailed). Explanations of this difference are primarily statistical, although other factors may also be operative. As noted earlier, the nonrepresentatively sampled sets of subjects had approximately equal groups of nondelinquents and delinquents. The measure of association is maximized with groups of equal size. In view of the considerable differences in effect size that are confounded with a method effect, we elected to set the nine nonrepresentatively sampled sets of subjects aside and use only the forty representatively sampled sets of subjects in the remaining analyses.

The forty unweighted effect sizes ranged from $+.010$ to $-.395$ with a median of $-.169$ and a mean of $-.165$. The standard deviation of the unweighted effect sizes was .085. The total N was 28,552, with sample sizes ranging from fifty to 4,637. After weighting by the sample sizes, the mean effect size was found to be $-.149$, with a total variance of .0050. Based on the marginal distributions for academic performance and delinquency reported by Kelly (1971), this effect size is equal to an odds ratio of 2.07. An odds ratio of this magnitude indicates that children with low performance (with grades of D or F) are about twice as likely to become delinquent than children with high performance (grades of C or above). In percentage terms, these data indicate that 34.7 percent of children with low performance would be delinquent compared to 20.4 percent of children with high performance.

To estimate the true variance in the effect sizes, the variance due to sampling error (.0013) was subtracted from the total variance. The variance of the effect sizes (Var_{res}) was .0036 (SD = .060), corrected for sampling error. If sampling error were the only cause of variability in the underlying population correlation, the residual variance would be reduced to zero. That it was not indicates that sources of variability remained. The sources of this variability may be substantive effects

such as gender or ethnic group differences, or method factors such as the type of delinquency measures used. We consider each of these factors in turn.

1. *Gender.*   Of the forty effect sizes, twenty-seven were based on samples of males ($N = 15,581$), and ten were based on samples of females ($N = 8,271$). The remaining three effect sizes were from pooled samples of males and females and so were not used in these comparisons. The mean effect size was $-.151$ ($Var_{res} = .0003$) for males and $-.094$ ($Var_{res} = .0012$) for females. Comparing the mean effect sizes for males and females showed the association to be significantly larger for males than for females ($z = 3.20$, $p < .005$, two-tailed).[5]

2. *Ethnicity.*   Unfortunately, only whites and African Americans could be compared because no studies reported data for either Hispanics or Asians. There were eight sets of white subjects ($N = 2,385$) and seven sets of African American subjects ($N = 2,047$). The remaining twenty-five sets of subjects included children of differing ethnic backgrounds and could not be used. The small sample size for both African Americans and whites reflects the fact that data were seldom reported for identified ethnic groups. The resulting mean effect size was $-.185$ ($Var_{res} = -.0023$) for whites and $-.134$ ($Var_{res} = .0044$) for African Americans.[6] The difference between the mean effect sizes for African Americans and whites was not significant ($z = 1.53$, $p < .15$, two-tailed).

3. *Delinquency Measures.*   The two most commonly used methods of obtaining information on delinquency are self-reports and official records from police or courts. Whether both measures show equal relationships with academic performance has not been tested. In the following analysis, the raw effect sizes from each study were grouped by set within type of delinquency measure (self-report or official records). If both types of delinquency measures were collected for the same set of subjects, that set of subjects appeared in both the self-report group and the official records group. Although this violates the principle of independence, we believe the overall conclusions of the test were not

[5] The authors are indebted to John E. Hunter for providing the test of the moderator variables.
[6] A negative value for the residual variance simply indicates that the sample variance was smaller than would be expected, which can occur since it is an estimate (see Hunter and Schmidt 1990).

significantly affected. There were thirteen sets of subjects (N = 13,063) for whom delinquency was measured from official records and twenty-four sets of subjects (N = 15,375) for whom delinquency was measured by self-report. The mean effect size was $-.140$ when based on official records and $-.155$ when based on self-reports. This difference was not significant (z = .67, p < .60, two-tailed).

B. Cross-Sectional Multivariate Analyses

The central finding of the previous section was the association of $-.149$ between academic performance and delinquency across gender and ethnicity. In this section, we consider whether some variables might function as common causes of both academic performance and delinquency. If such variables were found, the association between academic performance and delinquency would be spurious.

Testing whether a variable is a common cause can be accomplished by computing the partial correlation between academic performance and delinquency while controlling for the candidate variable. All that is required, in addition to the effect size between academic performance and delinquency, are the effect sizes between the candidate variable and both academic performance and delinquency. With several candidate variables, the required effect size data might be arranged as a correlation matrix (e.g., Schmidt and Hunter 1992). However, since meta-analyses of candidate variables have not been published, we used our academic performance-delinquency literature to construct such a matrix.

Several variables were tested using cross-sectional data to determine if they fit the common cause model for academic performance and delinquency for males. First, we computed the meta-analytically-derived correlations between SES, intelligence, and attention problems as potential causes, and academic performance and delinquency as the outcomes. The results showed that both intelligence and attention problems function as common causes for males. Controlling for intelligence reduced the partial correlation between academic performance and delinquency to $-.018$. Controlling for attention problems reduced the partial correlation between academic performance and delinquency to $-.029$. However, no support was found for a similar role for SES since the partial correlation was $-.139$. A review of multivariate studies supported the meta-analytic findings of lower effect sizes for males than females.

Seventeen studies listed in table 1 reported measures of association between SES, intelligence, and attention problems-impulsivity and both academic performance and delinquency. These studies are listed in table 2 with the additional information included about the nature and size of the sample and the types of measures. Of the seventeen studies, thirteen included SES as the third variable, five studies included intelligence, and two included attention problems. We found that only two studies included females either as a distinct set of subjects or pooled together with males. Because of this and the significant difference between males and females in the academic performance-delinquency association, we used only males in the common causes analysis.

Using the data from table 2, we computed the effect sizes between the candidate common cause variables and both academic performance and delinquency. Since each effect size was derived from a meta-analysis, six additional meta-analyses were required in addition to the already completed meta-analysis between academic performance and delinquency. As the meta-analysis process has already been described for the academic performance and delinquency analysis, the details are not repeated except as they bear on the rejection of specific studies.

The SES-delinquency and SES-academic performance effect sizes were based on the same twelve sets of subjects. The study by Bazemore and Noblit (1978) was deleted for the reasons noted earlier. Seven of the twelve sets consisted of subjects from differing ethnic backgrounds; the remaining five were equally divided between African American subjects and white subjects. The unweighted SES-delinquency effect size distribution ranged from $+.04$ to $-.24$ with a mean of $-.10$ and revealed no outliers. The resulting weighted mean effect size was $-.079$ with the negative sign indicating that lower SES is associated with delinquency. The unweighted SES-academic performance effect size distribution ranged from $.10$ to $.30$ with a mean of $.19$ after removing Cochran and Bo (1989) ($r = .50$), which appeared to be an outlier. The weighted mean effect size was $.178$, indicating that low SES is associated with low academic performance.

The IQ-delinquency and IQ-academic performance effect sizes were based on the same five distinct sets of subjects. The ethnic composition of the six sets consisted of one set of African American subjects and two sets of white subjects. The remaining sets consisted of subjects from various ethnic backgrounds. The distribution of the unweighted IQ-delinquency effect sizes ranged from $+.02$ to $-.26$ ($.02$, $-.22$,

TABLE 2

Studies Reporting Cross-Sectional Associations between Both Academic Performance and Delinquency and Potential Common Cause Variables

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic Performance/ Delinquency Measure	Association
		N	Sex	Ethnicity			
Bachman (1970)	Youth in Transition wave 1, national sample of tenth-grade males in public high schools (11 percent black)	2,213	M		Quick-Test IQ	SRD frequency past 3 years	.02
						SR GPA past year	.36
						GATB-J vocabulary	.68
						Gates reading	.66
Bazemore and Noblit (1978)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade + all delinquents from wave 1)	452	M		SES	OR lifetime prevalence at grade 12	−.07
						OSR cumulative GPA at grade 12	.19
Cochran and Bo (1989)	Boys in ninth grade in Stavanger, Norway (N = 97)	92	M		SES	SRD frequency at grade 9	−.08
						OSR grade 9 GPA	.50
Dishion et al. (1984)	Self-selected tenth-grade boys (N = 60) and ten boys with multiple offenses	69	M	W	Ammons IQ	OR lifetime prevalence	−.24
		69				SRD delinquent life-style past year	−.26
		69				WRAT reading achievement	.65
		67				Parent academic rating (CBCL)	.23

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Study	Sample	N	Sex	Correlate	Measure	r
Kelly and Pink (1973)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	223	M	SES	OR lifetime court contact at grade 12	−.10
					OR lifetime frequency > 1 contact grade 12	
					OR prevalence grade 12	−.08
					Commitment at grade 12 (GPA, college plans, homework time, and club membership)	.28
Le Blanc, Vallieres, and McDuff (1992)*	Francophone students aged 12–16 years at wave 1	420–21	M	Parent education wave 1	SRD past year at wave 1	.00
					SR GPA (French + math) wave 1	.30
					SR years delayed wave 1 (reversed)	.07
	14–18 years at wave 2	422		Parent education wave 2	SRD past year at wave 2	.07
		353			SR GPA (French + math) wave 2	.17
		425			SR years delayed wave 2 (reversed)	.05
	Wave 1 sample	334	F	Parent education wave 1	SRD past year at wave 1	.03
					SR GPA (French + math) wave 1	.20
					SR years delayed wave 1 (reversed)	.13
		335		Parent education wave 2	SRD past year at wave 2	−.07

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TABLE 2 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic Performance/ Delinquency Measure	Association
		N	Sex	Ethnicity			
	Wave 2 sample	259				SR GPA (French + math) wave 2	.11
		337				SR years delayed wave 2 (reversed)	.07
Lynam, Moffitt, and Stouthamer-Loeber (1993)	Pittsburgh Youth Study sample of fourth-grade males at age 12–13 (53.5 percent African American, remainder white)	181–218	M	W	SES	Self-, parent-, and teacher-reported life-time delinquency seriousness	–.11
					WAIS Full-Scale IQ		–.22
					Self-, parent-, and teacher-reported impulsiveness		.33
					SES	Composite teacher rating of reading, math, writing, and spelling	.27
					WAIS Full-Scale IQ		.65
					Self-, parent-, and teacher-reported impulsiveness		–.40
		214–67	M	AA	SES	Self-, parent-, and teacher-reported life-time delinquency seriousness	–.11
					WAIS Full-Scale IQ		–.25
					Self-, parent-, and teacher-reported impulsiveness		.37
					SES	Composite teacher rating of reading, math, writing, and spelling	.05
					WAIS Full-Scale IQ		.55
					Self-, parent-, and teacher-reported impulsiveness		–.28

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Study	N			Predictor	Outcome	
Maguin, Loeber, and LeMahieu (1993)* Pittsburgh Youth Study sample of first-grade males at age 6–7	205	M	W	Parent SES	Self, parent, and teacher-reported life-time delinquency seriousness at age 6–7	−.08
	208			Parent- and teacher-rated attention problems		.22
	205			Parent SES	Teacher rating at grades 1 and 2 reading	.28
	208			Parent- and teacher-rated attention problems		−.61
	204			Parent SES	Teacher rating at grades 1 and 2 math	.25
	207			Parent- and teacher-rated attention problems		−.56
	199			Parent SES	CAT achievement at grade 1 reading	.29
	199			Parent- and teacher-rated attention problems		−.59
	199			Parent SES	CAT achievement at grade 1 math	.13
	200			Parent- and teacher-rated attention problems		−.53
	205			Parent SES	Parent report *never* held back	.30
	208			Parent- and teacher-rated attention problems		−.42
	205			Parent SES	In expected grade for age	.17
	208			Parent- and teacher-rated attention problems		−.29
	285	M	AA	Parent SES	Self, parent-, and teacher-reported life-time delinquency seriousness at age 6–7	−.10
	287			Parent- and teacher-rated attention problems		.17
	285			Parent SES	Teacher rating at grades 1 and 2 reading	.19
	287			Parent- and teacher-rated attention problems		−.57
	284			Parent SES	Teacher rating at	.14

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TABLE 2 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic Performance/ Delinquency Measure	Association
		N	Sex	Ethnicity			
		286			Parent- and teacher-rated attention problems	grades 1 and 2 math	−.57
		263			Parent SES	CAT achievement at grade 1 reading	.11
		264			Parent- and teacher-rated attention problems		−.50
		264			Parent SES	CAT achievement at grade 1 math	.04
		265			Parent- and teacher-rated attention problems		−.44
		285			Parent SES	Parent report *never* held back	.19
		287			Parent- and teacher-rated attention problems		−.31
		285			Parent SES	In expected grade for age	.14
		287			Parent- and teacher-rated attention problems		−.34
Pittsburgh Youth Study sample of fourth-grade males at age 9–10		216	M	W	Parent SES	Self-, parent-, and teacher-reported life-time delinquency seri-ousness at age 9–10	−.19
		218			Parent- and teacher-rated attention problems		.41
		215			Parent SES	Teacher rating at grades 4 and 5 reading	.33
		217			Parent- and teacher-rated attention problems		−.69
		216			Parent SES	Teacher rating at grades 4 and 5 math	.31
		218			Parent- and teacher-rated attention problems		−.68

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		Predictor	Outcome	
211		Parent SES	CAT achievement at grade 4 reading	.38
213		Parent- and teacher-rated attention problems		−.58
210		Parent SES	CAT achievement at grade 4 math	.32
219		Parent- and teacher-rated attention problems		−.59
216		Parent SES	Parent report *never* held back	.22
218		Parent- and teacher-rated attention problems		−.46
216		Parent SES	In expected grade for age	.17
218		Parent- and teacher-rated attention problems		−.40
269	M AA	Parent SES	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 9–10	−.12
272		Parent- and teacher-rated attention problems		.35
266		Parent SES	Teacher rating at grades 4 and 5 reading	.11
269		Parent- and teacher-rated attention problems		−.50
266		Parent SES	Teacher rating at grades 4 and 5 math	.05
269		Parent- and teacher-rated attention problems		−.60
255		Parent SES	CAT achievement at grade 4 reading	.17
258		Parent- and teacher-rated attention problems		−.34
253		Parent SES	CAT achievement at grade 4 math	.04
256		Parent- and teacher-rated attention problems		−.47
269		Parent SES	Parent report *never* held	.18

TABLE 2 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic Performance/Delinquency Measure	Association
		N	Sex	Ethnicity			
		272			Parent- and teacher-rated attention problems	back	−.37
		269			Parent SES	In expected grade for age	.18
		272			Parent- and teacher-rated attention problems	age	−.35
	Pittsburgh Youth Study sample of seventh-grade males at age 12–13	187	M	W	Parent SES	Self-, parent-, and teacher-reported life-time delinquency seriousness at age 12–13	−.08
		190			Parent- and teacher-rated attention problems		.29
		177			Parent SES	Teacher rating at grades 7 and 8 reading	.26
		180			Parent- and teacher-rated attention problems		−.63
		171			Parent SES	Teacher rating at grades 7 and 8 math	.25
		174			Parent- and teacher-rated attention problems		−.61
		175			Parent SES	CAT achievement at grade 7 reading	.43
		178			Parent- and teacher-rated attention problems		−.50
		171			Parent SES	CAT achievement at grade 7 math	.39
		174			Parent- and teacher-rated attention problems		−.47
		187			Parent SES	Parent report *never* held back	.22
		190			Parent- and teacher-rated attention problems		−.40

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N			Predictor	Outcome	r
187 190			Parent SES Parent- and teacher-rated attention problems	In expected grade for age	.26 −.31
247 251	M	AA	Parent SES Parent- and teacher-rated attention problems	Self-, parent-, and teacher-reported life-time delinquency seri-ousness at age 12–13	−.16 .27
235 239			Parent SES Parent- and teacher-rated attention problems	Teacher rating at grades 7 and 8 reading	.22 −.47
230 234			Parent SES Parent- and teacher-rated attention problems	Teacher rating at grades 7 and 8 math	.28 −.51
220 221			Parent SES Parent- and teacher-rated attention problems	CAT achievement at grade 7 reading	.21 −.31
221 222			Parent SES Parent- and teacher-rated attention problems	CAT achievement at grade 7 math	.24 −.55
247 251			Parent SES Parent- and teacher-rated attention problems	Parent report *never* held back	.17 −.29
247 251			Parent SES Parent- and teacher-rated attention problems	In expected grade for age	.16 −.18

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TABLE 2 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic Performance/ Delinquency Measure	Association
		N	Sex	Ethnicity			
Menard and Morse (1984)	25 percent random sample of Elliot and Voss's (1974) sample of ninth-grade students in two California school districts, time 1 data only	257	M + F		OSR IQ grade 9	SRD frequency nonserious delinquency past 3 years	−.08
						SRD frequency serious delinquency past 3 years	−.16
						OSR GPA	.49
						DAT score	.78
Noblit (1976)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	261	M		SES	OR adjudication	−.11
						OR cumulative GPA	.18
Patterson and Dishion (1985)	Oregon Youth Study sample of seventh- and tenth-grade boys at wave 1	133	M		Ammons IQ	SRD variety	−.28
		133				OR lifetime police contact	−.24
		133				WRAT reading achievement	.25
		115				OSR GPA past 2 years	.40
Polk (1969)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade	260	M		SES	OR lifetime prevalence at grade 12	−.11
						OSR GPA at grade 12	.18

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Study	Sample description	N	Sex	SES measure	Outcome	r
Polk (1975)	Marion County Youth Study, wave 2 (25 percent random sample of wave 1 sample at twelfth grade)	260	M	SES	OR adjudication grade 12	−.11
					OSR cumulative GPA grade 12	.18
Polk, Frease, and Richmond (1974)	Marion County Youth Study, wave 1, all tenth-grade students in Oregon county	1,000	M	SES	OR adjudication grade 10	−.02
					OSR cumulative GPA	.22
Polk and Halferty (1966)	Lane County Youth Study, 50 percent sample of ninth–twelfth-grade males in Oregon school	410	M	Parent occupation	OR adjudication grade 12	−.10
				Parent education		−.16
				Parent occupation	OSR cumulative GPA	.13
				Parent education		.22
Wiatrowski et al. (1982)	Youth in Transition Study, national sample of tenth-grade males in public high schools (11 percent black) at wave 1	1,000	M	SES	SRD frequency past 3 years	−.02
					SR GPA past year	.19
Williams and McGee (1994)	Dunedin Multidisciplinary Health and Development Study, birth cohort of Dunedin, New Zealand, children (98 percent European background) at age 15	364	M	Family disadvantage at age 15 (reversed)	SRD frequency at age 15	−.24
					Burt reading test age 15	.10
		334	F		SRD frequency at age 15	−.11
					Burt reading test age 15	.18

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Note.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; AA = African American; W = white; M = male; F = female; GPA = grade point average; WRAT = Wide Range Achievement Test; CAT = California Achievement Test; WAIS = Wechsler Adult Intelligence Scale; SES = socioeconomic status; GATB-J = General Aptitude Test Battery-Part J; CBCL = Child Behavior Checklist; and DAT = Differential Aptitude Test.

* This entry also reports data provided to the current investigators by the original authors.

−.25, −.25, and −.26), with a mean of −.19. The distribution of the unweighted IQ-academic performance effect sizes ranged from .32 to .65 (.32, .44, .55, .57, and .65), with a mean of .51.

Since the effect sizes are weighted by sample size, an effect size from a large sample plays a critical role in determining the weighted mean effect size. The sample sizes of the six sets of subjects that made up the sample consisted of five sets that ranged in size from sixty-five to 257 and one set with a size of 2,213 (Bachman 1970). In the case of the distribution of the unweighted IQ-delinquency effect sizes, the effect size of the Bachman (1970) set was +.02. However, due to its sample size, the Bachman (1970) set almost completely determined the mean weighted effect size. With Bachman (1970) included, the mean effect size is −.034; however, with Bachman (1970) excluded, the mean effect size is −.243. In view of the singular role of this study, we elected to report both mean effect sizes. The negative sign indicates that low intelligence is associated with delinquency.

In the case of the unweighted IQ-academic performance effect sizes, the effect size from Bachman (1970) was .57, which placed it near the middle of the distribution. We examined the effects of deleting differ-ent combinations of this effect size and the .32 effect size (Patterson and Dishion 1985), which was noticeably smaller in magnitude. The mean effect size changed by less than .03 from the value obtained by using all sets. On this basis, we elected to report only the effect size based on the five sets of subjects. The resulting weighted mean effect size was .558, indicating that low intelligence is associated with low academic performance.

The attention problems-delinquency and attention problems-academic performance effect sizes were based on the same six distinct sets of subjects (three of white male children and three of African American male children), all of which were from the Pittsburgh Youth Study (Loeber et al. 1991). The distribution of the unweighted atten-tion problems-delinquency effect sizes ranged from .17 to .37, with a mean of .28. The weighted mean effect size was .273, indicating that high attention problems are associated with delinquency. The distribu-tion of the unweighted attention problems-academic performance ef-fect sizes ranged from −.38 to −.55, with a mean of −.46. The weighted mean effect size was −.460, indicating that high attention problems are associated with low academic performance.

Table 3 presents the mean effect sizes for the three potential common cause variables with both academic performance and delinquency. The

TABLE 3

Cross-Sectional Correlations between Socioeconomic Status,
Intelligence, Attention Problems, Academic Performance, and
Delinquency for Males

	Academic Performance	Delinquency	
		Full Set	Set after Removal of Bachman (1970)
Academic performance:			
r		.151	
Subjects		15,581	
Sets		27	
Socioeconomic status:			
r	.182	−.083	
Subjects	3,937	4,002	
Sets	11	12	
Intelligence:			
r	.558	−.034	−.243
Subjects	2,800	2,810	597
Sets	5	5	4
Attention problems:			
r	−.460	.273	
Subjects	1,371	1,378	
Sets	6	6	

first line is the effect size, the second is the number of subjects, and the third is the number of groups of subjects.

The common causes hypothesis was tested by computing the partial correlation between academic performance and delinquency, controlling for the hypothesized common cause—SES, intelligence, or attention problems. Controlling for SES, the partial correlation was found to be −.138. Thus SES does not account for the academic performance-delinquency association. However, the result was different when the variable attention problems was tested as the common cause. Controlling for attention problems, the partial correlation was −.029, indicating that attention problems were a likely common cause of both academic performance and delinquency.

The results for intelligence critically depended on how the Bachman (1970) study was treated in the computation of the IQ-delinquency mean effect size. If Bachman was deleted, which yielded a mean IQ-delinquency effect size of −.243, the partial correlation was −.018. However, if Bachman was included, which yielded a mean IQ-delinquency effect size of −.034, the partial correlation was −.159.

Overall, we were inclined to consider Bachman's effect size as an out-lier since the remaining effect sizes were considerably larger and gener-ally well clustered together. We concluded that intelligence functioned as a common cause of both academic performance and delinquency. However, we acknowledge that other interpretations are possible. Only further research can clarify this issue.

Although the results of the previous section have implicated both intelligence and attention problems as common cause variables to both academic performance and delinquency, there may be other variables that function in the same manner. These variables can be suggested by examining the results of the multivariate cross-sectional analyses presented in table 4.

Seven of the nine studies included in their analyses measures of attachment to parents or school, aspirations, and involvement in school, which are constructs from social control theory. In all cases, academic performance was included by itself or as part of a composite measure, which was usually labeled as commitment. Two of the six studies (Thornton and Voigt 1984; Fiqueira-McDonough 1986) in-cluded only social control variables. Four studies used social control plus peer association or peer attachment (Johnson 1979; Krohn and Massey 1980; Gomme 1985; LaGrange and White 1985); one study (Cernkovich and Giordano 1992) used social control variables plus per-ceived risk of arrest, which is a variable from deterrence theory.

One way to look at these seven quite different studies is to ask how many found the multiple regression coefficient (beta) between academic performance and delinquency to be near zero after the other indepen-dent variables had been entered. Although based on only a few studies, there is little consistent evidence that peer association or perceived risk of arrest or social control variables reduce the beta coefficient to near zero. The variable that more often reduces the beta coefficient to near zero is gender. Two of the three studies that conducted within-gender analysis found weaker relationships for females than males (Johnson 1979; Gomme 1985). Only Fiqueira-McDonough (1986) found equally strong relationships for females as for males.

The first of the two remaining studies, Rankin (1980), found no association between having been ever held back and the frequency of offending, both by self-report after controlling for grade level and sex. The second study, Wolff et al. (1982), compared incarcerated boys matched on race and age to nonincarcerated boys. This study found a significant association between reading achievement and adjudication after controlling for intelligence. Although the Wolff et al. (1982) study

runs counter to the results previously reported concerning the role of intelligence, we believe the matching design of the study may, in part, account for the results.

C. Longitudinal Bivariate Analyses

Our analysis of longitudinal relationships indicated several points. Earlier measured academic performance has a mean association of $-.153$ with later measured delinquency. This mean association was found to vary with each of the substantive factors examined. It was substantially stronger for males compared with females, for whites compared with African Americans, and for older children compared with younger children. It was almost independent of the interval between the measurements of academic performance and delinquency. The effect size was larger when delinquency was based on official records than on self-reports of delinquency.

One hundred and ten longitudinal effect sizes from twenty-six studies constituted the sample for this analysis (recall that "longitudinal" as used here refers to designs where the academic performance measurement preceded the delinquency measurement). These twenty-six studies are presented in table 5, with a brief description of the studys' sample demographics, selection method, types of academic performance and delinquency measures used, when the measures were administered, and the associated effect size.

As was true with the cross-sectional data, the 110 longitudinal effect sizes were not from 110 independent samples of subjects. In addition to separate effect sizes for males and females, and whites and African Americans, some studies used multiple measures of academic performance, delinquency, or both (e.g., Tremblay et al. 1992a; Williams and McGee 1994); or conducted multiple assessment waves (e.g., Wiatrowski et al. 1982; Denno 1990; Williams and McGee 1994). Finally, several studies reported results for the same set of subjects (Wiatrowski et al. 1982; Lipton and Smith 1983; Wells and Rankin 1983). We applied the same procedures as were used in the analysis of the cross-sectional data. That is, we identified distinct sets of subjects and then averaged together all effect sizes that were developed from the data for that set of subjects.[7] This resulted in thirty-one distinct sets of subjects, which spanned the remaining 105 effect sizes.

[7] Two studies, Moffitt and Silva (1988) and Walker et al. (1991), were removed because they analyzed a sample that overlapped with other studies. In the case of Moffitt and Silva (1988) the overlap was with McGee et al. (1988) and Williams and McGee (1994), and, in the case of Walker et al. (1991), the overlap was with Patterson, Capaldi, and Bank (1991).

TABLE 4

Studies Reporting Cross-Sectional Multivariate Analyses of Academic Performance as a Predictor of Delinquency with Controls for Third Variables

| Study | Selection and Description of Overall Sample | Analysis Sample | | | Academic Measure | Delinquency Measure | Control Variables | Association |
		N	Sex	Ethnicity				
Cernkovich and Giordano (1992)	Random sample of youth aged 12–19 years from Ohio city	233	M	AA	Commitment (SR grades, value of grades, and homework aspirations)	SRD frequency past year weighted by seriousness	School and teacher attachment, SES, arrest risk, age, school involvement, parent commitment, opportunities, school context	−.21*
		196	M	W				−.21*
		238	F	AA				−.18
		217	F	W				−.15
Fiqueira-McDonough (1986)	Two schools (TOPS and CENTRAL) in same community differing in school climate (that is, goals, rule making, discipline, problems, and supervision) (N = 350 tenth-grade students)	SSNR	M		SR GPA past year at TOPS	SRD frequency minor delinquency past year	Illegal opportunity, school activities, family aspirations, school attachment, career aspirations, material aspirations, public equality, private equality, self-concept	−.23[a]
		SSNR	F					−.22[a]
		SSNR	M		SR GPA past year at CENTRAL			−.26[a]
		SSNR	F					−.26[a]

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Study	Sample	N	Sex		Dependent measure	Independent measure	Control variables	r
Gomme (1985)	Seventh–tenth-grade students in Ontario, Canada, city (total N = 429)	SSNR	M		Failed course in past 2 years	SRD total frequency past year	SES, age, peer association, belief in law	−.16*
						SRD serious frequency past year		−.15*
						SRD theft frequency past year		−.10
						SRD status frequency past year		−.16*
		SSNR	F		Failed course in past 2 years	SRD total frequency past year	SES, age, peer association, belief in law	−.01
						SRD serious frequency past year		−.02
						SRD theft frequency past year		−.04
						SRD status frequency past year		−.02
Johnson (1979)	Tenth-grade students in 3 high schools in below-median income areas (N = 518 white, 114 Asian, 60 African American, 42 other)	207	M	W	SR composite of modal grade, work level expected, school difficulty, and success	SRD frequency past year	Social class, parental concern	.22**
		178	F	W				N.S.[b]

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TABLE 4 (Continued)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Control Variables	Association
		N	Sex	Ethnicity				
Krohn and Massey (1980)	Random sample of seventh- to twelfth-grade students in six midwestern districts ($N = 3,065$)	SSNR	M		SR GPA	SRD frequency minor	Maternal, paternal, and peer attachment; commitment; educational and career aspirations, beliefs in laws, parental morals, value of school	−.25[a]
						SRD frequency serious		−.19[a]
		SSNR	F			SRD frequency minor		−.17[a]
						SRD frequency serious		−.11[a]
LaGrange and White (1985)	Rutgers Health and Human Development Study sample				Composite of SR math and English grades past 3 years, SR last semester GPA	SRD frequency past 3 years	School commitment, school attachment, parent attachment, parent love, delinquent peers, SES	
	Males aged 12	122	M					−.09
	Males aged 15	138	M					−.15
	Males aged 18	81	M					−.01
Rankin (1980)	Random sample of seventh- to eleventh-grade students in 33 Michigan public school districts	385	M + F		SR ever held back	SRD frequency past year	Sex, grade level	N.S.[b]

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Study	Sample	N	Sex	Independent measure	Dependent measure	Variables controlled	Coefficient
Thornton and Voigt (1984)	Random sample of fourth–twelfth-grade students in large city public schools	3,500	M + F	Commitment (SR GPA, likes school, and importance of grades)	SRD frequency: Minor theft Major theft Violence	Age, SES, gender, belief in law, involvement, attachment to school, parents, parental social control, peer delinquency, exposure to media violence, time watching television	−.44** −.23* −.16
Wolff et al. (1982)	56 incarcerated white boys ages 14–16 matched on age and race with 48 lower-middle- and 48 upper-middle-class boys without known or SR delinquency	152	M	PIAT reading achievement	OR adjudication or school and SR arrest	IPAT Culture Fair IQ	b***

Note.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; SSNR = sample size not reported; AA = African American; W = white; M = male; F = female; GPA = grade point average; SES = socioeconomic status; PIAT = Peabody Individual Achievement Test; and IPAT = Institute for Personality and Ability Testing; N.S. = not significant.

a Significance level not reported.

b Coefficient not reported or could not be computed.

* p < .05.

** p < .01.

*** p < .001.

TABLE 5

Studies Reporting Longitudinal Associations between Academic Performance and Delinquency

| | | Analysis Sample | | | | | |
Study	Selection and Description of Overall Sample	N	Sex	Ethnicity	Academic Measure	Delinquency Measure	Association
Denno (1990)	Philadelphia Collaborative Perinatal Project subsample of African American youth born 1959–62 and residing in Philadelphia from age 10 to 17 who attended public schools and had IQ and achievement data	487	M	AA	WRAT (age 7):	OR prevalence police contact age 10–17	
					Spelling		+ .03
					Reading		− .09*
					Arithmetic		− .03
					CAT achievement (age 14–15):		
					Total		− .10*
					Reading		− .10*
					Math		− .08*
					Spelling		− .12**
					Language		− .10*
		500	F	AA	WRAT (age 7):		
					Spelling		− .09
					Reading		− .07
					Arithmetic		− .04
					CAT achievement (age 14–15):		
					Total		− .17***
					Reading		− .16***
					Math		− .16***
					Spelling		− .15***
					Language		− .16***

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Study	Sample	N	Sex		School measure	Delinquency measure	
Ferguson (1952)	Males who left school legally at age 14 in Glasgow in 1947	1,275	M		School GPA at age 14	OR conviction age 15–18 but not prior	−.12**
		1,349				OR conviction age 8–18	−.14***
						2 or more OR convictions age 8–18	−.13***
Kupersmidt and Coie (1990)	Fifth-grade children in semi-rural area (69 percent white, 47 percent female)	104	M + F		OSR composite GPA at grade 5	OR police contact at age 18	−.11
Le Blanc, Vallieres, and McDuff (1992)[a]	Francophone students aged 12–16 years at wave 1 and aged 14–18 years at wave 2	451	M		SR GPA (French + math) wave 1	SRD past year at wave 2	−.08
					SR years delayed (reversed)		−.04
		362	F		SR GPA (French + math) wave 1	SRD past year at wave 2	−.03
					SR years delayed (reversed)		+.02
Lipton and Smith (1983)	Youth in Transition sample; national sample of tenth-grade males in public high schools (11 percent African American), wave 1 (grade 10) and wave 2 (grade 11)	1,592	M	W	SR GPA past year at grade 10	SRD frequency theft + vandalism at grade 11	−.10

TABLE 5 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Maughan, Gray, and Rutter (1985)	10-year-old white children attending schools in an inner London borough in 1970 ($N = 1,689$); subsample with/without reading retardation and antisocial or mixed behavior selected for follow-up and for interview 1 year after leaving school	84	M	W	Reading retardation at age 10 (>2 years below expected grade adjusted for IQ and age)	OR caution or conviction up to age 18	−.07
McCarthy and Hoge (1984)[a]	Students in seventh, ninth, and eleventh grades of public and parochial schools in Mid-Atlantic cities (55 percent male, 49 percent white at time 1)	1,379	M + F		OSR grades past year at wave 1	SRD theft + vandalism frequency past year wave 2	−.13***
		1,485			OSR grades past year at wave 2	SRD theft + vandalism frequency past year wave 3	−.11***
		1,403			OSR grades past year at wave 1	SRD theft + vandalism frequency past year wave 3	−.10***

Study	Sample	N	Sex	Measure	Outcome	r
McGee et al. (1988)	Dunedin Multidisciplinary Health and Development Study, birth cohort of Dunedin, New Zealand, children at age 13	428	M	Reading disability at ages 9 and 11	SR police contact	.01
					Parent-reported police contact	+.05
		403	F		SR police contact	−.04
					Parent-reported police contact	+.04
Moffitt and Silva (1988)	Dunedin Multidisciplinary Health and Development Study; birth cohort of Dunedin, New Zealand, children (98 percent European background) at age 13	678	M + F	Burt reading test age 11	Composite of SRD frequency, parent-reported socialized aggression, teacher-reported antisocial (age 13)	−.17***
Ouston (1984)	Children born in school-year 1959 and attending at 1 of 12 London schools	1,220	M	NFER reading test at age 14	OR caution or guilt by age 18	−.15***
		954	F			−.10**
	Subsample of children in present study who were included in another study	374	M	NFER reading test at age 10		−.14**
		483	F			−.08
Patterson, Capaldi, and Bank (1991)	Oregon Youth Study sample of fourth-grade boys from schools in high-crime areas	91	M	Teacher CBCL composite grade 4	SRD at grade 7	−.10
					OR police contact at grade 8	−.22
				OSR composite achievement grade 4	SRD at grade 7	−.09
					OR police contact at grade 8	−.07
				WRAT Reading grade 4	SRD at grade 7	−.03
					OR police contact at grade 8	−.04

TABLE 5 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Robins and Hill (1966)	Purposive selection of boys born 1930–34 and attending at least 6 years to yield median splits on SES, father in home, and school problems	296 / 256	M	AA	OSR school retardation grades 1–6 (reversed)	OR police/court contact lifetime: To age 15 / To age 17 / Age 16–17 only	−.20*** / −.11 / −.05
Schafer (1972)	Boys in 2 schools who were continuously enrolled for grades 10–12 and were not delinquent at grade 10	568	M		OSR GPA at grade 9	OR adjudication at grade 12	−.11**
Schafer, Olexa, and Polk (1972)	Boys in 2 schools who were continuously enrolled for grades 10–12 and were not delinquent at grade 10	1,157	M + F		OSR high academic track at grade 10	OR adjudication at grade 12	−.16***

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Study	Sample	N	Sex	Race	Achievement measure	Outcome measure	r
Spreen (1981)	Boys who were diagnosed as LD at ages 8–12 (N = 57) and random sample of boys of average ability from high schools with no history of learning problems or brain damage (N = 52) matched at group level on sex, age, and SES	86	M		OSR LD diagnoses ages 8–12 (reversed)	SR police contact ages 16–20	−.09
						Parent report police contact ages 16–20	−.19
						SRD > 1 serious offense ages 16–20	−.07
						SRD frequency ages 16–20	−.08
Tracy, Wolfgang, and Figlio (1990)	1958 Philadelphia birth cohort of males born in 1958 and residing in Philadelphia from age 12 to 18	2,455	M	W	CAT achievement at age 12	OR police contact at ages 10–18	−.24***
		4,305	M	NW			−.17***
Tremblay and Masse (1993)	Low SES, white, Francophone boys attending kindergarten in 53 Montreal schools	587	M	W	Age 10 achievement: French	SRD frequency age 14:	
						Stealing	−.06
						Vandalism	−.07
						Aggression	−.13**
					Age 10 achievement: math	SRD frequency age 14:	
						Stealing	−.03
						Vandalism	−.03
						Aggression	−.09*

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TABLE 5 (Continued)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Tremblay et al. (1992a)	Concordia University High Risk Project sample of first-grade children from low-middle and impoverished areas of Montreal	67	M		Age 7 achievement: French	SRD frequency past year grade 7	−.33**
					Math		−.31**
					Age 7 achievement: French	SRD aggression frequency past year grade 7	−.22
					Math		−.24
					Age 10 achievement: French	SRD frequency past year grade 7	−.19
					Math		−.30**
					Age 10 achievement: French	SRD aggression frequency past year grade 7	−.20
					Math		−.32**
		80	F		Age 7 achievement: French	SRD frequency past year grade 7	+.02
					Math		+.03
					Age 7 achievement: French	SRD aggression frequency past year grade 7	−.01
					Math		−.01
					Age 10 achievement: French	SRD frequency past year grade 7	−.17
					Math		−.20
					Age 10 achievement: French	SRD aggression frequency past year grade 7	−.16
					Math		−.21

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Study	Sample	N	Sex	Predictor measure	Outcome measure	Correlation
Walker et al. (1993)	Randomly selected subsamples of low antisocial risk (N = 41) and high antisocial risk (N = 39) fourth-grade boys from Oregon Youth Study	60	M	Achievement grade 7: Total	OR + SRD composite to grade 7	−.28*
				Reading		−.20
				Math		−.27*
				Special class placement (reversed)		−.14
Wallander (1988)	Danish males without history of parental psychiatric hospitalization	34	M	Never held back	OR arrest frequency to age 18–21	−.07
				Special class placement (reversed)		−.01
Wells and Rankin (1983)	Youth in Transition sample; national sample of tenth-grade males in public high schools (89 percent white; waves 1 (grade 10), 2 (grade 11), and 3 (grade 12)	1,691	M	SR GPA past year at grade 10	SRD frequency at grade 12: total	−.23***
					Theft + vandalism	−.12***
					Aggression	−.19***
				SR GPA past year at grade 10	SRD frequency at wave 2: total	−.19***
Werner and Smith (1977)	1955 birth cohort of children born on Kauai (42 percent low SES; 97 percent nonwhite)	320	M	OSR grade 4 reading achievement	OR police/court contact at age 18	−.20***
				OSR LD Dx at age 10 (reversed)		−.07
		313	F	OSR grade 4 reading achievement		−.18**
				OSR LD Dx at age 10 (reversed)		−.15**
West and Farrington (1973)[a]	Cambridge Study in Delinquent Development; all males in 6 lower-class London schools (90 percent white, British origin)	411	M	Secondary school allocation age 11	OR conviction ages 10–16	−.15**
		411		Junior attainment age 11		−.18***
		409		Secondary school allocation age 11	SRD ages 14 and 16	−.13**
		409		Junior attainment age 11		−.17***

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TABLE 5 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Association
		N	Sex	Ethnicity			
Wiatrowski et al. (1982)	Youth in Transition Study; national sample of tenth-grade males in public high schools (11 percent black) at wave 1 (grade 10), wave 2 (grade 11), wave 3 (grade 12), and wave 4 (grade 13)	1,000	M		SR GPA past year at grade 10	SRD frequency past year grade 12	$-.19$***
						SRD frequency past year grade 13	$-.13$***
						SRD serious past year grade 13	$-.12$***
					SR GPA past year at grade 12	SRD frequency past year grade 13	$-.18$***
						SRD serious past year grade 13	$-.13$***
Williams and McGee (1994)	Dunedin Multidisciplinary Health and Development Study; birth cohort of Dunedin, New Zealand, children (N = 1,037; 98 percent European background) at age 15	364	M		Burt reading test age 7	SRD frequency age 15	$-.05$
					Prose reading test age 7		$-.02$
					Burt reading test age 9		$+.02$
					Dunedin spelling test age 9		$-.06$
		334	F		Burt reading test age 7		$-.03$
					Prose reading test age 7		$-.01$
					Burt reading test age 9		$+.02$
					Dunedin spelling test age 9		$-.06$

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| Wolfgang, Figlio, and Sellin (1972) | 1945 Philadelphia birth cohort of males born in 1945 and residing in Philadelphia from age 12 to 18 (N = 7,043 whites, 2,902 non-whites) | 2,642 | M | W | Achievement test at grade 6 or below | OR police contact ages 10–18 | − .26*** |
| | | 1,207 | M | NW | | | − .12*** |

Note.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; AA = African American; W = white; M = male; F = female; GPA = grade point average; WRAT = Wide Range Achievement Test; CAT = California Achievement Test; SES = socioeconomic status; LD = learning disabled; Dx = diagnosis; NFER = National Foundation for Educational Research; and CBCL = Child Behavior Checklist.

[a] This entry also reports data provided to the current investigators by the original authors.

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

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Inspection of these thirty-one sets revealed that one set of subjects (Spreen 1981) was selected using a nonrepresentative sampling design. This set was removed from the data set to maintain consistency with the cross-sectional meta-analysis.

Of the remaining thirty sets of subjects, twenty-one sets were composed of males, seven sets were composed of females, and the remainder were composed of both males and females. Three of the sets of subjects were composed of African American children, three sets were composed of white children, and two sets were composed of nonwhite children. The remaining sets of subjects were from several different or unspecified ethnic backgrounds. The sample sizes of the sets of subjects ranged from a low of thirty-four (Wallander 1988) to a high of 4,305 (the nonwhite sample of Tracy, Wolfgang, and Figlio 1990).

Inspection of the 101 raw, unweighted effect sizes for the thirty sets of subjects revealed that the distribution ranged from $+.045$ to $-.330$, with a median of $-.114$ and a mean of $-.112$. The distribution of the thirty effect sizes for the thirty sets of subjects showed the range to be from $-.005$ to $-.264$, with a mean of $-.118$ and a standard deviation of $.065$. The distribution also showed the presence of a set of three effect sizes that were approximately 1.3–1.5 SD above the next largest effect size. Two of the effect sizes were from very large samples: the set of white subjects from the Tracy, Wolfgang, and Figlio 1990 study and the set of white subjects from the Wolfgang, Figlio, and Sellin (1972) study. The third was from a considerably smaller and therefore less influential sample. To represent the effects of the sets of subjects from these two studies, we computed the effect sizes with and without them. However, we emphasize the results computed with the two sets of subjects included.

The mean effect size with the two sets of subjects included was $-.153$, with a total variance of $.0039$, a sampling error variance of $.0012$, and an N of 24,361. However, with the two sets of subjects deleted, the mean effect size was $-.127$, with a total variance of $.0019$, a sampling error variance of $.0014$, and an N of 19,265. The variance of the effect sizes, corrected for sampling error, was $.0028$ with the two sets of subjects included and $.0005$ with the two sets of subjects excluded. The two sets of subjects, thus, have some impact on the mean effect size.

Based on the marginal distributions for academic performance and delinquency reported by Kelly (1971), an effect size of $-.153$ is equal to an odds ratio of 2.11. In percentage terms, 35.0 percent of children

with low performance would be delinquent compared to 20.3 percent of children with high performance. For an effect size of $-.127$, the equivalent odds ratio is 1.87.

1. *Gender.* The comparison of the strength of the association by gender was based on twenty-one distinct sets of male subjects ($N = 19,786$) and seven distinct sets of female subjects ($N = 3,049$). The mean effect size for males was $-.166$ ($Var_{res} = .0025$) and $-.086$ ($Var_{res} = .0001$) for females. The test for differences between the effect size for males and females was significant ($z = 3.55$, $p < .001$, two-tailed), which indicated that the academic performance-delinquency association was larger for males than females. Removing the two previously identified effect sizes reduced the mean effect size for males to $-.137$, but the significant difference between males and females remained.

2. *Ethnicity.* Two studies (Wolfgang, Figlio, and Sellin 1972; Tracy, Wolfgang, and Figlio 1990) identified their subjects as either "whites" or "nonwhites." We interpreted their "nonwhite" label to mean primarily African American. There were five distinct sets of African Americans ($N = 6,782$), three distinct sets of whites ($N = 5,181$), and 21 sets of subjects with various ethnic heritages ($N = 12,412$). The resulting mean effect size was $-.146$ ($Var_{res} = -.0003^6$) for African Americans, $-.246$ ($Var_{res} < .0001$) for whites, and $-.119$ ($Var_{res} = .0003$) for sets with subjects of differing heritages. The comparison for mean effect sizes revealed that the effect size for whites, which included the two large effect sizes, was significant ($z = 6.00$, $p < .001$, two-tailed). However, when the effect size for African Americans was compared to that for subjects of differing heritages, the difference ($-.146$ versus $-.119$, respectively) was just barely not significant ($z = 1.95$, $p < .06$, two-tailed). Although these data do not support a definitive statement, the mean effect size for African Americans and whites seem more different than alike.

3. *Age.* The third factor examined was the joint effect of age at academic performance assessment and delinquency assessment. Three groups were defined from an examination of the distributions of ages at academic performance assessment and delinquency assessment and their joint distribution. Group A (seven sets of subjects, $N = 1,863$) received academic performance assessments before age eleven and delinquency assessments before age sixteen. Group B (eight sets of subjects, $N = 2,837$) also received academic performance assessments before age eleven but received delinquency assessments at age sixteen or

after. Group C (eighteen sets of subjects, $N = 20{,}938$) received academic performance assessments at age eleven or after and delinquency assessments at age sixteen or after. It should be noted that some sets of subjects were allowed to contribute effect sizes to more than one group. For example, if one set of subjects had completed academic performance assessments both before and after age eleven and were assessed for delinquency after age sixteen, those subjects' data would appear in both group B and group C. Although this practice violates the principle of independence, we believe the results are sufficiently robust to mitigate any concerns.

All possible pairwise tests were examined to determine whether and where differences were to be found. The results showed no differences in mean effect size between group A and group B ($M = -.074$ vs. $-.094$, respectively). However, group C had a significantly larger mean effect size ($M = -.164$) than either group A or group B ($z = 2.91$, $p < .005$ and $z = 3.45$, $p < .001$, respectively, all two-tailed). Because both effect sizes from the large samples were in group C, we removed them and recomputed the comparisons. Although the mean effect size of this group was reduced, it remained significantly larger than that for either group A or group B. The academic performance-delinquency relationship, thus, appears to become stronger with increasing age.

4. *Delinquency Measures.*   A test for differences in the mean effect size by the type of delinquency measure (self-report or official records) was conducted by grouping the raw effect sizes from each study by subject within type of delinquency measure in the same manner as in the cross-sectional analysis. There were twenty-one sets of subjects ($N = 19{,}316$) for whom delinquency was measured from official records and eleven sets of subjects ($N = 5{,}502$) for whom delinquency was measured by self-report. The mean effect size was $-.168$ when based on official records and $-.101$ when based on self-report. This difference was significant ($z = 3.27$, $p < .005$, two-tailed). The difference remained significant when the two large effect sizes from the two large studies were removed. Thus the predictive association between poor academic performance and delinquency was stronger for official than for self-reported measures of delinquency.

D. Longitudinal Multivariate Analyses

The previous section reported that academic performance and delinquency were correlated even when the measurements were separated by several years. This section addresses the question of whether SES

or conduct problems might function as a common cause of both academic performance and delinquency when longitudinal data are considered. Again, these analyses are based on effect sizes developed from the already identified studies. Studies reporting other multivariate results are also examined.

Socioeconomic status and conduct problems were tested to determine if they fit a common cause model for the predictive association between academic performance and delinquency. The results showed that SES was not a common cause of both academic performance and delinquency and thus replicates the results found earlier for SES in the cross-sectional analyses. The results for conduct problems accounted for only a small part of the association between academic performance and delinquency. Therefore conduct problems did not function as a common cause of academic performance and delinquency. Multivariate analyses showed that controlling for prior delinquency reduced the contribution of prior academic performance to later delinquency. Children who have increased their offending, whether in seriousness or frequency, had poorer academic performance than those who had not.

The studies listed in table 5 were reviewed to identify potential common cause variables that could account for the association between academic performance and delinquency. Because our interest was in examining the common cause model, we judged that potential common cause variables that were measured after the academic performance measure would have very little facial validity. It could be plausibly argued that poor academic performance leads to greater attention problems or conduct problems. Although the ideal test of the common cause model in longitudinal data would be to measure both the potential common cause and academic performance at the same time, we found that this requirement imposed a severe loss of data. Thus we allowed common cause variables measured before academic performance, so long as the common cause variable was measured after the start of elementary school. Although our choice reflects an assumption of continuity in behavior and its stability over time, which has some empirical support (see, e.g., Olweus [1979], for aggression and intelligence), it should be subjected to empirical validation.

We were able to examine SES and conduct problems with academic performance and delinquency. We were not able to include intelligence and attention problems because there were few distinct sets of subjects in the studies we examined. The resulting set of studies on which the common causes analyses were based are presented in table 6.

TABLE 6

Longitudinal Follow-up Studies Reporting Associations between Both Academic Performance and Delinquency with Potential Common Cause Variables

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic/ Delinquency Measure	Association
		N	Sex	Ethnicity			
Le Blanc, Vallieres, and McDuff (1992)*	Francophone students aged 12–16 years at wave 1 and 14–18 years at wave 2	418	M		Parent education wave 1	SRD past year at wave 2	+ .07
		421				SR GPA (French + math) wave 1	.30
		420				SR years delayed wave 1 (reversed)	.07
		332	F			SRD past year at wave 2	– .04
		334				SR GPA (French + math) wave 1	.20
		334				SR years delayed wave 1 (reversed)	.13
Lipton and Smith (1983)	Youth in Transition sample; national sample of tenth-grade males in public high schools (11 percent black), wave 1 (grade 10) and wave 2 (grade 11)	1,592	M		Parent SES grade 10	SRD frequency theft + vandalism at grade 11	+ .02
						SR GPA past year at grade 10	.25

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Study	Sample	N	Sex	Predictor	Outcome	r
Maughan, Gray, and Rutter (1985)	10-year-old white children attending schools in an inner London borough in 1970; subsample with/without reading retardation and antisocial or mixed behavior selected for follow-up and interview one year after leaving school	84	M	Teacher rating antisocial behavior age 10	OR caution or conviction up to age 18	.14
					Reading retardation at age 10 (>2 years below expected grade adjusted for IQ and age)	−.10
Patterson, Capaldi, and Bank (1991)	Oregon Youth Study sample of fourth-grade boys from schools in high-crime areas	91	M	Grade 4 ratings:	SRD at grade 7	
				SR ASB		.52
				Teacher ASB		.39
				Parent ASB		.39
				Observer ASB		.12
				SR ASB	OR police contact at grade 8	−.01
				Teacher ASB		.46
				Parent ASB		.35
				Observer ASB		.01
				SR ASB	Teacher academic composite grade 4	−.17
				Teacher ASB		−.55
				Parent ASB		−.30
				Observer ASB		−.16
				SR ASB	WRAT reading achievement grade 4	−.15
				Teacher ASB		−.25
				Parent ASB		−.08
				Observer ASB		−.16
				SR ASB	OSR composite achievement grade 4	−.16
				Teacher ASB		−.33
				Parent ASB		−.23
				Observer ASB		−.34

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TABLE 6 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic/ Delinquency Measure	Association
		N	Sex	Ethnicity			
Schafer (1969)	Boys in 2 schools who were continuously enrolled for grades 10–12 and were not delinquent at grade 10	547	M		Parent SES grade 9	OR lifetime prevalence at twelfth grade	−.16
						OSR ninth grade GPA	.22
Tremblay and Masse (1993)	Low SES, white, Francophone boys attending kindergarten in 53 Montreal schools (N = 1,161)	587	M	W	Teacher-rated oppositional behavior age 6	SRD frequency theft age 14	.13
						SRD frequency vandalism age 14	.14
						SRD frequency aggression age 14	.11
						French achievement age 10	−.12
						Math achievement age 10	−.12
					Teacher-rated oppositional behavior age 10	SRD frequency theft age 14	.16
						SRD frequency vandalism age 14	.17
						SRD frequency aggression age 14	.21
						French achievement age 10	−.26
						Math achievement age 10	−.26

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Study	N	Sex		Measure	r
Tremblay et al. (1992a)			Disruptive behavior age 7:		
Concordia University High Risk Project sample of first-grade children from low-middle and impoverished areas of Montreal (N = 161 boys; 163 girls)	67	M	Self-report	SRD frequency past year grade 7	.39
			Peer nominated		.46
			Self-report	SRD aggression frequency past year grade 7	.32
			Peer nominated		.41
			Self-report	French achievement age 7	−.28
			Peer nominated		−.28
			Self-report	Math achievement age 7	−.44
			Peer nominated	French achievement age 10	−.48
			Self-report		−.28
			Peer nominated	Math achievement age 10	−.39
			Self-report		−.18
			Peer nominated		−.32
	80	F	Disruptive behavior age 7:		
			Self-report	SRD frequency past year grade 7	−.04
			Peer nominated		.11
			Self-report	SRD aggression frequency past year grade 7	−.13
			Peer nominated		.10
			Self-report	French achievement age 7	−.28
			Peer nominated		−.51
			Self-report	Math achievement age 7	−.28
			Peer nominated	French achievement age 10	−.48
			Self-report		−.11
			Peer nominated	Math achievement age 10	−.48
			Self-report		−.06
			Peer nominated		−.43

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TABLE 6 (Continued)

Study	Selection and Description of Overall Sample	Analysis Sample N	Sex	Ethnicity	Potential Common Cause Measure	Academic/Delinquency Measure	Association
West and Farrington (1973)*	Cambridge Study in Delinquent Development; all males in 6 lower-class London schools (90 percent white, British origin)	411	M		Income age 8	OR conviction ages 10–16	−.18
		411			SES ages 8–10		−.07
		379			SES age 14		−.02
		409			Income age 8	SRD ages 14 and 16	−.12
		409			SES ages 8–10		−.13
		379			SES age 14		−.02
		411			Income age 8	Secondary school allocation age 11	.30
		411			SES ages 8–10		.09
		386			Income age 8	Junior attainment age 11	.25
		386			SES ages 8–10		.13
		411			Teacher and peer-rated troublesomeness, ages 8 and 10	OR conviction ages 10–16	.32
		409				SRD ages 14 and 16	.20
		411				Secondary school allocation age 11	−.24
		386				Junior attainment age 11	−.18
Wiatrowski et al. (1982)	Youth in Transition Study; national sample of tenth-grade males in public high schools (11 percent African American), waves 1 (grade 10), 3 (grade 12), and 4 (grade 13)	1,000–1,500	M		Parent SES grade 10	SRD frequency past year grade 12	−.06
						SRD frequency past year grade 13	+.01
						SRD serious past year grade 13	.00
						SR GPA grade 10	.19
						SR GPA grade 12	.21

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Study	N	Sex	Description	Measure	Correlate	r
Williams and McGee (1994)	364	M	Dunedin Multidisciplinary Health and Development Study; birth cohort of Dunedin, New Zealand, children at age 15 (98 percent European background)	Family disadvantage age 7 (reversed)	SRD frequency age 15	−.17
					Burt reading test age 7	.26
					Prose reading test age 7	.26
				Oppositional behavior age 7:		
				Teacher rating	SRD frequency age 15	.20
				Parent rating		.11
				Teacher rating	Burt reading test age 7	−.23
				Parent rating		−.19
				Teacher rating	Prose reading test age 7	−.18
				Parent rating		−.20
				Family disadvantage age 9 (reversed)	SRD frequency age 15	−.18
					Burt reading test age 9	.15
					Dunedin spelling test age 9	.17
				Oppositional behavior age 9:		
				Teacher rating	SRD frequency age 15	.22
				Parent rating		.15
				Teacher rating	Burt reading test age 9	−.17
				Parent rating		−.14
				Teacher rating	Dunedin spelling test age 9	−.16
				Parent rating		−.16
	334	F		Family disadvantage age 7 (reversed)	SRD frequency age 15	−.10
					Burt reading test age 7	.27
					Prose reading test age 7	.22

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TABLE 6 (*Continued*)

Study	Selection and Description of Overall Sample	Analysis Sample			Potential Common Cause Measure	Academic/ Delinquency Measure	Association
		N	Sex	Ethnicity			
					Oppositional behavior age 7:		
					Teacher rating	SRD frequency age 15	.00
					Parent rating		.06
					Teacher rating	Burt reading test age 7	−.21
					Parent rating		−.21
					Teacher rating	Prose reading test age 7	−.27
					Parent rating		−.17
					Family disadvantage age 9 (reversed)	SRD frequency age 15	−.07
						Burt reading test age 9	.22
						Dunedin spelling test age 9	.22
					Oppositional behavior age 9:		
					Teacher rating	SRD frequency age 15	.04
					Parent rating		.10
					Teacher rating	Burt reading test age 9	−.23
					Parent rating		−.18
					Teacher rating	Dunedin spelling test age 9	−.23
					Parent rating		−.17

NOTE.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; W = white; M = male; F = female; GPA = grade point average; WRAT = Wide Range Achievement Test; SES = socioeconomic status; and ASB = antisocial behavior.

* This entry also reports data provided to the current investigators by the original authors.

1. *SES.*   We examined SES for males only as there were five studies representing five distinct sets of subjects ($N = 2,877$) for males but only two studies for females. The five sets of subjects provided fourteen correlations between SES and delinquency. Again, we averaged all effect sizes for a set of subjects to yield an effect for each set of subjects. The set of five SES-delinquency effect sizes ranged from $+.070$ to $-.175$, with a mean of $-.074$ and a standard deviation of $.104$. The resulting mean effect size was $-.059$. The five sets of subjects also provided nineteen correlations between SES and academic performance. The five SES–academic performance effect sizes ranged from $.184$ to $.221$, with a mean of $.205$ and a standard deviation of $.016$. The resulting mean effect size was $.209$.

The common causes analysis for SES was conducted by computing the partial correlation between academic performance and delinquency while controlling for SES. Based on an academic performance–delinquency effect size of $-.166$ for males, a SES-delinquency effect size of $-.059$, and a SES–academic performance effect size of $.209$, the partial correlation was $-.157$. Since SES did not materially diminish the association between academic performance and delinquency, it did not qualify as a common cause. We also examined the effect of deleting the two large effect sizes from the two large samples, which yielded an academic performance–delinquency effect size of $-.137$. Although this reduced the partial association to $-.128$, the conclusion that SES is not a common cause remained firm.

2. *Conduct Problems.*   Data on conduct problems as a potential common cause were provided by six studies containing seven distinct sets of subjects ($N = 3,618$). Two of the sets of subjects consisted of females, and the remaining sets consisted of males.

The seven sets of subjects provided thirty-three correlations between conduct problems and delinquency. The set of seven conduct problem–delinquency effect sizes ranged from $.010$ to $.278$, with a mean of $.154$ and a standard deviation of $.098$—a considerable spread in the distribution. The two smallest effect sizes, $.010$ and $.050$, were from sets of female subjects from different samples, whereas the remaining five effect sizes, the smallest being $.143$, were from sets of male subjects. To allow for the possibility of a sex difference in the association between conduct problems and delinquency, we computed the effect sizes separately for males and females. The weighted mean effect size was $.203$ for males and $.042$ for females, which indicates that high conduct problems were associated with delinquency.

There were fifty-one correlations between conduct problems and academic performance for the seven sets of subjects. The seven conduct problem–academic performance effect sizes ranged from $-.096$ to $-.329$, with a mean of .212 and a standard deviation of .070. In view of the apparent difference between males and females for association between conduct problems and delinquency, we checked the distribution of effect sizes to see if there might be similar differences for the conduct problems and academic performance association. However, we found no evidence of a clustering by gender. We, therefore, averaged the data across sex to yield a mean effect size of $-.206$, indicating that high conduct problems were associated with low academic performance.

The common cause model for conduct problems was tested separately for males and females. The academic performance–delinquency and the conduct problem–delinquency effect sizes for males and for females were used. However, because there appeared to be no sex differences in the conduct problems-academic performance effect size, the sets of males and the sets of females were averaged together to compute the value used.

The results for males, based on an academic performance–delinquency effect size of $-.166$, a conduct problem–delinquency effect size of .203, and a conduct problem–academic performance effect size of $-.206$, yielded a partial correlation of $-.129$. The results were not materially different when we deleted the values for the two large samples and recomputed the partial correlation. The results for females, based on an academic performance–delinquency effect size of $-.086$, a conduct problem–delinquency effect size of .042, and a conduct problem–academic performance effect size of $-.206$, yielded a partial correlation of $-.079$. Thus since conduct problems did not reduce the association between academic performance and delinquency to near zero for either males or females, it did not qualify as a common cause.

3. *Other Factors.*   We found four other multivariate studies (see table 7) (Spivack and Marcus, n.d.; White, Pandina, and LaGrange 1987; Denno 1990; and Kupersmidt and Coie 1990). Denno analyzed the data from a subsample of inner-city African American boys and girls whose families participated in the Philadelphia Collaborative Perinatal Project. The analysis included a host of variables from the pre- and postnatal period, infancy, and school-age periods. In separate structural equation models for males and females, she found partial

associations from −.09 to −.12 between achievement scores and the frequency and seriousness of official delinquency, when variables from earlier developmental periods were taken into account (e.g., parental education, IQ measures at age 4 and age 7) for both males and females. Her results indicated that academic performance retains some significance after controlling for intelligence.

Kupersmidt and Coie (1990) and Spivack and Marcus (n.d.) reported differing results from studies that controlled for aggression as well as other variables. Kupersmidt and Coie found that grades, school absences, peer rejection, gender, and ethnicity failed to remain in the logistic regression for delinquency at twelfth grade after peer-rated aggression was entered. Spivack and Marcus, by contrast, found a nonsignificant regression coefficient of .11 for males and a significant regression coefficient of .29 for females between grade retention or special class placement and official police contact after controlling for teacher ratings of negative behavior and comprehension at grade 1. The studies' differences may be substantive or due to sample selection. This highlights the difficulties of drawing conclusions from narrative statements of relationships.

The fourth study (White, Pandina, and LaGrange 1987) used a sample of male and female adolescents aged twelve ($N = 298$), fifteen ($N = 305$), or eighteen years ($N = 279$) at the initial assessment to study the relationship of academic performance to delinquent status measured three years later. An analysis of covariance design was used to control for age. The first analysis compared "heavy" (three or more index offenses in the past three years) and "nonheavy" youth, and the second analysis compared "labeled" (incarcerated, or on probation or parole in past three years) and "nonlabeled" youth. The results found that heavy delinquent youth had significantly lower grades than nonheavy youth and that labeled delinquent youth had significantly lower grades than nonlabeled youth. Thus the association between academic performance and delinquency remained after controlling for age.

4. *Prior Delinquency.*   Table 8 presents the five studies that have controlled for prior delinquency as well as other variables. Two of the studies (Wiatrowski et al. 1982; Agnew 1985) used the Youth in Transition sample, and the third (Agnew 1991) used the National Youth Survey sample. Both of these are large, nationally representative samples of adolescents. Although the McCarthy and Hoge (1984) sample had substantially different participation rates from parochial and

TABLE 7
Longitudinal Follow-up Studies with Academic Performance as a Predictor of Delinquency with Controls for Third Variables

Study	Selection and Description of Overall Sample	Analysis Sample			Academic Measure	Delinquency Measure	Control Variables	Association
		N	Sex	Ethnicity				
Denno (1990)	Philadelphia Collaborative Perinatal Project subsample of African American youth born 1959–62 and residing in Philadelphia from age 10–17 who attended public schools and had IQ and achievement data	487	M	AA	CAT language achievement at age 14–15	OR frequency of police contact ages 7–17	Pregnancy and delivery, education (mother and father), income, father unemployed, hand/foot preference, physical and neurological abnormalities, anemia, lead exposure, father absence, foster placement, family size, moves, age-4 Binet IQ, age-7 WISC, school discipline, and retardation	−.10*
						OR seriousness of police contact ages 7–17		−.12**
		500	F	AA		OR frequency of police contact ages 7–17		−.10*
						OR seriousness of police contact ages 7–17		−.09*

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Study	Sample	N	Sex	Academic measure	Delinquency measure	Control variables	Result
Kupersmidt and Coie (1990)	Fifth-grade children in semirural area (69 percent white, 47 percent female)	104	M + F	OSR composite GPA at grade 5	OR police contact at age 18	Ethnicity, gender, absences, peer rejection, aggression	N.S.
Spivack and Marcus [n.d.]	Disadvantaged, inner-city children	147 / 142	M / F	Held back or special class placement	OR police contact at age 17	Teacher-rated negative behavior and comprehension at grade 1	−.11 / −.29***
White, Pandina, and LaGrange (1987)	Rutgers Health and Human Development Study sample of males aged 15 ($N = 153$), 18 ($N = 153$), and 21 ($N = 135$) from New Jersey (90 percent white)	341	M	Composite of SR math and English grades past 3 years, SR last semester GPA at ages 12, 15, or 18	SRD frequency index offenses past 3 years / OR incarcerated/on parole past 3 years	Age	−[a]*** / −[a]****

Note.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; AA = African American; M = male; F = female; GPA = grade point average; CAT = California Achievement Test; and WISC = Wechsler Intelligence Scale for Children; N.S. = not significant.

[a] Study provided insufficient data to compute an effect size. The significance level noted is that reported by the investigator for the analysis performed, and the sign was determined by an inspection of the group means if the analysis was significant.

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

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TABLE 8

Longitudinal Follow-up Studies with Academic Performance as a Predictor of Delinquency, Controlling for Third Variables and Prior Delinquency

Study	Selection and Description of Overall Sample	Analysis Sample		Academic Measure	Delinquency Measure	Control Variables	Association
		N	Sex				
Agnew (1985)	Youth in Transition waves 1 (tenth grade) and 2 (eleventh grade; national sample of tenth-grade males in public high schools (11 percent African American)	1,498	M	SR GPA past year	SRD total frequency past 3 years	Parent attachment, school attachment, commitment, and involvement; peer attachment; dating index; deviant beliefs	−.06*
					SRD serious frequency past 3 years		−.04
Agnew (1991)	National Youth Survey waves 1 (ages 11–17) and 2 (ages 12–18), sample size not reported		M + F	Commitment at waves 1 and 2 (SR GPA, has high GPA, does well in hard classes)	SRD frequency minor (theft, assault, and status offenses) past year at waves 1 and 2	School attachment, parent attachment, deviant peers, deviant beliefs	−.11[a]*
Le Blanc, Vallieres, and McDuff (1992)	Francophone students aged 12–16 years at wave 1 and 14–18 years at wave 2 (55 percent male)	825	M + F	SR GPA (French + math) at wave 1	SRD past year at waves 1 and 2	Parent's education level at wave 1	−.07*

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Study	Sample	N	Gender	Academic measure	Delinquency measure	Control variables	Effect
McCarthy and Hoge (1984)	Students in seventh, ninth, and eleventh grades of public and parochial schools in 2 Mid-Atlantic cities at year 1 (55 percent male, 49 percent white at year 1)	1,658	M + F	OSR grades past year at years 1 and 2	SRD theft + vandalism frequency past year at years 1 and 2	Coopersmith self-esteem at year 1	−.05
Wiatrowski et al. (1982)	Youth in Transition Study; national sample of tenth-grade males in public high schools (11 percent African American), wave 1 (grade 10), wave 2 (grade 11), wave 3 (grade 12), and wave 4 (grade 13)	1,000	M	SR GPA at tenth grade	SRD frequency past 3 years at grade 12; SRD frequency past year at grade 13; SRD seriousness past year at grade 13	Wave 1: SES, IQ, self-esteem, school attachment, occupational aspirations, college encouragement, college plans; wave 2: curriculum; wave 3: school attachment, self-esteem, grades	−.00 −.01 −.00

NOTE.—A negative sign means that delinquency involvement is associated with lower grades or special class placement. SRD = self-reported delinquency; OSR = official school records; SR = self-reported; M = male; F = female; GPA = grade point average; and SES = socioeconomic status.

[a] Correction for measurement error is included.

* $p < .05$.

public school adolescents, they believe it to be representative of the base population. Le Blanc, Vallieres, and McDuff (1992) used a sample of twelve- to sixteen-year-old Francophone students.

All studies used self-report measures of prior delinquency frequency. Wiatrowski et al. (1982) also used a self-reported seriousness measure. Academic performance was measured by grades in all studies. Self-report of grades was used in the Youth in Transition Study (Bachman 1970), the National Youth Survey (Elliott, Huizinga, and Ageton 1985), and the Le Blanc, Vallieres, and McDuff (1992) samples; and school records were used in the McCarthy and Hoge (1984) sample. The Agnew (1985, 1991) studies and Wiatrowski et al. (1982) study also used measures of attachment to parents or school, commitment, involvement, and aspirations, in addition to several other variables derived from social control theory, as control variables. McCarthy and Hoge used only self-esteem as a control variable.

Three of the five studies found at least one significant result, although all coefficients are small, ranging from 0.0 to $-.07$. The largest coefficient, $-.11$ (from Agnew 1991), was corrected for reliability and is not directly comparable to those from the other studies. These results indicated that once prior delinquency and other variables were controlled, prior academic performance only weakly predicted future delinquency.

5. *Severity and Frequency of Delinquency.*   Several studies have examined academic performance as a predictor of escalation in frequency, variety, or seriousness of officially recorded delinquency among subjects who have initiated offending.

Tracy, Wolfgang, and Figlio (1990) compared achievement scores of one-time, nonchronic, and chronic offenders. The results for the 1958 cohort indicated that chronic recidivists had the lowest mean academic achievement percentiles ($M = 14.4$), whereas one-time offenders had the highest mean academic achievement percentiles ($M = 35.9$).

Blumstein, Farrington, and Moitra (1985) and Farrington (1987), using data from the Cambridge Youth Study, compared occasional offenders (who had from one to five convictions by age twenty-five) with chronic offenders (who had six or more convictions by age twenty-five). Their results showed that a significantly higher proportion of chronic offenders had low school attainment at age eleven, low intelligence scores, high troublesomeness ratings by teachers, and came from low-income families. A subsequent multivariate analysis indi-

cated only high troublesomeness and low school attainment as pre-
dictors.

Denno (1990), using data from African American children whose
mothers participated in the Philadelphia Collaborative Perinatal Proj-
ect, found that both the WRAT (Wide Range Achievement Test) score
at age seven and CAT (California Achievement Test) scores at age
thirteen/fourteen decreased with the frequency of offending for males.
However, females with two or more offenses had significantly lower
CAT but not WRAT scores than did females with only one offense.
Denno also found that males with index offenses (homicide, rape, rob-
bery, aggravated assault, burglary, larceny, and auto theft) had sig-
nificantly lower WRAT scores at age seven and CAT scores at age
thirteen/fourteen than males with nonindex offenses. Her results for
females revealed that index offenders had significantly lower CAT
scores but not WRAT scores compared to nonindex offenders. She
found that males with violent index offenses had significantly lower
WRAT and CAT scores than did males with only property index
offenses. Females with violent index offenses were found to have sig-
nificantly lower CAT scores but not WRAT scores than females with
only property index offenses. Unfortunately, the violent index of-
fender group was not broken down into persons with only violent
offenses and persons with both violent and property offenses.

The results of this section consistently indicate that both males and
females who have escalated their offending, whether measured as in-
creases in frequency or severity, have lower academic performance
than children who have not. In several cases, that children, particularly
males, had lower test scores in early elementary school argues against
an explanation based solely on the effects of prior delinquency on
subsequent academic performance.

E. Studies of Onset, Escalation, and Desistance

This section considers studies that have related academic perfor-
mance to stages in the development of delinquency. Loeber and Le
Blanc (1990) and others view delinquent offending as progressing
through three broad stages: onset, escalation, and desistance. Onset
marks the beginning of offending and is measured by the commission
of the first delinquent act. If offending increases in seriousness or fre-
quency or diversifies into other types of acts, that person is considered
to have entered the stage of escalation. Eventually, a person's offending

decreases and finally ceases. For some, the time of cessation or desistance may be in adolescence; for others, it may be in adulthood.

In contrast to the studies presented in previous sections, with their emphasis on either frequency of offending during an interval or lifetime prevalence, developmental criminology emphasizes the importance of timing—of when onset occurs as well as whether it occurs. With escalation, the interest is in the timing as well as in the magnitude of escalation. And with desistance, developmental criminology asks what factors determine whether a person continues to offend into adulthood rather than stopping at some point during adolescence.

Our review of the literature for studies of onset, escalation, or desistance identified too few studies to permit a meta-analytic review. There have been few studies of the relationship of academic performance to the stages of offending from a developmental criminology perspective. Clearly, a considerable amount of further work is needed. With only two exceptions, the studies have been restricted to univariate analyses. Multivariate studies are needed to test the effects of intelligence, attention problems, or other possible common cause variables. The samples used to date have consisted of males. These same questions need to be studied with samples of females as well. Results for onset are contradictory. Of the three onset studies, all of which employed different definitions of onset, measures of delinquency and academic performance, and method of analysis, only one found significant univariate relationships, and academic performance did not remain significant in multivariate analyses. The limited results to date indicate that academic performance is not a significant predictor of onset in a multivariate sense. Even less is known about escalation and desistance.

1. *Onset.*   Farrington and Hawkins (1991) used data from the Cambridge Study in Delinquent Development to identify predictors of an early onset of delinquency (before age fourteen) based on official records. In their analysis, they compared early- to late-onset (age fourteen or later) delinquents. They found that a low school track placement at age fourteen, but not low academic attainment at the same age, was marginally associated with early onset. Subsequent multivariate analysis using low school track placement and other variables associated with early onset (low family income, low involvement with father, high troublesomeness at ages eight to ten, and low nonverbal IQ) indicated that only low involvement with father and high troublesomeness predicted early onset.

Loeber et al. (1991) examined the bivariate relationship between academic performance and onset over a one-and-a-half-year period for samples of first-, fourth-, and seventh-grade boys from the Pittsburgh Youth Study. Onset was defined as the first report of *any* delinquent act over the follow-up period, and academic performance was measured by the mean of the caretaker's and teacher's academic performance ratings of the child at the start of the study. No significant association between low academic achievement and onset was noted in any of the three samples.

Maguin and Loeber (1992) used discrete time survival analysis to study the relationship of academic performance and other variables to the onset of moderately serious delinquency over a three-year follow-up in the first-grade cohort of boys in the same study. Onset was defined as the first occurrence of a delinquent act of at least moderate seriousness (carrying weapons, joyriding, gang fighting, and theft of items over $5), and academic performance was measured by a composite of caretaker-reported reading and math performance. Univariate results showed that low academic performance and the variables of high attention problems, low family SES, grade retention (i.e., held back), and African American ethnicity were associated with a shorter time to delinquency onset. Finally, multivariate analysis was used to integrate the previous univariate analyses. This analysis found that academic performance was a predictor of delinquency onset when tested with ethnicity, family SES, and grade retention. However, when attention problems was added to the equation, academic performance was no longer a significant predictor. In summary, these three studies, using data from the same samples, do not show conclusively that academic performance is or is not associated with an earlier delinquency onset.

2. *Escalation.*   Only one study, Loeber et al. (1991), has examined the contribution of academic performance to escalation. They tested for significant bivariate associations between academic performance and escalation over a one-and-a-half-year follow-up period for boys in the first-, fourth-, and seventh- grade samples of the Pittsburgh Youth Study. Escalation was defined as an increase in delinquency seriousness during the follow-up period over that at the initial assessment. Academic performance was again the mean of the caretaker's and teacher's academic performance ratings of the child at the start of the study. Low academic performance was found to be significantly associ-

ated with escalation in the fourth-grade and seventh-grade samples but only marginally so in the first-grade sample. Inspection of the magnitudes of the associations suggested no interaction with age.

3. *Desistance.*   In the same study Loeber et al. (1991) also examined the bivariate relationship between academic performance and desistance, defined as no report of a delinquent act over the follow-up period. They found that high academic performance at the initial assessment was associated with subsequent desistance for all three samples relative to boys who only deescalated their offending (committed only less serious offenses over the follow-up period).

Farrington and Hawkins (1991) examined univariate predictors of the persistence of offending into adulthood, the converse of desistance, from ages twenty-one to thirty-two, using data from the Cambridge Study in Delinquent Development. They found that *persistence* into adult offending as measured by official records was associated with low school attainment and a low school track, both measured at age eleven. However, in a multivariate analyses, they found that neither low school attainment nor low school track placement entered the equation for predicting persistence into adult offending.

Thus to date, the predictors of desistance have been examined by only two studies. Although the results of both studies indicate a role for academic performance in desistance, these data need to be replicated using both self-report and officially recorded measures of offending.

4. *Effects on Education.*   Once children have experienced the onset of delinquency or escalated their offending, the consequences for their academic performance are quite important. However, we found no studies that have addressed this question. Although Le Blanc et al. (1991) compared the social functioning of boys at age ten who had an onset of serious delinquency prior to age ten to that of boys who had not experienced the onset of delinquency, the study did not include a measure of academic performance. Furthermore, data on the preonset functioning of those boys who experienced the onset of delinquency were not reported. Thus there is a great need for studies that examine the impact of the onset of delinquency on subsequent academic performance.

III. Intervention Studies

In this section, we turn to intervention and prevention studies to illuminate an important area concerning temporal and causal ordering.

Suppose that boys who received an intervention and improved their academic performance at termination then decreased their delinquency at follow-up. Such an outcome would support the ordering of academic performance as a cause of delinquency. Instead, suppose that boys who received an intervention decreased their delinquency at termination and then improved their academic performance at follow-up. Such an outcome would support the converse causal ordering. The key to distinguishing between different possible orderings is the use of several posttreatment assessments to monitor the dependent variables.

For this purpose, we sought intervention and prevention studies that employed and reported measures of both academic performance and delinquency and used methodologically appropriate designs and analyses (i.e., random assignment to an untreated control group when comparing group means at posttest or follow-up or comparison group when using pretest measures in an analysis of covariance). We found very few studies that met these criteria. Few studies employed control groups, and many studies that initially looked acceptable had to be eliminated. Furthermore, many delinquency studies did not report academic performance measures, or even such school measures as attendance, discipline contacts, or graduation/general equivalency diploma completion. Many educational studies did not report delinquency measures even though measures of negative behavior were employed. Follow-up assessments were rare. Finally, very few of the selected studies reported the necessary data for subsequent meta-analytic analyses (pre- and posttest means and standard deviations by group for continuous variables or cross-tabulations for categorical variables). A complete meta-analysis was, thus, impossible. A narrative overview is given here, supplemented where possible by effect size data.

These disparate studies shared few characteristics beyond those imposed by the selection criteria. However, one important dimension was the distinction between true primary prevention studies, where all persons, whether at risk or not, received the intervention, and high-risk intervention studies, where the intervention was offered only to children and youth at high risk for delinquency. Using this distinction, studies were categorized as either "high-risk intervention" studies or "prevention" studies. Although the studies were not explicitly selected to include only samples of children or youth who resided in their own community throughout the duration of the intervention program, the requirement that there be academic performance measures effectively excluded virtually all the studies considered by Lipsey (1992).

The results of these individual intervention studies seem promising with respect to their ability to affect delinquency and academic performance. Only four of the nine high-risk studies in table 9 failed to show at least one significant effect, and none of the prevention studies in table 10 failed to show at least one significant effect. Where effect sizes could be estimated, they were in the .15–.35 range for high-risk studies and in the .05–.10 range for prevention studies. Unfortunately, since only one study reported follow-up assessments, we have scant evidence that the effects were maintained once the intervention ended. Realistically, these studies do not provide the firm foundation needed for building an intervention knowledge base. It is too early to decide which types of interventions work and which do not and whether different interventions are more effective for one age group than another.

More methodologically well-designed studies are needed. For instance, to find the twelve studies presented here, nearly seventy were rejected because they lacked a control group or delinquency or academic performance measures. Furthermore, even among studies with control groups and measures of both academic performance and delinquency outcomes, few studies reported the data necessary to compute effect sizes. Also, in the planning of future studies, investigators need to pay more attention to ensuring adequate sample sizes to maintain power. As tables 9 and 10 show, the majority of studies do not have large enough sample sizes to ensure adequate power given the effect size they actually found. For instance, an effect size (r) of .20 requires final samples of 100 treatment and control children each. Investigators also need to specify theoretically how their interventions are expected to work. For instance, why should moral or law-related education also lead to higher grades? Could improvements in bonding to school or teachers have accounted for the results? Thus theoretical models need to incorporate a specification of mediating variables in the intervention. On this point, Hawkins and associates are on the right track, since they measured the social bond constructs that were expected to change as a result of the intervention. It also needs to be shown that treated subjects received the intervention as specified (i.e., intervention integrity was maintained). Again, the Hawkins group have incorporated these checks into their evaluation program. Finally, data on treatment integrity might be used in the evaluation model as control variables for modeling treatment effects. Thus the results to date suggest, we believe, some cause for hope. However, many improvements are

TABLE 9

Intervention Studies for At-Risk or High-Risk Children

Study	Selection and Description of Overall Sample	Intervention Description	Academic Effects				Delinquency Effects			
			Group	N	Measure	Effect Size	Group	N	Measure	Effect Size
Arbuthnot and Gordon (1986)	Children aged 13–17 ($N = 48$, 14.5 years, 73 percent male) rated as "behavior disordered" by teachers and randomly assigned to E or C	16–20 sessions, 1 per week, of moral reasoning education	E	24	OSR GPA past term (pre/post)	+[a]*	E	24	OR frequency police/court contacts past 3 months (pre/post)	+[a]*
			C	19			C	24		
			E	11	OSR GPA past term (pre/post, past year (follow-up)	+[a]*	E	13	OR frequency police court contacts past 3 months (pre/post/follow-up)	N.S.[a]
			C	9			C	9		
Berrueta-Clement et al. (1984)	Perry Preschool Project sample of low-IQ African American children from low-income area ($N = 123$); matched on IQ then randomly assigned to E or C	2-year preschool program of intellectual and social development plus weekly home visits	E	38	OSR GPA in grades 9–12	+[a]*	E	54	OR previous arrests lifetime age 19	.12
			C	39			C	59		
			E	54	OSR mean number of failing marks in grades K–12	N.S.[a]	E	58	OR frequency arrests lifetime age 19	N.S.[a]
			C	58			C	63		

TABLE 9 (Continued)

Study	Selection and Description of Overall Sample	Intervention Description	Academic Effects				Delinquency Effects			
			Group	N	Measure	Effect Size	Group	N	Measure	Effect Size
Emshoff and Blakely (1983)	Adjudicated youth ($N = 73$, 14.5 years, 67 percent male, 67 percent white) in community randomly assigned to E_1, E_2, or C	E_1 group received family-focused behavioral contracting and advocacy, and E_2 received multiple interventions and advocacy, each for 10 months	E_1 E_2 C	24 23 26	School performance	N.S.[a]	E_1 E_2 C	24 23 26	OR police contacts	N.S.[a]
Gottfredson (1986)	Students in 5 middle and 4 high schools in low-income inner-city and rural areas; schools assigned to E (4 high schools, and 3 middle schools) or COM; in each school (E or COM) high aca-	2-year multicomponent program of school-level change to improve climate and academic performance made with student involvement, and student career planning; 2 years of one-on-	E C	358 306	SR GPA	.05	E C	296 249	Serious SRD prevalence past year	.00
			E C	382 340	OSR GPA year 2	.02	E C	468 401	OR court contacts	.00
			E C	368 316	Percent in lowest quartile of total achievement (reversed)	.09				
			E C	410 352	Percent promoted year 1	.08				

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demic or behavioral risk students were randomly assigned to receive special services

Gottfredson (1990) Self- and teacher-nominated youth in a Pasadena, California junior and senior high school; random assignment constrained by scheduling to E or C

1-year law-related curriculum program with cooperative learning teams

Results for Program in Junior High School

		Measure	Effect			Measure	Effect
E	47	SR GPA past year	.21*	E	42	Serious SRD prevalence past year	.17
C	57			C	48		
E	52	OSR GPA past year	.22**	E	56	OR court contacts	.04
C	61			C	67		

Results for Program in Senior High School

		Measure	Effect			Measure	Effect
E	50	SR GPA past year	.34**	E	44	Serious SRD prevalence past year	.21*
C	36			C	32		
E	56	OSR GPA past year	.42**	E	64	OR court contacts	.09*
C	44			C	55		
E	86	OSR credits earned	.12	E	79	Serious SRD prevalence past year	–.20*
C	21			C	17		
				E	109	OR court contacts	–.06
				C	26		

Gottfredson (1990) Youth at high-delinquency risk referred from Miami public schools; E and NEC groups design

Alternative school program with token economy, individualized instruction

program with tutoring, and work experience components

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TABLE 9 (Continued)

Study	Selection and Description of Overall Sample	Intervention Description	Academic Effects				Delinquency Effects			
			Group	N	Measure	Effect Size	Group	N	Measure	Effect Size
Hawkins, Doueck, and Lishner (1988)	Seattle Social Development Project; sample of grade 7 children in 5 public schools; random assignment to E or C classroom at 3 schools and whole school either E or C at 2 schools; study sample is students at third stanine or below in math achievement at grade 6	Program components: proactive classroom management, interactive teaching, cooperative learning	E	73	Achievement at grade 7: Math	N.S.[a]	E	63	SRD at grade 7: Property crime	N.S.[a]
			C	76	Reading	N.S.[a]	C	66		N.S.[a]
			E	67			E	63	Violence	N.S.[a]
			C	72			C	65		
			E	66	Language arts	N.S.[a]	E	66	Serious crime	N.S.[a]
			C	72			C	64		
			E	77	Grade 7 grades: Social studies	N.S.[a]				
			C	81		N.S.[a]				
			E	74	Math					
			C	52						

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Study	Sample	Intervention			Academic measures				Delinquency measures	
Massimo and Shore (1963)	Boys aged 15–17 with history of antisocial behavior, normal IQ, and school problems randomly assigned to group E or C (N = 20)	Individualized program of one-on-one contact with therapist on full range of issues (job, education, and so forth) lasting 10 months	E	10	Pre-/postscores achievement: Reading	+a***	E	10	OR court contact	.40
			C	10	Vocabulary	+a***	C	10		
					Math concepts	+a***				
					Math problems	+a***				
Tremblay et al. (1992b)	White, Francophone boys scoring >70th percentile on teacher-rated disruptive behavior at grade K and parents from schools in low SES areas; random assignment to group E and NTC	Boys: social skills and self-control training for 2 years; some boys also received fantasy play component; parents: OSLC-based parent training for up to 2 years	E	42	Grade placement for age at grade 4	a*	E	42	SRD lifetime prevalence at age 12:	
			C	118	Grade placement for age at grade 5	N.S.a	C	118	Trespass	.19*
					Grade placement for age at grade 6	a*			Steal < $10	.23*
									Steal > $10	.16
									Steal bicycle	.17

NOTE.—E = intervention group; E₁ = intervention group for variation 1; E₂ = intervention group for variation 2; C = control group; NEC = nonequivalent comparison group; COM = comparison group; OR = officially recorded delinquency; SRD = self-reported delinquency; OSR = official school records; SR = self-reported; GPA = grade point average; SES = socioeconomic status; and OSCL = Oregon Social Learning Center. Positive effect sizes means that, relative to the control group, the intervention group scored higher on academic measures and lower on delinquency measures. Unless otherwise noted, effect sizes shown are computed for posttest data. N.S. = not significant.

a Study provided insufficient data to compute an effect size. The significance level noted is that reported by the investigator for the analysis performed, and the sign was determined by inspection of the group means if the analysis was significant.

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

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TABLE 10
Prevention Studies for Children

Study	Selection and Description of Overall Sample	Intervention Description	Academic Effects				Delinquency Effects			
			Group	N	Measure	Effect Size	Group	N	Measure	Effect Size
Elias et al. (1991)	Fourth-grade children in public schools	2-year social problem-solving program implemented with higher fidelity (E_1) or lower fidelity (E_2)	E_1	39	Achievement at grade 10: total	$+^{a}$*	E	[b]	SRD frequency for males at grades 9–11	[c]
			C	26			C	[b]		
			E_2	57	Achievement at grade 10: total	$+^{a}$*	E	[b]	SRD frequency for females at grades 9–11	[c]
			C	26			C	[b]		
			E_1	56	Achievement at grade 11: total	N.S.[a]				
			C	20						
			E_2	60	Achievement at grade 11: total	N.S.[a]				
			C	20						
Gottfredson (1986)	Students in 5 middle schools and 4 high schools in low-income inner-city and rural areas; schools assigned to E (4 high schools and 3 middle schools) or comparison	2-year multicomponent program of organizational changes to enhance climate and academic performance, student career planning, and student involvement in school change planning	Middle Schools Receiving Intervention				Middle Schools Receiving Intervention			
			SR GPA past year at year 0 (N = 854) and year 2 (N = 936)			$-.08$**	Serious SRD prevalence past year at year 0 (N = 857) and year 2 (N = 773)			.04
			Middle School Receiving No Intervention (Comparisons)				Middle School Receiving No Intervention (Comparisons)			
			SR GPA past year at year 0 (N = 299) and year 2 (N = 303)			$-.03$	Serious SRD prevalence past year at year 0 (N = 302) and year 2 (N = 270)			$-.10$*
			High Schools Receiving Intervention				High Schools Receiving Intervention			
			SR GPA past year at year 0 (N = 675) and year 1 (N = 1,269)			$-.04$	Serious SRD prevalence past year at year 0 (N = 649) and year 1 (N = 1,146)			.06**

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High School Receiving No Intervention (Comparison)

Study	Sample	Intervention		SR GPA past year at year 0 (N = 233) and year 1 (N = 233)	.04	Composite achieve-ment grade 5	−ᵃ*	Serious SRD prevalence past year at year 0 (N = 254) and year 1 (N = 221) and year 1	Serious SRD prevalence past year −.02	SRD prevalence at grade 5	.06*
Hawkins et al. (1992)	Seattle Social Development Project sample of grade 1 children in 8 public schools; random assignment to E or C classroom at 6 schools and all grade 1 students either E or C at two schools; incoming students randomly assigned to E or C	Multicomponent 4-year intervention: year 1: cognitive problem solving; years 1–4: proactive classroom management, interactive teaching, cooperative learning; and voluntary parent-training classes	E	185					E	187	
			C	644					C	665	

NOTE.—E = intervention group; E₁ = intervention group for variation 1; E₂ = intervention group for variation 2; C = control group; SR = self-reported; SRD = self-reported delinquency; and GPA = grade point average. Positive effect sizes means that the intervention group scored higher on academic measures and lower on delinquency measures (a) relative to the control group for the post-only comparisons or (b) relative to pretest. Meaning is implied by context. A plus sign (+) or minus sign (−) with only a significance level indicates the direction of difference. N.S. = not significant.

ᵃ Study provided insufficient data to compute an effect size. The significance level noted is that reported by the investigator for the analysis performed, and the sign was determined by inspection of the group means if the analysis was significant.

ᵇ Sample sizes are not reported.

ᶜ Significance test not reported.

* p < .05.

** p < .01.

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needed before we can really begin to answer the important question
of what should we do for whom and when.

A. At-Risk Group Programs

This section describes studies that have targeted at-risk or high-risk
youth. The at-risk status may be defined by the participant's behavioral
or academic status. A total of nine studies presenting results for ten
distinct samples were identified (table 9).

Two age groups of children were used by the ten samples: preschool
and young school children (two samples) and adolescent children (eight
samples). The intervention programs used ranged from a cognitively
focused preschool program to moral education to multifocus individual
counseling. Beyond the observation that law-related education pro-
grams were used for adolescents, there was no clear indication that
one type of program was more commonly used for one age group than
for another. However, there was a clear preference to locate more
recent programs partially or completely in the schools. Also, among
the more recent programs, the interventions tended to include multiple
components to address both academic and behavioral problems.

Turning to the outcome measures, the ten samples reported results
for a total of twenty-six academic performance measures at termina-
tion. Of these twenty-six significance tests, thirteen were significant.
The thirteen significant tests were from six samples: Arbuthnot and
Gordon (1986) (two of two significant), Berrueta-Clement et al. (1984)
(one of three significant), Gottfredson (1990) (Pasadena junior high
sample) (two of two significant), Gottfredson (1990) (Pasadena senior
high sample) (two of two significant), Massimo and Shore (1963) (four
of four significant), and Tremblay et al. (1992b) (two of three signifi-
cant). Effect sizes that were reported or could be estimated from the
significance level (most studies did not report effect sizes) ranged from
.2 to .35 at termination. The positive sign indicates that the academic
performance or the delinquency involvement of the intervention group
improved more than that of the control or comparison group of chil-
dren who did not receive the intervention. Unfortunately, only one
study reported follow-up assessment data (Arbuthnot and Gordon
1986).

The delinquency measures show a similar story. Of the twenty-one
delinquency measures examined from the ten samples, six were sig-
nificant. The significant tests were from four samples: Arbuthnot and
Gordon (1986) (one of two significant), Gottfredson (1990) (Pasadena

senior high sample) (two of two significant), Gottfredson (1990) (Miami sample) (one of two significant), and Tremblay et al. (1992b) (two of four significant). However, the results for the Miami sample in Gottfredson (1990) favor the control group over the treatment group. Overall, the effect sizes—of those reported or of those that could be computed—tended to be somewhat smaller, though a number were in the .15–.3 range at termination. Again, only one study reported follow-up data (Arbuthnot and Gordon 1986).

Both the law-related education program used by Gottfredson (1990) (both Pasadena samples) and the moral education program used by Arbuthnot and Gordon (1986) were successful in producing improvements in academic performance and reductions in delinquency. Law-related education programs seek to educate youth about the origins and role of law in the major social systems (e.g., family, school, and criminal justice systems). Moral education is built around techniques to help participants progress to higher levels of moral reasoning as described by Kohlberg (1981). Other studies with some significant academic performance results used a comprehensive preschool program (Berrueta-Clement et al. 1984), multifocus individual counseling (Massimo and Shore 1963), and a social skills and self-control training for boys and behavioral parent training for parents (Tremblay et al. 1992b). Law-related or moral education components (Arbuthnot and Gordon 1986; Gottfredson 1990 [Pasadena senior high sample]) also produced significant reductions in delinquency. Other studies with significant delinquency results used an alternative schools program (Gottfredson 1990) or social skills and self-control training for boys and behavioral parent training for parents (Tremblay et al. 1992b). In sum, studies that produced significant results for both academic performance and delinquency used law-related or moral education (Arbuthnot and Gordon 1986; Gottfredson 1990) or a multicomponent intervention with social skills and self-control training for the boys and behavioral parent training for the parents (Tremblay et al. 1992b).

Although these studies' common thread may be that parent training combined with self-control and social skills is needed by young children, moral or law education is needed by younger adolescents, and counseling about jobs and other issues is needed by older adolescents, there are too few data to confirm this possibility. Instead, more replications are needed to increase the chances of finding common elements that can be compared in future analyses.

B. Prevention Programs

Three studies (table 10) presented results for prevention-focused programs. All three studies reported some significant results for either the academic performance or delinquency measures; however, the effect sizes, where available, were clearly smaller, in the .05–.10 range. However, this result would be expected if some children benefited from the intervention more than other children did. The study by Elias et al. (1991) found academic performance differences between children who had completed a two-year social problem solving program some five years earlier beginning in the fourth grade; however, no effect on delinquency was observed.

Hawkins et al. (1992) found a significant reduction in delinquency at age 10 ($r = .056$), which was one-year posttreatment. A significant result for the academic performance variable was also found but in the wrong direction (with the control group being higher). They note, however, that the reported result may have been due to accretion (new students entering the original control group) and that unreported analyses for grade 7 and grade 8 show the expected effects. This study used a multiyear, multicomponent program featuring one year of cognitive problem-solving training plus four years of classroom management and learning innovations and voluntary parent training.

Finally, Gottfredson (1986) implemented a two-year multicomponent program of organizational changes developed with student and staff involvement to enhance school climate in nonrandomly selected junior and senior high schools. She found some evidence of improvement in both academic performance and delinquency in schools receiving the program. Those schools either improved or remained constant, whereas the comparison schools remained constant or worsened. The net effect was probably significant change in both junior and senior high schools.

IV. Summary and Implications

Poor academic performance is related to the prevalence and onset of delinquency, and escalation in the frequency and seriousness of offending, while better academic performance is associated with desistance from offending.

More specifically, the results showed that the poorer the academic performance, the higher the delinquency. The odds of delinquency, given low academic performance, were about 2.1 times higher than those given high academic performance. Stated in yet another way, 35

percent of low academically performing children became delinquent compared to only about 20 percent of high performing children.

Both males and females with a higher frequency of offenses, more serious offenses, or violent rather than nonviolent offenses had lower levels of academic performance. There is some evidence that low academic performance is related to early onset of offending. Finally, low academic performance was related to escalation in delinquency seriousness and persistence in offending, and better academic performance was associated with desistance from offending. Thus data from a number of sources clearly show the relationship between academic performance and delinquency.

The mean association between poor academic performance and delinquency was significantly and consistently stronger for males than females. The mean association for white children was not significantly different from that for African American children when only cross-sectional studies were considered. However, in longitudinal studies, the mean association was significantly stronger for whites than for African American children. This difference, however, was principally due to two large samples with large effect sizes. Unfortunately, information on other ethnic groups was not available. We also found that the association between poor academic performance and delinquency became stronger with age.

Intervention studies showed that improvements in academic performance co-occurred or followed improvements in the prevalence of delinquency. Although meta-analysis was not possible, some programs for high-risk children produced small to moderate effect sizes for either academic performance or delinquency. Although only three prevention studies were found, some of these studies reported small effect sizes for both academic performance and delinquency. All intervention studies reported significant improvements for either an academic measure or a delinquency measure. However, these data are not sufficient to determine whether the improvements in academic performance and the reductions in delinquency persisted or whether academic performance improvements precede reductions in delinquency. To ascertain these relationships, follow-up data must be collected, which only one study (Arbuthnot and Gordon 1986) did.

High-risk intervention studies using law-related or moral education components showed promising results. The high-risk intervention studies that showed the most successful outcomes employed law-related or moral education components for adolescents and self-control

and social skills training combined with parent training interventions for younger children. Furthermore, these types of intervention tended to produce improvements in both academic performance and delinquency at termination. The more successful prevention studies tended to use multilevel intervention strategies combining school-level interventions with individual and family interventions.

Intelligence and attention problems were found to be a likely common cause of both poor academic performance and delinquency. In contrast, SES and prior conduct problems were not common causal factors—in their presence, poor academic performance continued to predict delinquency. Four variables, intelligence, attention problems, SES, and prior conduct problems, were tested as possible common cause variables for academic performance and delinquency. When poor intelligence was controlled, the partial association of poor academic performance with delinquency decreased to nearly zero cross-sectionally. Likewise, when high attention problems were controlled, the partial association of academic performance and delinquency also decreased to nearly zero cross-sectionally. Thus both intelligence and attention problems likely function as common cause variables. Controlling for SES, the partial association of academic performance with delinquency remained essentially unchanged in both cross-sectional and longitudinal analyses. When controlling for prior conduct problems, the partial correlation of academic performance with delinquency decreased slightly for both males and females. Thus academic performance continues to make an independent contribution to delinquency after the effects of either SES or prior conduct problems are controlled.

These results suggest that interventions that improve intelligence or decrease attention problems will improve academic success and reduce delinquency. The gains obtained by these early intervention programs can be further strengthened by programs of moral education. At the same time, some children will require interventions to reduce their level of conduct problems since conduct problems affect their ability to profit from educational instruction.

A. Implications for Research

What are the important issues that future research efforts, both naturalistic studies and high-risk and prevention studies, should address? We offer several recommendations.

1. *Naturalistic Studies.*   The results of our analysis suggest a num-

ber of important questions for future research concerning between-individual and within-individual differences.

Priority should be given to identifying common cause variables influencing both academic performance and delinquency. These variables have immense relevance for future intervention studies since it *may* be true that interventions that alter the level of the common cause will also alter the levels of both academic performance and delinquency.

A second important question concerns the stronger association between academic performance and delinquency for older children, suggesting that interventions for academically poor performing children should take place early rather than late. However, it would be important to know whether this is due to children who have persistently poor academic records, perhaps dating from school entry. If the variation were due to a persistent group, then early intervention would seem to be recommended. However, only intervention studies can answer this question.

Gender effects are also an important question. We found the academic performance–delinquency association to be stronger for males than for females. Although the delinquency rate for females is markedly lower than that for males (e.g., Bureau of Justice Statistics 1993), and females are less likely to display reading problems (e.g., McGee et al. 1988), these findings alone are not likely to explain the lower association. However, the estimate for females is based on a relatively small number of studies, and further studies would be useful for a clearer estimate of the relationship for females. If further research corroborates our findings, considerable theoretical work will be needed to explain the source of the differences.

Ethnic differences in the academic performance–delinquency association are especially relevant for culturally appropriate interventions. To date, the association has been studied only for African American and European American children; however, it should be examined for children of other ethnic groups as well. Because the study of ethnicity in the United States is also a study of economics, it is critically important that the samples used for these studies be selected so as to disentangle these two factors. For instance, Peeples and Loeber (1994) found that African American and European American children from equivalent neighborhoods did not differ in their level of delinquency.

For future studies, the contribution of poor academic performance

to other problem behaviors including truancy and early substance use is particularly important. It is crucial to know, for example, if poor academic performance leads to a deeper involvement in delinquency and if variables such as truancy, delinquent peers, or decreased commitment to school moderate this relationship. Another question concerns the role of academic performance as a promoter of deceleration and desistance from offending. Along with the level of academic performance, it may be important to consider the timing of academic failure and its persistence in relation to subsequent delinquency.

Another important question from this perspective concerns the consequences of delinquency onset and its escalation on truancy, academic performance, and substance use. Here again, it may prove important to evaluate the timing of delinquency onset or escalation and its persistence in addition to its severity or frequency. The possible consequences of delinquent involvement should also include school dropout, subsequent success or failure in obtaining legitimate employment, and involvement in illegal activities for gain.

It is important to consider the context in which individual development takes place. From the point of view of criminology, the most important context to consider may be the neighborhood. It is clear that neighborhoods differ greatly in terms of their opportunities for illegal activities. The worst neighborhoods offer a relative wealth of visible illegitimate employment opportunities and the presence of delinquent peers. In the best neighborhoods, there is a relative scarcity of these same features. Thus for children with the same individual risk factor load (i.e., lower IQ, behavior problems, poor parenting), the developmental context may lead to quite different outcomes. Clarification of these issues may allow the development of interventions that are more closely matched to needs of vulnerable children and their families living in disorganized neighborhoods.

2. *Intervention Studies.*   Intervention and prevention studies need a considerable amount of work to improve their yield. A number of broad questions need to be addressed. One question concerns the effectiveness of different intervention components in improving academic performance or reducing delinquency or both. Moral or law-related education and social skills and parent-training components have been more successful than other components, but only a relatively limited number of components have been tested. Where should new components come from? Certainly, one source should be risk factors identi-

fied by naturalistic studies, especially factors that fit the common cause model.

In addition to assessing the overall effectiveness of each intervention component, several further questions should also be addressed for each. First, what is the mechanism of action? This is especially important in social interventions where several different mechanisms are plausible. For instance, consider the moral education program used by Arbuthnot and Gordon (1986). This program was found to be effective at raising academic performance and reducing delinquency at posttest and maintaining academic performance at a one-year follow-up. How did this program affect improvements in academic performance? Was it that achieving higher levels of moral development led to achieving better grades, or could successful boys have developed significant attachments to the intervenor—as social control theory might predict? From the information given, it is not possible to trace out the path of effects, yet knowing the mechanism of effect is critical to improving the intervention.

Second, it is important to identify for whom the intervention works best. This information should include age ranges but might also include gender or depth and persistence of involvement in delinquency. That adolescent children received a moral or law-related education program whereas young school-age children received self-control and parent training suggests this question may have been considered. However, would self-control or social skills training be useful for older-aged children? To the extent that attention problems are stable, the answer may be yes. Would younger-aged children benefit from moral or law-related education? These are valid questions for investigation.

Third, the duration and intensity of exposure to an intervention component necessary to produce an effect needs to be determined. The persistent nagging question with a failed intervention is whether it would have worked had it continued longer or been delivered more intensely. It would be desirable to vary the exposure to the intervention component to determine whether a dose-response relationship can be established. A related question is whether the exposure to the intervention should be intensive or structured into an initial set of sessions followed by booster sessions.

The fourth question concerns the sequence in which problems should be addressed. Our analysis showed that conduct problems overlap modestly with delinquency and academic performance; thus, it is

likely that interventions for each are needed. Is the modification of conduct problems a prerequisite for effective intervention in academic performance, or can the interventions for each be implemented simultaneously?

A related question is whether it is sufficient to target only common causes or whether academic performance or delinquency must also be addressed by separate intervention components. For instance, if self-control training and medication were used to intervene with attention problems, are remedial education or moral education components also needed to assist the recovery from delinquency and disrupt the continuity of offending?

The fifth question concerns the persistence of treatment effects. We found that few previous interventions included follow-up assessments. Without these data, future users of an intervention have no way of knowing whether they will need to apply the treatment continuously, intermittently, or only once. This question is also important from an economic point of view since few school districts or local governments can afford to offer continuous, intensive intervention.

The sixth question concerns how to ensure that persons who would benefit the most actually take part in the program. As Hawkins et al. (1992) found, many parents of children at high risk choose not to take part in a voluntary parent-training program. How can these parents be "sold" on the program enough at least to give it a try? Although these issues do not appear to emerge in controlled trials, they most likely do, but they are simply called by another name—dropouts. Thus it is important to understand how parents decide whether or not to take part. Furthermore, Hawkins et al. found that African American parents were less likely to take part. What can be done to make the programs more appealing to African American parents?

B. Theoretical Implications

These results present several challenges to current and future theories of delinquency with respect to the range of variables to be included, the role of mediating processes, and gender.

The results confirm the position of SES, which is often viewed as a social structure variable in theories of delinquency. More important, the results demonstrate that the individual-level characteristics of intelligence and attention problems, hyperactivity, and impulsiveness are related to delinquency. Thus existing theories of delinquency must incorporate the effects of these variables.

These additions pose no problems for social development theory (Catalano and Hawkins, forthcoming) because these variables are sub-sumed under the label of constitutional factors. Since integrated theory (Thornberry et al. 1991) includes SES as an exogenous or initial causal variable, there may be little difficulty here. Placing these findings in the theory offered by Elliott, Huizinga, and Ageton (1985) poses more difficulty because of the strain-based origins of this theory. However, these variables could be incorporated by viewing them as indicators of personal resources. On the assumption that children with different levels of personal resources share similar levels of aspirations, children with low levels of such resources would be more likely to engage in delinquency.

That intelligence and attention problems are common causes of both academic performance and delinquency poses several important problems. Several existing integrated social theories of delinquency hypothesize that variables such as commitment or skills for inter-action completely mediate the relationship between SES or individual-level characteristics and delinquency (e.g., Catalano and Hawkins, forthcoming). That is, intelligence affects delinquency only through its relationship to commitment and does not act directly on delin-quency.

Quantitatively, for this hypothesis to be true means that the strength of the path from intelligence, for example, through the mediating vari-ables and to delinquency must be nearly equal to the bivariate associa-tion between the individual-level characteristic (e.g., attention prob-lems) and delinquency. The problem is that academic performance does not have a strong relationship to delinquency, and, by extension, constructs that use academic performance as an indicator variable (e.g., commitment) also are not likely to have a strong relationship to delin-quency. Thus the individual-level characteristic will retain a direct relationship with delinquency. The solution to this theoretical problem may be the identification of additional processes linking the individual-level characteristic to delinquency.

The results also indicated that the association between academic performance and delinquency is stronger for males than females. Cur-rent theories treat gender differently. Social development (Catalano and Hawkins, forthcoming) and interaction theory (Thornberry et al. 1991) view gender as a structural variable whose effects are mediated through the constructs unique to that theory. Elliott's theory (Elliott, Huizinga, and Ageton 1985), by contrast, makes no explicit mention

of gender, which implies that the theoretical relationships are the same for males and females.

Our results indicate that gender is a moderator variable rather than a mediator because gender determines the strength of the relationship between academic performance and delinquency. Although the relationship is small, nonetheless, it is present. Thus this difference is a point that deserves attention from future theoreticians of delinquency.

C. Policy Recommendations

A number of policy recommendations are suggested by the results of this review. These results suggest that police, schools, social workers, and parents should take the problem of truancy quite seriously. Although truancy was not addressed as an issue in this essay, children cannot be expected to do well in school if they are not there. Thus ensuring their attendance is a large step toward helping them to perform to their potential in school.

As workers in the agency that comes into daily contact with delinquent youth, members of the juvenile justice system should be especially alert to problems of academic performance. The finding that youth with serious, frequent, and varied offending also had the poorest academic performance suggests that a premium should be placed on assessing poor performance, understanding its causes, and implementing effective remedial programs. This assessment might well be part of the routine intake procedures.

Although children in detention inevitably miss some school, these results would suggest that it is important to attempt to continue to teach them. Given the importance of academic performance, judges might be advised to consider placement in specialized educational programs for some youth. Operators of juvenile residential facilities should make every effort to ensure that youth with academic problems receive diagnostic and remedial services while in their custody. Law-related education programs are a promising intervention for high risk children. Judges might consider requiring adjudicated youth to attend such a program. Finally, it would seem valuable to encourage probation officers to monitor their probationers' school attendance and coursework, perhaps through reports from the schools.

Schools should also consider offering a moral philosophy or law-related intervention program to students who display conduct prob-

lems or antisocial behavior on the school premises. It may be beneficial to develop versions of these programs for younger-aged students as well.

Schools should attempt to involve parents to a greater degree in their children's education. Although this course of action is fraught with difficulties, the gains may outweigh the disadvantages. In some cases, this may involve literacy training or other remedial programs for the parents. In other cases, it may require "selling" parents on the value of education for their children and the contribution they, as parents, can make to their children's education. When children display behavior problems in school, schools might consider extending an offer of parenting education to the parents of these children. Finally, when children have significant learning or intellectual deficits, schools might well consider offering education programs, organized around teaching techniques, to the parents of these children.

Schools offering preschool education programs such as Head Start or other early education programs should consider adding an assessment component for some children. Although both intellectual and behavioral development undergo considerable change between early childhood and high school completion, our analysis suggests that children exhibiting deficits in precursors to academic performance (e.g., language deficits, intellectual handicaps, social deprivation) or appropriate social behavior (e.g., attention or activity-level regulation, or aggression) may be a cause for concern. Where these precursor conditions are especially severe, intervention programs may be well advised. If intervention programs are undertaken, every attempt should be made to involve the child's parents in order to obtain a unified environment.

More generally, schools should consider implementing, on an experimental basis, school-level interventions that have shown promise for improving academic performance. Certainly, innovative techniques that lead to a greater sense of control and safety for both teachers and students, in conjunction with improved academic performance, are worth trying. Although the introduction of these techniques may cause controversy, a thoughtful preparation of the ground ahead of time will prevent some problems.

Parents have a unique responsibility to their children. As the persons closest to their children, they are in the best position to observe and modify their children's behavior. It is important that parents ensure that their children receive an adequate education, including access to

special resources. Ensuring an education for their children should not be limited only to academic subjects but should also include appropriate social conduct toward others.

Governmental legislative bodies and agencies should consider two courses of action. One course of action is to review local, state, and federal laws and administrative regulations to determine if children in need of educational or behavioral services are prevented from receiving them. Where significant legal or administrative impediments to service access are found, legislative remedies should be used to ensure access. Their review should extend across agency boundaries to ensure that agencies whose service population includes children are not working at cross-purposes or with excessive duplication of services.

The second course of action is for legislative bodies to fund the development, evaluation, and dissemination of promising intervention and prevention programs. However, it is critical that each program funded have a methodologically rigorous evaluation component that addresses the questions set forth for interventions in the preceding section of this review. Candidate programs should not be limited to service delivery but should also include multimedia campaigns designed to build consensus for the value of education and methods of resolving social conflict.

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