



Disentangling the relationship between delinquency and hyperactivity, low achievement, depression, and low socioeconomic status: Analysis of repeated longitudinal data

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ABSTRACT

Purpose: To test hypotheses about causal linkages among hyperactivity, low academic achievement, depression, low SES, and delinquency.

Methods: 503 boys were followed up in the Pittsburgh Youth Study. Comparable measures of all variables at each age from 11 to 15 are analyzed. Cross-lagged panel models are tested.

Results: Hyperactivity, depression and achievement decreased with age, while SES and delinquency increased with age. The analyses suggest that hyperactivity and low SES caused low achievement, which in turn caused delinquency, which in turn caused depression.

Conclusions: Depression is not a risk factor for delinquency. These analyses should be repeated with larger numbers of variables. Developmental and life-course theories should propose and test sequential rather than simultaneous influences on offending. Since low achievement has the most direct influence on delinquency, interventions should target low achievement rather than hyperactivity or SES.

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Introduction

Hyperactivity, low academic achievement, depression, and low socioeconomic status (SES) are viewed as important risk factors for delinquency (see e.g. Derzon, 2010; Farrington, Loeber, & Ttoli, 2012; Farrington, Loeber, & Van Kammen, 1990; Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998a, 1998b). A risk factor is defined as a variable that precedes and predicts an outcome such as delinquency. A risk factor is considered to have causal effects if changes in the risk factor are followed by changes in the outcome with high internal validity (see, e.g., Murray, Farrington, & Eisner, 2009). Therefore, longitudinal research is needed to investigate risk factors and causal risk factors.

While the most important risk factors for delinquency have been well established for many years and are highly replicable across time and place (e.g., Farrington & Loeber, 1999), less is known about causal influences and intervening mechanisms. For example, if hyperactivity and low academic achievement both predict delinquency, is it that hyperactivity causes low academic achievement which in turn causes delinquency, so that hyperactivity only indirectly influences delinquency through the mediating factor of low academic achievement? Similarly, if low SES and low academic achievement both predict

delinquency, is it that low SES causes low academic achievement which in turn causes delinquency, so that low SES only indirectly influences delinquency through the mediating factor of low academic achievement? The main aim of this paper is to investigate these alternative sequences of risk factors and mediating processes.

The relationship between depression and delinquency is particularly perplexing. Depression is positively related to delinquency (e.g., Loeber et al., 1998a, 1998b). However, depression is classified as an internalizing problem and is positively related to other internalizing problems such as anxiety and shyness/withdrawal (Achenbach & Edelbrock, 1983). Nevertheless, anxiety and shyness/withdrawal are often negatively related to delinquency and are sometimes regarded as protective factors against delinquency. For example, in the Cambridge Study in Delinquent Development, which is a longitudinal survey of over 400 London boys, Farrington, Gallagher, Morley, St. Ledger, and West (1988) found that boys from criminogenic backgrounds who did not become offenders tended to have few or no friends at age 8. Similarly, Kerr, Tremblay, Pagani, and Vitaro (1997), in the Montreal longitudinal-experimental study of over 1,000 boys, concluded that behavioral inhibition (anxiety) protected boys against delinquency. The present paper aims to advance knowledge about the relationship between depression and delinquency.

There have been previous attempts to investigate causal effects and mediating mechanisms (see, e.g., Baron & Kenny, 1986; Hayes, 2009). For example, McGloin, Pratt, and Maahs (2004), using US National

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Longitudinal Survey of Youth data, concluded that the relationship between low intelligence and delinquency was mediated by low school achievement, low self-control, and deviant peer pressure. Masten et al. (2005), in a Minneapolis longitudinal study of over 200 children from age 8 to age 20, concluded that childhood externalizing behavior (aggression and delinquency) led to low academic achievement in adolescence, which in turn led to externalizing and internalizing problems later in life. The present study goes beyond previous research by including more risk factors and by analyzing comparable annually collected data in the Pittsburgh Youth Study (PYS; see later).

Annually collected data in the PYS was previously used to study causal effects by comparing within-individual analyses and between-individual analyses (Farrington, Loeber, Yin, & Anderson, 2002). The authors found that poor parental supervision predicted a boy's delinquency both between and within individuals, but that peer delinquency predicted a boy's delinquency between individuals but not within individuals. In other words, changes in peer delinquency within individuals (from one assessment to the next) did not predict subsequent changes in a boy's delinquency from one assessment to the next. This suggested that peer delinquency might not be a cause of a boy's delinquency but might instead be measuring the same underlying construct (perhaps reflecting co-offending). In contrast, poor parental supervision was predictive within individuals and therefore might be a causal factor. These kinds of analyses can only be carried out in a study such as the PYS with numerous comparable assessments repeated at regular intervals.

The present paper uses similar PYS data to investigate causal linkages between hyperactivity, low academic achievement, depression, low SES, and delinquency.

The following are plausible hypotheses which will be tested:

1. Hyperactivity, low achievement, depression, and low SES cause delinquency
2. Delinquency causes hyperactivity, low achievement, and depression. The hypothesis that delinquency of a boy causes low SES of his parents seems very unlikely and was not tested.
3. Hyperactivity causes low achievement which in turn causes delinquency. The alternative hypothesis that low achievement causes hyperactivity which causes delinquency was also tested.
4. Low achievement causes depression which in turn causes delinquency. The alternative hypothesis that depression causes low achievement which causes delinquency was also tested.
5. Low SES causes hyperactivity, low achievement, and depression, which in turn cause delinquency.

These hypotheses were tested in cross-lagged panel models.

Method

Sample

The PYS is a prospective longitudinal survey of over 1,500 boys originally studied in the first, fourth, or seventh grades of Pittsburgh public schools in 1987–88. This paper is based on the youngest cohort, which was initially recruited from a list of names of boys in the first grade provided by the Pittsburgh Board of Public Education. Of 1,003 eligible boys who were randomly selected, 849 (85%) completed a screening assessment of antisocial behavior using a combination of parent, teacher, and self-report instruments. Boys who scored in the upper 30% on antisocial behavior on this screening measure ($n = 256$), as well as an approximately equal number of boys who were randomly selected from the remainder ($n = 247$), were then included in the longitudinal follow-up sample. The 503 boys in the youngest cohort who were followed up were similar to boys in the screening sample in terms of ethnicity and California Achievement Test (CAT) reading scores. Just over half of the boys were African American (57%), and 55% had an above-average CAT reading score.

Nearly all (94%) were living with their biological mother, but only 39% were living with their biological father. Extensive details of the sample selection, study characteristics, and participants can be found elsewhere (Loeber & Farrington, 2011; Loeber, Farrington, Stouthamer-Loeber, & White, 2008; Loeber et al., 1998a).

Procedures

Interviews for the longitudinal follow-up of the youngest cohort were conducted with the boy and his primary adult caretaker (referred to as the parent, but the vast majority were mothers), and self-administered questionnaires were completed by the parent and the teacher. Most interviews were conducted in the boys' homes. Prior to the assessment, informed written consent was obtained from the parent. The data collection procedures were approved by the Institutional Review Board at the University of Pittsburgh. The follow-up assessments of the youngest cohort took place every 6 months for the first 8 assessments following screening, and then annually for the next 9 assessments. The information was combined into annual data extending from age 7 to age 19.

Measures

In choosing factors to compare with delinquency, Farrington et al. (2002) began with the 40 key explanatory variables identified by Loeber et al. (1998a). The data reduction process ensured that these variables were not highly intercorrelated. It was not possible to calculate within-individual correlations with delinquency for most of these variables, because they were either dichotomous or had very few values (see Farrington & Loeber, 2000) or were not measured comparably in all waves. Only 9 explanatory variables were measured comparably using reasonably continuous scales. Four explanatory variables and one outcome variable (delinquency) were studied in the present paper:

- (1) *HIA problems*: the number of hyperactivity, impulsivity, or attention deficit problems out of 14, rated by parents and teachers.
- (2) *Low academic achievement*: a continuous score from 1.0 (above average) to 4.0 (failing), rated by boys, parents, and teachers. All informants rated the boy's performance in reading, math, writing, and spelling, while parents and boys also evaluated up to three other subjects. The construct was created by taking the mean of all ratings across informants.
- (3) *Depressive symptoms*: a score from 0 to 11, based on 11 items rated by mothers and teachers (e.g. about whether the boy is lonely, cries a lot, feels that no-one loves him, feels worthless, is unhappy, worries a lot).
- (4) *Socioeconomic status (SES)*: the Hollingshead (1975) index, scored from 0 to 60, derived by multiplying the scale value for occupational prestige (from none to executive/professional) by 5 and the scale value for the educational level of the parent (from sixth grade or less to advanced degree) by 3, based on information from the parent. If two parents were living in the home, the higher SES of the two was coded.
- (5) *Delinquency*: measured according to self-reports of the frequency of committing the following 25 types of acts in the previous year; carrying a weapon; vandalism; firesetting; avoiding paying (e.g. for a fare); breaking and entering; stealing an item worth less than \$5; stealing an item worth \$5–\$50; stealing an item worth \$50–\$100; stealing an item worth more than \$100; shoplifting; pickpocketing; stealing from a car; handling stolen goods; joyriding; vehicle theft; check fraud; credit card fraud; cheating someone out of money; attacking to hurt; robbery; gang fighting; hurting someone to get sex; forcing someone to have sex; selling marijuana; and selling heroin, cocaine, or LSD.

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