PARENTAL MANAGEMENT, ADHD, AND DELINQUENT INVOLVEMENT:

REASSESSING GOTTFREDSON AND HIRSCHI'S GENERAL THEORY
ABSTRACT

A core but underresearched proposition of Gottfredson and Hirschi’s (1990) general theory of crime is that ineffective parenting fosters low self-control in children, which in turn leads to involvement in delinquent conduct. Using a sample of 2,472 students from six middle schools, we test this thesis. In the context of the general theory, we also examine the impact of ADHD on self-control and delinquency. The analysis revealed three main conclusions. First, consistent with the general theory, low self-control was a strong predictor of both self-reported delinquency and self-reported arrests. Second, inconsistent with the general theory, parental monitoring not only increased self-control but also had direct effects on both measures of delinquency. Third, the effects of ADHD on delinquency were largely through low self-control. This finding both illuminates a potentially important pathway from ADHD to misconduct and suggests that, contrary to the general theory; low self-control may have multiple determinants.
Gottfredson and Hirschi’s general theory has emerged as a salient criminological paradigm. It has received over 300 citations in the *Social Science Citation Index* and is discussed in virtually every book on contemporary criminological theory (see, e.g., Akers, 2000; Cullen and Agnew, 1999; Lilly, Cullen, and Ball, 2002; Paternoster and Bachman, 2001; Vold, Bernard, and Snipes, 1998). Gottfredson and Hirschi’s general theory claims that low self-control is the principal source of juvenile delinquency, adult crime, and “analogous” behaviors. After more than a decade of research, the existing studies show consistent empirical support for this proposition (Pratt and Cullen, 2000). These investigations suggest that criminal and related behaviors are higher among adolescents and adults who behave impulsively, enjoy taking risks, prefer physical activities to mental exertion, are self-centered and short-tempered, and choose simple tasks over complex ones.

Gottfredson and Hirschi (1990) attribute low self-control to ineffective parenting and contend that inculcating self-control requires parents to monitor their children so they can effectively recognize and punish wayward acts. In essence, Gottfredson and Hirschi link self-control to what other criminologists have called parental “direct control” (Wells and Rankin, 1998) or “instrumental control” (Hagan, 1989). They disagree with current scholars who argue that parents have little impact on young adolescents (Harris, 1998), but also assert that when parental influence occurs, it is exerted through the narrow conduit of self-control. Phrased alternatively, they dismiss the notion that parenting could affect delinquency directly or through other social processes (e.g., social learning, social support).
Despite its centrality to the general theory, relatively few studies have examined Gottfredson and Hirschi’s thesis on parental management, control, and crime (for exceptions, see Hay, 2001; Gibbs, Giever, and Martin, 1998; Feldman and Weinberger, 1994). In part, this neglect is due to researchers using older samples (i.e., late teens or adults) and/or samples that do not contain measures of parental management and self-control. A main goal of this study is to help fill this void by providing a test of this core proposition of the general theory that parental management affects crime through self-control.

Additionally, the criminological research has not explored whether self-control has sources beyond parental management. Again, Gottfredson and Hirschi (1990:97) are clear in their assertion that “ineffective child rearing” is the “major” cause of low self-control. Our data set allows us to assess this proposition by investigating whether Attention Deficit Hyperactivity Disorder (ADHD)—an individual difference with a strong genetic component—might be an alternative source of delinquency and of low self-control. If so, then Gottfredson and Hirschi’s analysis of the origins of low self-control might require further specification.

In short, our study attempts to examine two core propositions of the general theory of crime: first, whether low self-control is the sole cause of juvenile delinquency and, second, whether ineffective parenting is the exclusive cause of low self-control. We begin by examining the research on parenting as it relates to the general theory and then by reviewing research on ADHD and misconduct. These sections are a prelude to our outlining the research strategy for our empirical analysis.
PARENTING AND THE GENERAL THEORY OF CRIME

The basic premise of Gottfredson and Hirschi’s general theory of crime is as follows. People who lack self-control will tend to be impulsive, insensitive, physical (as opposed to mental), risk-taking, shortsighted, and nonverbal, and they will tend therefore to engage in criminal and analogous acts. Since these traits can be identified prior to the age of responsibility for crime, since there is considerable tendency for these traits to come together in the same people, and since the traits tend to persist through life, it seems reasonable to consider them as comprising a stable construct useful in the explanation of crime (Gottfredson and Hirschi, 1990:90-91).

Thus, Gottfredson and Hirschi argue that at a very early age, individuals fail to develop the ability to control their behavior and therefore are prone to engage in risky behaviors that give them either a short-term reward or relief from momentary irritations (i.e., criminal behavior). Furthermore, they argue that once children develop this inability to exercise control, they will not be able to control their impulses over their life span (i.e., they will offend throughout their lives).

Support for an inverse relationship between self-control and deviant behavior is consistent. Research has shown that low self-control is significantly related to general law violations and to self-reported delinquency (Grasmick et al., 1993; Tremblay, Boulerice, Arseneault, and Niscale, 1995). Additionally, Vazsonyi, Pickering, Junger, and Hessing (2001) found that the Grasmick et al. (1993) self-control scale had very similar predictive ability cross-nationally (United States, Switzerland, Hungary, and Netherlands). A recent
meta-analysis also gives credence to the argument that low self-control is related to criminal behavior. Pratt and Cullen’s (2000) meta-analysis included 21 empirical studies spanning nearly a decade of research and 126 effect size estimates representing nearly 50,000 individual cases. They designed their meta-analysis to assess whether the extant research supports Gottfredson and Hirschi’s theory. Pratt and Cullen found that whether it is in its weighted, unweighted, or independence-adjusted form, self-control is a strong predictor of crime. They report also that the effect size of the self-control variable is not significantly affected by whether the scale used to measure it is Grasmick et al.’s (1993) or an alternative one. In addition, Pratt and Cullen found that the size of the self-control variable remains relatively constant regardless of the other variables included in the analysis, and that self-control has “general” effects.

What, however, is the source of low self-control? Gottfredson and Hirschi state that the major cause of low self-control is when parents (or guardians) fail to effectively raise their children during the first eight years of their lives. Their definition of ineffective parenting includes three components: (1) monitoring or tracking the child’s behavior, (2) recognition of deviant behavior when it occurs, and (3) consistent and proportionate punishment for the deviant behavior when it is recognized. Thus, Gottfredson and Hirschi argue that during childhood, people develop low self-control if their parents fail to effectively monitor their behavior and appropriately hold them accountable for their deviant behaviors. Quite simply, crime could be prevented if parents effectively raised their children (p. 102).

Notably, Gottfredson and Hirschi clearly downplay the possibility that low self-control has a genetic/biological component. For example, after a careful analysis of adoption studies, they argue that this research provides “strong evidence that the inheritance of
criminality is *minimal*…we conclude that the ‘genetic effect’…is near zero” (p. 60, emphasis in the original). They also observe that, “obviously, we do not suggest that people are born criminals, inherit a gene from criminality, or anything of that sort. In fact, we explicitly deny such notions…” (p. 96). Gottfredson and Hirschi, however, raise the *possibility* that “individual differences may have an impact on the prospects for effective socialization (or adequate control)” (p. 96). But in contrast to other theorists who systematically incorporate individual differences into their models (e.g., Moffitt, 1993; Sampson and Laub, 1994; Wilson and Herrnstein, 1985), they fail to develop further the interplay between individual differences and self-control. In fact, they assert, “effective socialization is…always possible whatever the configuration of individual traits” (p. 96).

Further, in their most recent statement of their theory (Hirschi and Gottfredson, 2001), they refrain from mentioning the idea that individual traits—such as genetic/biological predispositions—could underlie self-control. Instead, they suggest that at the inception of life, criminal propensity is virtually universal, for “all of us…are born with the ability to use force and fraud in the pursuit of our private goals” (2001:90). In the end, Gottfredson and Hirschi are clear in their contention that parenting is the key factor in differentiating whether children do, or do not, develop the ability to resist the gratification inherent in criminal conduct; or, as they put it, the “major ‘cause’ of low self-control thus appears to be ineffective child-rearing” (1990:97).

Few criminological studies have tested the proposition that ineffective parenting causes low self-control. Even so, those that have been conducted are largely supportive of the general theory. Thus, Feldman and Weinberger (1994) report on a sample of sixth-grade boys and their families who were followed up four years later (n = 81). They examined
whether self-control mediates the link between ineffective parenting during preadolescence and subsequent adolescent delinquency. Feldman and Weinberger’s measure of self-control included a self-report rating by the boys using the Weinberger Adjustment Inventory and ratings by their teachers, parents, and peers. Using self-reports, the boys assessed ineffective parenting along multiple dimensions, including inconsistency, rejection versus child-centeredness, and power assertive/harsh discipline. In addition, observers assessed general family functioning. Feldman and Weinberger’s (1994) path analysis showed that ineffective parenting was a significant predictor of low self-control, which, in turn, predicted delinquent behavior. Additionally, they found that low self-control completely mediated the influence of ineffective parenting on delinquency.

Gibbs et al. (1998) undertook a systematic analysis of the general theory’s parenting thesis. Using retrospective accounts of family management practices collected from 262 university students, they reported that ineffective parenting had a significant indirect effect on their deviance index through a 40-item self-control scale. Similar to Feldman and Weinberger (1994), they found that parental management did not directly affect their deviance index once they controlled for low self-control. Their finding supports Gottfredson and Hirschi’s (1990) contention that low self-control should entirely mediate the influence of ineffective parenting on criminal behavior.

Most recently, Hay (2001) analyzed the impact of parental monitoring and parental willingness to discipline on self-control and “projected” delinquency (or intentions to offend) among 197 urban high schools students in a southwestern state. Again, the results are largely consistent with the general theory. Self-control was influenced in the predicted direction by parental management practices and self-control directly affected delinquency. However,
contrary to the research by Feldman and Weinberger (1994) and Gibbs et al. (1998), Hay (2001) found that a scale measuring parental monitoring and discipline was associated with both “predatory delinquency” and “substance use” after controlling for the effect of low self-control.

**ADHD, SELF-CONTROL, AND CRIME**

ADHD is the most common neurobehavioral disorder of childhood and is among the most prevalent chronic health conditions affecting school-aged children (Homer et al., 2000). The core symptoms of ADHD include inattention, hyperactivity, and impulsivity. The assessment and diagnosis of school-aged children with attention-deficit/hyperactivity disorder (ADHD) include six recommended criteria:

1) in a child 6 to 12 years old who presents with inattention, hyperactivity, impulsivity, academic underachievement, or behavior problems, primary care clinicians should initiate an evaluation for ADHD; 2) the diagnosis of ADHD requires that a child meet *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria; 3) the assessment of ADHD requires evidence directly obtained from parents or caregivers regarding the core symptoms of ADHD in various settings, the age of onset, duration of symptoms, and degree of functional impairment; 4) the assessment of ADHD requires evidence directly obtained from the classroom teacher (or other school professional) regarding the core symptoms of ADHD, duration of symptoms, degree of functional impairment, and associated conditions; 5) evaluation of the child with ADHD should include assessment for associated (coexisting)
conditions; and 6) other diagnostic tests are not routinely indicated to establish the
diagnosis of ADHD but may be used for the assessment of other coexisting
conditions (e.g., learning disabilities and mental retardation) (Homer et al.,
2000:1158).

When impairment criteria based on the Diagnostic and Statistical Manual (DSM) are
used, prevalence rates for ADHD in the general population of children and young adolescents
ages 6 to 12 range from 4 to 12 percent, with higher rates for urban areas, boys and those
from low SES backgrounds (Barbaresi, Katusic, Colligan, Pankratz, Weaver, Weber,
Mrazek, and Jacobsen, 2002; Brown et al., 2001; Pineda et al., 1999; Wender, 2002).

The etiology of ADHD is likely multifaceted, combining genetic, environmental, and
other risk factors. Research suggests, however, that approximately 80 percent of the variance
in ADHD is genetic; thus, the disorder travels along biological but not adoptive family lines
(Sprich, Biederman, Crawford, Mundy, and Faraone, 2000; Thapar, Harrington, Ross, and
McGuffin, 2000; Weiss, Hechtman, and Weiss, 1999; see also, Rowe, 2002). Other potential
causes of ADHD include adversity, obstetric complications, and exposure to nicotine and
alcohol as a fetus. Research has also shown that events such as car accidents that affect brain
development may cause ADHD. None of the studies we examined suggested that ineffective
parenting causes the onset of ADHD.

Children with ADHD frequently manifest a range of comorbid conditions including
aggression, conduct disorders, oppositional defiant disorder, poor academic and cognitive
skills, anxiety, depression, poor neuropsychological deficits, and low self-esteem (Barkley,
1998; Brown et al., 2001; Loeber and Loeber, 1998; Nadder, Silberg, Rutter, Maes, and
Eaves, 2001). Research suggests that individuals diagnosed with ADHD have higher rates of
offending (Pratt, Cullen, Blevins, Daigle, Wright, and Unnever, Forthcoming; Satterfield, Swanson, Schell, and Lee, 1994; Satterfield and Schell, 1997; Stern, 2001). It has been estimated that more than 25 percent of adult prison inmates have ADHD (Foley, Carlton, and Howell, 1996) and that in excess of 50 percent “exhibit a significant number of ADHD symptoms” (Richardson, 2000:18-2). Most noteworthy, a recent meta-analysis revealed that ADHD is associated with increased conduct disorders, drug use, and criminal behavior (Pratt et al., 2001; see also, Hawkins, Herrenkohl, Farrington, Brewer, Catalano, and Harachi, 1998). Although research by criminologists on ADHD is not plentiful, findings from major longitudinal studies show an association between various measures of ADHD and delinquency; the strength of the relationship, however, appears to decline with age (Moffitt, 1990; Farrington, Loeber, and Van Kammen, 1990; Loeber, Stouthamer-Loeber, Van Kammen, and Farrington 1991; Loeber et al., 2001). Relevant to our concerns here, none of these studies explored systematically the relationships among ADHD, Gottfredson and Hirschi’s construct of self-control, and crime.

Our special interest is in exploring the potential linkages between ADHD and the general theory. In particular, we assess whether ADHD may be an independent source of low self-control. If so, then this relationship would expand the general theory to consider the possibility that self-control is not exclusively caused by parental management; it may also have a genetic/biological component—a possibility that, as we have noted, Gottfredson and Hirschi have downplayed or, in the least, have not taken the opportunity to systematically develop. We also are interested in whether ADHD has direct effects on delinquency or effects that are indirect through low self-control. If so, then this latter finding would advance
research on ADHD by identifying a key factor through which ADHD increases delinquent involvement.

RESEARCH STRATEGY

The current paper attempts to contribute to the empirical assessment of Gottfredson and Hirschi’s theory in three ways. First, we provide another test of whether Grasmick et al.’s (1993) measure of self-control is related to delinquency—assessed by self-reported acts and by self-report arrests—among a sample of middle school students. Again, previous research has shown this scale to be consistently related to delinquency (Pratt and Cullen, 2000). We should note that Hirschi and Gottfredson (1993:48-49) recommend measuring self-control with behavioral measures (see also, Evans, Cullen, Burton, Dunaway, and Benson, 1997). These were not available in the data set. However, existing studies have shown self-control similarly affects crime whether it is measured attitudinally (as do Grasmick et al.) or behaviorally (see Pratt and Cullen, 2000).

Second, we explore the relationships among parental management, self-control, and delinquency. Gottfredson and Hirschi’s theory predicts that parental management should directly affect self-control, which, in turn, affects delinquency. The general theory also predicts that self-control should completely mediate the effect of parental management on delinquent involvement.

As noted in the previous section, the extant research is largely supportive of the general theory’s theses on the impact of parenting on self-control and on self-control’s role in mediating parental effects on delinquency (Hay, 2001; Gibbs et al., 1998; Feldman and
Weinberger, 1994). This research, however, has been limited by the use of small samples (n = 87 to 267), samples of limited diversity (e.g., boys only, college students), and/or samples composed of “older” youths (students in high school or beyond). In contrast, the sample in the current study is large (over 2,400 students), racially and economically diverse, and confined to middle school students. Accordingly, it presents the opportunity to assess the generality of Gottfredson and Hirschi’s core parenting thesis among a large, socially diverse, and youthful sample.

Indeed, we employ a sample that is considerably younger than those used in the most systematic existing studies of Gottfredson and Hirschi’s parental management theses (Hay, 2001; Gibbs et al., 1998). Even so, because Gottfredson and Hirschi argue that self-control is an enduring propensity by the end of childhood (around age 8), it might have been preferable to have used a sample of grade school children. Gottfredson and Hirschi’s perspective, however, largely emphasizes continuity in self-control. Given the short time span between age 8 and the age of our sample (mean age 12), we would expect that the respondents’ self-control—as well as their parents’ willingness to monitor the children’s behavior—would remain relatively constant into the middle school years.1

Third, we explore the relationship between ADHD and delinquency. The extant research has established an ADHD-crime connection (Babinski, Hartsough, and Lambert, 1999; Burke, Loeber, and Lahey, 2001; Pratt et al., Forthcoming). However, the general theory would predict that any relationship between ADHD and delinquency should be spurious. That is, the personality orientations associated with ADHD should not influence delinquency beyond the effects of the theory’s concept of low self-control. Further, in a causal model, ADHD—as a largely genetic/biological condition—can be placed prior to self-
control; that is, it should be considered as an exogenous factor that potentially influences the endogenous factor of self-control (Rowe and Osgood, 1984).

The potential criminogenic symptoms of ADHD, hyperactivity and impulsivity, are similar to a core symptom of low self-control, impulsivity (Gottfredson and Hirschi, 1990). Therefore, we hypothesize that students with ADHD should exhibit lower levels of self-control, which, in turn places them at greater risk for offending. It is noteworthy, however, that Gottfredson and Hirschi would predict that in such a model, ADHD should not significantly impact levels of self-control. Instead, the general theory contends that the level of self-control is determined principally by the quality of parenting management.

In summary, the causal relationships that we test are theoretically derived and consistent with prior tests of the general theory’s parental management thesis (Feldman and Weinberger, 1994; Gibbs et al., 1998; Hay, 2001). However, we recognize that alternative causal relationships could be hypothesized (e.g., consistent with a “child effects” thesis, that low self-control prompts poor parental management). Because our data are cross-sectional, we are restricted in our ability to assess these possibilities. Accordingly, although an advance in several ways over the extant research, future analyses may need to further specify this present test of Gottfredson and Hirschi’s theory. To the extent our results confirm the general theory, it gains credibility; in contrast, anomalous findings, would weaken the perspective’s claim to be the general theory of crime (more generally, see Braithwaite, 1968).
METHODS

Sample

The data for this study were collected in an effort to gather baseline data on school bullying and school violence. The sample was drawn from the six public middle schools that serve a metropolitan area with a diverse population of nearly 100,000 inhabitants in Virginia. The six middle schools served a total enrollment of 3,038 students in grades six, seven, and eight. Approximately, 46.5 percent of the middle school student population was nonwhite, 52 percent received a free or reduced cost breakfast or lunch at school, and 50 percent were male. The percentage of students receiving some services in special education based on an IEP (individualized education plan) was 19.6 percent and the dropout rate for the middle schools in 1999-2000 was 1.9 percent.

All middle school students in attendance on the day of the survey were eligible for the study. In all, 2,472 students completed the survey (a response rate of 81 percent). School administrators sent an “opt-out” letter to all the parents/guardians of the students before the administration of the survey. The parents of 42 students declined to allow their children to participate in the survey. Teachers administered an anonymous survey in classrooms during the fall of 2000. The 12-page op-scan survey consisted of 146 questions; including measures of delinquency, parenting effectiveness, low self-control, ADHD status, and personal characteristics of the students.

The respondents who completed the survey closely matched the total population of students. The percentage of students who reported they were non-white was 40 percent in comparison to the student population of 46.5 percent; the percentage of male study participants was 49.1 percent in comparison to the student population of 50 percent; and the
percentage of students who reported that they received a free or reduced cost breakfast or lunch was 50 percent in comparison to the student population, for grades 7-12, of 52 percent.

Surveys were carefully screened for complete and accurate information (patterned responses). We deleted 31 surveys in which the students gave the same response to every question on one or more pages (excluding the pages focused on bullying and having been bullied). We also dropped four surveys in which the student reported an unlikely height (over six foot five inches) or weight (over 300 pounds). We confirmed with school principals that no students in the school were this large.

Using LISREL 8.50 for Windows and the EM algorithm (Schafer, 1997), we substituted values for missing cases. The EM algorithm generated values based on a data set that included the variables used in the present analysis. All analyses were run with and without missing cases; the results did not differ substantively. After imputing values for the missing cases, the sample included 2,437 middle school students. Ordinary least squares was used as the estimation procedure when we analyzed the low self-control and delinquency scales and logistic regression was used when we analyzed the dichotomous dependent variable, self-reported arrest.

Measures

Table 1 shows the coding of the variables included in this analysis. Variable names are in the first column, the coding categories are in the second, and descriptive statistics are in the last columns.

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**Dependent Variables.** A self-report instrument adapted from the National Youth Survey was used to measure *delinquent involvement* (Elliott, Huizinga, and Ageton, 1985; Elliott, Huizinga, and Menard, 1989). To ensure a clear reference period for offending, students were asked to indicate how often “since school started in August” that they had engaged in nine relatively serious delinquent acts. The survey was administered in the last week in October (in 2000). To respond to the self-report items, the youths used a scale ranging from “0 = never” to “4 = 4 or more times.” The acts on the measure of delinquent involvement included purposely damaging property belonging to a school, purposely setting fire to a building/car or other property, carrying a hidden weapon, attacking someone with the idea of seriously hurting or killing them, and getting involved in gang fights. They also included hitting or threatening to hit a teacher or other adult at school, selling illegal drugs, hitting or threatening to hit a parent, and using force or threatening to use force to get money or things from other people. The students’ scores were summed across these nine items to create the Delinquent Involvement scale. Its alpha coefficient was .90. Thirty-four percent of the 2,437 middle school students reported that they had committed at least one delinquent act. The log transformation of the scale scores was used in the analysis given that it was positively skewed.

In addition to the delinquency scale, we measured *self-reported arrest*. The respondents were asked if they had ever “been arrested by the police for anything other than a minor traffic offense.” Six percent of the 2,437 students reported that they had been arrested. We used an “ever” measure because with a sample of youths with a mean age of 12 (as in our sample), a short reference period (“since school started”) would have yielded too few arrests to permit a meaningful analysis. The major purpose of including this measure
was to examine whether the results on the self-report scale—our main measure of offending—would be robust across a measure of “official” delinquency. Thus, although the measure of arrest must be viewed with caution, it provides an opportunity to explore the consistency of the findings across different means of assessing delinquency.

**Independent Variables.** The Grasmick et al. (1993) scale was used to measure the respondent’s level of *low self-control*. Responses were summed across 22 items and the scores were standardized. The alpha coefficient for Low Self-control was .89. This reliability is consistent with previous research (Arneklev, Grasmick, Tittle, and Bursik, 1993; Gibbs and Giever, 1995; Gibbs et al., 1998; Hay, 2001; Longshore, 1998; Longshore and Turner, 1998; Piquero and Tibbetts, 1996). Note that we have coded this measure so that a high score means that a respondent has “more” low self-control (i.e., the respondent has a higher “criminal propensity”).

In Gottfredson and Hirschi’s perspective, effective parental management hinges on parents monitoring their children, recognizing deviant behavior when it occurs, and then consistently punishing misconduct. We measure two of these dimensions, monitoring and consistent punishment. No measure was available for how parents differed in their recognition of wrongdoing. Past research has also omitted this dimension of parental management (e.g., Hay, 2001). Hay (2001:715) contends that omitting this dimension of parental management may be “acceptable” because “research has consistently identified monitoring and discipline as the key aspects of effective parenting.”

*Parental monitoring* was measured through a scale developed by Simons, Wu, Conger, and Lorenz (1994). This scale assessed how effectively parents or guardians monitored the behavior of their children. The responses ranged from never (never = 0) to always (always = 4).
Responses were summed across five items (e.g., How often do/does your parent or parents (guardians) know who you are with when you are away from home?) and the scores were standardized. The alpha coefficient for the Monitoring scale was .75, which is similar to the alpha reported by Simons et al.

A single item created by Simons et al. (1994) was used to measure consistency of discipline: “How often do/does your parent or parents (guardians) punish you for something at one time and then at other times not punish you for the same thing?” The responses ranged from never (never = 0) to always (always = 4). This variable was recoded so that a high score meant more consistency in punishment. The variable was termed consistent punishment.5

The data set did not contain a standard psychometric measure of ADHD. We also were precluded from consulting school records for official psychological diagnoses, because the promise to parents of complete anonymity on the survey precluded this option (i.e., no identifiers on the survey instrument). The data set, however, did contain an alternative means of assessing ADHD status. Specifically, we used a question in the survey instrument that asked students: "Have you ever taken medication for being hyperactive (attention-deficit hyperactivity disorder)?"6 Notably, epidemiological researchers have also used surveys including questions about ADHD medication status to measure its prevalence (Rowland, Umbach, Stallone, Naftel, Bohlig, and Sandler, 2002).

We believe that our measure is a reasonable proxy for ADHD for the following reasons. First, to receive a prescription for ADHD medication, students must have been referred to a physician and found to have symptoms consistent with ADHD. It is standard practice in the schools surveyed for physicians to prescribe medication only after consulting with teachers and parents about the child’s behavior. It also is relevant that the use of a
middle school sample likely means that clear cases of ADHD would have been diagnosed by the age at which the students completed the survey (i.e., a younger sample would have had less “time” to be diagnosed with ADHD).

Second, the ADHD prevalence rates using the medication status measure are consistent with the extant research. In the current study, 14 percent of the 2,437 students (n = 359) reported having ever taken medication for ADHD. This percentage is similar to the rate of ADHD found in low income community samples in which DSM impairment criteria are used to establish prevalence rates (Brown et al., 2001; Pineda et al., 1999). In addition, the majority of the students who reported ever having taken medication for ADHD were boys (69 percent, n = 249). This finding is consistent with previous research showing that boys have higher prevalence rates of ADHD (Pineda et al., 1999).

Third, the results we present on the relationships of the medication status measure of ADHD to self-control and to delinquency are in the predicted direction. Measurement error might influence the strength of the statistical associations we report. However, the fact that the ADHD measure is “behaving” in a theoretically anticipated, rather than counterintuitive, fashion suggests that it is assessing the underlying construct in a reasonable way. Additionally, it is instructive that the measure we employ also has findings consistent with those based on research using alternative measures of ADHD (Pratt et al., Forthcoming; Satterfield, Swanson, Schell, and Lee, 1994; Satterfield and Schell, 1997; Stern, 2001).

Fourth, it could be argued that our measure of ADHD—medication status—reflects external efforts at “social control” rather than a child’s behavior. With regard to the current study, the most salient control thesis would be that medication status reflects not ADHD but parental management (cf. Moffitt, 1990). Two possibilities exist: (1) children receive
medication because their parents are ineffective managers and use it to control their children, or
(2) children receive medication because their parents are effective managers and monitor them
closely enough to know when intervention is needed. To some degree, the control of parental
management in the multivariate analysis would account statistically for any spurious
relationship of ADHD medication status to delinquency that is due to parental behavior. More
directly, however, we explored in our data the zero-order correlations between the parenting
variables and ADHD medication status. The relationships were substantively weak, with
ADHD having a -.04 correlation with parental monitoring and a .07 relationship with consistent
punishment. These finding are not surprising given that previous research suggests that ADHD
has a large genetic component and is not a product of parenting (Rowe, 2001).

Again, the use of a limited measure of ADHD means that the results should be viewed
with appropriate caution. Using medication status as a proxy for a clinically defined case of
ADHD introduces some measurement error into our analysis. Studies have shown that whites
are more likely to receive medication for ADHD than blacks (Rowland et al., 2002; Safer and
Malever, 2000). It is also possible that we have children in the sample who report that they
have taken medication for ADHD but do not have a clinical case of ADHD. Research shows
that there has been a several-fold increase in prescriptions for stimulant medication among
children during the past decade (Safer, Zito, and Fine, 1996). In addition, there are significant
regional variations in the amounts of stimulants prescribed by physicians and surveys among
primary care pediatricians and family physicians reveal wide variations in practice patterns
about diagnostic criteria and methods (Homer et al., 2000). However, it is also noteworthy that
recent research indicates that only .2% of subjects in a population-based birth cohort study with
no evidence of ADHD were treated with a stimulant medication (Barbaresi et al., 2002).
It is more likely that our self-report measure based on medication status underestimates rather than overestimates the prevalence of ADHD in the population of middle school students we studied. Barbaresi et al. (2002) found that only 72.1% of the subjects in the definitive ADHD group were treated with stimulants alone or in combination with either tricyclic antidepressants or centrally acting \( \alpha \)-adrenergic agonists, 14.4%. Nonetheless, for the reasons stated, it seems unlikely that the findings we report can be attributed to a methodological artifact inherent in the measure of ADHD. At the very least, the medication status measure allows us to conduct analyses that result in provisional specifications of Gottfredson and Hirschi’s theory that future researchers will need to take into account.

**Control Variables.** The control variables are listed in Table 1. They included student grade level (grades six, seven, and eight) and gender. As a rough index of socioeconomic status, we identified students who reported receiving a free or reduced cost meal at school. An income chart adjusted by household size determines whether a student qualifies for a free or reduced cost meal. For example, a student living in a household of four whose annual income does not exceed $22,945 can qualify for a free meal and can qualify for a reduced cost meal if the annual income does not exceed $32,653. In addition, children can qualify for a free meal if they are a foster-child, live in a household receiving food stamps, or if they get TANF (Temporary Assistance for Needy Families). Of the 2,437 students, 49 percent reported receiving a free or reduced cost breakfast or lunch at school. For race, we included a dichotomous variable to identify African-American students, the only minority group large enough for statistical analysis (\( n = 978 \), 49 percent of the 2,437 students).
RESULTS

It is important to initially establish whether middle school students with ADHD are more likely to report that they have engaged in delinquency. Collapsing the delinquent involvement scale into a dichotomous variable and cross-tabulating it with ADHD shows that 41 percent of the students who reported ever having taken medication for ADHD reported committing at least one delinquent act. In comparison, 33 percent of the non-ADHD students committed at least one delinquent act, a difference of 8 percent. The student’s ADHD status is significantly associated with the logged delinquent involvement scale (Chi-square = 359.43, d.f. = 277, p = .0006).

-----Insert Table 2 About Here-----

If Gottfredson and Hirschi (1990) are correct, parental monitoring and consistency of punishment—not ADHD—should be the chief predictors of level of self-control. Model I in Table 2 shows the results of regressing the Grasmick et al. (1993) scale on ADHD status, our measures of parental management, and the other characteristics of the respondents. In support of the general theory, children who report that they were effectively parented are likely to report having more self-control (or, conversely, those who were ineffectively monitored and inconsistently punished had higher levels of low self-control). In addition, the beta weights indicate that the parental monitoring and consistent punishment measures have the greatest affect on low self-control. These findings affirm Gottfredson and Hirschi’s (1990) assumption that ineffective parenting is a major correlate of low self-control.
However, the results from Model I do not fully conform to Gottfredson and Hirschi’s (1990) predictions. Most noteworthy, the regression equation shows that ADHD status is significantly related to low self-control while holding constant the effects of the other variables in the equation. This means that the effect of ADHD status on low self-control is independent of the effects of parental management and the student’s other sociodemographic characteristics. In addition, the regression equation indicates that boys, African-Americans, and those who received a free or reduced cost meal are more likely to report having low self-control.

Our next concern is whether youths with low self-control are more likely to offend after holding constant the effects of the other variables in the regression equation and whether ADHD and the parental management measures directly affect offending. If Gottfredson and Hirschi (1990) are correct, the only reason why students should have higher rates of offending is because they have less self-control. That is, the respondents’ ADHD status, whether they were ineffectively parented, and their other sociodemographic characteristics should not be associated with their offending. We created two models, Models II and III, to assess these possibilities. Model II investigates whether ADHD status and the parental management measures are associated with delinquent involvement without low self-control included in the equation. Model III examines whether low self-control mediates the potential influence of ADHD status and the parental management measures on delinquent involvement and whether low self-control directly affects the delinquency scale.

Model II indicates that, without low self-control in the regression equation, there is a significant relationship between ADHD status and delinquent involvement. Respondents with ADHD are more likely to report that they committed delinquent acts. In addition,
youths who report that they were effectively parented report lower rates of delinquency. This is particularly true for respondents who report that their parents closely monitored them. In addition, boys, African-Americans, those who receive a free or reduced cost meal, and those in upper-grade levels report more delinquency.

Model III confirms Gottfredson and Hirschi’s (1990) prediction that youths with low self-control are more likely to engage in delinquency. However, our results do not support their prediction that low self-control would be the only variable associated with higher delinquency. Boys, African-Americans, and those in upper-grade levels report higher delinquent involvement. It is instructive that even with low self-control in the model, parental monitoring retained an independent effect on delinquency, with the presence of monitoring leading to lower involvement in delinquent conduct. Consistency of parental punishment, however, had no direct effect on the delinquency scale.

Of additional interest, respondents who report having ADHD report higher levels of delinquency, although the association was statistically and substantively marginal ($p = .059, \beta = .03$). Low self-control mediated half of the effect of ADHD on delinquency.$^7$

Figure 1 presents a path diagram illuminating the relationships among ADHD status, parenting, low self-control, and delinquency. Because the data are cross-sectional, this model should be seen as suggestive and viewed with appropriate caution. The causal model, however, is consistent with the logic of the general theory. ADHD is placed as a precursor to self-control because of its likely genetic/biological origins.

As expected, and as predicted by Gottfredson and Hirschi (1990), the path model shows that low self-control is a strong predictor of delinquent involvement. Also in line with the general theory, parental management variables were related to self-control, which
partially mediated their effects on delinquency. Contrary to the general theory, however, parental monitoring exerted a strong independent effect on delinquent involvement that was not mediated by low self-control. Thus, it appears that youths closely monitored by their parents have low levels of delinquency or, conversely, that ineffective parenting directly increases delinquent involvement. The path diagram also shows that gender, race, and year in school directly affected delinquency, but the relationships were weak.

The direct impact of ADHD on delinquency was substantively and statistically marginal. More relevant, however, is that Figure 1 shows that ADHD is a source of low self-control. Again, the general theory would not predict this finding.

-----Insert Figure 1 About Here-----

In addition to the measure of self-reported delinquency, we reanalyzed the data using a dichotomous measure of self-reported arrest (i.e., “arrested for something other than a minor traffic offense”). Model IV in Table 2 presents the logistic regression results from our analysis of the arrest data. The results from this analysis are nearly identical to those in Model III, which are based on self-reported delinquency. Both models show that the respondents most at risk for offending have low self-control, have ADHD, are boys, and report having been poorly supervised. There are three differences between the models. African-Americans are more likely to report that they have engaged in delinquent acts, but we found no race differences in the arrest data. In addition, socioeconomically disadvantaged middle school students are more likely to have been arrested but do not report engaging in more delinquency. We also found that students in upper grade levels report they have committed more acts that are delinquent but are not more likely to be arrested.
DISCUSSION

Since its publication in 1990, Gottfredson and Hirschi’s “general theory” has exerted an enormous influence on criminological theory and research. The theory challenged many beliefs in the field—among them that social experiences beyond childhood matter (cf. Sampson and Laub, 1993)—and prompted a wealth of research on its clearly stated propositions (for a summary, see Pratt and Cullen, 2000). The present study has attempted to contribute to the research on the general theory by assessing key aspects of this approach that heretofore have not been thoroughly investigated. The findings support the general theory but also reveal that important aspects may be overstated and in need of qualification.

First, we provide data on the Gottfredson and Hirschi’s core proposition that low self-control is positively related to delinquent involvement. This relationship appears to be both strong and consistent. Thus, the low self-control-delinquency relationship holds across both self-reported delinquency and self-reported arrests.

It is also noteworthy that these findings are consistent with a growing body of research in which the Grasmick et al.’s (1993) measure of self-control has been found to be related to delinquent involvement (Pratt and Cullen, 2000). The Grasmick et al. scale is important because it has high face validity. Many other measures of self-control used to test the general theory were constructed from items within secondary data sets (see, e.g., Avakame, 1998; Brownfield and Sorenson, 1993; Paternoster and Brame, 1998; Polakowski, 1994). In contrast, Grasmick et al. developed their scale to measure specifically the main features of low self-control that Gottfredson and Hirschi attributed to the concept. That is, their operationalization of low self-control was theoretically derived. This close connection
between theory and method lends confidence that Gottfredson and Hirschi have identified a factor that must be seen as an important predictor of criminal conduct.

The more problematic aspect of Gottfredson and Hirschi’s theory is the contention that low self-control is the only criminal propensity. In advancing a “general” theory, Gottfredson and Hirschi were not identifying multiple propensities or risk factors. Instead, they used the concept of self-control to describe the very nature of criminal propensity. This is a bold assertion that almost certainly is inaccurate. Existing research on criminogenic risk factors supports the idea that low self-control fosters misconduct—including recidivism—but self-control is but one of several factors consistently and strongly related to criminal involvement (Andrews and Bonta, 1998; Hawkins et al., 1998; Lipsey and Derzon, 1998). In particular, there is evidence that social learning variables (e.g., antisocial values, antisocial associations) are also predictive of wayward behavior (Andrews and Bonta, 1998; Evans et al., 1997; Pratt and Cullen, 2000; Sellers, Pratt, Winfree, and Cullen, 2000). Still, it is salient that self-control, as identified by Gottfredson and Hirschi, is a factor that should be incorporated into our understanding of crime causation. Its relationship to delinquent involvement is a “fact” for which extant theories must account.

Second, beyond assessing the self-control and delinquency relationship, our study focused on a theoretical proposition that has received limited empirical investigation: Gottfredson and Hirschi’s contention that parental management (or “direct control”) is the main source of low self-control and, by implication, has effects on delinquency only through low self-control. Our study suggests that the origins of self-control are likely to be multifaceted and not limited to parental management. Importantly, we found that ADHD medication status was a source of low self-control—a point that we will return to below.
Our analysis revealed partial support for Gottfredson and Hirschi’s view on parental management, self-control, and delinquency. Parental monitoring and consistent punishment were clearly related to self-control in the predicted direction, with higher levels of monitoring and consistency in punishment associated with higher levels of self-control. Contrary to Gottfredson and Hirschi’s perspective, however, parental monitoring has substantial effects on both self-reported delinquency and arrests independent of low self-control. This suggests that Gottfredson and Hirschi’s conceptualization of “why parents matter” is excessively narrow. Parental monitoring may have direct effects or perhaps “work through” other processes. For example, social learning theory is clear in suggesting that effective parental monitoring would result in lower delinquent involvement (Patterson, DeBaryshe, and Ramsey, 1989).

Another possibility is that parental monitoring limits offending not only by increasing self-control but also by reducing criminal opportunities. LaGrange and Silverman (1999:47), for example, suggest that the “degree to which parents monitor where teens are and who they are with can be expected to have a direct impact on their opportunities to offend.” If so, this could explain why parental management not only indirectly effects delinquency through self-control but also has a direct effect.

We should note, however, that Gottfredson and Hirschi do not explore this possibility, but instead link ineffective parenting only to the development of criminal propensity or, in their words, low self-control. They recognize the role of opportunity in making crime possible, but they largely see opportunity as involving either situational contingencies (e.g., one must be employed to embezzle) or the basic elements of the crime (e.g., one has to have alcohol and a vehicle to engage in drunk driving) (Gottfredson and
Hirschi, 1990:190; Hirschi and Gottfredson, 2001:88). Additionally, Gottfredson and Hirschi argue that because crime is “easy” to commit, criminal opportunities are ubiquitous. Given these considerations, it is not clear whether they would theorize that parental monitoring is an effective *direct control* that reduces offending through opportunity reduction. First, because parents are not physically present in many situations where criminal opportunities abound, their ability to significantly deter crime is likely to be minimal. Second, the clear emphasis of Gottfredson and Hirschi’s model is that parental monitoring is a key ingredient in instilling *self-control* that will operate to limit offending even when parents are absent and cannot exercise direct control. Still, LaGrange and Silverman (1999) raise an interesting possibility about the multiple effects of parental monitoring that future research should explore.

Consistency of punishment was related to low self-control and, as the general theory would predict, its effects on delinquency were mostly mediated by low self-control. Still, the impact of consistency of punishment on self-control and delinquency was weaker than parental monitoring. It is possible that the differential influence of these two variables is due to our use of a single-item measure of what is a potentially complex social process. Another possibility is that monitoring is more consequential than consistency in parents’ influence on misconduct. We propose this possibility only tentatively, but it does suggest that future research should focus on distinct components of parental management and not assume that all control strategies used by parents are equally consequential (Hay, 2001).

Our results might also be questioned because we use a middle school sample to assess Gottfredson and Hirschi’s propositions on parental management. Gottfredson and Hirschi assert that parenting in childhood establishes enduring individual differences in self-control (or criminal propensity). Ideally, one might wish to test their perspective on a sample of
children under the age of eight. Even so, the sample used in our study is one of the youngest samples used to test the general theory (the average age of our sample is 12) (Pratt and Cullen, 2000). It also is much younger than the college student and high school samples used by the most systematic previous studies (Gibbs et al., 1998; Hay, 2001). Furthermore, as noted previously, the logic of the general theory would suggest a stable relationship between parenting and self-control during childhood and into early adolescence. Gottfredson and Hirschi’s perspective downplays change in propensity and human conduct in favor of stability in relative individual differences in self-control across time and situations (Hirschi and Gottfredson, 1995; Sampson and Laub, 1995). Minimally, it is likely the general theory would predict that child-parent relations at age eight would be similar to those that exist as the children move into early adolescence.

Finally, the current study attempted to advance the general theory by interjecting ADHD into the analysis. Although exceptions exist (Farrington, Loeber, and Van Kammen, 1990; Moffitt, 1990; Loeber et al., 1991), research on ADHD and youth problem behavior has been conducted primarily by psychologists and biomedical researchers with few ties to the field of criminology. This omission is potentially problematic in that ADHD characterizes a meaningful subset of young adolescents and is a risk factor for a range of negative life outcomes. In our analysis, the inclusion of ADHD status allowed for two interrelated insights that were theoretically consequential.

First, for the general theory, the relationship of ADHD to low self-control suggests that the origins of self-control are not limited to parental practices. Because ADHD almost certainly has genetic/organic causes, this suggests that low self-control is not a purely social outcome but also is affected by genetic predispositions (e.g., related to temperament). It is
noteworthy that, although Gottfredson and Hirschi (1990:96) raise the possibility that self-control might be influenced by “individual differences,” they refrain from developing this insight or incorporating such factors systematically into their paradigm (see also, Hirschi and Gottfredson, 2001).

Second, for ADHD researchers, it appears that their models—by ignoring criminological theory and studies—are almost certainly misspecified or, in the least, incomplete. It is important that we found that ADHD status’ effect on delinquent involvement was almost completely indirect through low self-control. Apparently, ADHD is a condition that does not consign youths to delinquent behavior. Rather, it likely exposes them to risk factors—such as low self-control—that may foster delinquency in the absence of appropriate intervention.

The findings we report in this paper on ADHD, self-control, and delinquency are fairly robust. They hold across both the measure of self-reported delinquency and across the measure of self-reported arrest. The sample used also had the advantage of being diverse socially and economically, thus increasing the likely generalizability of the findings. Even so, future research would benefit from assessing these relationships for different age groups and across different social contexts. We also caution the reader that we may have underestimated the effects of ADHD. Recent research indicates that the prevalence of treatment with stimulant medication was 86.5% for definite ADHD and 40% for probable ADHD (Barbaresi et al., 2002). Our sample is limited to students who report having received medication for ADHD. Thus, future research may want to replicate our findings using multiple measures of ADHD, including independent psychological diagnoses (where feasible) and/or multiple-item measures of the construct. Regardless, the current study does
help to lay a foundation for research on ADHD and delinquency in general and for research seeking to extend Gottfredson and Hirschi’s insights into the relationships among parenting, self-control, and crime.
FOOTNOTES

1. Gottfredson and Hirschi argue that although absolute levels in criminal propensities may change over the life course, people’s individual differences in self-control established in childhood will remain stable relative to one another across time. In any event, because we employ a young sample (average age of 12), changes in levels of self-control should not influence the results. We also note that Gottfredson and Hirschi indicate that their theory should be tested with cross-sectional data, suggesting that relationships between key variables persist across the life course.

2. An alternative school, whose enrollment includes fifty seventh and eighth graders, ten of whom are in a separate self-contained program at another site, was excluded from participation in the survey.

3. For example, when we ran Model I in Table 2 with and without missing cases, the coefficient for ADHD differed by .02 (-.12 versus -.10), the coefficient for consistency in punishment differed by .04 (-.21 versus -.17), and for the monitoring scale, the difference was .07 (.37 versus .30). For Model III, the coefficient for ADHD remained the same at .03; the coefficient for consistency in punishment differed by .02 (-.02 versus -.04 ); and for the monitoring scale, the difference was .01 (-.26 versus -.27). The self-control standardized regression coefficient differed by .05 (.26 versus .21).

4. Grasmick et al.’s (1993:17) scale initially contained 24 items, but they deleted one item related to physical activities because it lowered the scale’s reliability. Accordingly, the original 23 questions from the Grasmick et al. scale were included on the current survey. However, two questions were placed on the same line of the survey, thus inadvertently
combining them into one question. The two questions were listed as “The things in life that are easiest to do bring me the most pleasure, I dislike really hard tasks that stretch my abilities to the limit.” Consequently, students responded to 22 instead of 23 items. This slight departure from the original scale had no discernible effect on the scale’s reliability, which, as noted, remained high (.89).

5. The data set did not contain a measure of opportunity, an omission that characterizes other studies on parenting, self-control, and delinquency. It is difficult to know how the omission of opportunity would affect the results, because Gottfredson and Hirschi do not develop a theory of opportunity in which they specify how the relationship of self-control to offending will be conditioned by this factor over time and across a sample of youths. Gottfredson and Hirschi do say that opportunity is a necessary condition for a criminal event to occur. On the other hand, they also suggest that crime is easy and requires little planning, suggesting that criminal opportunities are ubiquitous. If so, then opportunity would not be expected, across time, to have a large impact on the relationship between self-control and offending (i.e., if opportunities are prevalent, criminal propensities would have ample chances to flourish across time). As we note later, however, it is possible that parental management could not only influence self-control but also limit opportunities to offend. The implications of this insight are explored in the discussion section.

6. The respondents were not asked if they were currently on medication and, if so, what type and dose of medication. In retrospect, this may have been useful information to include. Even so, the current study is interested in how ADHD is related to delinquency across a sample of middle school students. In any population, the ADHD cases will include respondents currently taking and not taking medication. Notably, to our knowledge, no previous
A criminological study examining ADHD has controlled for whether respondents were currently taking prescribed medication (Moffitt, 1990; Farrington, Loeber, and Van Kammen, 1990; Loeber, Stouthamer-Loeber, Van Kammen, and Farrington, 1991; Loeber et al., 2001; Pratt et al., 2001).

7. Because the research on ADHD has found that boys are more likely to have ADHD and comorbid conditions (e.g., conduct disorders) (Gaub and Carlson, 1997; Weiss, Hechtman, and Weiss, 1999), we tested for the interaction term, Gender X ADHD in the main effect equation presented in Model III. It was insignificant. This suggests that the relationship between ADHD and self-reported delinquency does not vary across gender. Further, for exploratory purposes, we also examined whether there was an interaction effect between ADHD and self-control. The interaction term of ADHD X low self-control was significant. Generating separate regression lines by substituting mean values showed that the youths most at risk for offending were those with ADHD and low self-control.

8. It should be noted that the relationship of social learning variables to crime is partially due to self-selection effects or, in other words, “birds of a feather flocking together.” Even so, individual differences cannot account fully for social learning effects (Akers, 1998; Warr, 2002). Further, in empirical tests of the general theory, measures of self-control do not render social learning variables spurious (Evans et al., 1997; Pratt and Cullen, 2000).

9. We should note that it is possible to interpret Gottfredson and Hirschi’s statements on individual differences in an alternative fashion. As a reviewer pointed out, Gottfredson and Hirschi could be seen as arguing that genetic/biological traits do not lead “inexorably” to crime. In this view, Gottfredson and Hirschi were raising the possibility that parenting mediates the effects of genetics/biology on delinquency. This is a different position than
interpreting, as we do here, that Gottfredson and Hirschi largely discounted potential genetic/biological causes of crime (whether they are direct or indirect). If this former interpretation is correct, then our study is best seen more as a favorable, rather than as a critical, elaboration of the general theory (since the effect of ADHD on delinquency is substantially mediated by self-control).

10. Gottfredson and Hirschi (1990) might also wish to consider the impact of ADHD and other individual differences (beyond low self-control) on the ability of parents to manage their children effectively. The challenges for parents of ADHD children are potentially greater because they are, themselves, at risk of having ADHD.
REFERENCES


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<th>Standard Deviation</th>
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<td></td>
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<td>2=eighth grade</td>
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<td>1.02</td>
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<td>1=has taken medication for ADHD</td>
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Table 2. Determinants of Low Self-Control, Delinquent Involvement, and Arrests

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model I Low Self-Control</th>
<th>Model II Delinquent Involvement without Low Self-Control</th>
<th>Model III Delinquent Involvement with Low Self-Control</th>
<th>Model IV Arrest with Low Self-Control and ADHD*</th>
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<td>.092*** (.127) [.025]</td>
<td>.050** (.069) [.025]</td>
<td>.655*** (1.926) [.201]</td>
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<td>.036* (.030) [.015]</td>
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<td>-.079*** (-.043) [.010]</td>
<td>-.022 (-.012) [.010]</td>
<td>-.026 (.974) [.069]</td>
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<td>.069** (.134) [.036]</td>
<td>.034 (.066) [.035]</td>
<td>.474* (.1607) [.207]</td>
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<td>Low Self-Control</td>
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<td>-----</td>
<td>.269*** (.211) [.016]</td>
<td>.961*** (2.615) [.120]</td>
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<td>R²</td>
<td>.330***</td>
<td>.191***</td>
<td>.242***</td>
<td>.213***</td>
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*Note: For Models I, II, and III:
standardized estimates are listed first and have no parentheses or brackets;
unstandardized estimates are listed below the standardized estimates and are in parentheses();
standard errors are listed last and are in brackets [   ].
Model IV presents logistic regression coefficients, log odd ratios, and the standard errors are in brackets. The R² for the Arrest equation is the Max-rescaled R².

* p < .05
** p < .01
*** p < .001
N = 2437
Figure 1. Path Diagram of Determinants of Low Self-Control and Delinquent Involvement