THE EMPIRICAL STATUS OF GOTTFREDSON AND HIRSCHI'S GENERAL THEORY OF CRIME: A META-ANALYSIS

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To determine the empirical status of Gottfredson and Hirschi's (1990) "general theory of crime," we conducted a meta-analysis on existing empirical studies. The results indicate that, regardless of measurement differences, low self-control is an important predictor of crime and of "analogous behaviors." Also, low self-control has general effects across different types of samples. Contrary to Gottfredson and Hirschi's position, however, the effect of low self-control is weaker in longitudinal studies, and variables from social learning theory still receive support in studies that include a measure of low self-control. Finally, we argue that meta-analysis is an underutilized tool in discerning the relative empirical merits of criminological theories.

Gottfredson and Hirschi's (1990) *A General Theory of Crime* has been the focus of considerable academic attention and considerable controversy (Akers, 1991; Marenin and Reisig, 1995; Sampson and Laub, 1993; Tittle, 1991). Due in part to the popularity of the theory, both authors are among the most cited in criminal justice-criminology academic journals since 1991. In a study conducted by Cohn and Farrington (1998), Hirschi and Gottfredson are numbers one and three, respectively, in citation ranking. Equally noteworthy, their *A General Theory of Crime* ranks second in citations accorded to all books in the 1990s (Cohn and Farrington, 1999).

Gottfredson and Hirschi (1990) base their theory on the assumption that crime provides easily accomplished, immediate gratification. Other behaviors, many of which might be seen as "deviant" conduct (e.g., smoking, excessive drinking, driving fast, gambling, unprotected sexual relationships), they argue are "analogous" to crime because these activities are also gratifying. Gottfredson and Hirschi observe that people who commit crimes also tend to commit these analogous behaviors; deviance, or at least participation in activities that provide easy and immediate gratification, is "general."

Ignoring the nature of crime, traditional theories of crime inevitably must also ignore the generality of deviance and must, in Gottfredson and Hirschi's view, create unnecessarily complex explanations for why people are motivated to commit crime. Again, for Gottfredson and Hirschi, the answer is simple: Crime and analogous behaviors are gratifying. This

observation leads to the classic control theory assertion that the key to understanding participation in crime and deviance is understanding "why they don't do it"—that is, in discovering what prevents people from breaking the law.

At this point, Gottfredson and Hirschi introduce another empirical regularity to be theoretically explained. People committing crimes and analogous behaviors in adolescence and in adulthood start manifesting conduct problems early in life. Getting into trouble—although perhaps called different things at different ages—reflects a stable pattern of behavior. This observation calls into question theories—including much of Hirschi's (1969) social bond theory—that link crime to social processes that do not occur in the life process until after childhood. For example, commitment to education, status frustration in the job market, and being enmeshed in a delinquent gang cannot explain why children enter onto a pathway to crime long before being exposed to these social conditions. In fact, it seems likely that the relationship of these factors to crime is *spurious*—a manifestation of the same state that causes people to become wayward throughout life (Hirschi and Gottfredson, 1995).

What is this state or condition that separates criminals from noncriminals in childhood and across the life course? Gottfredson and Hirschi use the term "low self-control" to describe the enduring "criminality" or "criminal propensity" that increases the likelihood that individuals will be unable to resist the easy, immediate gratification that crime and analogous behaviors seductively, and almost ubiquitously, present in everyday life. Those lacking self-control are characterized by Gottfredson and Hirschi (1990:90) as "impulsive, insensitive, physical (as opposed to mental), risk-taking, short-sighted, and non-verbal." Their view of self-control is, in many ways, derived from their view of crime. Because crime is easy to commit, involves little planning, requires minimal physical skills, and provides immediate gratification, it is not surprising that offenders tend to be impulsive, nonverbal, short-sighted, and so on. Making this connection, however, has exposed the "general theory" to the charge of tautology (Akers, 1991, 1997). One rebuttal is that criminologists have made the opposite mistake: that of divorcing their understanding of criminals from their understanding of crime. In any event, as long as self-control and crime are measured independently and with valid measures, tautology in empirical tests will be avoided.

In describing their core concept, Gottfredson and Hirschi speak of the "elements of self-control" (e.g., impulsive, risk taking). Even so, they largely see these elements as forming a unitary, underlying propensity. They also realize this criminal propensity does not guarantee that any specific criminal event will transpire. In any situation, low self-control will result in a crime or analogous behavior only when the opportunity to

engage in the behavior is present. Although linking criminal events to the interaction between propensity and opportunity, the logic of the general theory would seem to accord the factor of self-control a more powerful role in accounting for individual differences in crime and analogous behaviors. Although people vary in levels of self-control, the world is filled with criminal opportunities; after all, crime is easy to commit and requires little planning. Gottfredson and Hirschi even suggest that this is true for white-collar crimes, which scholars typically have portrayed as involving detailed planning and access to opportunities that are earned only after employees have worked hard for many years to secure upper echelon positions in a company.

The origins of the presence or lack of self-control are found in childhood, for it is there that conduct problems first emerge. Gottfredson and Hirschi (1990) in essence contend that weak direct controls exerted by parents result in weak self-control in their offspring. Parents who are attached to their children, argue Gottfredson and Hirschi, monitor, recognize, and punish wayward behavior. Their children, thus, develop the self-control to resist the easy gratification offered by misbehavior and to have the will to succeed in social institutions—such as the school and later the job market—that require and reward diligence and delayed gratification.

Finally, Gottfredson and Hirschi argue in favor of testing their theory through cross-sectional research designs. Longitudinal studies are not needed because they are expensive and because individual differences in the dominant predictor of criminal behavior—self-control—remain stable across time. This assertion counteracts the view of life-course researchers who, in important ways, see the predictors of crime as age-graded (see, e.g., Sampson and Laub, 1993). Perhaps more controversial, Hirschi and Gottfredson (1993) also recommend that self-control should preferably be measured not through attitudinal scales but through behavioral scales comprising items measuring participation in "analogous" behaviors. Again, Gottfredson and Hirschi are charged with being tautological or, in the least, with flawed reasoning. If analogous behaviors are caused by low self-control, how can they then be used to measure self-control? Further, any relationships between behavioral measures of self-control and crime become suspect. In this case, measures, in essence, of deviance are being used to predict another form of deviance, criminal conduct. The thesis of the "generality of deviance" might predict such an interrelationship among "dependent variables" of this sort, but what such findings tell us about the impact of self-control on crime is unclear at best.

It is now a decade since Gottfredson and Hirschi's (1990) "general theory" appeared in print. In the intervening time, this perspective has not

only generated critical analysis, but also a growing body of empirical studies of the theory's central proposition that low self-control is the chief predictor of involvement in crime and in behaviors analogous to crime (see, e.g., Benson and Moore, 1992; Brownfield and Sorenson, 1993; Grasmick et al., 1993; Paternoster and Brame, 1998; Piquero and Tibbetts, 1996; Polakowski, 1994; Winfree and Bernat, 1998). In light of this research (as well as the theoretical criticism), the question now emerges as to the *empirical status* of Gottfredson and Hirschi's general theory. In particular, is self-control—their term for the propensity to commit crime—the main source of or explanation for criminal conduct?

One way of answering this question is to undertake a "narrative review" of existing studies. In this approach, which is the normative practice in criminology, the results of past studies are summarized, usually with the goal of assessing whether a theory is consistently supported by past research (see, e.g., Akers, 1997). Using this approach, some aspects of the general theory appear to be problematic. For example, studies have challenged certain propositions in the theory regarding the predictors of white-collar crime and the nature of the age-crime relationship (Benson and Moore, 1992; Reed and Yeager, 1996; Sampson and Laub, 1995; Steffensmeier, 1989; Tittle and Grasmick, 1998). Further, empirical support for the theory in its entirety is not always found. For example, support for the self-control-opportunity relationship specified by the theory has been inconsistent, and the ability of self-control variables to cause those from other theories to "wash out" is rarely demonstrated (Brownfield and Sorenson, 1993; Grasmick et al., 1993; Polakowski, 1994; Winfree and Bernat, 1998).

Nonetheless, support for an inverse relationship between self-control and crime or analogous behaviors is fairly consistent. Research has shown that measures of low self-control (e.g., see Grasmick et al., 1993; Keane et al., 1993) are related to general law violations (Burton et al., 1994; Gibbs and Giever, 1995; Gibbs et al., 1998; Grasmick et al., 1993; Keane et al., 1993; Nagin and Paternoster, 1993; Piquero and Tibbetts, 1996; Wood et al., 1993), to self-reported delinquency and future criminal convictions (Polakowski, 1994), and to other analogous or imprudent behaviors (Arneklev et al., 1993; Cochran et al., 1996; Tremblay et al., 1995; Wood et al., 1993). Further, low self-control is a significant predictor of negative life outcomes, including poor social bonds, lifestyles, and low socioeconomic attainment (Evans et al., 1997). Measures of low self-control have also been found to have statistically significant effects on crime and deviance even after controlling for measures of competing criminological theories, such as strain, social bond, and differential association-social learning theories (Brownfield and Sorenson, 1993; Burton et al., 1994; Burton et al.,

1998; Evans et al., 1997; Nagin and Paternoster, 1993; Piquero and Tibbetts, 1996; Polakowski, 1994).

A general review of the literature also indicates that in testing the theory, researchers have employed a variety of operational measures of low self-control, and methodological approaches vary considerably across studies. For example, tests may include attitudinal or behavioral measures of self-control (or both), cross-sectional or longitudinal designs, and various multivariate model specifications (e.g., whether variables from competing theories are included in the analysis). Furthermore, the samples of independent studies vary according to whether they are drawn from community versus offender populations, whether they are racially homogeneous or racially integrated, whether they comprise juveniles or adults, or whether they are limited to males or females. Finally, studies may vary according to whether they are attempting to predict self-reported crime or some other form of analogous behavior. Most often, narrative reviews, which usually appear in the introductory sections of empirical tests, have not systematically specified how these study characteristics influence support for Gottfredson and Hirschi's theory.

Although useful, narrative reviews of research have their limits. First, they are based, at least to a degree, on the qualitative judgments of those conducting the review as to what existing studies actually find. How studies are read, weighted, and integrated in a discussion may well differ according to who is doing the narrative review. Within criminology, the use of narrative reviews has often led to disagreements among authors as to whether a theory is empirically supported and, if so, to what degree. Second and relatedly, narrative reviews often only provide crude estimates of the degree to which theoretical variables are related to criminal involvement. Although detailed narrative reviews can furnish a more refined reading of the existing data, the approach is limited in its ability to specify the magnitude of the relationship between theoretical variables and crime.

An alternative method for assessing the empirical status of a theory is to conduct a meta-analysis—that is, a quantitative synthesis of existing research studies. This approach entails "the application of statistical procedures to collections of empirical findings for the purpose of integrating, synthesizing, and making sense of them" (Niemi, 1986:5). By treating each separate or "independent" study as the unit of analysis, the meta-analytic technique allows for the statistical discovery of common patterns in the research literature. Most salient inferences can be drawn on the basis of the "effect size" (or predictive capacity) of variables (Cohen, 1977; Hunter et al., 1982). The present study uses the technique of meta-analysis to assess, quantitatively, the current empirical status of Gottfredson and Hirschi's general theory. In doing so, two broad concerns guide the analysis: first, to determine the overall, aggregated effect of self-control on crime;

and second, to assess the variability of effects for self-control on crime under different methodological conditions.

RESEARCH STRATEGY

GENERAL CONSIDERATIONS

In contrast to narrative reviews of empirical literature, meta-analyses have four advantages. First, they can provide a more precise estimate of the relationship, across all tests, of theoretical variables to crime. Second, they can allow for multivariate analyses in which researchers can explore whether the effect size of theoretical variables varies under certain methodological conditions (e.g., in longitudinal versus cross-sectional studies; when variables are operationalized differently). Third, because coding decisions are "public," meta-analyses can be replicated by other scholars. Fourth, the database is not static but dynamic: As additional studies are published, they can be added to the sample of studies and relationships reassessed.

To date, scholars have generally not subjected *criminological theories* to meta-analyses. Meta-analyses in the criminal justice-criminology literature have been used to address system dynamics in criminal justice, such as racial disparities in sentencing (Pratt, 1998), the relative cost-effectiveness of correctional alternatives (Pratt and Maahs, 1999), and the effectiveness of correctional treatment interventions (Andrews et al., 1990; Lipsey and Wilson, 1998). Furthermore, works have used the technique to assess the relative influence of various predictors of crime/delinquency (Lipsey and Derzon, 1998; Loeber and Stouthamer-Loeber, 1986), of recidivism (Gendreau and Goggin, 1996), and of crime rates (Hsieh and Pugh, 1993). Nonetheless, our understanding of the empirical status of the major *theories* of crime relies virtually exclusively on narrative literature reviews (see, e.g., Akers, 1997; Burton and Cullen, 1992; Kempf, 1993).

THE CURRENT STUDY

The central purpose of the current study, therefore, is to move beyond the narrative-review approach and to subject the empirical tests of Gottfredson and Hirschi's general theory to a meta-analysis. In doing so, four issues will be addressed. First and most important, we use the meta-analytic technique to assess the "effect size" between measures of self-control and crime/analogous behaviors. We focus in particular on whether this theoretical construct should be considered an important predictor of criminal behavior. If so, Gottfredson and Hirschi's theory earns support, and future studies not incorporating a measure of self-control will potentially be misspecified.

Second, the influence of opportunity on the self-control/crime relationship is assessed because Gottfredson and Hirschi (1990) contend that it may in fact be the interaction between low self-control and opportunity that results in high levels of criminal behavior (see also Grasmick et al., 1993; Longshore, 1998). Third, we examine whether the effect size between self-control and crime across studies is influenced by methodological factors, including the measure used to operationalize self-control, model specifications (e.g., whether including variables from competing theories affects the self-control/crime relationship), the use of different research designs, and sample characteristics.

Fourth, variables associated with control theory in general, and low self-control theory in particular, are often viewed as competitors to variables from social learning theory (Akers, 1997). Indeed, although the general theory denounces the validity of other criminological theories (e.g., strain, rational-choice, and social disorganization theories), Gottfredson and Hirschi take special pains to argue that effects of social learning variables—especially delinquent associates and antisocial values—on crime are spurious (i.e., that no positive learning is needed for crime to occur). Specifically, Gottfredson and Hirschi (1990:158) claim that individuals with low self-control "tend to end up in the company of one another, creating groups made up of individuals who tend to lack self-control," and that "individuals in such groups will therefore tend to be delinquent, as will the group itself." Recent analyses, however, indicate that peer influences and antisocial values are among the strongest predictors of crime and deviance (Goggin et al., 1998; Heimer, 1997; Matsueda and Anderson, 1998; Warr, 1993a, 1993b; Warr and Stafford, 1991). Even so, the question still remains as to whether variables from social learning theory will remain statistically significant in the presence of low self-control variables. The current study addresses this contention empirically by examining the effect size of low self-control variables relative to social learning variables when the two are included in the same multivariate model.

We recognize that meta-analyses are not beyond criticism and limitations. Wolf (1986) notes that critics of the method tend to focus on two potential problems. First, academic journals (and their editors) may be biased in favor of statistically significant findings, and therefore, literature reviews may not uncover every study of a particular hypothesis that has been conducted. Rosenthal (1979) refers to this as the "file drawer" problem due to the tendency of studies failing to reject the null hypothesis to be buried away in file drawers. This omission of null-model studies may limit the utility of meta-analyses that are conducted on published research only. Although we cannot dismiss this issue fully, the potential for bias in

the current study may be reduced because Gottfredson and Hirschi's theory is provocative and vigorously attacks virtually every other criminological theory. Not surprisingly, it has been subjected to harsh critiques (see, e.g., Akers, 1991; Geis, 1998; Miller and Burack, 1993). Given the lack of sympathy accorded the general theory, a compelling argument could be made that reviewers would be equally, if not more, likely to favor the publication of articles showing that low self-control has no significant effects. In any event, as an added check on this potential bias, we provide a statistical estimate for the number of unmeasured studies that would have to contain a "null finding" to drive the mean effect size estimate down to zero. In other words, we calculate the number of studies failing to reject the null hypothesis—referred to as the "fail-safe *N*"—that would be needed to reverse a conclusion that a relationship exists.[1]

The second potential problem, which tends to be the more serious of the two, is that well-done studies may be included with studies using less rigorous methodological designs (i.e., what is referred to as the "apples and oranges" problem), which may bias the overall effect size estimates of the analysis (Cohen, 1977). The primary mechanism for minimizing this problem is to code each empirical study for methodological variations that could influence the effect size estimate(s) (e.g., see Glass et al., 1981; Pratt, 1998). Doing so is especially important when integrating the results of studies using correlational research designs. Statistical control, as opposed to experimental control, is typically used to assess key theoretical relationships in correlational designs (and in most tests of criminological theories). In turn, estimates of effect size from correlational designs may be contingent, at least in part, on which variables are used as statistical controls, on the composition of the sample, and on how theoretical variables are measured. Thus, controlling statistically such methodological variations across empirical studies becomes necessary for calculating valid and reliable mean effect size estimates. We adopt this approach in the present analysis. Indeed, a central objective of the paper is to assess the impact certain methodological techniques on the self-control/crime relationship.

Relatedly, we should add the more general caution that the quality of a meta-analysis is contingent on the quality of research on the topic being investigated. One advantage of using published research—as we do in this study—is that the research studies being analyzed have been vetted for quality by the review process. Still, this does not obviate the fact that measurement error marks virtually all social-science research endeavors. To

1. This statistic, the "fail-safe *N*" (Rosenthal, 1979; see also Wolf, 1986), is calculated using a .05 significance level by the formula:

$$N = (\Sigma z\text{-scores}/1.645)^2 - N.$$

some extent, meta-analysis assumes that error that is idiosyncratic to individual studies "washes out" or is minimized as empirical relationships are examined across a sample of studies. Of more concern, however, are methodological biases that are patterned. To address this possibility, one approach—just mentioned above—is to examine within the meta-analysis whether methodological factors (e.g., measuring a variable one way rather than another) specify the estimate of the effect size. For those remaining skeptical of the results of the meta-analysis—claiming, for example, that the quality of the sample of studies assessed is suspect—another option remains: Probe the meta-analysis for potential shortcomings, and then undertake a new, rigorous individual study that attempts to falsify or otherwise revise the conclusions supported by the meta-analysis. In this way, a meta-analysis may prove useful not only in organizing existing knowledge, but also in prompting or otherwise guiding future empirical research.

METHODS

SAMPLE

The sample generated by a literature search through electronic databases (National Criminal Justice Reference Service [NCJRS], Articlefirst, Criminal Justice Abstracts, PsycINFO) includes all published empirical tests of the general theory of crime. Also, consistent with the guidelines set forth by Petrosino (1995), we examined prior narrative reviews of criminological literature for tests of the theory. Studies that did not explicitly test the theory, but included measures of low self-control in their statistical models, were also included in the sample. Because Gottfredson and Hirschi, as well as most subsequent research studies, treat self-control as a unitary construct, only those studies yielding effect size estimates from a single measure of self-control were incorporated in the sample.[2] Overall, the sample includes 21 empirical studies, which contained 126 effect size estimates, representing the integration of 49,727 individual cases. The 21 studies were derived from 17 independent data sets; the

2. The studies meeting these criteria and therefore included in the sample include Arneklev et al. (1993), Avakame (1998), Brownfield and Sorenson (1993), Burton et al. (1994), Burton et al. (1998), Burton et al. (1999), Cochran et al. (1996), Evans et al. (1997), Gibbs and Giever (1995), Gibbs et al. (1998), Grasmick et al. (1993), Longshore (1998), Longshore and Turner (1998), Longshore et al. (1996), Nagin and Paternoster (1993), Piquero and Rosay (1998), Piquero and Tibbetts (1996), Polakowski (1994), Tremblay et al. (1995),Winfree and Bernat (1998), and Wood et al. (1993). Those studies that contained a multidimensional measure of self-control and were therefore excluded from the analysis include Cochran et al. (1994), Costello (1995), Forde and Kennedy (1997), Keane et al. (1993), LaGrange and Silverman (1999), Sorenson and Brownfield (1995), and Wood et al. (1995).

number of studies exceeds the number of data sets because more than one study can be published from a given data set.

EFFECT SIZE ESTIMATE

The effect size estimate used—the meta-analytic equivalent of the dependent variable—is a standardized correlation coefficient *r*. This estimate, drawn from each independent study, was chosen because of its ease of interpretation, and because formulae are available for converting other test statistics (e.g., *F*, *t*, chi-square) into an *r* (see Rosenthal, 1978, 1984). Using Fisher's *r* to *z* transformation (see Wolf, 1986), the standardized regression coefficients (beta weights) from each empirical study (i.e., each test of the theory) were converted to a *z(r)* score. The regression coefficients were converted to *z*-values because the sampling distribution of *z(r)*-scores is assumed to approach normality, whereas the sampling distribution for *r* is skewed for all values other than zero (Blalock, 1972).[3] Normally distributed effect size estimates are necessary for (1) the accurate determination of central tendency for fixed values of the control variables and (2) unbiased tests of statistical significance (Hanushek and Jackson, 1977; Rosenthal, 1984).

Each *z(r)* was then weighted for sample size, according to the method recommended by Rosenthal (1984), by taking the product of the *z(r)* value and the appropriate degrees of freedom (sample size–3) from each study. Weighting the studies on the basis of their sample sizes was done to place a greater emphasis on those studies yielding outcomes from larger samples, which are assumed to be more representative of the population of interest (Rosenthal, 1984; see also Blalock, 1972; Hanushek and Jackson, 1977).

INDEPENDENCE OF EFFECT SIZE ESTIMATES

As noted, the analysis is conducted on 126 effect size estimates drawn from 21 empirical studies. This approach means that most studies contained more than one effect size estimate (e.g., for different ways of measuring self-control), and that the number of effect sizes drawn from individual studies varied in number. The rationale for including multiple effect sizes from individual studies is twofold. First and most important, selecting only one effect size estimate from each data set would severely limit the possibility of examining how methodological variations in the studies potentially affect the effect size estimates (e.g., does the effect size of self-control differ by whether it is assessed by an attitudinal or behavioral measure?). Second, it would be difficult to develop a "rule" that

3. The equation for the transformation of *r* values to *z(r)* values (see Blalock, 1972), which converts the sampling distribution of *r* to one that approaches normality is:

$$z(r) = 1.151\log[1+r/1-r].$$

would guide which effect size estimate should be selected from any one independent data set. Single data sets are used in multiple published studies, each of which potentially includes a unique set of variables in the multivariate analyses that are presented in the articles' tables. Selecting only one effect size estimate from these different analyses could introduce, wittingly or unwittingly, a "researcher" bias.

Although we base the main portion of our analysis on all 126 effect size estimates, we also recognize that this decision can *potentially* introduce a measure of bias into the meta-analysis. In short, to the extent that more than one effect size estimate is drawn from a data set, then these effect size estimates are not "independent" from one another. Further, to the extent that one study produces a greater number of effect size estimates than do other studies, it could possibly disproportionately affect the mean effect size reported across the sample of studies in the meta-analysis. Given these concerns, we conducted diagnostic analyses on our data to assess whether the lack of effect size independence is likely to have affected the results we report here.

Specifically, for each data set in which multiple effect size estimates were gathered, we constructed what we have called "independence-adjusted effect size estimates." To compute these estimates, we statistically modeled the interdependencies among the coefficients by removing the variation in a set of coefficients that could be explained simply by their production from a common source. This process is similar to removing serial correlation (i.e., shared variation across successive residuals) in ordinary least-squares (OLS) regression analysis (Hanushek and Jackson, 1977). First, estimates of serial correlation were calculated for each data set in which multiple effect size estimates were drawn using the equation:

$$\Sigma[e(t) - e(t-1)]^2 / \Sigma[e(t)]^2 = 2 - 2\rho.$$

In this instance, $e(t)$ and $e(t-1)$ represent successive error terms estimated from OLS regression models predicting the self-control effect size estimates using the methodological control variables as independent variables. Upon calculating values for the left side of the equation (which estimates values for the Durbin-Watson test statistic), we then solved for "ρ" (rho), the estimate of serial correlation. A weight was then created, $1 - \rho$, to give lesser weight to those effect size estimates with large degrees of serial correlation. In so doing, the resulting effect size estimates contained uncorrelated residuals. As an additional consequence, the weighting procedure, which essentially reduced the degrees of freedom in the construction of the standard errors, widened the error variances for the predictor domains; thus, tests for statistical significance with these estimates will be more conservative.[4]

4. Such estimates of serial correlation, of course, are contingent on the ordering

In short, this procedure allowed us to correct for the potential bias that a lack of statistical independence may have produced while avoiding the arbitrariness of choosing one effect size estimate per data set. These results are reported in Table 1. Note, however, that the aggregated effect size estimates were not affected by the lack of statistical independence. Indeed, each of the independence-adjusted effect size estimates fall within the confidence intervals for the original (unadjusted) effect size estimates.

Table 1. Unweighted and Weighted Effect Size Estimates for Self-Control and Social Learning Variables

Variable	Mz	WMz	Medz	AdjMz	95% CI	Fail-Safe *N*
Self-Control Theory						
Attitudinal (82)	.257**	.223**	.213	.262**	.197–.317	422
Behavioral (12)	.277**	.288**	.246	.278*	.157–.397	6
Self-Control-Opportunity Interaction (10)	.540**	.505**	.159	.576**	.070–1.01	82
Social Learning Theory						
Differential Association (10)	.232**	.239**	.224	.232**	.215–.245	52
Delinquent Definitions (10)	.175*	.184*	.161	.176*	.173–.179	36

NOTES: * Statistically significant at the $p < .05$ level; ** Statistically significant at the $p < .01$ level.

Mz = Mean effect size estimate; WMz = Weighted mean effect size estimate (weighted by sample size); Medz = Median effect size estimate; AdjMz = Mean effect size estimate adjusted for interdependencies between coefficients in same data set; numbers of effect size estimates are in parentheses.

METHODOLOGICAL CONTROLS

Each empirical study was coded for a number of variables related to methodological variations to determine their impact on the effect size estimate for the self-control/crime relationship.

of the coefficients. Specifically, successive error terms may be more or less similar depending on how the values of the dependent variable are ordered. In the present case, all coefficients from the same data set were ordered from lowest to highest in value before the estimates of serial correlation were calculated. This ensured that if the error terms from the effect size estimates were statistically interdependent, such interdependencies would be as pronounced as possible (i.e., the error term from one effect size estimate would be as similar as possible to the next effect size estimate). Thus, we took the most conservative approach that maximizes the likelihood of finding statistical interdependencies, which, in turn, maximizes the reduction for which the potential lack of statistical independence may differentially influence the overall mean effect size estimates.

Self-Control Measure

Studies vary according to how self-control is operationalized. To assess the impact of this variation, studies were coded as to whether the measure was attitudinal or behavioral (measured as 0 and 1, respectively). If the measure was attitudinal, we coded whether the scale used in the study was that developed by Grasmick et al. (1993) (0 = no, 1 = yes). Their 24-item scale is perhaps the most carefully designed and valid measure of self-control. Studies that employed a slightly modified version of the Grasmick et al. scale were also coded as 1.

Model Specification and Research Design

Studies were coded as to whether an opportunity variable was included in the regression model (0 = no, 1 = yes), and as to whether the effect size estimate for self-control was a main effect or an interaction effect between low self-control and opportunity (coded as 0 and 1, respectively). Furthermore, the general theory posits that once low self-control is introduced into a regression equation, the effects of key variables from other theories should be negligible (Gottfredson and Hirschi, 1990). To evaluate this contention, each study was coded as to whether variables from competing criminological theories (such as social learning, strain, social bond, and rational choice-deterrence theories) were included in the model (0 = no, 1 = yes). In addition, studies were coded according to whether a cross-sectional or longitudinal design was employed (dummy coded to values of 0,1). Notably, Gottfredson and Hirschi (1990:221–240, 249–252) argue that the effects of self-control should not vary by whether the design is cross-sectional or longitudinal.

Sample Characteristics

The sample used in each empirical study was coded as to whether it was a community versus an offender sample (0,1), a male versus a female sample (0,1), and an adult versus a juvenile sample (0,1). We also coded whether the sample was racially integrated or racially homogenous (limited to whites only) (0,1). Because studies have not reported analyses separately for racial groups, we could not directly assess the effect size for self-control for African Americans versus whites (or other racial-ethnic groups).

Dependent Variable

Studies also varied according to what was being predicted. A dummy variable was created to reflect whether low self-control was being used to predict crime (or a crime index) or some form of analogous behavior (e.g., drug use, smoking, driving fast) (coded as 0 and 1).

Overall Predictive Power

The *r*-squared values from each study (i.e., the variation in crime explained by each full statistical model) were coded to determine whether those studies that included variables from competing theories of crime (e.g., social learning theory) could significantly explain more variation than those without such measures. With specific reference to social learning theory, we test whether Gottfredson and Hirschi are correct in their assertion that low self-control is the only true cause of crime, and that once low self-control has been controlled, variables from social learning theory should not contribute significantly to the proportion of variation in crime explained by the studies' full statistical models.

Because a number of self-control studies also included measures of either "differential association" (or criminal friends) or "delinquent definitions" (or antisocial values), their effect size estimates were also calculated as "social learning theory" predictor domains. These effect size estimates are then compared with those for self-control to determine which of the two sets of predictors has a larger effect size. To assess whether the social learning theory effect size estimates significantly contribute to each study's explained variation, a dummy variable was constructed for whether each study controlled for variables from social learning theory (0,1).

RESULTS

Table 1 contains the unweighted, weighted, and independence-adjusted mean effect size estimates for each of the various measures of low self-control. It also includes data on social learning variables (differential association and delinquent definitions). Finally, the table presents "fail-safe *N*" estimates for each set of variables.

This analysis indicates that whether in its weighted, unweighted, or independence-adjusted form self-control is a strong predictor of crime; all three estimates share a statistically significant mean effect size above .20.[5] The behavioral measures have a slightly larger effect size than do the attitudinal measures by .020, .065, and .016 for the unweighted, weighted, and

5. Although multiple methods for tests of statistical significance in meta-analyses exist (see Rosenthal, 1984), a conservative test was used for each coefficient in this case. To test the null hypothesis that $r = 0$, a *t*-statistic was calculated using the following equation:

$$t = r/\text{S. E. (standard error)},$$

and the equation for the standard error of the effect size estimate is:

$$\text{S. E.} = \sqrt{[(r^2(1 - r^2))/(N-3)]},$$

where *N* is the number of effect size estimates included, and in losing three degrees of freedom (see Rosenthal, 1984; Wolf, 1986), the sampling distribution approaches that of "*t*" (see Blalock, 1972).

independence-adjusted estimates, respectively. This finding is not surprising because, in such instances, deviant behaviors (e.g., alcohol abuse, smoking, driving fast)—which make up measures of analogous conduct—are being used to predict other deviant behaviors (crime) (e.g., see Evans et al., 1997).

The larger issue is the possibility that the findings pertaining to behavioral measures are merely a reflection of tautology: the failure to develop a measure of the core theoretical construct—low self-control—that is distinct from the dependent variable of criminal involvement. This criticism, however, should not be taken too far. Even if the results with behavioral measures are viewed with suspicion, the charge of tautology does not apply to studies that measure self-control with attitudinal scales that were developed to assess self-control independently of criminal behavior. The fact that the effect size estimates for attitudinal and behavioral measures of self-control are similar, thus, undermines the criticism that support for Gottfredson and Hirschi's theory lies primarily on data biased by the use of tautological measures.

Table 1 also shows the role that opportunity plays in shaping the strength of the self-control/crime relationship. The interaction term between self-control and opportunity has an unweighted mean effect size of .540, a mean weighted effect size of .505, and an independence-adjusted effect size of .576. All three effect size estimates were statistically significant at the .01 level.

The last column in Table 1 displays the "fail-safe *N*" estimates for each of the effect size estimates for the self-control and social learning theory variables. Again, the "*N*" indicates the number of unmeasured studies that would have to contain a null finding for the magnitude of the effect size for each predictor domain to be reduced to zero. In doing so, the equation for the fail-safe *N* takes into account the magnitude of the mean effect size estimate and the number of independent effect size estimates that contributed to the overall pooled effect size.

As seen in Table 1, it would take an additional 422 studies producing no relationship between "attitudinal" measures of self-control and crime to reverse a conclusion that a significant relationship does exist. The large fail-safe *N* for the attitudinal measures of self-control is produced by both the substantial number of independent effect size estimates contributing the mean effect size (82 estimates) and the large overall mean effect size. Although the magnitude of the effect size for the behavioral measures of self-control is greater than for the attitudinal measures, it was produced by a smaller number of effect size estimates, and therefore, its fail-safe *N* is smaller ($N = 6$). The fail-safe *N* for the self-control-opportunity interaction variable, $N = 82$, is larger than is the behavioral self-control measure

because its mean effect size was so large, despite the fact that it was produced by only ten effect size estimates. Finally, the fail-safe *N*'s for the social learning theory predictor domains of differential association and delinquent definitions were 52 and 36, respectively, suggesting that these effects are robust and unlikely to be eliminated by future research studies.

Establishing the general estimates of central tendency for the self-control (and social learning theory) predictor domains was only the first objective of this analysis. Indeed, simply providing mean effect size estimates may mask the degree to which methodological variations influence or condition the purported effect of self-control on crime (e.g., different operational definitions of the independent and dependent variables, model specifications and research designs, and sample characteristics). This concern guided the second objective of our analysis: to quantitatively assess the impact of methodological variations on the effect size of self-control.

Table 2 reveals the results of this series of tests for the unweighted and independence-adjusted effect size estimates. Several conclusions are suggested. First, the effect size of the self-control variable is not significantly affected by whether the scale used to measure self-control is Grasmick et al.'s (1993) version or an alternative attitudinal scale. Second, the effect size of self-control is not influenced by whether a study included a control for opportunity or for variables assessing competing criminological theories, including social learning theory.[6] Third, although based on a limited number of comparisons, it appears that the effect of low self-control on crime is significantly weaker in longitudinal designs (unweighted $r = .142$; independence-adjusted $r = .186$; $p > .05$). Note that this finding is inconsistent with Gottfredson and Hirschi's (1990) contention that findings in cross-sectional studies should mirror those from longitudinal studies.[7]

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6. We acknowledge that a portion of the effect size of self-control may be due to the differential degrees of shared variation among predictor variables. To deal with this problem systematically, we first ensured that all effect size estimates contributing to the analysis were gathered from multivariate statistical models. A *z*-test among the standardized coefficients for self-control variables from bivariate to multiple regression models revealed that the effect size was significantly overestimated in the absence of control variables ($z = 2.16$; $p < .05$). Second, to disentangle the effects of separate theories, dummy variables were constructed for each of the types of competing theories that were contained in the empirical studies (social learning, strain, social bond, and rational choice-deterrence theories). The self-control effect size estimates were not significantly affected by the presence of variables from any of these theories.

7. A research design was coded as longitudinal if it contained a measure of either self-control or prior delinquency at some point in time (e.g., delinquency at "time 1") that was then used as a predictor of crime/delinquency at a later point in time (e.g., delinquency at "time 2"). Thus, the cross-sectional versus the longitudinal dummy variable analysis presented in Table 2 may be treated as a proxy for how the effect size of self-control is influenced by controlling for prior delinquency.

Table 2. Impact of Methodological Variations on Self-Control Effect Size Estimates

Methodological Control Variable	Mean Effect Size	Test Statistic	Adjusted Mean Effect Size	Test Statistic
Self-Control Measure				
Attitudinal (82)	.257**	$t = -0.223$	.262*	$t = -0.207$
Behavioral (12)	.277**		.278*	
Grasmick et al. Scale				
Yes (41)	.255**	$t = 0.078$	.263*	$t = 0.032$
No (41)	.259**		.261*	
Model Specification and Research Design				
Opportunity Controlled				
Yes (35)	.283**	$t = -0.604$	.294*	$t = -0.579$
No (47)	.238**		.247*	
Competing Theories Controlled				
Yes (30)	.280**	$t = -0.539$	.295*	$t = -0.582$
No (52)	.244**		.248*	
Longitudinal Design (2)	.142	$t = 2.668$*	.186	$t = 2.133$*
Cross-Sectional Design (80)	.260**		.273*	
Sample Characteristics				
Community Sample (64)	.278**	$t = 2.204$*	.283*	$t = 2.247$*
Offender Sample (18)	.185*		.186*	
Racially Integrated Sample (50)	.242**	$t = -0.612$	.241*	$t = -0.999$
Racially Homogeneous Sample (32)	.282**		.302**	
Male Samples (10)	.155*	$t = -2.440$*	.173†	$t = -1.560$
Female Samples (5)	.573**		.571**	
Juvenile Samples (14)	.169*	$t = 2.514$*	.178†	$t = 1.896$
Adult Samples (50)	.308**		.330**	
Dependent Variable				
Crime (62)	.227**	$t = -1.718$	.238*	$t = -1.588$
Analogous Behavior (20)	.352**		.354**	

NOTES: Numbers of effect size estimates are in parentheses.
* Statistically significant at the $p < .05$ level; ** Statistically significant at the $p < .01$ level; † Statistically significant at the $p < .10$ level.

Fourth, and more consistent with the general theory, self-control appears to have "general" effects. This variable has a meaningful effect size (a minimum of .155) regardless of whether samples comprise community members or offenders, are racially integrated or homogenous, and are limited to juveniles or adults, and regardless of whether the outcome variable is crime or analogous behavior. Even so, the effect sizes are not the same across all of these conditions. The results for the comparisons between male and female samples and between the adult and juvenile samples, however, should be viewed with caution. In the analysis using

the independence-adjusted mean effect size estimates, the differences in magnitude between the effect sizes in these comparisons were similar to those using the unadjusted mean effect size. Nonetheless, the use of the independence-adjusted mean effect sizes, which contain wider error variances, rendered these relationships nonsignificant at the .05 level.

Table 3 displays the results of a series of difference of means tests between the attitudinal and behavioral measures of self-control and both of the social learning theory predictor domains. These analyses were conducted to determine whether the attitudinal or behavioral measures of self-control are significantly stronger or weaker than are the attitudinal (delinquent definitions) or behavioral (differential association) variables from social learning theory. As indicated by Table 3, even though the effect sizes of the differential association and delinquent definitions predictor domains were smaller than were those for both measures of self-control, none of the differences were statistically significant (the largest *t*-value was –0.440). Thus, it seems that both sets of variables (from self-control and social learning theories) are strong predictors of crime, and that controlling for one set of variables is unlikely to eliminate the effects of the other.

Table 3. Comparisons of Mean Effect Size Estimates Between Variables from Social Learning Theory and Self-Control Theory

Variable	Mean Effect Size	Test Statistic
Differential Association (10)	.232**	
Attitudinal Self-Control (82)	.257**	$t = -0.087$
Behavioral Self-Control (12)	.277**	$t = -0.198$
Delinquent Definitions (10)	.175*	
Attitudinal Self-Control (82)	.257**	$t = -0.280$
Behavioral Self-Control (12)	.277**	$t = -0.440$

NOTES: * Statistically significant at the $p < .05$ level; ** Statistically significant at the $p < .01$ level.

Numbers of effect size estimates are in parentheses. *t*-values are based on separate comparisons between the two social learning theory variables and the attitudinal and behavioral measures of self-control.

Finally, Table 4 shows the effect of variables from social learning variables theory on the overall predictive power of the full statistical models, including self-control variables. The results indicate that Gottfredson and Hirschi's claim that variables from social learning theory should not contribute significantly to the amount of explained variation in crime after self-control has been held constant is unsupported by the data. Table 3

indicates that on average, studies including social learning variables in conjunction with self-control variables explain 15.3% more variation in crime than do studies that do not control for social learning variables.

Although including variables from social learning theory in a statistical model does not significantly influence the self-control effect size estimate (see Table 2), the mean effect size of both types of social learning variables are still statistically significant after controlling for self-control (see Table 1, for the differential association variables the effect sizes are an unweighted = .232, a weighted = .239, and an independence-adjusted = .232; for the delinquent definitions variables, the effect sizes are an unweighted = .175, weighted = .184, and an independence-adjusted = .176). Indeed, as noted, the fail-safe N estimates for the social learning theory predictor domains (Table 1) indicate that it would take 52 additional null-finding independent studies to "undo" the statistical significance of the differential association effect size estimate, and 36 studies for the delinquent definitions effect size estimate. Therefore, it seems that although self-control is a strong and relatively consistent predictor of crime, Gottfredson and Hirschi's contention that it is the sole cause of crime may be, according to the present analysis, overstated.

Table 4. Impact of Social Learning Variables on the Explanatory Power of Full Statistical Models

Social Learning Variable Included	Mean R^2	t-ratio
No (58)	.193	
		–4.222*
Yes (22)	.346	

NOTE: * Statistically significant at the $p < 0.001$ level.
Number of independent studies are in parentheses.

DISCUSSION

Criminologists' allegiance to particular theories of crime depends on many factors beyond any given paradigm's empirical validity: whether ideas are "interesting" and contrary to common sense (Hagan, 1973); whether a theory provides "puzzles" that can be easily researched and result in publications (Cole, 1975); whether the policy implications of a paradigm are disquieting or pleasing (Gould, 1996); whether a given perspective coincides with scholars' ideology and understandings about life produced by their professional socialization and the larger social context (Lilly et al., 1995; Pfohl, 1985); and so on. Still, only the most radical postmodernists and antipositivists would dispute that empirical data

should play the key role in which theories criminologists accept or reject. The daunting task, however, is in knowing precisely what the data say about the diversity of theories that compete for scholars' attention.

Part of the problem in establishing the empirical status of existing theories inheres in the nature of criminological theorizing. Few theories are presented as a set of formal, logically interrelated propositions that can be falsified or supported (Gibbs, 1989). Instead, they are usually conveyed discursively over tens if not hundreds of pages, and often over several works and at times over many years. This approach can lead to intellectual richness, the nuanced analysis of reality, and the sophisticated evolution of ideas. What theories gain in complexity, however, they risk losing in parsimony and clarity. Accordingly, criminologists frequently dispute what a given theorist—for example, Sutherland or Merton—"really said" in his writings (e.g., compare Kornhauser, 1978, and Costello, 1997, with Matsueda, 1988, 1997). This lack of consensus is consequential because it results in correlated disagreements over whether a theory, if not "properly understood," has ever been adequately tested and over what existing studies "really mean" (see, e.g., Burton and Cullen, 1992; cf. Costello, 1997, with Matsueda, 1988, 1997; see also, Gibbs, 1989:194). Matters are complicated further by the ability of scholars to use methodological skills to fend off attacks of a cherished theory or to undermine a perspective they find displeasing. Thus, for advocates, negative findings can be dismissed as inadequately operationalizing the theory's key variables and diverse contentions; for detractors, virtually no theory can survive unscathed if subjected to withering methodological scrutiny (see Gottfredson's 1979 discussion of "knowledge destruction techniques").

We suggest, however, that another hindrance to discerning the empirical status of theories is how criminology, as a discipline, organizes the knowledge derived from the many studies testing explanations of crime. Given that the discipline's vitality depends on the creation of knowledge, it is understandable that professional prestige and journal space are chiefly reserved for articles that convey new data. One consequence, however, is that the task of systematically assessing the existing knowledge base regarding the discipline's central theories has been, perhaps unwittingly, devalued; "mere" literature reviews rarely find their way into first-tier journals. Instead, this task of reviewing studies has been largely relegated to edited books and to texts on theories. Offering few professional rewards, it is perhaps not surprising that the number of sophisticated analyses of the empirical status of theories is in short supply (for exceptions, see Akers, 1997; Burton and Cullen, 1992; Kempf, 1993; Nagin, 1998; Paternoster, 1987). Although speculative, we suspect that one unintended consequence of the dearth of such reviews is that most criminologists have

only a general, and perhaps inaccurate, understanding of which theories have earned the most empirical support.

Using meta-analysis to quantitatively synthesize the extant empirical literature on criminological theories is not a panacea for the problems raised above. As noted, however, this technique is a potentially valuable way for organizing knowledge about prevailing criminological theories. Consider, for example, if all theories were subjected to systematic meta-analysis. If so, we might begin to rank order theories by their relative effect sizes and thus explain variation in crime. We might also have comparative information on how theories fare under similar methodological conditions (e.g., types of samples, types of designs). Further, we might discover, within theories, which parts are more valid and which measures of the theories produce stronger results. And we might learn which theories or issues have been insufficiently investigated and learn where additional research is warranted. In the end, we would have a knowledge base that would be fairly parsimonious in form and thus more easily disseminated, that could be replicated through independent meta-analyses by those doubting the results, that could be revised as new knowledge emerged, and that could help to inform future research that aimed to provide more definitive tests of competing theories.

These considerations provided the context for the current study: We wished to assess whether, after nearly a decade of research and its emergence as a leading criminological theory, Gottfredson and Hirschi's "general theory" had earned empirical support. Is this a perspective worth pursuing or should it be relegated to the dustbin of criminological theory? We hasten, again, to acknowledge the limits of what a meta-analysis can provide to a definitive evaluation of the theory's value (e.g., the potential problems associated with integrating the results of nonexperimental studies). In particular, Gottfredson and Hirschi's paradigm has been criticized on logical, ideological, and conceptual grounds that lie beyond what our meta-analysis can assess (see, e.g., Akers, 1998; Arneklev et al., 1998; Geis, 1998; Longshore et al., 1996; Miller and Burack, 1993; Sampson and Laub, 1995; Tittle, 1995). For example, as Andrews and Bonta (1998) point out, it is not clear whether Gottfredson and Hirschi's central concept of "low self-control" is a newly discovered distinct propensity or merely an attempt to package old wine in a new bottle by bringing together, under the concept of self-control, a series of factors that "coincide with some of the empirically best established [psychological] correlates of criminal conduct" (p.114).

With these caveats stated, the meta-analysis reported here furnishes fairly impressive empirical support for Gottfredson and Hirschi's theory. First and most noteworthy, their central concept—low self-control—consistently had an effect size that exceeded .20. When compared with other

studies that have examined predictors of criminal behavior (Andrews and Bonta, 1998:42–43; Gendreau et al., 1996:583; Lipsey and Derzon, 1998:96–97), this effect size would rank self-control as one of the strongest known correlates of crime. This effect size remained even when studies included controls for other theories and for opportunity. Further, the effect size was not significantly affected by whether self-control was measured by an attitudinal or behavioral measure or whether it was measured by Grasmick et al.'s (1993) scale or by scales developed by other scholars. This latter finding is important because it suggests that self-control's effects are sufficiently robust that they are not sensitive to different ways in which self-control is operationalized. Taken together, then, these considerations suggest that future research that omits self-control from its empirical analyses risks being misspecified.

Second, consistent with Gottfredson and Hirschi's contentions, the effects of self-control appear to be general. Thus, low self-control had a similar effect size for crime and analogous behaviors and in studies that were, or were not, racially integrated. The effect sizes were larger for women, in adult samples, and in community samples. Still, the differences between male and female samples and adult and juvenile samples were not statistically significant in the analysis using the independence-adjusted mean effect size estimates. Most noteworthy, regardless of the analysis undertaken, self-control was related to crime among men, in younger samples, and in offender samples.

Not all findings, however, provide unqualified support for the general theory. First, although based on a limited number of comparisons, the effect size for self-control was lower in longitudinal as opposed to cross-sectional studies. This finding takes on added importance because of Gottfredson and Hirschi's (1990) avid defense of cross-sectional research and claims that the same predictors of crime—presumably in the same magnitude—would emerge for longitudinal studies. This loss of explanatory power is not unique to the general theory; indeed, in longitudinal research, it is commonplace to find that the effects of theoretical variables decrease in size in longitudinal studies (see, e.g., the research on "general strain theory": Agnew and White, 1992; Paternoster and Mazerolle, 1994). In any case, Gottfredson and Hirschi's bold contention that self-control is a stable propensity that does not work through other variables over the life course is not supported by our analysis (for a more detailed discussion of this debate, see Sampson and Laub, 1994, 1995).

Second, the meta-analysis revealed clearly that even with self-control included in a study's statistical analysis, social learning variables continued to have a strong effect and to increase significantly the multivariate models' explained variation. Since Hirschi's (1969) *Causes of Delinquency* and

Kornhauser's (1978) attack on "cultural deviance theory," control theorists have claimed that the peer-delinquency relationship was spurious and that no positive learning of anti-social attitudes was necessary for crime to occur (see, more recently, Costello, 1997 and compare with Akers, 1998, and Matsueda, 1988, 1997). Our results contradict this claim and suggest that, despite different views of human nature and other theoretical tensions, support exists for both the general theory and social learning theory: Low self-control and social learning variables are important predictors of crime. We should note that other meta-analyses also show that anti-social attitudes and peers are strong predictors of criminal involvement whose effects rival those of low self-control (Andrews and Bonta, 1998; Gendreau et al., 1996; Goggin et al., 1998; Lipsey and Derzon, 1998). Further, research on offender rehabilitation reveals that consistent with social learning theory, programs that target anti-social attitudes/peers for change achieve among the highest reductions in recidivism (Andrews and Bonta, 1998; Andrews et al., 1990; Lipsey and Wilson, 1998).

In summary, although the general theory is not beyond criticism and qualification, the meta-analysis of the extant literature indicates that Gottfredson and Hirschi's core proposition that low self-control increases involvement in criminal and analogous behaviors is empirically supported. On an absolute level, therefore, it appears that low self-control must be considered an important predictor of criminal behavior and the general theory warrants a measure of acceptance. On a relative level, it is unlikely that Gottfredson and Hirschi's perspective can claim the exalted status of being the general theory of crime. As noted, support for social learning theory can be drawn from our meta-analysis. Still, it remains to be shown whether other criminological theories now vying for criminologists' allegiance—such as general strain theory, feminist theory, reintegrative shaming theory, or adult social bond theory—will equal or surpass the empirical support for Gottfredson and Hirschi's paradigm when they are subjected to meta-analysis. Such work, of course, is the next step in helping to illuminate the relative empirical status among contemporary criminological theories.

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APPENDIX

Study	# of Effect Size Estimates (Range)	Sample	Self-Control Operationalization	Research Design	Controls for Competing Theories	Findings
Arneklev et al. (1993)	1 (.18)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported
Avakame (1998)	2 (.23–.42)	Community-adult; race integrated; female-male models run separately	Attitudinal; other	Cross-sectional	N/A	SCT supported
Brownfield and Sorenson (1993)	2 (.04–.19)	Community-juvenile; white males only	Attitudinal; other	Cross-sectional	SLT-delinquent peers	SCT generally supported; SLT supported
Burton et al. (1994)	12 (.15–.32)	Community-adult; whites only; female-male models run separately	Attitudinal; other	Cross-sectional	SLT-delinquent peers, definitions; strain; social bond	SCT supported; SLT generally supported
Burton et al. (1998)	11 (.01–.89)	Community-adult; race integrated; female-male models run separately	Attitudinal; other	Cross-sectional	SLT-delinquent peers, definitions	SCT generally supported; SLT generally supported
Burton et al. (1999)	2 (.27–.33)	Community-adult; whites only; race integrated	Attitudinal; other	Cross-sectional	N/A	SCT supported

Study	# of Effect Size Estimates (Range)	Sample	Self-Control Operationalization	Research Design	Controls for Competing Theories	Findings
Cochran et al. (1996)	4 (.21–.98)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	Social bond	SCT generally supported; social bond not supported
Evans et al. (1997)	5 (.26–.65)	Community-adult; white only; gender integrated	Attitudinal (other); behavioral	Cross-sectional	Social bond (factor); SLT (factor)	SCT supported; SLT generally supported; social bond not supported
Gibbs and Giever (1995)	2 (.34–.34)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported
Gibbs et al. (1998)	4 (.17–.37)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported
Grasmick et al. (1993)	4 (.04–.24)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT generally supported
Longshore et al. (1996)	2 (.23–.24)	Offenders; adults and juveniles; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported
Longshore (1998)	8 (.08–.17)	Offenders; adults and juveniles; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported

Study	# of Effect Size Estimates (Range)	Sample	Self-Control Operationalization	Research Design	Controls for Competing Theories	Findings
Longshore and Turner (1998)	6 (.16–.24)	Offenders-juvenile and adult mix; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT generally supported
Nagin and Paternoster (1993)	3 (.06–.11)	Community-male juvenile; race integrated	Attitudinal; Grasmick et al.	Cross-sectional	Rational choice-deterrence	SCT supported; rational choice-deterrence generally supported
Piquero and Rosay (1998)	2 (.23–.26)	Offenders; adults and juveniles; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	N/A	SCT supported
Piquero and Tibbetts (1996)	2 (.11–.15)	Community-adult; race and gender integrated	Attitudinal; Grasmick et al.	Cross-sectional	Rational choice-deterrence	SCT supported; rational choice-deterrence generally supported
Polakowski (1994)	10 (.03–.35)	Community-male juveniles; race integrated	Behavioral	Longitudinal	N/A	SCT generally supported
Tremblay et al. (1995)	2 (.11–.17)	Community-male juveniles; whites only	Attitudinal; other	Longitudinal	N/A	SCT supported

Study	# of Effect Size Estimates (Range)	Sample	Self-Control Operationalization	Research Design	Controls for Competing Theories	Findings
Winfree and Bernat (1998)	4 (.07–.23)	Community-juvenile; race and gender integrated	Attitudinal; other	Cross-sectional	SLT; delinquent definitions	SCT generally supported; SLT supported
Wood et al. (1993)	6 (.09–.35)	Community-juvenile; race and gender integrated	Attitudinal; other	Cross-sectional	N/A	SCT supported