TESTING CONTROL THEORY AND DIFFERENTIAL ASSOCIATION: A CAUSAL MODELING APPROACH*

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A number of strong theoretical statements have been based on analyses of delinquency data from the Richmond Youth Project. Hirschi (1969) and Jensen (1972), in particular, found that Hirschi's control theory was empirically supported over Sutherland's theory of differential association. This paper reanalyzes these data and reassesses this negative evidence pertaining to differential association theory. It is shown that the ratio of learned behavior patterns favorable and unfavorable to violation of legal codes, the critical variable in Sutherland's theory, can be operationalized by explicitly modeling its measurement error structure. In turn, this allows the testing of specific hypotheses derived from the theory. The analysis based on this strategy finds differential association theory supported over control theory. Specifically, the unobservable construct representing the ratio of learned behavior patterns successfully mediates the effects on delinquency of the model's other variables.

A major contemporary controversy in the sociology of crime and delinquency concerns two dominant theories of criminal behavior: Sutherland's theory of differential association, and Hirschi's control theory. The most significant research addressing this issue is Hirschi's (1969) landmark study. Hirschi developed, operationalized, and empirically confirmed his control theory, and presented evidence that seriously questioned the empirical efficacy of differential association theory. Jensen (1972) reanalyzed these data from the Richmond Youth Project and, focusing on the relationships among parents, peers, and delinquency, also found Sutherland's theory unsupported. The objective here is to develop a better strategy for testing differential association theory, to investigate certain measurement properties of the Richmond data, and to reassess this negative evidence pertaining to the theory.

DIFFERENTIAL ASSOCIATION VERSUS CONTROL THEORY

Based on a conception of modern society as heterogeneous and segmented into conflicting groups, the theory of differential association asserts that crime is rooted in normative conflict (Sutherland, 1947:19). In industrialized societies, at least, definitions of legal codes that favor law violation exist alongside definitions unfavorable to law violation.

Sutherland gave the name "differential association" to the process by which persons experience these conflicting definitions about appropriate behavior. Thus, definitions favorable and unfavorable to delinquent or criminal behavior are learned through interaction (communication) in intimate personal groups.[1] This differential learning includes the specific direction of motives, drives, rationalizations, and attitudes—whether toward viewing legal codes as rules to be observed or broken. "A person becomes delinquent because of an excess of definitions favorable to violation of law over definitions unfavorable to violation of law" (Sutherland and Cressey, 1978:81).

Both favorable and unfavorable definitions (behavior patterns) are weighted by frequency, duration, priority, and intensity. Thus, behavior patterns presented with greater frequency, presented for a longer time, presented earlier in life, and presented from a more prestigious source will have more weight in the process producing delinquent or nondelinquent behavior (differential association).

In developing differential association, Sutherland attempted to account for both the distribution of crime rates and for individual cases of criminal behavior (Sutherland, [1942] 1973:18–20; Cressey, 1960). Because true crime rates are summary statements about the

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[1] Our references to crime also pertain to juvenile delinquency, and vice versa.

frequency of individual criminal acts, they are determined by the proportions of persons receiving an excess of criminal behavior patterns through the differential association process. In other words, the extent to which a group or society is organized in favor of crime, as against the extent to which it is organized against crime, determines its crime rate. Sutherland gave the name "differential social organization" to this process whereby certain structures translate normative conflict into various rates of crime. Moreover, he proposed that structural conditions such as class, age, sex, ethnicity, and family status affect individual criminality (and, thus, aggregate crime rates) only by affecting the probability of learning behavior patterns favorable and unfavorable to law violation (Sutherland, [1944] 1973:31). Thus, any effects that these factors have on either criminality or crime rates are mediated by the process of learning definitions favorable and unfavorable to delinquency.

In contrast, Hirschi's control theory insists that definitions of the legal code do not mediate all such factors. Instead of asking why some persons engage in crime—as do most theories of deviance—control theory asks why most persons *refrain* from criminal behavior. Delinquency is taken for granted; conventional behavior is problematic (Hirschi, 1969:10). Put positively, control theory maintains that persons conform to legal codes because they are bonded to society. Accordingly, when a person's bond to society is broken or weakened, he or she is free to engage in delinquency—but is not *required* to do so. For Hirschi, then, the motivation to commit delinquent and criminal behavior is constant across persons, and thus, is not an explanatory variable (Hirschi, 1969:10–11, 24–25, 32).

The bond to society is a strong cord consisting of four interwoven strands: attachment, belief, commitment, and involvement. Because the fibers or elements of each strand resemble those of the others, these strands are positively intercorrelated. However, each affects delinquency independently, so the four are analytically separable (Hirschi, 1969:27–30). Attachment, perhaps the most important strand in the bond, contains a moral dimension that dissuades persons from delinquency. For Hirschi there are no delinquent subcultures. Instead, there is variation in the extent to which people believe in society's norms, and the less their belief the more likely they are to engage in delinquency. Commitment to conventional activity dissuades persons from delinquency because, when considering delinquent behavior, a person who has invested time and energy in a conventional activity—such as getting an education or building up a business—calculates the risk of losing the investment. Finally, involvement in conventional activity reduces delinquency by limiting one's time to contemplate and commit delinquent acts.[2]

In summary, according to differential association theory, definitions of the legal code mediate the effects of structural factors on crime. According to control theory, in contrast, definitions of the legal codes, which reflect the degree of belief in the moral order, do not mediate attachment, commitment, or involvement. This difference provides a basis for empirically testing the comparative explanatory efficacy of the two theories (Hirschi, 1969:98–100; Jensen, 1972:564; Hepburn, 1976:450–51; Kornhauser, 1978:238).

HIRSCHI AND JENSEN'S TESTS OF DIFFERENTIAL ASSOCIATION

Hirschi's analysis of the self-report delinquency data collected from the Richmond Youth Project provides empirical evidence that purportedly contradicts differential association theory and supports his control theory. Specifically, two of his findings regarding parents, peers, and delinquency directly question the explanatory power of differential association.[3]

First, Hirschi finds that the more intense the friendships—as measured by attachment—among boys with one or more delinquent friends, the less likely they will engage in delinquency.[4] Here, following Short (1957), Hirschi operationalizes differential association theory by using associations with delinquents rather than associations with behavior patterns favorable to delinquency.[5] But because delin-

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[2] Sutherland maintained that neutral (conventional) behavior affects criminality in two principal ways. First, neutral behavior occupies one's time, which prevents one from associating with either criminal or anticriminal behavior patterns (Sutherland, 1947:7). Second, in a given situation, a particular noncriminal act can provide an alternative to criminal behavior and thereby prevent that behavior from transpiring (Sutherland, [1944] 1973:35–36). This constitutes part of the objective opportunity to engage in criminal behavior.

[3] We are here concerned with only the two specific findings pertaining to parents and peers. We do not address other hypotheses, used by Hirschi (1969:140) as indirect tests of differential association, because they are quite peripheral, if not irrelevant, to the theory.

[4] In a partial replication of Hirschi's study, Hindelang (1973) found that, contrary to predictions from control theory, attachment to peers increased the likelihood of delinquency.

[5] Among the other studies operationalizing differential association using associations with delinquent friends, rather than using behavior patterns

quent behavior patterns can be learned from nondelinquents, and antidelinquent behavior patterns can be learned from delinquents, this procedure cannot refute the theory, though it can provide support for it. Further, even if friends are used as a crude measure of associations with behavior patterns, attachment must, from the standpoint of differential association, refer to all friends, not just delinquent ones.

Specifically, by interpreting Sutherland to mean that "crime is more likely the more intense the associations with criminals," Hirschi (1969:151) concludes that his finding about intensity contradicts differential association theory. Sutherland's theory, however, pertains to associations with behavior patterns, not to associations with criminals and noncriminals. As noted above, he specified "intensity" as a modality that gives weight to whatever criminal and anticriminal behavior patterns are presented: an "intense" behavior pattern has greater impact on criminal behavior than a behavior pattern that is not "intense." What is needed is a specific measure of the ratio of the two kinds of behavior patterns, explicitly weighted for intensity. Measures of the number of delinquent and nondelinquent friends, if used at all, should be used to investigate the sources of learning delinquent and antidelinquent behavior patterns.

Second, Hirschi reports that when the number of delinquent friends is held constant, certain indicators of attachment to parents, attachment to school, and commitment to conventional achievement all affect delinquency. But, strictly speaking, this procedure formally invalidates a "bad companions" theory of crime, not differential association. This is because it controls for the number of delinquent friends rather than measuring definitions of the legal code. Again, a more direct operationalization of delinquent and antidelinquent definitions is needed.

In reanalyzing these data but using more extensive measures of "availability of delinquent patterns," Jensen (1972) goes beyond Hirschi to a more explicit test of differential association theory. He investigates two hypotheses. First, does parental control affect delinquency directly—as control theory predicts—or only indirectly by influencing the probability of learning delinquent definitions—as differential association theory suggests? Second, do delinquent peers foster delinquency directly—as suggested by group-process and situationally-induced-motives theories (Short and Strodtbeck, 1965; Briar and Piliavin, 1965)—or indirectly by exposing a boy to delinquent behavior patterns—as differential association specifies?

As measures of the "availability of delinquent patterns," Jensen uses official delinquency rates in schools, perceptions of trouble in the neighborhood, and number of delinquent friends (see also Short, 1957). Furthermore, he uses self-reported delinquency as an outcome variable, but because the self-report rates varied little across schools, he uses official delinquency rates in schools to measure the availability of delinquent definitions (Jensen, 1972:566). In addition, Jensen combines four questionnaire items to represent Sutherland's "definitions favorable to violation of the law."

Jensen reports, with reference to the first hypothesis, that when the differential association variables are held constant (by subdivision in three-variable tables), the parental control variables (father's supervision and father's support) still depress delinquency. He concludes that control theory is supported over differential association (Jensen, 1972:574). With reference to the second hypothesis, Jensen finds that the number of delinquent friends affects delinquency independently of the effect of delinquent definitions. He concludes that group-process and situational-motives theories are empirically superior to differential association theory (Jensen, 1972:573–74).

Although Jensen improved on Hirschi's test of differential association theory, his study still leaves several questions unanswered. First, does measurement error in the indicators of the ratio of delinquent and antidelinquent definitions seriously attenuate their effects on delinquency? Second, given that Sutherland invented the differential association principle in part to account for certain variations in crime rates—variations according to age, social class, broken homes, and neighborhoods—can it in fact do so? And third, is the substantive picture distorted because Jensen's three-variable tables fail to capture more complex relationships among relevant variables? These issues are addressed in the following analysis.

SPECIFICATION OF A CAUSAL MODEL

The Richmond data used by Hirschi and Jensen are reanalyzed here; thus the quality remains the same, as do the assumptions about the research design. Perhaps the most tenuous assumption pertains to the causal ordering of the variables.[6] Consistent with the theory of

learned from all sources, Short (1957, 1958, 1960), Voss (1964), Stanfield (1966), and Krohn (1974) find support for the theory, while Reiss and Rhodes (1964) do not.

[6] Another limitation stems from nonresponse bias in the original sample. Hirschi (1969) noted that indi-

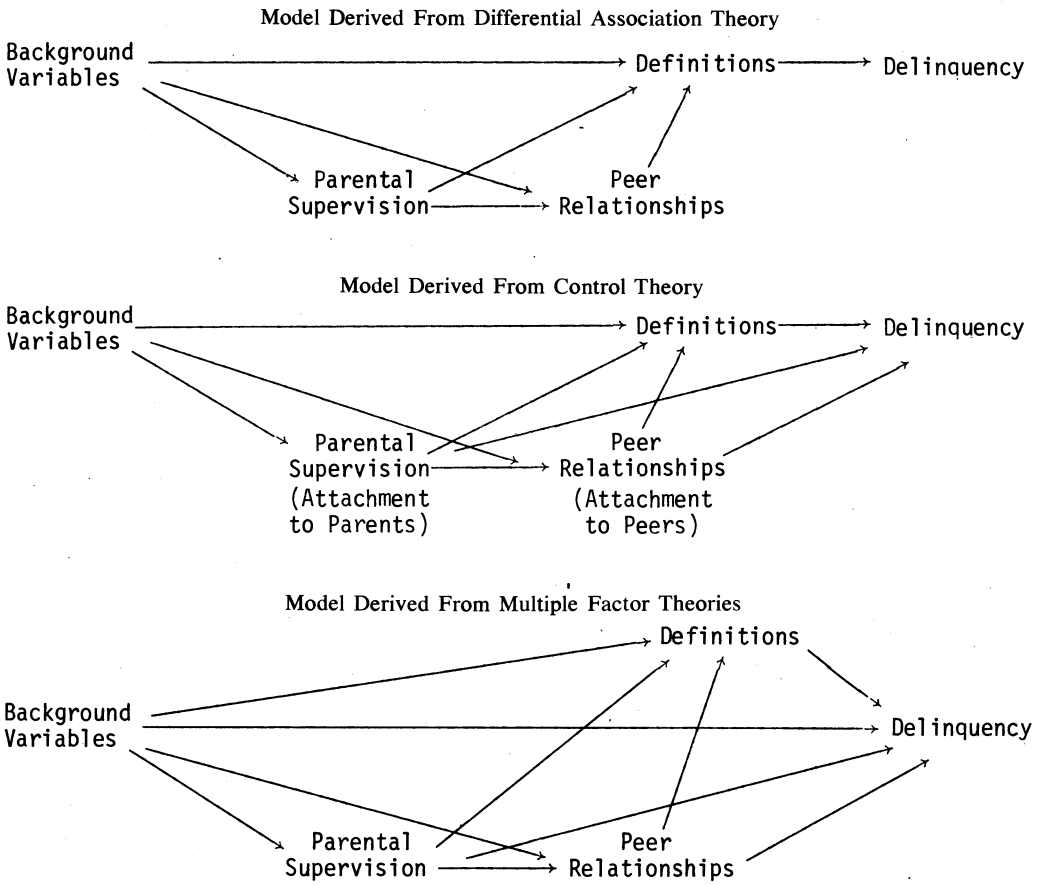

Figure 1. Causal Models of Delinquency

differential association, it is assumed that the measure of definitions favorable and unfavorable to delinquency is causally prior to delinquent behavior and causally subsequent to other variables in the model. This assumption cannot be tested with cross-sectional data; instead, a longitudinal design is required. (For evidence on this issue, see Cressey, [1953] 1973; Minor, 1981.)

The reanalysis attempts, in three steps, to go beyond Hirschi and Jensen's tests of differential association theory. First, certain causal relations implied by the theory are translated into a structural equation model. Second, a measurement model, which treats definitions favorable and unfavorable to delinquency as an unobservable variable with multiple indicators, is incorporated into the system of equations. Third, specific hypotheses and the overall fit of the model are evaluated using both tests of point estimates and a more global goodness-of-fit test.

The Substantive Model

To simplify matters, the causal relations specified in the substantive model can be discussed in terms of the five variables diagrammed in Figure 1. Primary focus will be given to the differential association model, using the alternative models derived from control theory and multiple factor theory as a point of contrast.

The four background variables, the age of the respondent (AGE), his parents' socioeconomic status (SES), whether or not his home is intact (BROKHOME), and his perceptions of trouble in his neighborhood (YOUNGTRO), are commonly cited as important determinants of crime and delinquency. However, as Sutherland and Cressey (1978) show, dif-

viduals who failed to complete the questionnaire were more likely to be delinquent. The critical question, however, is whether the relationships among relevant variables differ for those who failed to respond. Hirschi (1969:46) compared the relationships between certain school-related variables and delinquency and found no significant differences between respondents and nonrespondents. For a detailed description of the Richmond data, see Hirschi (1969).

ferential association theory explicitly stipulates the causal mechanism that makes these background variables "work" to produce crime or delinquency. (See Appendix A for brief descriptions of the variables.)

For example, after summarizing the empirical literature on age and crime, Sutherland and Cressey (1978:129–30) conclude that age has important direct or indirect effects on criminality. The objective here is to determine whether age affects delinquency directly, or indirectly through its effects on parental supervision, peer relationships, and definitions favorable and unfavorable to delinquency.

Sutherland and Cressey (1978:220) further hypothesize that low socioeconomic status may affect delinquency in two ways. First, because poverty areas are often areas of high delinquency, a child from a low SES home has a greater probability of encountering many delinquent behavior patterns. Second, being a member of a lower class may affect a child's denial or acceptance of conventional values. Similarly, they conclude that various home conditions, including broken homes, promote delinquency by increasing children's associations with delinquent definitions, and decreasing their associations with antidelinquent definitions (Sutherland and Cressey, 1978:219–24).

Perceptions of trouble in the neighborhood (YOUNGTRO) is used as an indicator of delinquency area. Both Short (1957) and Jensen (1972) advocate using neighborhood delinquency or trouble as *perceived* by respondents. For Sutherland and Cressey, what is important is actual trouble in the neighborhood, which indicates the number of delinquent behavior patterns in the area. But perhaps one's *effective* neighborhood, as experienced through association with persons and values of the area, is more significant for learning delinquency than is one's *objective* neighborhood. This is because some persons do not perceive trouble in their neighborhoods because they are isolated from it.

In the substantive model (Figure 1), each background variable is assumed to affect parental supervision. From the perspective of differential association theory, supervision reduces delinquency by increasing exposure to antidelinquent definitions and decreasing exposure to delinquent definitions (Sutherland and Cressey, 1978:222). In contrast, both Hirschi and Jensen treat parental supervision as an indicator of attachment to parents, and find that, as control theory predicts, supervision affects delinquent behavior directly (see Figure 1).

The substantive model also allows parental supervision, as well as the background variables, to affect peer relationships. Presumably, the kinds of friendships a boy makes, and the closeness of those friendships, are affected by the extent that his parents supervise him. Differential association theory predicts that because delinquent behavior, like all behavior, is learned primarily in intimate groups, peer relationships have an important impact on learning definitions of the legal code.

The two aspects of peer relationships considered here are number of delinquent friends and attachment to friends. From the standpoint of differential association theory, delinquent friends increase one's delinquency because they are more likely than nondelinquent friends to transmit definitions favorable to delinquency. Jensen, however, finds that number of delinquent friends affects delinquency regardless of the number of definitions favorable to delinquency. This finding is reassessed.

According to differential association theory, behavior patterns learned in relationships that are intense, emotional, and prestigious have more significance for subsequent conduct than behavior patterns without these characteristics. Therefore, degree of attachment to friends should have an important effect on learning definitions of legal codes. But the direction of that effect depends on the content of the behavior patterns learned—whether favorable or unfavorable to delinquency. Again, the important point is that, from the standpoint of differential association theory, attachment to friends affects delinquency only insofar as it affects the learning of definitions favorable and unfavorable to law violation. In contrast, control theory predicts that attachment to peers affects delinquency regardless of what is learned (see Figure 1).

In short, differential association theory predicts that the ratio of definitions favorable and unfavorable to delinquency mediates the effect of each prior variable on delinquency. Thus, the effects of these variables should be zero, or at least trivial in size compared to the effect of definitions of the law. In contrast, multiple factor theories impute direct causal power to each variable, while control theory predicts that parental supervision (attachment to parents) and peer relationships (attachment to peers) directly affect delinquent behavior. In the following analysis, each of these alternative hypotheses is examined.

The full structural equation model, containing these relationships, is presented in the path diagram of Figure 2. The substantive model is a recursive system of five equations. Each disturbance is assumed to be independent of all other disturbances in the model and independent of the predictor variables in its equation. The disturbances contain numerous omitted

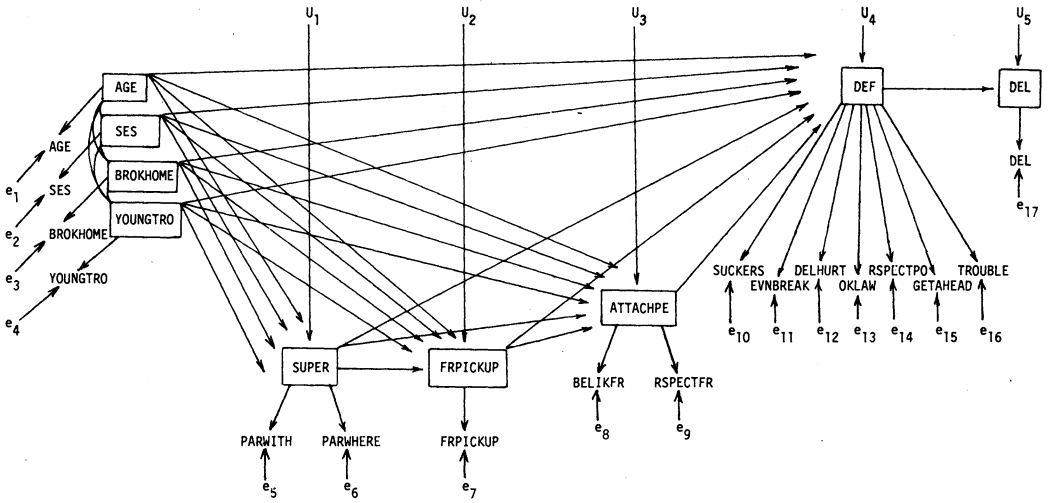

Figure 2. Path Diagram of the Full Causal Model Derived From Differential Association Theory

effects which, we assume, constitute a random shock.[7] Also, the disturbances are assumed to have a mean of zero and constant variance. In addition, apart from BROKHOME, a dummy variable, all variables are treated as interval scale measures, and all effects are assumed to be linear and additive.[8]

Finally, following Hirschi and Jensen, the measure of delinquency (DEL) is an index of self-reported delinquent acts committed in the year prior to administration of the questionnaire.[9]

[7] For example, the disturbance predicting delinquency contains the objective opportunity to engage in delinquency, which includes alternative behaviors within the situation, interactions between person and situation, and techniques of delinquency not learned through delinquent definitions. DeFleur and Quinney (1966), however, argue that underlying differential association is the postulate that knowing delinquent definitions implies knowing the techniques for committing delinquency.

[8] We follow Hirschi (1969) in assuming interval scales. Although Jensen (1972) found some slight interaction effects, they are not substantively important for our purposes.

[9] Although our primary focus is on the research framework of Hirschi and Jensen, we also investigated the measurement properties of the specific items entering the index of delinquency. Incorporating this measurement model—a single latent variable with six indicators and three measurement error correlations—into the system of equations yields similar substantive results. Most important, the hypothesis tests again confirm differential association theory. The validity coefficients of the indicators of DEL are .46 for THEFT2, .45 for THEFT250, .37 for THEFT50, .36 for CARTHEFT, .42 for VANDALSM, and .46 for BATTERY.

The Measurement Model

Perhaps the most damaging criticism of differential association theory argues that a person's ratio of learned behavior patterns cannot be determined accurately (Cressey, 1952:52; Sutherland and Cressey, 1978:91). This is a severe criticism, for if this variable cannot be operationalized, the theory cannot be subjected to empirical verification. Cressey (1960:57) argues that although differential association is not stated precisely enough to stimulate a rigorous empirical test, it remains an important principle that focuses attention on the fact that all behavior is oriented by norms, and it also integrates and explains variations in crime rates. Still, the theory would be more valuable to social scientists if it could stimulate explicit empirical investigations.

In developing the theory, Sutherland ([1944] 1973:36; 1947:7) intended to express the ratio of weighted definitions favorable and unfavorable to delinquency in terms of a precise mathematical formula, which he would then use to predict criminal behavior. It now seems clear that the ratio cannot be determined in the precise way that Sutherland anticipated because the relevant behavior patterns cannot be directly observed, let alone weighted and summed to form a ratio. Nevertheless, when the ratio of behavior patterns favorable and unfavorable to delinquency is treated as a "latent" or "unobservable" variable, it does have operational implications for relationships among variables than *can* be observed. More precisely, observable items measuring definitions of the legal code can be specified as indicators of this underlying theoretical construct. Although each indicator is a fallible measure of

the underlying construct, the inaccuracy can be taken into consideration by explicitly modeling the indicators' measurement error structure.

However, this method of operationalizing the "ratio" concept does not directly compute a ratio. Sutherland ([1942] 1973:22) specified "ratio" to indicate:

> that some persons who have many intimate contacts with criminals refrain from crime and that this is probably due to the counteracting influence of associations with anti-criminal behavior. Actual participation in criminal behavior is a resultant of two kinds of associations, criminal and anti-criminal, or the associations directed toward crime and the associations directed against crime.

Empirically, this implies that any operationalization must capture associations with both procriminal and anticriminal behavior patterns. Because each definition varies by the weight it receives from frequency, duration, priority, and intensity, each can, at least in principle, be placed on a continuum. If each definition is placed on a single continuum, ranging from highly antidelinquent to highly delinquent, each can be measured by the same scale. The theoretical construct, then, becomes a unidimensional variable measuring weighted definitions favorable and unfavorable to delinquency on a continuous scale. Although, strictly speaking, the theoretical construct here is not a ratio, it is a monotonic transformation of a ratio, and, moreover, it measures both kinds of associations, which is what Sutherland intended to accomplish.[10]

In short, after eliminating measurement error, the common variance among these indicators should adequately capture the variation among persons' definitions of the legal code. Consequently, the ratio of definitions of the legal code can be operationalized, and the theory of differential association can be subjected to rigorous empirical examination.

The measurement model is specified by the indicator-construct and indicator-error paths of Figure 2. As in a factor analytic configuration, each indicator is specified as a linear combination of the latent variable (DEF), plus a random measurement disturbance. The measurement errors are assumed to be uncorrelated with both structural variables and structural disturbances. The stochastic measurement error component consists of two elements. One, the eight indicators are each assumed to be randomly generated from an infinite domain of definitions items, and the resulting sampling error is picked up by the disturbance.[11] Two, imperfections in the measuring instrument (the questionnaire) result in measurement error (see Jöreskog, 1976). From a statistical standpoint, the two are treated the same way (Bielby and Hauser, 1977:144).

There are two reasons to expect some measurement errors to be positively correlated. First, some of the items are substantively similar, so the components orthogonal to DEF tap some communality. Second, the items were all measured on a single occasion, measured on identical scales, and (for the first four items) measured consecutively on the questionnaire.

This procedure for operationalizing DEF requires that the indicators show content validity—the items should tap the content of behavior patterns favorable and unfavorable to delinquency as Sutherland intended. In addition, collectively, the sample of items should represent all strata of the domain of content (Bohrnstedt, 1970:92). The items were designed to measure attitudes toward the law and Sykes and Matza's (1957) techniques of neutralization, both direct operationalizations of Sutherland's delinquent definitions (Hirschi, 1969:198–212; see also Austin, 1977).[12]

Also specified as an unobservable variable with multiple indicators, the theoretical construct "parental supervision" (SUPER) is indicated by PARWITH and PARWHERE.[13]

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[10] Jensen (1972), Hepburn (1976), Akers et al. (1979), and Johnson (1979) have tried to measure definitions of the legal code on a continuous unidimensional scale, but without modeling its measurement error structure.

[11] With domain sampling models the measures are not literally sampled from an infinite domain of measures. Rather, it is merely assumed that the sample of items is a random realization of all possible measures (see Nunnally, 1967; and Bohrnstedt, 1970).

[12] Persons' responses along the continuous scale should also reflect aspects of their ratios of definitions. For the sample of items used here, this assumption appears reasonable. For example, persons answering "strongly agree" to the statement, "It is all right to get around the law if you can get away with it," should be those with high ratios of weighted definitions pertaining to this class of verbalizations. Conversely, those answering "strongly disagree" feel it is not "all right to get around the law if you can get away with it"—which reflects antidelinquent attitudes. Thus, these persons should have low ratios of this class of weighted definitions.

[13] Parental supervision was originally specified as a perfect linear combination of its two indicators, and similar substantive results were found. However, if these indicators contain measurement error, that specification could bias the model in favor of differential association theory. Consequently, to increase the strength of the test of differential association, the results of the present specification, allowing for errors of measurement, are reported.

Similarly, ATTACHPE is indicated by BELIKFR and RSPECTFR, and, (following Hirschi) labeled "attachment to peers."[14]

In addition, the perhaps unrealistic assumption that AGE, SES, BROKHOME, YOUNGTRO, FRPICKUP, and DEL are perfectly measured variables is relaxed. Since each of these constructs has but a single indicator, the measurement parameters of a model allowing for measurement error cannot be identified—a prerequisite for estimation. Thus, these parameters cannot be estimated from the data; they can only be fixed to more plausible values. The validity coefficients of SES, BROKHOME, YOUNGTRO, and DEL were fixed to equal .80, and that of AGE to equal .95; the corresponding reliabilities were fixed to .64 and .90. These values appear low enough to reduce adequately the chance that tests are biased in favor of differential association theory, and high enough to avoid obtaining implausible estimates of the remaining parameters of the model.[15]

ESTIMATION OF THE MODEL

Following Hirschi and Jensen, the present study focuses on the 1588 nonblack males sampled. After using listwise deletion, missing values reduced the sample size to 1140.[16]

The model's parameters were estimated by using Jöreskog and Sörbom's (1978) LISREL IV program. Assuming that the joint distribution of the 17 variables is approximately multivariate normal, the program computes consistent and asymptotically efficient maximum likelihood estimates of parameters for identified models. The parameters of both the five equation substantive model and the seventeen equation measurement model were estimated jointly as a single system.[17]

LISREL IV also allows one to test an overidentified model's ability to reproduce the observed variance-covariance matrix. Specifically, the likelihood-ratio-test statistic tests the null hypothesis, that the model's overidentifying restrictions are satisfied in the population, against the alternative, that the moments are actually unconstrained. In large samples, such as the one used here, this statistic is distributed approximately χ^2, with degrees of freedom equal to the number of moments minus the number of parameters estimated. In addition, specific hypotheses, or overidentifying restrictions, can be tested by nesting the hypothesized model within a less restrictive model. The difference in χ^2s provides a likelihood-ratio test of the restrictions, with degrees of freedom equal to the difference in degrees of freedom between the two models. Often the descriptive ratio of χ^2/df is used to assess the relative fit of various models (cf. Wheaton et al., 1977; Isaac et al., 1980). This procedure is followed here.

The program also provides a matrix of first-order partial derivatives of the minimized function with respect to each fixed and free parameter, and a residual matrix of discrepancies between observed and implied moments. These may be useful in respecifying a poor fitting model (see Sörbom, 1975; Jöreskog, 1979).

Table 1 lists the goodness-of-fit tests for each model estimated. Model 1, derived from control theory and multiple factor theory, allows each variable antecedent to DEF to affect delinquency directly and also restricts all measurement errors to be uncorrelated. The χ^2 is over four times the degrees of freedom, indicating a relatively poor fit (p = .000). Model 2

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[14] The metric of an unobservable is arbitrary and must be normalized for identification purposes. For metric models, by constraining one of the factor loadings of each construct to equal unity, the metric of SUPER was arbitrarily fixed to equal that of PARWITH, the metric of ATTACHPE was fixed to equal that of BELIKFR, and the metric of DEF was fixed to equal that of TROUBLE. Thus the slope parameters of these indicators can be identified only relative to one another (Bielby et al., 1977:1251). In addition, for standardized models, the metric was set by fixing the variance of all unobservables to unity and freeing all factor loadings (see Jöreskog, 1979).

[15] We also performed a sensitivity analysis on these error variances (see Duncan, 1975:110). With the exception of FRPICKUP, varying the validity coefficients from .95 to .60 does not alter the substantive picture in any meaningful sense. However, with a validity fixed at .70, FRPICKUP has a direct effect on delinquency statistically distinguishable from zero, but still dwarfed by the effect of DEF; at .60, multicollinearity prevents stable estimation. We believe that the reliability estimates we chose for these indicators are the most plausible values. Moreover, the values for SES, FRPICKUP, and DEL are similar to previously reported estimates (see Bielby et al., 1977; Hindelang et al., 1981). For metric models, reliabilities were fixed to an arbitrary value by fixing error variances: $\sigma_e^2 = (1-\text{Reliability})\ \sigma_y^2$, where σ_y^2 is the variance of the observable. For standardized models, reliabilities are fixed by fixing $P_{ye}^2 = 1 - \text{Reliability}$, where P_{ye}^2 is the squared path coefficient of the measurement disturbance.

[16] Estimation of a model based on a pairwise present covariance matrix yielded similar substantive results.

[17] By using the full information given by the model, this strategy provides efficient parameter estimates but has the drawback that misspecification in one portion of the model can spill over and bias estimates of another portion.

Table 1. Chi-square Goodness-of-Fit Tests for Models Estimated: Nonblack Males (N = 1,140)

Model	χ^2	df	p	χ^2/df
(1) No correlated errors, 8 direct effects on DEL	368.84	89	.000	4.14
(2) 9 correlated errors within DEF, 8 direct effects on DEL	222.76	80	.000	2.78
(3) 9 correlated errors within DEF, 9 correlated errors between constructs, 8 direct effects on DEL	97.65	71	.020	1.38
(4) 9 correlated errors within DEF, 9 correlated errors between constructs, 1 direct effect on DEL	107.56	78	.016	1.38

allows certain measurement errors in the indicators of DEF to correlate positively. Adding these nine parameters into the model substantially improves the fit: the difference in values of 146.09 with nine degeees of freedom is statistically significant (p = .000) and the χ^2/df ratio is substantially reduced. Consequently, the hypothesis of purely random measurement error is rejected in favor of Model 2. (The parameter estimates of the measurement model are discussed in Appendix B.)

Model 2, however, still shows only a marginal fit to the data (χ^2 = 222.76, df = 80, p = .000). But with a large sample size and a large number of overidentifying restrictions, even small residuals can produce a significant χ^2 (Jöreskog, 1969, 1979). Thus, the lack of fit may simply represent sampling variability. On the other hand, it could indicate a misspecified model, which, in turn, could produce biased and inconsistent parameter estimates. For example, error correlations between indicators of DEF and one or more background variables could result from social desirability effects (see Costner, 1969). To test for this, the first-order derivatives were examined to locate those restrictions that may be untenable. In so doing, care was taken to avoid contradicting the logic of the strong theoretical framework guiding the initial model specification, and to avoid adding parameters that were theoretically implausible.[18]

Proceeding incrementally, nine parameters allowing for error correlations between indicators of SES, AGE, FRPICKUP, and PARWHERE to certain indicators of ATTACHPE and DEF were added (see Appendix B). The resulting model fits the data reasonably well (χ^2 = 97.65, df = 71, p = .020). Although there was no strong a priori theoretical reason for including these parameters, they do appear plausible, and, moreover, they work to attenuate important relations that *were* explicitly derived from the theoretical perspective. Therefore, the results of Model 3, which are reported here, are the more conservative findings, and thus the stronger test of differential association theory.

Table 2 presents the unstandardized coefficient estimates for the substantive equations in their reduced, semireduced, and structural forms; their standardized counterparts appear in Table 3. The discussion will focus on those findings most significant for our examination of differential association theory. For equations predicting the unobservable variable (DEF) underlying the indicators of definitions of the legal code, parameter estimates are presented in lines 7 through 10. Of the background variables, YOUNGTRO, followed by AGE, has the largest total impact on DEF (line 7 of Table 3). As predicted by differential association theory, boys who are older, who are from more modest socioeconomic backgrounds, who are from broken homes, and who perceive more trouble in their neighborhoods, are exposed to more definitions favorable than unfavorable to delinquency.

Together, the background variables explain 19 percent of the variance in DEF; adding SUPER to the reduced form increases this to 39 percent (line 8). For the most part, SUPER affects DEF directly (compare lines 8 and 10). Presumably, close parental supervision increases boys' exposure to antidelinquent behavior patterns in the home, and thus reduces DEF. Nearly all of the effect of BROKHOME on DEF is mediated by SUPER (compare lines 7 and 8). Thus, boys from broken homes learn slightly more delinquent patterns because their parents supervise them less. In addition, because they are less supervised, older boys and boys from trouble-ridden neighborhoods are exposed to slightly more delinquent than an-

[18] In general, a poor fit may result because the number of factors is untenable, the hypothesized structure is untenable, or both (Jöreskog, 1969). Because of the strong theoretical reason for specifying DEF as a unidimensional construct, attempts to improve the model's fit by introducing additional factors were not made. For this reason, too, the final model relaxes constraints involving error correlations across constructs, rather than constraints on direct effects from certain background variables to various indicators. From the standpoint of restrictions on the covariance matrix, the two are nearly identical. If, however, the latter constraints are relaxed—allowing for a second form of differential bias (Costner, 1969)—the substantive picture remains unaltered. Furthermore, principal axis factor analysis of the seven indicators of definitions of the law supports a unidimensional solution.

Table 2. Unstandardized Parameter Estimates of the Substantive Model 3: Nonblack Males (N = 1,140)

Dependent Variable	Predetermined Variables								Components of Variation			
	AGE	SES	BROKHOME	YOUNGTRO	SUPER	FRPICKUP	ATTACHPE	DEF	R^2	Residual σ_u	Explained $\sigma_{\hat{t}}$	Total σ_t
1. SUPER	−.032	−.004	−.143	−.145					.114	.385	.138	.409
	(.009)	(.010)	(.050)	(.024)								
2. FRPICKUP	.177	−.027	−.106	.349					.108	1.129	.393	1.196
	(.027)	(.029)	(.154)	(.072)								
3. FRPICKUP	.152	−.030	−.219	.235	−.789				.172	1.088	.496	1.196
	(.027)	(.029)	(.154)	(.076)	(.141)							
4. ATTACHPE	.019	.014	.052	−.072					.064	.282	.074	.291
	(.010)	(.009)	(.046)	(.023)								
5. ATTACHPE	.024	.015	.078	−.046	.180				.120	.273	.101	.291
	(.010)	(.009)	(.046)	(.023)	(.046)							
6. ATTACHPE	.032	.014	.066	−.033	.138	−.054			.160	.267	.117	.291
	(.011)	(.009)	(.046)	(.023)	(.046)	(.017)						
7. DEF	.038	−.006	.072	.207					.189	.367	.177	.408
	(.012)	(.012)	(.058)	(.031)								
8. DEF	.022	−.008	.003	.138	−.480				.394	.317	.256	.408
	(.011)	(.011)	(.055)	(.029)	(.067)							
9. DEF	−.004	−.003	.041	.097	−.344	.173			.608	.255	.318	.408
	(.011)	(.011)	(.053)	(.027)	(.059)	(.022)						
10. DEF	.009	.002	.067	.084	−.290	.152	−.390		.673	.233	.334	.408
	(.012)	(.010)	(.053)	(.027)	(.059)	(.022)	(.097)					
11. DEL	.056	.004	.125	.368					.120	.822	.304	.876
	(.020)	(.022)	(.114)	(.054)								
12. DEL	.036	.001	.035	.277	−.629				.196	.786	.388	.876
	(.020)	(.020)	(.113)	(.056)	(.104)							
13. DEL	−.018	.012	.113	.193	−.349	.356			.391	.684	.548	.876
	(.020)	(.020)	(.109)	(.054)	(.103)	(.037)						
14. DEL	−.009	.016	.132	.184	−.310	.340	−.286		.399	.680	.553	.876
	(.021)	(.020)	(.110)	(.054)	(.106)	(.038)	(.178)					
15. DEL	−.021	.012	.034	.061	.113	.118	.283	1.458	.549	.589	.649	.876
	(.024)	(.022)	(.117)	(.064)	(.146)	(.065)	(.244)	(.345)				

Note: Standard errors appear in parentheses. Components are expressed as standard deviations; the additive decomposition is $\sigma_t^2 = \sigma_{\hat{t}}^2 + \sigma_u^2$.

Table 3. Standardized Parameter Estimates of the Substantive Model 3: Nonblack Males (N = 1,140)

Dependent Variable	Predetermined Variables							
	AGE	SES	BROK-HOME	YOUNGTRO	SUPER	FRPICKUP	ATTACHPE	DEF
1. SUPER	−.128	−.018	−.126	−.275				
2. FRPICKUP	.243	−.043	−.032	.226				
3. FRPICKUP	.209	−.047	−.066	.152	−.268			
4. ATTACHPE	.105	.095	.065	−.190				
5. ATTACHPE	.137	.099	.096	−.121	.252			
6. ATTACHPE	.183	.089	.082	−.088	.193	−.220		
7. DEF	.152	−.029	.064	.393				
8. DEF	.090	−.036	.003	.260	−.481			
9. DEF	−.016	−.014	.037	.184	−.344	.508		
10. DEF	.035	.011	.059	.159	−.291	.446	−.279	
11. DEL	.105	.008	.052	.324				
12. DEL	.067	.003	.014	.244	−.293			
13. DEL	−.034	.026	.047	.170	−.163	.485		
14. DEL	−.017	.034	.054	.162	−.144	.464	−.095	
15. DEL	−.040	.027	.014	.054	.053	.162	.094	.678

tidelinquent definitions (compare lines 7 and 8).

Also consistent with differential association theory, number of friends picked up by the police has a large positive total impact on DEF (line 9 of Table 3). In fact, FRPICKUP has the largest relative direct effect (line 10 of Table 3). In addition, FRPICKUP mediates nontrivial amounts of AGE, YOUNGTRO, and SUPER in their effects on DEF. Therefore, being older, being in a neighborhood perceived to be more trouble-ridden, and being supervised less causes boys to acquire slightly more delinquent friends which, in turn, increases their exposure to delinquent definitions. Adding FRPICKUP into the equation increases the R^2 to over .60.

The negative effect of ATTACHPE on DEF (line 10) indicates that, on the average, in closer friendships a higher proportion of antidelinquent definitions is transmitted. As a result of being more attached to their friends, boys who are from more trouble-free neighborhoods, who are more closely supervised, and who have fewer delinquent friends tend to learn more antidelinquent definitions relative to delinquent definitions. With the addition of ATTACHPE (line 10), the structural form equation explains over 67 percent of the variance in DEF. Thus, the model does well in accounting for variability in the unobservable underlying definitions of the legal code.

Lines 11 through 15 present estimates of the parameters predicting delinquency (DEL). While the background variables explain 12 percent of the variance in delinquency (line 11), adding SUPER, FRPICKUP, and ATTACHPE increases this to 40 percent (line 14). Without DEF, then, the model still accounts for a substantial amount of variance in delinquency. Also, the total effects of each variable except SES and BROKHOME are nontrivial. These are important findings, for the empirical test of differential association—the ability of DEF to mediate the antecedent variables' effects on delinquency—requires something nontrivial to be mediated.

Adding DEF to the equation predicting delinquency gives the structural form (line 15). The impact of DEF on delinquency is negative and, as revealed by the standardized coefficients (line 15 of Table 3), comparatively large. Thus, as differential association theory specifies, increasing the number of definitions favorable to violation of law relative to unfavorable definitions increases delinquent behavior. The model accounts for over half of the variance in delinquency.

The hypothesis, derived from differential association theory, that DEF mediates the other variables' effects on delinquency, can be assessed by comparing lines 14 and 15. Line 14 reveals that before adding DEF to the equation, AGE and SES already have trivial direct effects on delinquency. On the other hand, YOUNGTRO has a substantial and statistically significant direct effect. But when DEF is added to the equation, the effect becomes both trivial in size and statistically indistinguishable from zero (line 15). Therefore, as differential association predicts, perceptions of neighborhood trouble increase delinquency by increasing the probability of learning delinquent behavior patterns. While modest in size and not quite significant, the direct effect of BROKHOME on delinquency is also mediated by DEF (compare lines 14 and 15).

As both Hirschi and Jensen found, and as control theory predicts, attachment to parents, indicated by SUPER, has a negative effect on delinquency unmediated by variables representing peer relationships (line 14). However, contrary to control theory, but consistent with

differential association theory, this effect is entirely mediated by DEF. In fact, not only is the remaining effect (line 15) statistically nonsignificant, but it is opposite in sign to that predicted by control theory. Thus, delinquent behavior is reduced by parental supervision because boys are exposed to more antidelinquent definitions compared to delinquent definitions.

Also consistent with Hirschi and Jensen's results, the semireduced form effect of FRPICKUP on delinquency is large and positive (line 14). But, unlike Jensen's finding, DEF mediates all but a trivial and statistically nonsignificant portion of this effect (line 15). Because delinquent friends affect boys' delinquent behavior only by increasing their exposure to delinquent definitions, differential association theory is supported over group-process and situationally-induced-motives theories.

The total effect of attachment to peers is to reduce the number of delinquent friends (line 14). Again, this is consistent with Hirschi's findings, and with control theory in general. But with the addition of DEF into the equation, this direct effect becomes statistically indistinguishable from zero, and, from the standpoint of control theory, implausibly positive (line 15). Again, differential association is supported over control theory.

In short, individual hypothesis tests of point-interval estimates indicate that DEF, the latent variable underlying the indicators of definitions of the legal code, successfully mediates effects that other structural variables have on delinquency. In addition, the more global likelihood-ratio goodness-of-fit test can be applied to these hypotheses (see Table 1). By constraining each coefficient—tested individually—to equal zero, Model 4 (derived from differential association) can be tested against Model 3 (the less restricted alternative). The difference in χ^2 values of 9.48 with 7 degrees of freedom (compare lines 3 and 4 in Table 1) is not statistically significant ($p > .20$). Collectively, these parameters fail to improve the model's fit significantly; Model 3 is consequently rejected in favor of the differential association model. In addition, in Model 4, definitions of the legal code (DEF) has a standardized effect on delinquency of .738, and explains 54 percent of the variation in delinquent behavior.

To sum up, tests of the specific hypotheses formulated here confirm the theory of differential association. This contrasts with the findings of Hirschi and Jensen who assumed that all variables were measured perfectly. Using recently developed methodological techniques, this assumption is relaxed and measurement error in certain variables is considered. This is a significant issue, for had errors in measurement not been considered, the estimates would have been biased and the substantive conclusions misleading.

DISCUSSION

According to the argument developed here, contrary to popular criticisms of differential association, the theory can and should be investigated empirically. The oft-cited difficulty of operationalizing the ratio of learned behavior patterns, so crucial to the theory, can be conceptualized as a problem of measurement error. Stated in this way, the problem can be addressed by explicitly modeling the measurement error structure of items tapping the underlying definitions construct, which then allows the testing of specific hypotheses derived from the theory.

After following this strategy, and examining a number of alternative model specifications, the conclusion is clear: differential association theory is supported over control theory. Because of limitations in the data, however, several caveats are in order. First, as mentioned earlier, the causal ordering of the variables could be incorrect, since the data are cross-sectional. If so, this could cause serious biases in the parameter estimates. Second, both the indicators and the outcome measure refer to delinquent behavior in general, whereas Sutherland specified that specific forms of criminal or delinquent behavior, such as theft or assault, are determined by specific ratios of behavior patterns pertaining to those classes of acts (Sutherland, [1944] 1973:36). This study has only had access to general indicators of definitions of the legal code; consequently, these have been used to predict a general index of delinquent behavior. Accordingly, it has been assumed that any differences between these results using general indicators and those obtaining from specific indicators (had they been accessible) are random.

Third, recent research has identified certain problems in using self-reported measures of relatively trivial delinquent offenses—as are used here—to make statements about *all* delinquent behavior. For example, Elliot and Ageton (1980) note that the use of trivial items, items that overlap, and items with truncated scales can mask significant relationships between delinquency and certain demographic variables (see also Braithwaite, 1981). Hindelang et al. (1979, 1981) conclude that while such measures fail to capture relations that hold among certain demographic variables and official measures of delinquent behavior, they remain, within the specific domain of behavior

they are intended to tap, valid and reliable indicators of offending behavior. Consequently, generalization of the findings reported here to more serious forms of delinquency is probably unwarranted without further research.

Fourth, this analysis is necessarily based on Hirschi and Jensen's assumptions about the content validity of the indicators of DEF. Ideally, the indicators should be consistent with Sutherland's intended meaning of "definitions favorable and unfavorable to violation of the legal code." Further, they should measure, at the very least, the most dominant definitions of the legal code communicated, transmitted, and applied to delinquent behavior within the population studied. The content of such definitions is likely to vary across subcultural groups, where communication is distant and impersonal, and yet remain invariant within subcultural groups and geographic areas, where communication is relatively open, intimate, and personal.

Although the measures used here appear reasonably consistent with Sutherland's specification, it is not certain that they are appropriate for this particular population, because the content of the items was determined deductively from a priori theoretical and conceptual considerations, rather than also inductively from a subset of the respondents themselves.

Finally, some of the evidence reported here raises questions about the validity and reliability of the indicators of DEF (see Appendix B). The relatively low reliability coefficients are similar to those reported for other social psychological data (cf. Miller et al., 1979; and Isaac et al., 1980), and in fact support the very reason for disentangling unreliability from actual variation in the theoretical construct (Kohn and Schooler, 1978). Nevertheless, the low reliabilities could also signal that the indicators have undesirable measurement properties. Furthermore, although it is unreasonable to expect these measurement errors to be uncorrelated, the finding of many correlated errors among indicators within and between theoretical constructs could suggest problems of validity. Ultimately, however, questions about validity should be resolved on theoretical rather than statistical grounds.[19]

In sum, this study has located possible sources of unreliability in the Richmond data and also has explicitly modeled that unreliability by relaxing a number of untenable restrictions. This is important, for previous work that ignored these issues has produced misleading results. Thus, if one chooses to reject the Richmond data outright, this research locates possible grounds for doing so. If, on the other hand, one chooses to accept these data (which are still perhaps the best data addressing the theoretical issue at hand and easily the most widely cited) this research exploits these data more fully than previous work, takes various forms of unreliability into account, and thus provides an improved test of control theory versus differential association.

APPENDIX A

KEY TO VARIABLE LABELS

AGE	Age of respondent. 0 = 12 years or younger, 1 = 13 years, 2 = 14 years, 3 = 15 years, 4 = 16 years, 5 = 17 years, 6 = 18 years, 7 = 19 years, 8 = 20 years or older.
SES	Father's occupation measured on the Duncan Scale; if there is no father living in the home, then mother's occupation is used. For the few cases in which father's occupation had a missing value, and father's education was reported, values of father's occupation were predicted by regressing occupation on education.
BROKHOME	A dummy variable coded as one if either the mother or father did not live with the respondent.
FRPICKUP	"Have any of your close friends ever been picked up by the police?" 0 = no or don't know, 1 = one friend has, 2 = two friends have, 3 = three friends have, 4 = four or more friends have.
PARWITH	A composite asked regarding each parent: "Do your parents know who you are with when you are away from home?" 0 = never-never, 0.5 = sometimes-never, 1.0 = sometimes-sometimes, 1.5 = usually-sometimes 2.0 = usually-usually.
PARWHERE	Same as above but with the question: "Do your parents know where you are when you are away from home?"
BELIKFR	"Would you like to be the kind of person your best friends are?" 0 = not at all, 1 = in a few ways, 2 = in most ways.
RSPECTFR	"Do you respect your best friend's opinions about the important things in life?" 0 = not at all, 1 = a little, 2 = pretty much, 3 = completely.

[19] In the strategy used here, specifying the items as fallible indicators of an unobservable variable amounts to correcting for attenuation due to unreliability, a procedure requiring reasonably valid and reliable measures (Crouse et al., 1979:359–63). If in fact these indicators do not tap the theoretical domain specified by Sutherland, *any* use of them for examining differential association theory is unwarranted.

DEL	An index of delinquency committed during the last year containing the following six items:
THEFT2	"Have you ever taken little things (worth less than $2) that did not belong to you?"
THEFT250	"Have you ever taken things of some value (between $2 and $50) that did not belong to you?"
THEFT50	"Have you ever taken things of large value (worth over $50) that did not belong to you?"
CARTHEFT	"Have you ever taken a car for a ride without the owner's permission?"
VANDALSM	"Have you ever banged up something that did not belong to you on purpose?"
BATTERY	"Not counting fights you may have had with a brother or sister, have you ever beaten up on anyone or hurt anyone on purpose?"

The following items are all measured on the scale, "strongly agree, agree, undecided, disagree, strongly disagree."

YOUNGTRO	[In my neighborhood] "Young people are always getting into trouble."
EVNBREAK	"Policemen try to give all kids an even break."
DELHURT	"Most things that people call 'delinquency' don't really hurt anyone."
OKLAW	"It is all right to get around the law if you can get away with it."
RSPECTPO	"I have a lot of respect for the Richmond police."
GETAHEAD	"To get ahead, you have to do some things which are not right."
TROUBLE	"I can't seem to stay out of trouble no matter how hard I try."
SUCKERS	"Suckers deserve to be taken advantage of."

APPENDIX B

Analysis of the Measurement Model

Parameter estimates of the measurement model appear in Table 4. All unrestricted metric slopes (listed in column 3), except those of EVNBREAK and DEL-

Table 4. Measurement Parameter Estimates of Model 3: Nonblack Males (N = 1,140)

Variable		(1) Observed	(2) Error	(3) Metric	(4) Validity	(5) Reliability
Latent	Observable	Variance	Variance	Slope	Coefficient	Coefficient
AGE	AGE	3.012	.277[f]	1.000[f]	.949[f]	.900[f]
SES	SES	5.663	2.037[f]	1.000[f]	.800[f]	.640[f]
BROKHOME	BROKHOME	.204	.073[f]	1.000[f]	.800[f]	.640[f]
YOUNGTRO	YOUNGTRO	.932	.336[f]	1.000[f]	.800[f]	.640[f]
SUPER	PARWITH	.292	.125	1.000[f]	.756	.571
			(.014)			
	PARWHERE	.279	.132	.938	.725	.526
			(.012)	(.075)		
FRPICKUP	FRPICKUP	2.235	.804[f]	1.000[f]	.800[f]	.640[f]
ATTACHPE	BELIKFR	.374	.289	1.000[f]	.477	.227
			(.019)			
	RSPECTFR	.499	.319	1.456	.600	.361
			(.033)	(.244)		
DEF	EVNBREAK	1.500	1.361	.904	.301	.091
			(.060)	(.128)		
	DELHURT	1.123	.989	.904	.348	.121
			(.044)	(.113)		
	OKLAW	1.079	.834	1.213	.476	.227
			(.042)	(.130)		
	RSPECTPO	1.189	.893	1.327	.496	.246
			(.044)	(.136)		
	GETAHEAD	1.222	.988	1.183	.436	.190
			(.047)	(.130)		
	TROUBLE	.967	.801	1.000[f]	.415	.172
			(.037)			
	SUCKERS	1.219	1.010	1.132	.418	.175
			(.048)	(.120)		
DEL	DEL	1.200	.432[f]	1.000[f]	.800[f]	.640[f]

[f] Fixed coefficient.

Note: Standard errors appear in parentheses. The following measurement errors were found to be significantly correlated: $\rho(e_1e_8) = -.433$ $\rho(e_1e_{10}) = .467$ $\rho(e_1e_{12}) = .265$ $\rho(e_1e_{15}) = -.467$ $\rho(e_1e_{16}) = -.262$ $\rho(e_2e_{11}) = -.186$ $\rho(e_2e_{13}) = .137$ $\rho(e_6e_{15}) = .098$ $\rho(e_7e_{10}) = .166$ $\rho(e_{10}e_{13}) = .308$ $\rho(e_{10}e_{14}) = .077$ $\rho(e_{11}e_{16}) = .089$ $\rho(e_{11}e_{12}) = .159$ $\rho(e_{12}e_{13}) = .054$ $\rho(e_{12}e_{14}) = .130$ $\rho(e_{12}e_{16}) = .104$ $\rho(e_{14}e_{16}) = .107$ $\rho(e_{15}e_{16}) = .127$.

HURT, depart significantly (by at least one standard error) from the normalized value of unity. For the indicators of definitions of the law (DEF), this indicates that, relative to TROUBLE, persons scoring highly prodelinquent on each of these other indicators tend to understate their prodelinquency, and vice versa. For the indicators of parental supervision (SUPER), which like those of DEF are measured on identical scales, relative to PARWITH, persons scoring highly supervised on PARWHERE tend to understate their degree of parental supervision, and conversely.

As is commonly the case with measures of attitudes, the indicators of attachment to peers (ATTACHPE) and definitions of the legal code (DEF) contain large portions of measurement error (column 2). In general, larger validity (indicator-construct correlations) and reliability (squared validities) coefficients than are found here are desirable. These findings raise questions about the quality of the indicators, and the Richmond data in general. On the other hand, given that random measurement error was assumed to be generated by both domain sampling processes and imperfections in the instrument, low reliability was expected.

The relative accuracy of the indicators can be assessed by evaluating the error variances (column 2) and the validity and reliability coefficients (columns 4 and 5). PARWITH and PARWHERE are both reasonably reliable indicators of parental supervision. As a measure of attachment to peers, RSPECTFR appears more reliable than BELIKFR (columns 4 and 5). The indicators of definitions of the law, all measured on the same scale, have error variances around 1.0, showing some stability across indicators. TROUBLE and OKLAW appear to be particularly accurate measures, while EVNBREAK does not. The validity and reliability coefficients reveal that these indicators have similar reliabilities, with EVNBREAK and DELHURT being slightly less reliable. The indicators used by Jensen (EVNBREAK, DELHURT, OKLAW, and GETAHEAD) are about average in reliability.

As expected, the largest error correlation among indicators of DEF involve EVNBREAK and RSPECTPO, which both refer to attitudes toward the police. For pairs of indicators in which at least one error variance is fixed, rather than estimated, the error covariance is an identifiable parameter, but not the error correlation. Thus, the magnitude of the error correlation depends on the value of the error variance(s) fixed. Consequently, the error correlations involving AGE are anomalously large due to the small error variance fixed for AGE.

REFERENCES

Akers, Ronald L., Marvin D. Krohn, Lonn Lanza-Kaduce and Marcia Radosevich
1979 "Social learning and deviant behavior: a specific test of a general theory." American Sociological Review 44:635–55.

Austin, Roy L.
1977 "Commitment, neutralization, and delinquency." Pp. 121–37 in Theodore N. Ferdinand (ed.), Juvenile Delinquency: Little Brother Grows Up. Beverly Hills: Sage.

Bielby, William T. and Robert M. Hauser
1977 "Structural equation models." Annual Review of Sociology 3:137–61.

Bielby, William T., Robert M. Hauser and David L. Featherman
1977 "Response errors of black and nonblack males in models of the intergenerational transmission of socioeconomic status." American Journal of Sociology 83:1242–88.

Bohrnstedt, George W.
1970 "Reliability and validity assessment in attitude measurement." Pp. 80–99 in Gene F. Summers (ed.), Attitude Measurement. Chicago: Rand McNally.

Braithwaite, John
1981 "The myth of social class and criminality reconsidered." American Sociological Review 46:36–57.

Briar, Scott and Irving Piliavin
1965 "Delinquency, situational inducements, and commitment to conformity." Social Problems 13:34–45.

Costner, Herbert L.
1969 "Theory, deduction, and rules of correspondence." American Journal of Sociology 75:245–63.

Cressey, Donald R.
1952 "Application and verification of the differential association theory." Journal of Criminal Law, Criminology and Police Science 43:43–52.
[1953] Other People's Money: A Study in the So-
1973 cial Psychology of Embezzlement. Montclair, NJ: Patterson Smith.
1960 "Epidemiology and individual conduct: a case from criminology." Pacific Sociological Review 3:47–58.

Crouse, James, Peter Mueser, Christopher Jencks and Charles S. Reichardt
1979 "Latent variable models of status attainment." Social Science Research 8:348–68.

DeFleur, Melvin L. and Richard Quinney
1966 "A reformulation of Sutherland's differential association theory and a strategy for empirical verification." Journal of Research in Crime and Delinquency 3:1–22.

Duncan, Otis Dudley
1975 Introduction to Structural Equation Models. New York: Academic Press.

Elliot, Delbert S. and Suzanne S. Ageton
1980 "Reconciling race and class differences in self-reported and official estimates of delinquency." American Sociological Review 45:95–110.

Hepburn, John R.
1976 "Testing alternative models of delinquency causation." Journal of Criminal Law and Criminology 67:450–60.

Hindelang, Michael J.
1973 "Causes of delinquency: a partial replication and extension." Social Problems 20:471–87.

Hindelang, Michael J., Travis Hirschi and Joseph G. Weis
1979 "Correlates of delinquency." American Sociological Review 44:995–1014.
1981 Measuring Delinquency. Beverly Hills: Sage.

Hirschi, Travis
1969 Causes of Delinquency. Berkeley: University of California Press.
Isaac, Larry, Elizabeth Mutran and Sheldon Stryker
1980 "Political protest orientations among black and white adults." American Sociological Review 45:191–213.
Jensen, Gary F.
1972 "Parents, peers, and delinquent action: a test of the differential association perspective." American Journal of Sociology 78:562–75.
Johnson, Richard E.
1979 Juvenile Delinquency and its Origins. Cambridge: Cambridge University Press.
Jöreskog, Karl G.
1969 "A general approach to confirmatory maximum likelihood factor analysis." Psychometrika 34:183–202.
1976 "Causal models in the social sciences: the need for methodological research." University of Uppsala, Department of Statistics Research Report 76–8, Uppsala, Sweden.
1979 "Analyzing psychological data by structural analysis of covariance matrices." Pp. 45–100 in Karl G. Jöreskog and Dag Sörbom (eds.), Advances in Factor Analysis and Structural Equation Models. Cambridge: Abt Books.
Jöreskog, Karl G. and Dag Sörbom
1978 LISREL IV: Analysis of Linear Structural Relationships by the Method of Maximum Likelihood. Chicago: National Education Resources, Inc.
Kohn, Melvin L. and Carmi Schooler
1978 "The reciprocal effects of the substantive complexity of work and intellectual flexibility: a longitudinal assessment." American Journal of Sociology 84:24–52.
Kornhauser, Ruth R.
1978 Social Sources of Delinquency. Chicago: University of Chicago Press.
Krohn, Marvin D.
1974 "An investigation of the effect of parental and peer associations on marijuana use: an empirical test of differential association theory." Pp. 75–89 in Marc Reidel and Terrence P. Thornberry (eds.), Crime and Delinquency: Dimensions of Deviance. New York: Praeger.
Miller, Joanne, Carmi Schooler, Melvin L. Kohn and Karen Miller
1979 "Woman and work: the psychological effects of occupational conditions." American Journal of Sociology 85:66–94.
Minor, W. William
1981 "Techniques of neutralization: a reconceptualization and empirical examination." Journal of Research in Crime and Delinquency 18:295–318.
Nunnally, Jum C.
1967 Psychometric Theory. New York: McGraw-Hill.
Reiss, Albert J., Jr., and Lewis Rhodes
1964 "An empirical test of differential association theory." Journal of Research in Crime and Delinquency 1:5–18.
Short, James F., Jr.
1957 "Differential association and delinquency." Social Problems 4:233–39.
1958 "Differential association with delinquent friends and delinquent behavior." Pacific Sociological Review 1:20–25.
1960 "Differential association as a hypothesis: problems of empirical testing." Social Problems 8:14–25.
Short, James F., Jr., and Fred L. Strodtbeck
1965 Group Process and Gang Delinquency. Chicago: University of Chicago Press.
Sörbom, Dag
1975 "Detection of correlated errors in longitudinal data." British Journal of Mathematical and Statistical Psychology 28:138–51.
Stanfield, Robert E.
1966 "The interaction of family variables and gang variables in the aetiology of delinquency." Social Problems 13:411–17.
Sutherland, Edwin H.
[1942] 1973 "Development of the theory." Private paper published posthumously. Pp. 13–29 in Karl Schuessler (ed.), Edwin Sutherland on Analyzing Crime. Chicago: University of Chicago Press.
[1944] 1973 "Critique of the theory." Private paper published posthumously. Pp. 30–41 in Karl Schuessler (ed.), Edwin Sutherland on Analyzing Crime. Chicago: University of Chicago Press.
1947 Principles of Criminology. Fourth Edition. Philadelphia: Lippincott.
Sutherland, Edwin H. and Donald R. Cressey
1978 Criminology. Tenth Edition. Philadelphia: Lippincott.
Sykes, Gresham and David Matza
1957 "Techniques of neutralization: a theory of delinquency." American Sociological Review 43:643–56.
Voss, Harwin L.
1964 "Differential association and delinquent behavior." Social Problems 12:78–85.
Wheaton, Blair, Bengt Muthen, Duane F. Alwin and Gene F. Summers
1977 "Assessing reliability and stability in panel models." Pp. 84–136 in David Heise (ed.), Sociological Methodology 1977. San Francisco: Jossey-Bass.