Testing Alternative Models of Delinquency Causation

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CRIMINOLOGY

TESTING ALTERNATIVE MODELS OF DELINQUENCY CAUSATION

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The etiological formulations by Sutherland, Hirschi and the Gluecks provide alternative explanations of the causal structure between four variables: lack of family support, delinquent definitions, delinquent associates and delinquent behavior. The Simon-Blalock method of making causal inferences from four-variable causal models is utilized to evaluate the alternative models of delinquency causation. Using two indicators of delinquent definitions, delinquent associates and delinquent behavior, partial correlation coefficients indicate little support for the models derived from the work of Sutherland or the Gluecks. The results are discussed in terms of Hirschi's social control theory and the affective ties model of Linden and Hackler.

Dimensions of family interaction are related to a juvenile's involvement in delinquent behavior.[1] Juveniles who engage in delinquent behavior have, as associates, friends who engage in delinquent behavior.[2] These two empirical regularities form the basis of competing theoretical models, each providing an alternative explanation of the causal structure which yields the observed correlations between delinquent behavior and both family interaction and delinquent associates. Four variables are common to both theories: family support, definitions favorable to law violation, delinquent associates, delinquent behavior.

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[1] S. GLUECK & E. GLUECK, UNRAVELING JUVENILE DELINQUENCY (1950) [hereinafter cited as GLUECK & GLUECK (1950)]; M. GOLD, STATUS FORCES IN DELINQUENT BOYS (1963); W. HEALY & A. BRANNER, NEW LIGHT ON DELINQUENCY AND ITS TREATMENT (1936); NYE, FAMILY RELATIONSHIPS AND DELINQUENT BEHAVIOR (1958).

[2] GLUECK & GLUECK (1950), supra note 1; A. HOLLINGSHEAD, ELMTOWN'S YOUTH (1961); Erickson & Empey, Class Position, Peers and Delinquency, 49 SOC. & SOC. RESEARCH 268 (1965); Reiss & Rhodes, The Distribution of Juvenile Delinquency in the Social Class Structure, 26 AM. SOC. REV. 720 (1961); Shaw & McKay, Social Factors in Juvenile Delinquency, 2 NATIONAL COMMISSION ON LAW OBSERVANCE AND ENFORCEMENT, REPORT ON THE CAUSES OF CRIME (1931).

Sutherland's theory of differential association posits a model in which the sequence of and relationship between variables are sufficiently different from that posited by social control theory, enabling an examination of data which will permit the investigator to demonstrate support for one model to the exclusion of the other, similar to what Stinchcombe refers to as the "crucial experiment."[3]

DIFFERENTIAL ASSOCIATION

Sutherland's theory of differential association,[4] in its simplest form, maintains that delinquency is the result of an excess of definitions favorable to law violation over those definitions unfavorable to law violation. These definitions, obtained through symbolic interaction in primary group settings, vary in intensity, duration, frequency and priority. While such definitions favorable to law violation may derive from the family,[5] it is the failure of the family successfully to integrate the juvenile into the family that may increase his associations with delinquent behavior patterns outside the home.[6] The role of family support in the etiology of delinquency is not fully articulated, although the theory appears to posit a relationship in which the family may have a direct causal effect upon both delinquent associates and delinquent definitions, and an indirect causal effect on delinquent definitions mediated by delinquent associates. The causal structure of differential association theory may be explicated as follows:
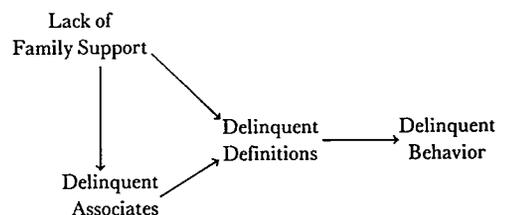
[3] A. STINCHCOMBE, CONSTRUCTING SOCIAL THEORIES 24–28 (1968).

[4] E. SUTHERLAND & D. CRESSEY, PRINCIPLES OF CRIMINOLOGY (1974) [hereinafter cited as SUTHERLAND & CRESSEY].

[5] Id. at 212.

[6] Id. at 213.

Attempts to examine the thesis of differential association have, for the most part, focused on the bivariate relationships between variables within the causal structure. Short, Voss and Hackler are among those who have noted the association between the juvenile's delinquency and the juvenile's perception of the delinquency of his associates.[7] Reiss and Rhodes, and also Mathews demonstrate delinquent sociometric choices based on the self-reported delinquency of both the subject and his associate.[8] Stratton and Severy have examined the relationship between delinquent definitions and delinquent behavior.[9] All these scholars provide some support for the causal structure within differential association theory, yet none has been able to demonstrate such support to the exclusion of competing models.
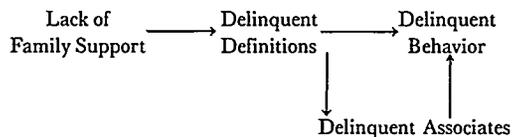
SOCIAL CONTROL THEORY

A noticeable cleavage exists between the proponents of social control theory. The Gluecks, for example, maintain that delinquent behavior produces delinquent associates. Delinquents seek out other delinquents just as "birds of a feather flock together," and the cause of delinquency originates, in part, from faulty family interaction. "Emotional indifference"[10] by parents and lack of supervision[11] are common traits of the family pathology which gives rise to delinquent emotions, leading to delinquent behavior. These delinquent emotions may bring about, or be defined as, definitions favorable to law violation, leading to the following explication of the causal structure of the observed relationships:

Lack of Family Support $\longrightarrow$ Delinquent Definitions $\longrightarrow$ Delinquent Behavior $\longrightarrow$ Delinquent Associates
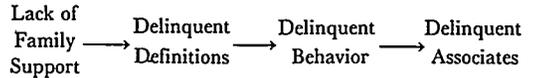
Hirschi concurs that delinquent behavior is the product of family interaction.[12] Weak family support leads to definitions favorable to law violation ("low stakes in conformity"[13]), which may result in both delinquent behavior and delinquent associates. Hirschi differs from the Gluecks, however, to the extent that he maintains that delinquent behavior and delinquent associates are independent effects of delinquent definitions and delinquent behavior is the effect, not the cause, of delinquent associates. Boys with high stakes in conformity are unlikely either to engage in delinquent behavior or have delinquent associates, and the greater the stake in conformity, the less the impact of delinquent associates on delinquent behavior. Among those boys with a relatively equal stake in conformity, however, delinquent associates are the cause of delinquent behavior.

Hirschi's formulation of the causal structure has only recently been published. This may perhaps explain why support for social control theory is not as extensive as that for differential association. Empey and Lubeck indicate that the effects of family support on delinquent behavior do not appear to be mediated by delinquent associates.[14] Jensen uses the same data-base as used by Hirschi, and, not surprisingly, reaches the same conclusions: that (1) family support is negatively related to delinquent behavior regardless of the delinquency of one's associates, and (2) delinquent behavior is independently related to delinquent associates and delinquent definitions.[15] In a replication, Hindelang reports data consistent with that of Hirschi with but two exceptions: attachment to peers and attachment to mother are not related, and self-reported delinquency and attachment to peers are found to be directly (not indirectly) related.[16] The causal structure thus advocated and advanced by Hirschi is as follows:

Lack of Family Support $\longrightarrow$ Delinquent Definitions $\longrightarrow$ Delinquent Behavior

Delinquent Definitions $\longrightarrow$ Delinquent Associates $\longrightarrow$ Delinquent Behavior

Delinquent Associates

[7]Hackler, *Testing a Causal Model of Delinquency*, 11 Soc. Q. 511 (1970) [hereinafter cited as Hackler (1970)]; Short, *Differential Association as a Hypothesis: Problems of Empirical Testing*, 8 Soc. Prob. 14 (1960); Short, *Differential Association with Delinquent Friends and Delinquent Behavior*, 1 Pac. Soc. Rev. 20 (1958); Short, *Differential Association and Delinquency*, 4 Soc. Prob. 233 (1957); Voss, *Differential Association and Reported Delinquent Behavior: A Replication*, 12 Soc. Prob. 78 (1964).

[8]Matthews, *Differential Identification; An Empirical Note*, 15 Soc. Prob. 376 (1968); Reiss & Rhodes, *An Empirical Test of Differential Association Theory*, 1 J. Research Crime & Delinquency 5 (1964).

[9]Severy, *Exposure to Deviance Committed by Valued Peer Group and Family Members*, 10 J. Research Crime & Delinquency 35 (1973); Stratton, *Differential Identification and Attitudes Toward the Law*, 46 Soc. Forces 256 (1967).

[10]S. Glueck & E. Glueck, Family Environment and Delinquency (1962).

[11]S. Glueck & E. Glueck, Identification of Predelinquents 155 (1972).

[12]T. Hirschi, Causes of Delinquency (1969) [hereinafter cited as Hirschi].

[13]*Id.* at 153.

[14]L. Empey & S. Lubeck, Explaining Delinquency (1971) [hereinafter cited as Empey & Lubeck (1971)].

[15]Jensen, *Parents, Peers, and Delinquent Action: A Test of the Differential Association Perspective*, 78 Am. J. Soc. 562 (1972) [hereinafter cited as Jensen].

[16]Hindelang, *Causes of Delinquency: A Partial Replication and Extension*, 20 Soc. Prob. 471 (1973).

EVALUATING ALTERNATIVE CAUSAL MODELS

Correlational data derived from cross-sectional analyses cannot demonstrate causality, yet causal inferences with regard to the adequacy of alternative models are possible, and in the absence of longitudinal data, desirable. The Simon-Blalock method eliminates inadequate models that do not predict relationships consistent with the data. Blalock maintains that this technique may be utilized when working with (1) a finite set of explicitly defined variables, (2) certain assumptions about the causal interrelation of the variables, and (3) assumptions that extraneous variables do not confound the relationships to be examined.[17]

This method of making causal inference is a formalization of the widely used partial correlation technique for ascertaining the temporal sequence of variables. Liska has advocated this "empirical solution" to the controversy between the Sutherland and Gluecks' models.[18] Gould,[19] Hackler,[20] and Jensen[21] are among those who have employed partial correlation coefficients in the examination of the temporal or causal sequence of variables hypothesized by theories of delinquency causation. Empey and Lubeck[22] and Liska[23] are among those who have evaluated alternative models of delinquency causation. All such attempts, however, have shortcomings.

The extent to which the juvenile subject has friends who approve of and/or engage in delinquent behavior is most commonly ascertained by obtaining the subject's *perception* of his friends' attitudes and activities. There is reason to believe, however, that the delinquent subject will perceive a congruence between his attitudes and behavior and the attitudes

and behavior of his friends.[24] It is essential that the attitudes and behaviors of the subject's friend be obtained from the friend. There is the tendency, or what has been referred to as a "literary error,"[25] to assume that the definitions favorable to law violation originate with law-violators. This assumption permits the examination of the delinquent *behavior* of the juvenile's friends as an indicator of their delinquent definitions or *attitudes*. What is needed is an examination of both behavior and attitudes of friends. Most attempts have been based on self-reports and a few have used official delinquency, but no study has yet used both measures to indicate the extent to which similar results will be obtained with either criterion of delinquent behavior.

In summary, Blalock maintains that alternative models may be evaluated on the basis of the degree of fit between actual and predicted correlation coefficients. The three causal structures to be evaluated and their predicted partial coefficients are presented in Figure 1. Based on predicted differences in partial correlation coefficients, it is seen that there exist (a) one test of Model 1 *vs* Model 2 *vs* Model 3; (b) four tests of Model 1 *vs* both Models 2 and 3; (c) three tests of Model 1 and Model 3 *vs* Model 2; (d) one test of Models 1 and 2 *vs* Model 3; and (e) five tests of Model 2 *vs* Model 3. An analysis of the fit between the empirically obtained partial correlation coefficients and those predicted by each model will therefore provide empirically-based inferences as to the adequacy of the causal structure provided within each theoretical model.[26] This evaluation is designed

[17]H. BLALOCK, JR., CAUSAL INFERENCES IN NONEXPERIMENTAL RESEARCH (1964); Blalock, *Four-Variable Causal Models and Partial Correlations*, 68 AM. J. SOC. 182 (1962).

[18]Liska, *Interpreting the Causal Structure of Differential Association Theory*, 16 SOC. PROB. 485, 486 (1969) [hereinafter cited as Liska (1969)].

[19]Gould, *Juvenile Entrepreneurs*, 74 AM. J. SOC. 710 (1969).

[20]Hackler (1970), *supra* note 7.

[21]Jensen, *supra* note 15. *See also* Liska, Comments on Jensen's *"Parents, Peers, and Delinquent Action,"* 79 AM. J. SOC. 999 (1974) [hereinafter cited as Liska (1974)].

[22]EMPEY & LUBECK (1971), *supra* note 14.

[23]Liska, *Causal Structures Underlying the Relationship Between Delinquent Involvement and Delinquent Peers*, 58 SOC. & SOC. RESEARCH 23 (1973) [hereinafter cited as Liska (1973)].

[24]Hackler, *Predictors of Deviant Behavior: Norms vs. the Perceived Anticipations of Others*, 25 CAN. REV. SOC. & ANTHROPOLOGY 92 (1968) [hereinafter cited as Hackler (1968)]; Hindelang, *Moral Evaluations of Illegal Behavior*, 21 SOC. PROB. 370 (1974) [hereinafter cited as Hindelang].

[25]SUTHERLAND & CRESSEY, *supra* note 4, at 78.

[26]It is imperative to recognize that *statistically* significant differences are the criteria utilized in ascertaining support for any particular model. One consequence of this decision, as best illustrated by the test for $r_{AB,D}$ in Table II, is that the likelihood of a partial coefficient significantly different from the bivariate coefficient or significantly different from zero is influenced by the standard error. In $r_{A_1B_1,D_2}$ we see that partial coefficient of .25 is significantly lower than the zero-order coefficient of .27 whereas for $r_{A_2B_2,D_2}$ a partial coefficient of .25 is not significantly less than the bivariate coefficient of .28. Another consequence is the fact that we are looking for cases in which the partial coefficient is reduced to zero when it is not realistic to expect a bivariate coefficient to be completely reduced when partialled. Similarly, the predicted value may be significantly greater than zero but significantly less than the

FIGURE 1

Partial correlation coefficients predicted by three alternative models of delinquency causation.

	First-Order Partial Correlation Coefficients*	Model 1 — S→D→B, S→A Predicted Value	Model 1 Explanation	Model 2 — S→D→B→A Predicted Value	Model 2 Explanation	Model 3 — S→D→B, S→D→A Predicted Value	Model 3 Explanation
a,e	$r_{AB.D}$	0	$r_{AD}\cdot r_{DB} = r_{AB}$	r_{AB}	D is Extraneous	$>0<r_{AB}$	Mediated Effect
b	$r_{SD.A}$	$>0<r_{SD}$	Mediated Effect	r_{SD}	A is Extraneous	r_{SD}	A is Extraneous
b	$r_{AD.S}$	$>0<r_{AD}$	Mediated Effect	r_{AD}	S is Extraneous	r_{AD}	S is Extraneous
b	$r_{SA.D}$	r_{SA}	D is Extraneous	0	$r_{SD}\cdot r_{DA} = r_{SA}$ S is Extraneous	0	$r_{SD}\cdot r_{DA} = r_{SA}$ S is Extraneous
b	$r_{AB.S}$	$>0<r_{AB}$	Mediated Effect	r_{AB}	S is Extraneous	r_{AB}	S is Extraneous
c,e	$r_{SB.A}$	$>0<r_{SB}$	Mediated Effect	r_{SB}	A is Extraneous	$>0<r_{SB}$	Mediated Effect
c,e	$r_{DA.B}$	r_{DA}	B is Extraneous	0	$r_{DB}\cdot r_{BA} = r_{DA}$	r_{DA}	B is Extraneous
c,e	$r_{SA.B}$	r_{SA}	B is Extraneous	0	$r_{SB}\cdot r_{BA} = r_{SA}$	r_{SA}	B is Extraneous
d,e	$r_{DB.A}$	r_{DB}	A is Extraneous	r_{DB}	A is Extraneous	$>0<r_{DB}$	Mediated Effect

S = Lack of Family Support
A = Delinquent Associates
B = Delinquent Behavior
D = Delinquent Definitions

a = Test of Model 1 vs Model 2 vs Model 3
b = Test of Model 1 vs Model 2 and Model 3
c = Test of Model 1 and Model 3 vs Model 2
d = Test of Model 1 and Model 2 vs Model 3
e = Test of Model 2 vs Model 3 (Included in a, c, and d)

*Three additional combinations are possible, ($r_{SB.D}$, $r_{SD.B}$, and $r_{DB.S}$), but the predicted partial correlation coefficients are the same for all three models and thus would not provide a basis of evaluating the alternatives implied by the models.

to incorporate attitudes and behavior of the subject, attitudes and behavior of an associate, and both self-reported and official indices of delinquency by subjects.

METHODOLOGY

The data were obtained for 139 males, age 14–17, in a medium-sized midwestern city. Each subject was asked to report to a central location with a "close male friend" of his choice. Both subject and friend completed questionnaires pertaining to the attitudes and behaviors of local adolescents, in return for which they were paid.[27] The indices of the four variables in the models to be evaluated are constructed from questionnaire responses and official police records.

Delinquent Behavior (B)

Two indices of delinquent behavior are utilized. Official delinquency (B_1) is merely the number of times the subject has come into formal contact with local police, as evidenced by municipal and county

records.[28] Self-reported delinquency (B_2) is a composite score, representing both the frequency and severity of delinquency admitted in response to a twelve-item self-report questionnaire. Each subject first evaluates the severity of each form of behavior on a seven-point scale; the mean score for each item then serves as a measure of the seriousness of the behavior. The mean seriousness score is then multiplied by the reported frequency of delinquency engaged in for each activity and the obtained values are subjected to a factor analysis. Following Harman's Complete Estimation Method,[29] each subject's scale score is a product of a linear regression equation and represents the frequency and severity of his self-reported delinquency behavior.[30]

Delinquent Definitions (D)

Two attitudinal scales are employed to operationalize delinquent definitions. Willingness to engage in delinquent behavior with delinquent others (D_1) is ascertained by means of a slightly modified version of the Deviancy scale.[31] Each subject is asked to respond on a seven-point scale to all seven of the items constituting the scale. Factor analysis indicates

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bivariate coefficient, in which case the difficulty to emerge pertains to those partial coefficients, as in the case of $r_{A_2D_2.S}$, which are not significantly different from zero yet which are of such magnitude as to suggest the likelihood of a mediated effect.

[27]Since a random sample of the population would produce a small proportion of cases in which the adolescent had been in official contact with the police, a different technique of sample selection is necessary to obtain a large proportion of subjects with this characteristic. Accordingly, a random selection of white male adolescents, ages 14–17, who had been in formal contact with the municipal police department at least once during the 1972 calender year provides 96 officially delinquent subjects. A random selection of white male adolescents, ages 14–17, enrolled in a public school during the 1972–1973 academic year and with no history of municipal or county police contact yields 105 officially non-delinquent subjects. Data from both subject and associate are available for 67 official delinquents and 72 official non-delinquents. The non-response rates are high and limited available data indicate that for both groups the non-respondents are older than the respondents; among official delinquents, however, there is no difference in frequency or severity of police contact. Furthermore, because the proportion of official delinquents in the "sample" is much greater than that in the population, conclusions based on sampling statistics will be affected: there is a decrease in the probability of rejecting a true null hypothesis (Type I error) at the risk of being more likely to fail to reject a false null hypothesis (Type II error). That is, while the presence and magnitude of observed differences must be suspect, the absence of differences may be taken as an indication that a representative sample would also yield no differences.

[28]Of the official delinquents, 45.8% have one recorded contact, 23.6% have two recorded contacts, 11.1% have three recorded contacts, 9.7% have four recorded contacts, and 9.7% have five or more recorded contacts.

[29]H. HARMAN, MODERN FACTOR ANALYSIS (1960).

[30]The self-report items and their group means are: buy or drink beer, wine or alcohol, 3.01; use marihuana, 3.92; run away from home, 4.43; shoplift less than $2 in value, 4.60; steal from another's desk or locker at school, 4.67; destroy property of less than $10 in value, 4.72; take a bicycle without the owner's consent, 5.08; beat up on another guy for the fun of it, 5.18; shoplift more than $2 in value, 5.41; destroy property of more than $10 in value, 5.56; take a car without the owner's consent, 5.72; break into and enter a building or home, 5.98. The frequency-seriousness scores were factored by means of principal factoring without iteration, utilizing VARIMAX rotation. The factor scores are not used. Rather, the principal component scores (regression weights) for each activity are multiplied by the standardized scores for each activity and the products are summed. Using principal components without iterations provides the same value as if the items had loaded on only one factor, and thus enables the use of all items while weighting each item in terms of its contribution to the total score.

$$Y = (f_1(X_1 - \bar{X}_1)/sd_1) + (f_2(X_2 - \bar{X}_2)/sd_2) + \ldots + (f_n(X_n - \bar{X}_n)/sd_n)$$

This technique is also employed for the two operationalizations of both delinquent definitions and delinquent associate.

[31]Empey & Lubeck, Conformity and Deviance in the "Situation of Company," 33 AM. SOC. REV. 760 (1968).

that these items all load on one factor, and will serve as one indication of the definitions favorable to delinquent behavior.

Advocates of either model of social control theory may challenge the epistemic relationship between the theoretical concept of delinquent definitions and its operationalization as willingness to engage in delinquent behavior with delinquent others. The group interaction context of the items does appear to be weighted in favor of the meaning implied within differential association theory. An operationalization consistent with the Gluecks' formulation would require some measure of internal predisposition having an emotional base. Similarly, an operationalization consistent with Hirschi's formulation would require some measure of "stakes in conformity." Consequently, a second attitudinal scale is constructed by presenting each subject with the self-report items and asking him the following question: "How important is it to you that you never do this in the future?" The subject is provided the following response-categories: very important, important, not very important, does not matter. Again a single composite scale score is constructed, representing the subject's definition of the importance of avoiding delinquent behavior (D_2). It is assumed that the importance of not engaging in delinquent behavior satisfies both the Gluecks' formulation, to the extent that it reflects an emotional predisposition toward delinquent behavior, and Hirschi's formulation, in that it indicates a successful neutralization of those processes of commitment, attachment and belief which bind the individual to the conventional order. Importance of not engaging in delinquent behavior, furthermore, is stated as a sentiment favorable to non-delinquency, whereas the first operationalization of delinquent definitions is stated as a sentiment favorable to delinquency. To remove the possibility of negative relationships, however, the importance of avoiding delinquent behavior has been recoded and will subsequently be referred to as the non-importance of delinquent behavior.

Delinquent Associates (A)

Data concerning the delinquency of the subject's associate are obtained from the questionnaire completed by a friend of his choice. The associate is also presented with the self-report items, which are treated independent of the subject's responses, to form a composite index of the frequency and severity of the associate's self-reported delinquency (A_1). Because the subject may receive definitions favor-

able to law violation from an associate whose actual delinquent behavior is low, it is deemed appropriate also to obtain an index of the associate's definitions toward delinquency. Accordingly, the items of the Deviancy scale are presented to the associate and a composite index is constructed to represent the associate's willingness to engage in delinquent behavior with delinquent others (A_2).

Lack of Family Support (S)

Finally, each subject responded on a seven-point scale to five items designed to ascertain the juvenile's perception of parental support. These five items, which elicit the child's attitudes concerning his relationship with his parents, form a Likert scale.[32] For ease in the presentation and interpretation of data, the scale has been recoded to indicate lack of family support.

In summary, questionnaire data are available from both subject and associate in 139 cases. The use of more than a single operationalization of each variable permits multiple analyses of the alternative causal models. A matrix of correlation coefficients for the variables to be utilized in testing the alternative models is presented in Table I. It is evident from the magnitude of these coefficients that the use of two indicators of a variable is warranted. In each case the coefficients are significantly related, yet they are not so large as to suggest that the same underlying dimension is being tapped by both indicators. The coefficient between the associate's self-reported delinquency and his willingness to engage in delinquent behavior with delinquent others $(r = .56)$ indicates that the delinquent associate variable may contain sufficiently different dimensions. The same holds for delinquent definitions, evidenced by a coefficient of .39 between subject's willingness to engage in delinquent behavior with delinquent others and the non-importance of delinquent behavior. Finally, the .40 correlation coefficient between the subject's official delinquency and his self-reported delinquency suggests that delinquent behavior may be more effectively operationalized by means of both indicators rather than either one or the other.

[32] The five items comprising the scale of family support are: (1) I enjoy talking over my plans with my parents; (2) I can confide in my parents; (3) My parents make me feel trusted; (4) My parents don't try to understand my problems; (5) My parents are always picking on me. The inter-item correlation coefficients range from .24 to .55 and the item-to-scale correlation coefficients range from .64 to .76.

TABLE I

BIVARIATE PEARSONIAN CORRELATION COEFFICIENTS
FOR ALL VARIABLES IN THE MODELS

	S	A_1	A_2	D_1	D_2	B_1	B_2
S	1.00	.19	.24	.38	.30	.25	.40
A_1		1.00	.56	.37	.22	.27	.32
A_2			1.00	.44	.17	.25	.28
D_1				1.00	.39	.29	.48
D_2					1.00	.15	.16
B_1						1.00	.40
B_2							1.00

S = lack of family support.

A_1 = associate's self-reported delinquency.

A_2 = associate's willingness to engage in delinquent behavior with delinquent others.

D_1 = subject's willingness to engage in delinquent behavior with delinquent others.

D_2 = subject's non-importance of delinquent behavior.

B_1 = subject's official delinquency.

B_2 = subject's self-reported delinquency.

The data of Table I provide support for the "empirical regularities" in which the alternative models are grounded. Lack of family support is significantly related to both official delinquency (r = .25) and self-reported delinquency (r = .40), and the self-reported delinquency of the associate is significantly correlated with subject's official delinquency (r = .27) and subject's self-reported delinquency (r = .32). Furthermore, the associate's willingness to engage in delinquent behavior with delinquent others shows significant relation to both subject's official delinquency (r = .25) and subject's self-reported delinquency (r = .28), thus supporting the linkage between the delinquent definitions held by significant others and delinquent behavior. Finally, a significant correlation (r = .44) is noted between willingness to engage in delinquent behavior with delinquent others by the subject and by the associate, indicating a congruence of attitudes which previously has largely been documented by ascertaining the subject's perception of the attitudes of his associates.[33]

DATA ANALYSIS

The bivariate correlation coefficients presented in Table I are the base against which the three alternative models of delinquency causation will be examined. The first column of Table II provides the first-order partials (from Figure 1) to be utilized, within each of which the possible combinations,

[33] *See* Hackler (1968), *supra* note 24; Hindelang, *supra* note 24.

based on the multiple indicators, are enumerated. The value of both the predicted and observed first-order partial is provided as a means of evaluating the degree of fit and demonstrating the model(s) supported.

A test of Model 1 *vs* Model 2 *vs* Model 3 is provided by partialling the relationship between delinquent associates and delinquent behavior by delinquent definitions ($r_{AB \cdot D}$). Model 1 predicts a partial coefficient equal to zero, Model 2 predicts a partial coefficient equal to the bivariate coefficient, and Model 3 predicts a partial coefficient significantly different than zero but significantly reduced below the bivariate correlation coefficient. A different criterion of the degree of fit to the value predicted by Model 3 is implemented (see Table II), and the data provide limited support of both Model 2 and Model 3 to the exclusion of Model 1. Model 3 is supported when willingness to engage in delinquent activities with delinquent others is used as the indicator of delinquent definitions, whereas Model 2 is supported when non-importance of delinquent behavior is used as the indicator of delinquent definitions. While support to either Model 2 *or* Model 3 is not clearly indicated, it is clear that delinquent definitions do not appear to intervene in the relationship between delinquent associates and delinquent behavior, contrary to differential association theory.

The tests of Model 1 *vs* Model 2 and Model 3 ($r_{SD \cdot A}$, $r_{AD \cdot S}$, $r_{SA \cdot D}$ and $r_{AB \cdot S}$) demonstrate the failure of the data to support the causal structure advocated by differential association theory. The bivariate relationship between lack of family support and delinquent behavior remains unchanged when delinquent associate is partialled, regardless of the indicator of delinquent behavior or delinquent associate. That is, delinquent associate does not appear to have an indirect effect in the relationship between lack of family support and delinquent definitions, contrary to the contention of the differential association model. Similarly, Model 1 predicts that the covariation of delinquent associate and delinquent definitions should be significantly altered when lack of family support is partialled. Data in Table II indicate that this is not the case, and additional support is provided Model 2 and Model 3. Model 1 is provided limited support, however, when the relationship between lack of family support and delinquent associate is partialled by delinquent definitions. In this case, Model 1 is supported to the exclusion of Models 2 and 3 when delinquent definitions are operationalized in terms of non-importance of delinquent behavior, while Models 2

TABLE II

TESTING THREE ALTERNATIVE MODELS OF DELINQUENCY CAUSATION

First-Order Partial Correlation Coefficient	Zero-Order Correlation Coefficient	Predicted Value			Observed Value	Degree of Fit [1]			Model Supported
		Model 1	Model 2	Model 3		Model 1	Model 2	Model 3	
$r_{AB \cdot D}$		0	r_{AB}	$>0. < r_{AB}$					
a) $r_{A_1B_1 \cdot D_1}$	.27				.19	.19	.08	c	3
b) $r_{A_2B_1 \cdot D_1}$	.25				.14	.14	.11	c	3
c) $r_{A_1B_2 \cdot D_1}$	.32				.17	.17	.15	c	3
d) $r_{A_2B_2 \cdot D_1}$	.28				.08*	.08	.20	b	1
e) $r_{A_1B_1 \cdot D_2}$	.27				.25	.25	.02	c	2 & 3
f) $r_{A_2B_2 \cdot D_2}$	.28				.25	.25	.03	a	2
g) $r_{A_2B_1 \cdot D_2}$	.25				.23	.23	.02	a	2
h) $r_{A_1B_2 \cdot D_2}$	.32				.29	.29	.03	c	2 & 3
$r_{SD \cdot A}$		$>0 < r_{SD}$	r_{SD}	r_{SD}					
a) $r_{SD_1 \cdot A_1}$	.38				.34	a	.04	.04	2 & 3
b) $r_{SD_2 \cdot A_1}$	.30				.26	a	.04	.04	2 & 3
c) $r_{SD_1 \cdot A_2}$	.38				.32	a	.06	.06	2 & 3
d) $r_{SD_2 \cdot A_2}$	.30				.27	a	.03	.03	2 & 3
$r_{AD \cdot S}$		$>0 < r_{AD}$	r_{AD}	r_{AD}					
a) $r_{A_1D_1 \cdot S}$	.37				.33	a	.04	.04	2 & 3
b) $r_{A_2D_1 \cdot S}$	.44				.39	a	.05	.05	2 & 3
c) $r_{A_1D_2 \cdot S}$	.22				.18	a	.04	.04	2 & 3
d) $r_{A_2D_2 \cdot S}$	.17				.11*	b	.06	.06	2 & 3
$r_{SA \cdot D}$		r_{SA}	0	0					
a) $r_{SA_1 \cdot D_1}$	.19				.06*	.13	.06	.06	2 & 3
b) $r_{SA_2 \cdot D_1}$	.24				.08*	.16	.08	.08	2 & 3
c) $r_{SA_1 \cdot D_2}$	.19				.14*	.05	.14	.14	1
d) $r_{SA_2 \cdot D_2}$	.24				.20	.04	.20	.20	1
$r_{AB \cdot S}$		$>0 < r_{AB}$	r_{AB}	r_{AB}					
a) $r_{A_1B_1 \cdot S}$	.27				.24	a	.03	.03	2 & 3
b) $r_{A_2B_1 \cdot S}$	.25				.20	c	.05	.05	1
c) $r_{A_1B_2 \cdot S}$	.32				.27	a	.05	.05	2 & 3
d) $r_{A_2B_2 \cdot S}$	.28				.20	a	.08	.08	2 & 3
$r_{SB \cdot A}$		$>0 < r_{SB}$	r_{SB}	$>0 < r_{SB}$					
a) $r_{SB_1 \cdot A_1}$	.25				.20	a	.05	a	2
b) $r_{SB_2 \cdot A_1}$	.40				.37	a	.03	a	2
c) $r_{SB_1 \cdot A_2}$	.25				.20	a	.05	a	2
d) $r_{SB_2 \cdot A_2}$	.40				.36	a	.04	a	2
$r_{DA \cdot B}$		r_{DA}	0	r_{DA}					
a) $r_{D_1A_1 \cdot B_1}$	.37				.31	.06	.31	.06	1 & 3
b) $r_{D_2A_1 \cdot B_1}$	.22				.19	.03	.19	.03	1 & 3
c) $r_{D_1A_2 \cdot B_1}$	.44				.40	.04	.40	.04	1 & 3
d) $r_{D_2A_2 \cdot B_1}$	.17				.14*	.03	.14	.03	1 & 3
e) $r_{D_1A_1 \cdot B_2}$	.37				.26	.11	.26	.11	1 & 3
f) $r_{D_2A_2 \cdot B_2}$	.17				.13	.04	.13	.04	1 & 3

* Not significant ($p > .05$).

[1] Degree of Fit represents the absolute difference between the predicted and the observed partial correlation coefficient values. The absence of a predicted partial coefficient in cases of mediated effects, however, compels the use of an alternative. Since the partial value is predicted to be significantly reduced but yet not approach zero, for purposes of analysis it is assumed that the model is supported if (1) the partial correlation coefficient is significant at $p < .05$ or more and (2) there is a statistically significant ($p < .05$) difference between the zero-order and partial correlation coefficients.

a = partial coefficient significantly different from zero, but not significantly less than zero-order coefficient.

b = partial coefficient significantly less than zero-order coefficient, but not significantly different from zero.

c = partial coefficient significantly different from zero *and* significantly less than zero-order coefficient.

d = partial coefficient neither significantly different from zero nor significantly less than zero-order coefficient.

TABLE II (Cont.)

First-Order Partial Correlation Coefficient	Zero-Order Correlation Coefficient	Predicted Value			Observed Value	Degree of Fit [1]			Model Supported
		Model 1	Model 2	Model 3		Model 1	Model 2	Model 3	
g) $r_{D_2A_1 \cdot B_2}$	.22				.18	.04	.18	.04	1 & 3
h) $r_{D_1A_2 \cdot B_2}$	.44				.37	.07	.37	.07	1 & 3
$r_{SA \cdot B}$		r_{SA}	0	r_{SA}					
a) $r_{SA_1 \cdot B_1}$	.19				.13*	.06	.13	.06	1 & 3
b) $r_{SA_2 \cdot B_1}$	.24				.19	.05	.19	.05	1 & 3
c) $r_{SA_1 \cdot B_2}$	.19				.08*	.11	.08	.11	2
d) $r_{SA_2 \cdot B_2}$	.24				.14	.10	.14	.10	1 & 3
$r_{DB \cdot A}$		r_{DB}	r_{DB}	$>0 < r_{DB}$					
a) $r_{D_1B_1 \cdot A_1}$	.29				.21	.08	.08	c	3
b) $r_{D_2B_1 \cdot A_1}$	.15				.09*	.06	.06	b	1 & 2
c) $r_{D_1B_2 \cdot A_1}$	.48				.42	.06	.06	c	3
d) $r_{D_2B_2 \cdot A_1}$	.16				.10*	.06	.06	b	1 & 2
e) $r_{D_1B_1 \cdot A_2}$	.29				.20	.09	.09	c	3
f) $r_{D_2B_2 A_2}$	.16				.12*	.04	.04	d	1 & 2
g) $r_{D_2B_1 \cdot A_2}$	.15				.11*	.04	.04	d	1 & 2
h) $r_{D_1B_2 \cdot A_2}$	.48				.42	.06	.06	c	3

and 3 are supported when willingness to engage in delinquent behavior with delinquent others is the indicator of delinquent definitions. Finally, Model 1 predicts a significant reduction in the coefficient between delinquent associate and delinquent behavior when lack of family support is partialled ($r_{AB \cdot S}$); three of the four partials, however, remain substantially unchanged, providing support for Model 2 and Model 3.

A test of Model 2 *vs* Model 1 and Model 3 is provided by three sets of partial correlation coefficients ($r_{SB \cdot A}$, $r_{DA \cdot B}$ and $r_{SA \cdot B}$). When the relation between lack of family support and delinquent behavior is partialled by delinquent associate, there is little support of the mediated effect specified within Models 1 and 3. Model 2 is supported to the extent that the partial coefficient is not significantly different than the bivariate coefficient. On the other hand, the zero-order relationship between delinquent definitions and delinquent associate is not reduced to zero when delinquent behavior is partialled ($r_{DA \cdot B}$). This is contrary to the Gluecks' causation model, which states that individuals engage in delinquent behavior and then, due to constraint or attraction, seek out associates who are themselves delinquent. Similarly, in only one of four combinations of $r_{SA \cdot B}$ is Model 2 supported. Delinquent behavior does not appear to intervene in the causal relationship between lack of family support and delinquent associate.

Finally, $r_{DB \cdot A}$ provides a test of Model 3 *vs* Model 1 and Model 2. Of the eight combinations of variable

indicators, four are both significantly different from zero and significantly less than the bivariate coefficient, and thus supportive of Model 3. Noteworthy is the fact that in all four instances delinquent definitions are operationalized as subject's willingness to engage in delinquent behavior with delinquent others. The remaining four combinations offer no support for Model 3: the partial coefficient is either not significantly different from zero or both not significantly different from zero and not significantly less than the bivariate coefficient. In summary, each model of delinquency causation is supported when the covariation between delinquent associate and delinquent behavior is partialled by delinquent definitions.

DISCUSSION

The enterprise of theory construction necessitates the testing of alternative theoretical models. Delinquency research has only recently recognized the value of assessing and interpreting a common data base so as not only to examine the propositions of one etiological model but to select those propositions which, if supported, lead to the rejection of alternative models.[34] Accordingly, first-order partial correlation coefficients are employed to assess the differential causal structure of three competing theories of delinquency. The data of Table II indicate that Sutherland's model of differential association is

[34] *See* Jensen, *supra* note 15; Liska (1973), *supra* note 23; Liska (1969), *supra* note 18.

supported in only four of twenty-four tests against Models 2 and 3. The Gluecks' model of delinquency causation, in twenty-four tests against the other two models, is supported in seven instances. The third model, Hirschi's formulation, is tested against both Models 1 and 2, with support derived in seven of sixteen tests. In those instances in which the predicted value differs for Model 2 and Model 3, although either may be in agreement with Model 1, the data indicate eleven occasions in which Model 2 is supported and eighteen occasions in which Model 3 is supported, with two instances in which the data cannot be said to support either model to the exclusion of the other.

The use of two indicators for each of three of the four variables in the models has produced an apparent ambiguity in assessing the causal inferences to be made from the data. When either measure of delinquent associate is used to partial the bivariate relationship between delinquent definitions and delinquent behavior, for example, the result indicates that delinquent associate is an intervening variable when willingness to engage in delinquent behavior with delinquent others is used as the indicator of delinquent definitions. When the non-importance of delinquent behavior is used as the indicator of delinquent definitions, however, delinquent associate appears to be extraneous to the original relationship. A similar divergence in results occurs when the relationship between lack of family support and delinquent associate is partialled by delinquent definitions, wherein one indicator of delinquent definitions produces a first-order partial near zero and the other indicator produces a first-order partial that is substantially unchanged. As a result, any one model of delinquency causation is supported by some combination of the operationalizations utilized. To the extent that the substitution of one or more indicators affects the support for each model, the results of previous attempts to demonstrate the empirical adequacy of any model with single indicators must be suspect.
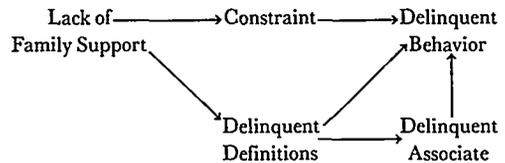
Despite the seeming ambiguity of the data, five causal patterns clearly emerge: (1) delinquent associate does not intervene in the relation between lack of family support and delinquent definitions; (2) delinquent associate does not intervene between lack of family support and delinquent behavior; (3) delinquent behavior does not intervene in the relation between delinquent definitions and delinquent associate; (4) delinquent behavior does not intervene between lack of family support and delinquent associate; (5) delinquent definitions do not inter-

vene in the relation between delinquent associate and delinquent behavior. In addition, there is no support for the interaction between lack of family support, delinquent associate and delinquent definitions as formulated in Model 1. What emerges is an unambiguous rejection of differential association as explicated in Model 1 and support for Hirschi's social control theory as formulated in Model 3.

Although the ambiguous findings appear to support Hirschi's statement as formulated in Model 3,[35] there is ample reason to suggest the data may provide additional support to Hirschi's position as extended by Linden and Hackler.[36] The distinction between delinquent definitions (D_1) and constraints (D_2) has already been made. Within Hirschi's statement it is clear that delinquent definitions would lead to both delinquent associates and delinquent behavior whereas the absence of contraints, which suggests that one is free to commit delinquent acts, does not necessarily mean that one will associate with other delinquents. Data reported by Linden and Hackler demonstrate that attachments to delinquent associates (D_1)

> are not in themselves good predictors of delinquency, though in the absence of ties to conventional adults and peers $[D_2]$, ties to deviant peers seem to be quite conducive to delinquency involvement.[37]

By making the conceptual distinction between definitions favorable to delinquency with delinquent peers (D_1) and constraints as measured by the non-importance of delinquent behavior (D_2), a revised formulation of Hirschi's social control model can be explicated as follows.

Lack of Family Support → Constraint → Delinquent Behavior; Lack of Family Support → Delinquent Definitions → Delinquent Behavior; Delinquent Definitions → Delinquent Associate → Delinquent Behavior

A re-examination of the data reported in Table II illustrates that this revised model not only retains the support which existed for Model 3 but gains additional support for Hirschi's social control theory. Because D_2 is now extraneous to the relation between the delinquent associate and delinquent behavior, the revised model predicts a partial coefficient which is not significantly different from the

[35]See HIRSCHI, *supra* note 12.
[36]Linden & Hackler, *Affective Ties and Delinquency*, 16 PAC. SOC. REV. 27 (1973) [hereinafter cited as Linden & Hackler].
[37]*Id.* at 42.

bivariate relationship. Therefore, $r_{A_2B_1.D_2}$ and $r_{A_1B_2.D_2}$ now demonstrate support for both Model 2 and the revised model. Similarly, since D_2 is extraneous to the relationship between lack of family support and delinquent associate, the revised model predicts that $r_{SA_1.D_2}$ and $r_{SA_2.D_2}$ will not significantly differ from the bivariate coefficients. Data reported in Table II indicate that this is the case, giving support to the revised model in addition to the previously supported Model 1. Finally, the relationship between constraints (D_2) and delinquent behavior when delinquent associate is partialled provides support for the revised model. Delinquent associate becomes an extraneous variable in the revised model, as is the case in Models 1 and 2, and data reported in Table II support Model 1, Model 2 and the revised model.

It is evident that some of those instances in which Model 3 was not supported by the data are eliminated by the revised formulation of Hirschi's model. Yet it is noteworthy that none of these changes provides support for the revised model to the exclusion of Models 1 and 2. In addition, whereas $r_{DA.B}$ yields support for Models 1 and 3, the revised model eliminates the causal linkage between D_2 and delinquent associate, thus removing a possible test of the revised model against the other models.

Reviewing all possible tests of the revised model, statistical support for Hirschi's social control theory remains lacking in only the following instances. (1) $r_{A_2B_2.D_1}$ supports Model 1 to the extent that the partial coefficient of .08 is not significantly different from zero. The revised model would expect this partial to be significantly greater than zero and significantly less than the bivariate relationship. Yet some support can be claimed for the revised model in that the partial is significantly less than the bivariate coefficient and greater, though not at a statistical level of significance, than zero.[38] (2) $r_{A_2B_1.S_1}$ statistically supports Model 1 in that the partial coefficient is significantly greater than zero and significantly less than the bivariate coefficient. Yet is is possible to argue that the difference between the bivariate coefficient ($r_{A_2B_1} = .25$) and the partial coefficient ($r_{A_2B_1.S} = .20$) is not drastically reduced and therefore is supportive of the revised model. (3) $r_{SB.A}$ supports Model 2 for all four possible combinations of variable indicators in that $r_{SB.A} = r_{SB}$. The revised model, however, would also argue that the

delinquent associate should have little impact on the relation between family support and delinquent behavior. According to Hirschi, "lack of attachment to the parents is directly conducive to delinquency because the unattached child does not have to consider the consequences of his actions for his relations with his parents."[39] The greatest influence of lack of family support, therefore, is directly on delinquent behavior and is not mediated by delinquent associate. To this extent, then, the data support the revised model in addition to Model 2. (4) $r_{SA_1.B_2}$ provides what may appear to be the most incriminating data against the revised model. Although delinquent behavior should not enter the relationship between family support and delinquent associate, the bivariate coefficient of .19 is reduced to a partial coefficient of .08. What may well be occurring, however, is a reciprocal relationship between delinquent associate and delinquent behavior which cannot be explored with this technique of causal inference.

CONCLUSION

Much of the initially observed ambiguity in findings centered upon the disparate results which v ere obtained by the use of two indices of delinquent definitions. By redefining these two indices in accordance with the affective ties model,[40] greater clarity emerges from the data and a pattern of support for the revised formulation of Hirschi's model of delinquency causation is evident. On the one hand, delinquency may be the direct product of an absence of constraints on behavior when the juvenile perceives a lack of family support. On the other hand, delinquency may be the result of associations with delinquent others selected so as to maximize attitude similarity.[41] When compared to the etiology set forth by Sutherland and Cressey,[42] the data support the distinction made by Hirschi that delinquent definitions, whether constraint or willingness to engage in delinquency, *precede* delinquent associates. This utilization of partial correlation coefficients as a basis for making causal inference suggests that strong ties to the conventional order, in this case the family, serve to limit the extent of delinquency involvement.

[38]*See* note 27 *supra*.

[39]HIRSCHI, *supra* note 12, at 98.

[40]Linden & Hackler, *supra* note 36.

[41]T. NEWCOMB, THE ACQUAINTANCE PROCESS (1961); Liska (1974), *supra* note 21.

[42]SUTHERLAND & CRESSEY, *supra* note 4.