

## Peer Pressure and Adolescent Substance Use<sup>1</sup>

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Peer influence is regarded as one of the strongest determinants of juvenile delinquency and particularly adolescent substance use. A commonly held view is that social pressure from friends to use drugs and alcohol is a major contributor to substance use. Yet the notion of peer pressure, implied by the association between peer-group associations and drug behavior, is seldom tested empirically. As a crucial test of the group pressure model, this research examines the role of peer pressure in mediating the effect of differential association on individual use. Moreover, few studies examine the nature of the relationship between peers and substance use as it relates to the processes leading to and from use. Drawing on differential association and social learning theories, our research specifies the social processes (socialization, group pressure, social selection, and rationalization) which dictate particular causal pathways leading to and from substance use and then estimates the reciprocal influences among differential association, social pressure from peers, attitudes favorable toward substance use, and individual use. Using the 1977–1979 National Youth Survey panel data, we estimate a covariance structural equation model allowing for correlated measurement error. In the cross-sectional analyses, we find no main effects of overt peer pressure on substance use. Estimation of the reciprocal effects model also reveals that overt peer pressure does not significantly influence substance use and does not mediate the effect of differential association. Instead, the influences of socialization, social selection, and rationalization play significant roles in understanding substance use.

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**KEY WORDS:** adolescent substance use; peer pressure; structural equation methods; differential association; social learning.

### 1. INTRODUCTION

Adolescent alcohol and marijuana use is pervasive in American society. Under age drinking has become a national concern because of the high

<sup>1</sup>An earlier version of this paper was presented at the 1994 American Society of Criminology meetings in Miami, Florida.

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proportion of youth who use alcohol and the risks associated with its use. A national survey of high-school seniors reveals that over 90% of American adolescents have tried alcohol and that 60–70% are regular users (Johnson *et al.*, 1995). These trends have remained relatively stable for nearly two decades, although regular use of alcohol has declined to 50% over the past 5 years. The prevalence of marijuana use among high-school seniors has declined steadily since the late 1970s; however, recent trends show a dramatic shift toward increased use of marijuana (Johnston *et al.*, 1995).

Exposure to friends who use drugs and alcohol has been firmly established as one of the most important determinants of adolescent drug and alcohol use (Jacquith, 1981; Johnson *et al.*, 1987; Marcos *et al.*, 1986). More generally, research shows that criminal associations are linked closely to crime and delinquency (Elliott *et al.*, 1985; Johnson, 1979). Results from studies have led many criminologists to conclude that the relationship between peer associations and criminal or delinquent activity represents one of the strongest in the field (Gottfredson and Hirschi, 1990). Such consistent findings call for closer examination of the role of peers in the etiology of all forms of adolescent crime and deviance, particularly in the processes leading to and from adolescent substance use.

A popular view regarding the relationship between peer-group associations and adolescent substance use is the pervasive role of social pressure from peers to use alcohol and drugs (Mann, 1980). Moreover, community and college student surveys identify peer pressure as a major contributor of adolescent substance use (Fromme, 1983; Pisano and Rooney, 1988). Researchers demonstrate consistently that differential association is a strong correlate of substance use and readily conclude that it reflects social pressure from peers (Burkett and Warren, 1987). The American Medical Association Board of Trustees (1991) echoes these claims, indicating that peer influence is a dominant force in substance use among American youth.

While it is commonly believed that social pressure from peers is a major contributor to substance use, most studies of peer influence do not provide any definitive test of the group pressure hypothesis. Researchers typically estimate the effect of differential association on substance use without controlling for peer pressure *per se*. Moreover, of the few studies that measure and estimate peer pressure effects, the researchers assume a recursive causal structure, ignoring the possibilities that peer pressure may affect peer-group associations and substance use may influence adolescents' perceptions of peer pressure.

The National Youth Survey (NYS) has been widely used in studies of adolescent misconduct over the past decade (Agnew, 1991a b; Elliott *et al.*, 1985; Elliott and Menard, 1996; Menard and Elliott, 1990, 1994; Warr and Stafford, 1991). Central to these investigations is the role of peer influence

on juvenile delinquency and drug use, couched within a differential association/social learning framework. A number of these studies have taken a recursive approach in investigating the causal structure as well as social processes underlying the link between peer-group associations and crime and deviance (Elliott *et al.*, 1985; Warr and Stafford, 1991). Other studies have exploited the longitudinal design in order to test and describe more adequately the social processes leading to and from delinquency and drug use (Agnew, 1991b; Elliott and Menard, 1996; Menard and Elliott, 1990, 1994). No study, to our knowledge, incorporates direct measures of peer pressure in the study of adolescent substance use. Drawing on differential association and social learning theories, this research uses the NYS panel design to examine the reciprocal causal structure between differential association, social pressure from peers to use drugs, attitudes favorable toward substance use, and substance use. This research also provides a partial test of Sutherland's differential association theory as it pertains to both socialization and group pressure processes. Specification of a reciprocal effects model permits us to estimate the confounding influences of social selection and rationalization within a general social learning framework and to assess their relative importance to differential association processes.

## 2. DIFFERENTIAL ASSOCIATION THEORY

Differential association is one of the most widely known and cited theories in criminology (Sutherland, 1947; Sutherland and Cressey, 1970).<sup>4</sup> Sutherland presents differential association as a developmental or historical theory which attempts to explain what there is about the past experiences of persons that lead to criminality. The theory posits that delinquency is a product of learning the norms, values, attitudes, rationalizations, motives, and drives (conceptualized as "definitions of law") in intimate, face-to-face interaction and communication with significant others.<sup>5</sup> Sutherland and Cressey assign special importance to peer influences, and most research has

<sup>4</sup>Numerous attempts have been made to reformulate the concept of differential association, the most important being Burgess and Akers' (1968) effort to frame Sutherland's model in a behavioral context. Akers and his associates (1979; Akers and Cochran, 1985; Krohn *et al.*, 1983) elaborate the process of differential association to include imitation and reinforcement as well as the acquisition of definitions.

<sup>5</sup>Researchers seldom conceptualize and measure definitions of law in this manner (Johnson *et al.*, 1987; Strickland, 1982). Instead, most simplify the concept by measuring only delinquent attitudes. Despite the differences in measurement, a comparison of results across several studies shows that the estimates of the effects of both measures are similar in size and significance.

followed by concentrating on the role of delinquent peers in the production of delinquency.<sup>6</sup>

### 2.1. Socialization Model

Sutherland and Cressey (1970; Sutherland, 1939, 1947) present nine propositional statements from which the theory's causal structure can be implied. The key mechanism in becoming delinquent is that one associates differentially with social circles, some of which define crime and deviance as favorable and others which define it as unfavorable. Exposure to criminogenic and conventional forces promotes the internalization of definitions both favorable and unfavorable to law violations. When a person is exposed to an excess of crime-favorable definitions, the person is likely to engage in criminal and delinquent behavior. Furthermore, people are exposed to associations in varying frequency, duration, priority, and intensity. Thus, the theory assumes that as the frequency, duration, priority, and intensity of delinquent associations increase relative to conventional associations, the probability of delinquency increases relative to conventional behavior. The socialization model specifies a causal order in which differential association affects delinquency and substance use indirectly through its effect on definitions (or attitudes).

### 2.2. Situational Group Pressure

Some researchers interpret differently the causal structure implied by Sutherland's statements. Short (1957, 1958) and Reiss and Rhodes (1964) assume only a direct effect from differential association to substance use. In other words, most of the impact of differential association on individual use bypasses definitions (or attitudes). Adolescents use alcohol and drugs simply because their friends do. Just how the direct effect is supposed to occur is rarely stated, although some researchers speculate about the processes underlying such a finding. Briar and Piliavin (1965) and Short and Strodtbeck (1965) suggest that this effect reflects situational group pressure. Briar and Piliavin argue that the delinquent peer group may be a source of "situationally induced motives" and that delinquent peers may provide the impetus to deviate before one has come to accept crime-favorable definitions

<sup>6</sup>Parental criminality is another important source of social learning. Parents who use legal drugs (alcohol and tobacco) are more likely to raise children who both drink alcoholic beverages and smoke cigarettes than parents who abstain from them completely. Early correlational studies show that the parental influence on the drug use of teenagers is small but significant (Kandel *et al.*, 1978). Recent research, however, demonstrates that parental drug use has no direct effect on adolescent drug use once peer drug use is controlled (Johnson *et al.*, 1987).

and, quite often, in spite of commitments to conventional normative standards. Adolescents whose friends use alcohol and drugs are more likely to use because they are more likely to find themselves in social situations which contain pressures to drink alcoholic beverages and use drugs.

Because there is no explicit, well-operationalized theory of situational group pressure, many researchers find it difficult to align these processes with a general theoretical framework. Nevertheless, some interpret group pressure processes within the framework of differential association and the social learning tradition (Akers *et al.*, 1979; Liska, 1987). Johnson *et al.* (1987), for example, argue that differential association theory is joined by group pressure notions within a general social learning framework to predict the link between peer and individual substance use. They argue that "the crucial differential association may not be association with people or definitions or "behavior patterns" but, rather, association with *situations* in which there is immediate pressure to use drugs at the risk of social discomfort or rejection" (1987, p. 336). Interpreted within this perspective, adolescents who experience pressure from friends to drink alcoholic beverages and smoke marijuana are influenced by the perceived rewards/costs consequences. Like social approval, social pressure serves as a form of reinforcement which conditions adolescents to think and behave in ways that they would normally not in the absence of this influence.

Still others allow for both direct and indirect effects. Jensen (1972) argues that differential association theory overemphasizes the role of attitudes in mediating the effect of delinquent associations on delinquency (see also Akers *et al.*, 1979). He suggests a causal structure, where delinquent associations directly affect both delinquent attitudes and delinquency, and delinquent attitudes affect delinquency. Burkett and Warren (1987, p. 113) state that "as the socialization process becomes complete, resulting in within-group attitude-behavior similarity, deviations from group standards should become increasingly visible and the intensity of attitudes should increase as a function of mutual reinforcement. As this occurs, one can expect to find increasing peer pressures to conform."

Empirical tests of differential association theory often restrict their measures to only delinquent attitudes and the intensity of delinquent associations [see Krohn *et al.* (1984) and Tittle *et al.* (1986) for notable exceptions].<sup>7</sup> Evidence for the socialization and situational group pressure models is

<sup>7</sup>Some studies include a measure of motives and report that motives mediate fully the effects of both delinquent associations and attitudes (Jackson *et al.*, 1986; Tittle *et al.*, 1986). Tests of Akers' social learning theory include measures of differential reinforcement and imitation and find that, although differential reinforcement, imitation, and definitions mediate partly the effect of differential associations on substance use, the direct effect of differential associations remains (e.g., Akers *et al.*, 1979; Akers and Cochran, 1985; Spear and Akers, 1988).

mixed. Most research indicates that, although delinquent attitudes mediate partly the effect of delinquent associations on delinquency, the direct effect of delinquent associations on delinquency persists (Akers *et al.*, 1979; Elliott *et al.*, 1985; Johnson *et al.*, 1987; Strickland, 1982). Generally, the evidence demonstrates that situational group pressure processes are more important than socialization processes in the production of delinquency. A few studies, however, find that attitudes mediate fully the effect of association with peers (Matsueda, 1982; Matsueda and Heimer, 1987).<sup>8</sup> Delinquency researchers interpret the direct influence of peers as supportive of the group pressure hypothesis. Such an interpretation, however, can be challenged on empirical grounds. These studies do not provide a crucial test of the group pressure hypothesis. Such a test requires measurement of peer pressure and the examination of its role in mediating the influence of differential association on adolescent substance use.

There is general consensus on the conceptualization of peer pressure, although disagreements about its form abound. Gottfredson and Hirschi (1990) define peer pressure as a process whereby individuals are heavily influenced by the wishes and expectations of their friends, often in opposition to their own inclinations or the desires of their parents.<sup>9</sup> Peer pressure comes in two general forms. First, *overt* peer pressure refers to peers daring or coercing someone to do things against their wishes and backing up the challenge with threats of ridicule or ostracism.<sup>10</sup> Second, peer pressure is more likely to occur in more subtle ways (Akers, 1992). It reflects an individual's *perception* that failure to behave in a particular way in the company

<sup>8</sup>Unlike most studies, Matsueda's research measures delinquent associations as how many of your close friends have been picked up by the police. Friend's police contact may take on special significance, compared to those adolescents who associate with delinquent friends but have not had any or much contact with the police. The weakened effect of differential association may have to do with the fact that some youth will avoid certain kinds of delinquency because of prior knowledge about friends' involvement with the police. Delinquent attitudes go unaffected, yet the perceived costs associated with certain forms of delinquency are heightened because of their friends' prior confrontations with the police.

<sup>9</sup>Gottfredson and Hirschi (1990, pp. 158) go on to question, however, the widely reported "peer pressure" phenomenon, arguing that "delinquents do not appear ordinarily concerned about the expectations and approval of others."

<sup>10</sup>Akers (1992, pp. 90-92) regards this popular form of peer pressure a myth. The myth states that "this is the main way in which peer influence operates, that it is ubiquitous, constant, and irresistible." The myth also holds that overt peer pressure always directs the youth's behavior in a deviant direction. On the contrary, modern social learning theory depicts peer influence as a more subtle and complex behavioral process that is not readily recognized by teenagers themselves and affects both conforming and deviant behavior. In fact, for the majority of teenagers, peer pressure is more likely to reinforce conforming behavior (Akers, 1992). Evidence suggests that peer pressure to engage in misconduct is reported to occur less frequently than other forms of peer pressure (Brown *et al.*, 1986).

of peers may result in the loss of popularity and respect and ultimately the rejection and withdrawal of friends. Because most people, especially adolescents, have a strong need to affiliate with others, adolescents will engage in behaviors that are recognized and approved by peers. The need to “fit in” or the desire to be “accepted” by one’s peers may mean that adolescents will engage in behaviors, conventional or delinquent, in an effort to be liked and respected and to foster and maintain friendships (Gonet, 1994; MacDonald, 1989).

Few empirical tests of the group pressure hypothesis have been made, although most offer evidence to support the hypothesis. Most studies measure peer pressure as being dared, pressured, or talked into doing things by their friends that they really did not want to do. One of the earliest studies conducted by Johnson (1979) demonstrates that overt peer pressure is not related directly to delinquency and thus does not mediate the effect of delinquent peer associations on delinquency. Instead, he finds a significant interaction between susceptibility to peer influence and delinquent associates involving the latter’s effect on delinquent behavior. Recent cross-sectional studies show that overt peer pressure is a strong predictor of adolescent substance use (Dielman *et al.*, 1989, 1991; Flannery *et al.*, 1994). Agnew (1991a), in a recent cross-sectional analysis of the National Youth Survey, finds evidence to support the more subtle form of group pressure. In the survey the respondents were asked if they agreed that someone must break rules and/or use violence in order to be popular and gain respect of friends and to keep friends. Agnew finds both main and interaction effects of peer pressure on minor and serious delinquency.

### 3. SOCIAL LEARNING PROCESS: SEQUENCE AND FEEDBACK EFFECTS

Sutherland’s (1939) first full statement of differential association theory provides a brief discussion of the sequence of events in the theory.<sup>11</sup> He proposes a historical process in the development of systematic criminal behavior. However, no provisions are made in this version nor his final version (1947) for a nonrecursive causal structure. It was not until Akers’ (1977, pp. 51–52, 1985, p. 60) reformulation of differential association theory that both the typical sequence of events and feedbacks of deviant behavior, associations, and definitions were discussed. According to Akers’ social learning theory, deviant associations and definitions precede initial deviant acts, but once these acts have been performed, the associational patterns

<sup>11</sup>The first edition of his *Criminology* (1924) makes no mention of the theory, and the second edition (1934) contains only some preliminary ideas.

may themselves in turn be altered.<sup>12</sup> Akers (1994, p. 100), however, goes on to point out that the reciprocal effects are not seen as equal, but that “the sequence of events, in which deviant associations precede the onset of delinquent behavior, will occur more frequently than the sequence of events in which the onset of delinquency precedes the beginning of deviant associations.” Recent delinquency research has identified two major social processes that specify and describe the feedback effects of the differential association variables within a reciprocal causal structure.

### 3.1. Social Selection

The notion of social selection was first introduced by Glueck and Glueck (1950) to explain why differential associations are likely to be a consequence of delinquency. Glueck and Glueck coined the adage, “Birds of a feather flock together (p. 164),” to illustrate the belief that delinquents continue old and seek new associations with others who share similar characteristics.<sup>13</sup> Liska (1969, 1973, 1978) more clearly specified the causal structure underlying the social process of what has come to be known as social selection. The social selection perspective proposes at least two alternative causal linkages. The attitude similarity linkage depicts drug use affecting differential association through its effect on attitudes favorable toward substance use. That is, adolescents who drink alcoholic beverages and smoke marijuana seek out and associate with others who share similar attitudes toward substance use. The behavior similarity linkage depicts substance use affecting differential association directly. In other words, adolescents who drink alcoholic beverages and smoke marijuana seek out and associate with peers who share a similar behavioral repertoire.

A third social selection process involves behavioral pressure. The selection of friendships and peer networks may occur because of perceived social pressure from peers. Most researchers assume that, if peer pressure influences adolescent misconduct, it must do so directly. However, peer pressure may also affect individual use indirectly through its effect on peer associations. Adolescents who experience pressure from peers to use alcohol and drugs may join these peer groups *before* they initiate drinking and drug behavior.

<sup>12</sup>Akers proposes a more complex differential association process than Sutherland, which includes associations, reinforcement, modeling, and exposure to definitions referring to both family and peer-group influences.

<sup>13</sup>Hirschi (1969) argues that the “birds-of-a-feather” phenomenon is consistent with the central tenet of control theories: boys who have low stakes in conformity tend to avoid those who are afraid of getting into trouble and seek out those with similar attitudes and interests (see also Briar and Piliavin, 1965). However, social control theories, including Hirschi’s (1969) social bonding theory, are basically silent on the issue of social selection as a central theoretical process.



Peer pressure may be more important in determining who you associate with rather than what you do. Because the need to affiliate with others is quite strong during adolescence, when teenagers are pressured to “fit in,” they are likely to join peer groups where they are most likely to be accepted. This seems reasonable since teenage substance use is influenced heavily within a group context.

Social selection processes, particularly in the form of attitude or behavior similarity linkages, can be interpreted within the social learning framework. In particular, differential reinforcement, traditionally viewed as affecting behavior, can also be seen as potentially influencing peer selection. The same process is at work—a process in which individuals act according to the degree of actual or anticipated rewards versus punishments associated with behavior—though it can presumably occur at different points in time or along various paths linking associations, attitudes, and behavior (Akers, 1994). For instance, behavior or attitudes may precede peer associations to the extent that adolescents continue old friendships or establish new associations because of an excess of anticipated positive reinforcements (i.e., receiving social approval) stemming from these relationships. Like-minded and similarly behaving individuals are likely to reinforce one another’s common behaviors, and in turn, these associations are likely to continue due to the anticipation of additional or repeated positive appraisals. On the other hand, other teenagers may dissolve friendships or avoid associations because of an excess of negative reinforcements (e.g., receiving social disapproval) or punishments (e.g., getting into trouble with parents or the law). In short, recent theoretical work in the social learning tradition has allowed for the possibility of reciprocal and feedback effects, suggesting that both adolescent substance use and the selection of friends among substance users can be attributed to differential reinforcement.

Recent longitudinal research confirms the importance of social selection processes (Agnew, 1991b; Burkett and Warren, 1987; Elliott and Menard, 1996). These studies report strong social selection effects across different types of delinquency and marijuana use. Thornberry *et al.* (1994) consider both behavior and attitude similarity and find that, while both causal linkages are important, the behavior similarity linkage is supported over the attitudinal one. Thus it can be concluded that delinquent teenagers tend to associate with one another because of similarities in attitudes and especially behavioral skills and accomplishments. Additionally, some studies demonstrate that social selection processes are relatively more important than socialization processes and are of equal importance in comparison to group pressure processes (see, e.g., Agnew, 1991b). This finding contrasts with Akers’ (1994) prediction that differential association processes are more important than social selection processes. What remains unknown, however,

is the relative importance of social selection and differential association processes when group pressure processes are measured directly.

### 3.2. Rationalization

Included in Sutherland's concept of definitions are rationalizations as well as moral values and attitudes. Differential association theory hypothesizes that rationalizations often precede the commission of deviant or criminal acts.<sup>14</sup> Akers (1985, 1994) questions the causal ordering of definitions and delinquency, arguing that definitions may be applied by the individual retroactively to excuse or justify an act already committed.<sup>15</sup> Thus the rationalization model posits a causal structure in which rationalizations or excuses *follow* norm and law violation. For example, adolescents who drink alcohol and smoke marijuana come to view their underage drinking and illegal use of marijuana merely as a technical violation, not a moral wrong. Several recent longitudinal studies examine the reciprocal relations between attitudes (e.g., How wrong is the illegal behavior?) and delinquency and find support for the rationalization argument (Burkett and Warren, 1987; Matsueda, 1989; Thornberry *et al.*, 1994; for different results see Agnew, 1991b).

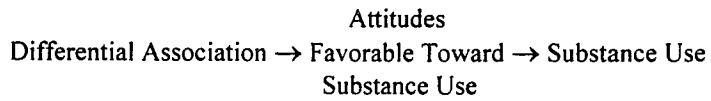
Figure 1 depicts a series of causal models of the various social processes assumed to be at work in linking peer-group associations and adolescent substance use.<sup>16</sup> The socialization and group pressure models are represented in Figs. 1A and B, respectively. The three social selection linkages—attitude similarity, behavior similarity, and behavioral pressure—are depicted in Figs. 1C–E, respectively. The rationalization model is displayed in Fig. 1F. Although the models are presented individually, we stress that these social

<sup>14</sup>Similarly, neutralization theory contends that learning excuses which may be situationally invoked allows youth to neutralize conventional norms and values so they can drift into delinquent behavior (Sykes and Matza, 1957).

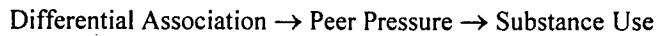
<sup>15</sup>Others have made similar observations. Hirschi (1969, p. 208) argues that it is more plausible that people who commit crime later make an attempt at neutralizing their behavior. In many cases, it is difficult to imagine how an adolescent could subscribe to the belief without having engaged in delinquent acts. Stafford and Ekland-Olson (1982) make a similar argument by illustrating that positive definitions can reflect efforts to rationalize delinquency and substance use.

<sup>16</sup>From a differential association/socialization perspective, two additional causal paths can be specified. First, the theory would view peer pressure as a form of direct instruction, as opposed to modeling, an alternative way in which behavior may be learned from peers (Bandura, 1977). Thus, a direct causal path from peer pressure to attitudes favorable toward substance use can be specified. Second, we also consider the direct causal path from substance use to peer pressure. From a social learning perspective, adolescents who drink alcohol and smoke marijuana may report that they were pressured into drinking and using drugs, an alternative way in which adolescents try retroactively to rationalize or excuse their behavior.

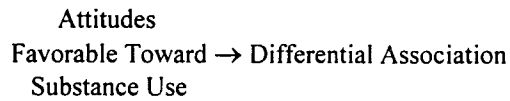
*A. Socialization*



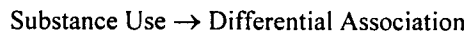
*B. Peer Pressure*



*C. Social Selection-Attitude Similarity*



*D. Social Selection-Behavior Similarity*



*E. Social Selection-Behavioral Pressure*



*F. Rationalization*

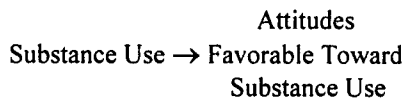


Fig. 1. Causal models of substance use.

processes are likely to operate simultaneously so as to demonstrate the complex pathways leading to and from substance use.

In summary, this study improves upon previous research in several important ways. First, most previous research assumes that direct peer influences on adolescent misconduct reflect social pressure from others. This study provides a crucial test of the group pressure model by measuring peer pressure directly and examining its mediating role between differential association and substance use. Second, this research utilizes panel data which allows us to model the reciprocal relations among peer-group associations, social pressure from peers, attitudes favorable toward substance use, and substance use. Extant cross-sectional analyses are likely to overestimate the effects of differential association variables because the confounding influences of social selection and rationalization processes cannot be determined easily and controlled. This study, however, provides a specific test of each of these competing notions regarding the interrelationships between associations, attitudes, group pressure, and substance use. Finally, most cross-sectional and longitudinal studies do not incorporate a measurement model in the structural model, thereby leaving open the possibility that the structural parameter estimates are biased due to measurement error. This research estimates a series of measurement models, correcting for the potential biasing effects of correlated measurement error.

#### 4. DATA AND METHODS

##### 4.1. Sample

The longitudinal data, collected from the National Youth Survey (Elliott, 1976), are based on a probability sample of households, using a multistage, cluster sampling design [see Elliott *et al.* (1981) and Huizinga (1978) for a detailed, technical discussion of design and sample]. Five annual waves of data for 1976–1980 are available in the public domain. The present analysis examines the second through fourth waves.<sup>17</sup> Of the 2360 youths asked to participate in the study, 1725 (73%) agreed. Respondent loss over the first four waves was about 11%, thereby leaving 1543 participants in the study. However, there was substantial loss of data on alcohol use at Time 2, due primarily to the significant changes in the “drug use” section of the second survey. This was brought about by funding constraints which resulted in randomly dividing the sample so that only about half the respondents

<sup>17</sup>Our panel analysis omits the first wave since no information on peer pressure was collected on the initial survey. Also, because general alcohol use was measured at Time 1 and specific use (i.e., beer, wine, and hard liquor) was measured beginning at Time 2, we restrict our analysis so that the measures of alcohol use will be consistent over time.

( $N = 947$ ) received the new drug items. Beginning at Time 3, the two samples were recombined together and administered the same survey. Listwise case deletion was used, resulting in 589 respondents for the T2–T3 analyses and 637 respondents for the T3–T4 analyses. It was found that selection loss due to this procedure did not alter our test of the theoretical model.

#### 4.2. Variable Measurement

To estimate the latent construct of substance use, three items were used as indicators to measure the frequency of beer and liquor consumption and marijuana use. The respondents were asked how often they had drunk beer, drunk liquor, and used marijuana or hashish during the past 12 months. A 9-point scale was used, ranging from 1 for never to 9 for two or more times a day. Cronbach's  $\alpha$  of interitem reliability ranges from 0.79 to 0.80 across the three time periods. To measure the latent construct of differential association, three items were used as indicators to measure exposure to substance use among peers. The respondents were asked how many of their close friends used alcohol and marijuana and got drunk during the past year. A 5-point scale is used, ranging from 1 for none of them to 5 for all of them. Cronbach's  $\alpha$  ranges from 0.89 to 0.90 across the three time periods. To measure the latent construct of peer pressure, four items were used as indicators to measure the frequency of overt pressure from peers. The respondents were asked how often their close friends put pressure on them to drink or use drugs or suggested that they have to get drunk or get high on drugs to have a good time. A 4-point scale, ranging from 1 for never to 4 for often, was used. Cronbach's  $\alpha$  varies across the three times from 0.73 to 0.75. Finally, the latent construct of attitudes favorable toward substance use was measured using three items as indicators. The respondents were asked how wrong it is for themselves or someone their age to use alcohol and marijuana and get drunk once in awhile. A 4-point scale is used, ranging from 1 for not wrong at all to 4 for very wrong. The coefficients of interitem reliability range from 0.87 to 0.89 across the three time periods.

Finally, several demographic characteristics of the respondents are included in the analyses as control variables: sex (female = 0, male = 1), race (white = 0, nonwhite = 1), and age (in years at Time 2). Of the respondents, 53.1% are male and 22.1% are nonwhite, and the average age of the respondent is 14.9 years old. A comparison of participants and nonparticipants at the first and fourth wave in terms of sociodemographic variables, general alcohol and marijuana use, differential association, and prodrug attitudes reveals no evidence of selection bias.

#### 5.3. Issues of Temporal Order and Time Lag

A major issue in recent longitudinal studies pertains to the time lag between predictor variables and delinquency. We have reason to believe that

the reciprocal causal structure among the variables is contemporaneous; however, the data do not readily lend themselves to an examination of contemporaneous effects. Two of these variables—differential association and substance use—are measured retrospectively and refer to the previous 12 months; the third and fourth variables—peer pressure and attitudes favorable toward substance use—are measured currently. When estimating contemporaneous effects, for example, we are faced with using present attitudes to explain past substance use and, in our reciprocal estimations, we are essentially using present attitudes to explain prior differential association. Numerous researchers have ignored the problem of temporal order when using both longitudinal (Agnew, 1991b; Liska and Reed, 1985; Thornberry *et al.*, 1994) and cross-sectional (Hirschi, 1969; Jensen, 1972; Matsueda, 1982) datasets. Some researchers have been critical of this strategy since an effect cannot precede its cause, and therefore, the results are likely to overestimate relationships where an incorrect temporal order among variables is specified (Menard and Elliott, 1990, 1994; Warr and Stafford, 1991).<sup>18</sup>

Although the issue of temporal order is a potential problem in this panel study, we remain interested in estimating contemporaneous effects wherever it is logically reasonable and defensible. To ensure the correct temporal ordering of variables, we estimate cross-sectional and reciprocal effects models where measurements are based upon time periods rather than wave periods. Table I presents the temporal order of the variables measured in the NYS dataset.

We base our belief that the effects are contemporaneous on theoretical and empirical grounds. First, it stands to reason from a theoretical standpoint that the effects of differential association are primarily contemporaneous in nature. Sutherland and Cressey (1947) and many of their contemporaries interpreted the explanation of criminality in terms of processes operating in the earlier history of the criminal rather than in terms of processes operating instantaneously with the occurrence of crime. However, critics argue that the theory ignores the situational properties of crime (e.g., nature of setting, availability of weapons, presence of bystanders and criminal associates) which influence the occurrence of crime (Lofland, 1969). Clearly, prior life experiences affect the way a person defines a situation, but they do not affect the occurrence of crime directly. Research confirms this view, demonstrating that properties of the situation mediate the relationship between past experiences of persons or personal dispositions and the occurrence of crime (Gibbons, 1971; Cullen, 1983, Tittle, 1985). Sutherland (1973,

<sup>18</sup>Ideally, the best strategy would be to measure delinquency and its causes during the same measurement periods (see the discussion by Kercher, 1988), but no present longitudinal dataset follows this approach.

Table I. Temporal Order of Variable Measurement<sup>a</sup>

Jan. 1977	Dec. 1977	Jan. 1978	Dec. 1978	Jan. 1979	Dec. 1979	Jan. 1980
Differential association (T2)		Differential association (T3)		Differential association (T4)		
	Peer pressure (T2)		Peer pressure (T3)		Peer pressure (T4)	
	Attitudes favorable toward substance use (T2)		Attitudes favorable toward substance use (T3)		Attitudes favorable toward substance use (T4)	
Substance use (T2)		Substance use (T3)		Substance use (T4)		

<sup>a</sup>Numbers in parentheses refer to the wave of the National Youth Survey in which the data were collected.

pp. 30–33) later recognized this problem, but it was Cressey (1953, pp. 12–13) who urged researchers to examine situational (contemporaneous) approaches. Of particular importance to this study is evidence from past research which demonstrates that prior differential association affects present exposure, which, in turn, influences the occurrence of substance use (Agnew, 1991b; Thornberry *et al.*, 1994).

Second, delinquency researchers have estimated both cross-lagged and contemporaneous models in testing differential association theory and find that, in general, contemporaneous effects of differential association tend to be considerably larger than their lagged effects (Agnew, 1991b; Thornberry *et al.*, 1994). Thus, the lagged effects of differential association are likely to *underestimate* the total influence of these variables on delinquency. These studies also indicate that social selection effects are primarily contemporaneous in nature.

#### 4.4. Model Estimation

To analyze these data, two different approaches are taken. First, similar to recent cross-sectional studies, we assume a recursive model and estimate the independent effects of differential association, peer pressure, and attitudes favorable toward substance use on individual substance use across two time periods. For example, substance use at Time 3 is regressed on attitudes and peer pressure at Time 2 and differential association at Time 3. Second, we relax the recursiveness assumption and estimate a reciprocal causal effects model using the panel data. Structural and measurement models are estimated jointly using the generalized least-squares (GLS) estimation

**Table II.** Unstandardized and Standardized (in Brackets) OLS Regression Estimates and Standard Errors (in Parentheses)

	Time 3	Time 4
Differential association ( $t$ )	0.719** (0.046) [0.540]	0.931** (0.050) [0.643]
Peer pressure ( $t-1$ )	-0.003 (0.080) [-0.001]	0.050 (0.084) [0.015]
Attitudes favorable toward Substance use ( $t-1$ )	0.553** (0.068) [0.292]	0.423** (0.070) [0.215]
Gender	0.960** (0.261) [0.091]	1.005** (0.268) [0.091]
Race	-0.263 (0.233) [-0.028]	0.358 (0.242) [0.037]
Age	0.090 (0.088) [0.029]	-0.138 (0.089) [-0.043]
Intercept	-3.388* (1.201)	-1.406 (1.217)
Adjusted $R^2$	0.631	0.626

\*  $P < 0.01$ .

\*\*  $P < 0.001$ .

method in the LISREL VII program (Joreskog and Sorbom, 1989). GLS is used instead of maximum-likelihood (ML) estimation because the ML procedure violates the assumption of multivariate normality when dichotomous exogenous variables are employed (Hayduk, 1987). We originally attempted to estimate a three-wave structural and measurement model; however, the parameter estimates were biased due to the fact that the number of degrees of freedom exceeded the sample size. Instead, we estimated two two-wave models (Times 2 and 3 and Times 3 and 4).

## 5. ANALYSIS OF RECURSIVE MODEL

Table II presents the unstandardized and standardized ordinary least-squares (OLS) regression estimates and standard errors for the recursive model for the two time periods. The results consistently show that differential association and attitudes favorable toward substance use are strong determinants of substance use. The influence of overt peer pressure is nonsignificant and the effect of neither attitudes nor overt peer pressure reduces the direct effect of differential association on substance use.



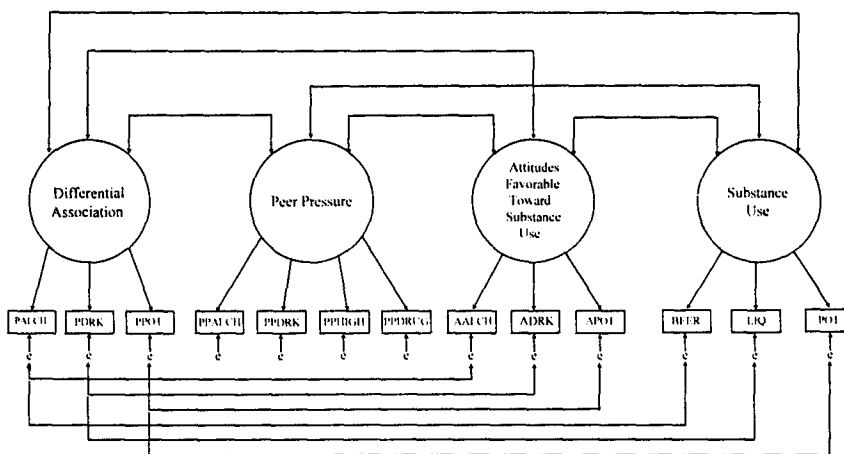


Fig. 2. Measurement model with error correlations.

We also examine the interaction effect of differential association and peer pressure and find a significant interaction (at the 0.05 level), but only at Time 4. Differential association is more predictive of substance use when adolescents are pressured by friends to use alcohol and marijuana. The interaction term, however, explains only an additional 0.3% of the total variation in substance use. This suggests that the effects are primarily additive in nature.

## 6. ANALYSIS OF MEASUREMENT MODEL

We first specify a measurement model for differential association, peer pressure, attitudes favorable toward substance use, and substance use. The measurement model allows us to test specific hypotheses about the structure underlying the indicators of these latent constructs and to estimate and control for the biasing effects of measurement error. This model considers each observed indicator as a linear combination of a latent unobserved factor plus random measurement error and is based on the theoretical framework discussed earlier. For example, the model implies that attitudes favorable toward alcohol and marijuana use (AALCH and APOT) and getting drunk (ADRK) converge together into a single latent concept representing attitudes favorable toward substance use (see Fig. 2 for illustration).

When modeling the error structure of measurement models, it is necessary to examine the possibility of correlated measurement error. This

research distinguishes between cross-sectional error and error over time.<sup>19</sup> First, Gottfredson and Hirschi (1987, 1990) suggest that the strong relationship between associating with delinquent peers and engaging in delinquency is not causal but a method effect created when respondents are asked to report the level of their own delinquency and peer's delinquency. This concern is reasonable since both measures are often based on subjective self-reports and are administered at the same time. They suggest that the delinquency of peers may actually be the delinquency of the respondent (e.g., the respondent may attribute own qualities to his or her friends or attribute friendship to individuals similar to self). Gottfredson and Hirschi conclude that the substantive meaning of this variable is unclear and its effect is probably seriously biased. In a similar vein, there may also be considerable method overlap between the measures of differential association and attitudes toward substance use. Again, the respondent may attribute qualities to his or her friends or attribute friendship to individuals similar to self. As a result, the influence of differential association on individual attitudes is equally unclear and may also be greatly exaggerated. To determine the degree of method overlap among these variables, we estimate a series of measurement models controlling for correlated cross-sectional error. To address this problem statistically, a measurement model is estimated in which the error terms of the indicators of the latent variables (differential association, attitudes favorable toward substance use, and substance use) at the same point in time are allowed to correlate (see measurement model in Fig. 2).

Second, due to problems of respondent memory recall, we expect response errors for each of the indicators to be somewhat stable over time. An autoregressive model is tested in which correlations between the error terms of the indicators across two time periods are estimated. Thus, to test and control for correlated measurement error in Model I, we estimate a structural model assuming four measurement restrictions: (A) no correlated measurement error; (B) 6 correlations between the error terms of the indicators, differential association and respondent substance use, at Times 2 and 3; (C) these correlations plus 6 correlations between the error terms of the indicators, differential association and respondent's attitudes favorable toward substance use, at Times 2 and 3; and (D) these correlations plus 13

<sup>19</sup>A third type of error is correlated structural error. By definition, in all nonrecursive systems one expects the errors in the structural equations involving the reciprocally related latent variables to be correlated. We raise doubts about allowing error terms of multistructural equations to correlate. It spreads the effects of misspecification of one equation throughout all the equations—even those that are correctly specified. With a system of eight structural equations the opportunities for this problem are endless, and therefore we exclude analyses of correlated error at the structural level.

**Table III.** Chi-Square Statistic and Goodness-of-Fit Test

	$\chi^2$	df	Adjusted goodness-of-fit index
Model I: T2 T3			
A. No correlated errors	1,053.29	334	0.839
B. 6 correlated errors	1,015.82	328	0.842
C. 12 correlated errors	940.75	322	0.851
D. 25 correlated errors	766.73	309	0.873
Model II: T3 T4			
A. No correlated errors	1,162.34	334	0.836
B. 6 correlated errors	1,155.65	328	0.834
C. 12 correlated errors	1,100.83	322	0.839
D. 25 correlated errors	819.85	309	0.875

correlations between the error terms of the indicators of differential association, peer pressure, respondent's attitudes toward substance use, and respondent's substance use across Times 2 and 3. In Model II the same measurement restrictions are used, although the model is estimated across Times 3 and 4.

Table III presents the  $\chi^2$  statistic and goodness-of-fit test for both models across the four measurement restrictions. The  $\chi^2$  statistic often leads to rejection of the model in large samples. Thus we use Joreskog and Sorbom's (1989) adjusted goodness-of-fit index (AGFI) since it is less dependent on sample size. Examination of the error correlations in Model B reveals few significant effects (see Appendix A). A comparison of the goodness-of-fit results between Model A and Model B shows a statistically significant improvement in the fit of Model I but not of Model II.<sup>20</sup> Significant improvement in the fit of the models occurs when the error terms of the indicators, differential association and respondent's attitudes toward substance use, are correlated (Model C).<sup>21</sup> Over one-half of the error correlations are significant. While there is some support for Gottfredson and Hirschi's claim that self-reported peer delinquency may merely be another measure of self-reported delinquency and that respondents may attribute qualities to friends, the presence of correlated cross-sectional errors in Models B and C does not alter substantially the size and significance of the parameter estimates in both models. The greatest improvement in model fit occurs when an autoregressive model (Model D) in which correlations between the error

<sup>20</sup>The  $\chi^2$  difference between IA and IB is 37.47 with 6 df ( $P < 0.001$ ). The  $\chi^2$  difference between Model IIA and Model IIB is 6.69 with 6 df (n.s.).

<sup>21</sup>The  $\chi^2$  difference between Model IB and Model IC is 75.07 with 6 df ( $P < 0.001$ ). The  $\chi^2$  difference between Model IIB and Model IIC is 54.82 with 6 df ( $P < 0.001$ ).

terms of the indicators across time periods is estimated.<sup>22</sup> Over two-thirds of the error correlations are significant. Again, despite the presence of error correlations in Model D, the size and significance of the parameter estimates remain consistent with those in Model A. Because the results remain consistent across the four measurement restrictions, we report only the estimates for Models ID and IID.

Tables IV and V present the generalized least-squares parameter estimates for Models ID and IID, respectively. The sociodemographic variables (e.g., sex, race, and age) are assumed to be measured perfectly and thus the parameters are fixed to 1.000. The validity coefficients indicate to what degree the items are acceptable indicators of the latent constructs. The estimates for differential association, attitudes favorable toward substance use, and substance use in both models are at or exceed the 0.7 to 0.8 range commonly regarded as acceptable in delinquency research (Agnew, 1991b). The validity coefficients for the indicators of peer pressure are somewhat lower than those of the other latent constructs, with most falling in the 0.6 to 0.8 range. These estimates are consistent with those found in similar studies (Dielman *et al.*, 1989).

## 7. ANALYSIS OF STRUCTURAL MODEL

Next we incorporate each measurement model into a structural model where the reciprocal influences between the latent variables are examined. To reiterate, our analysis assumes a contemporaneous model, but we include lagged effects where the temporal sequence of the variable measurements prohibits the estimation of contemporaneous effects [e.g., see Menard and Elliott (1994) for use of a similar procedure]. Figure 3 presents the structural model to be estimated. In our model, the behavior equation involves regressing the present level of substance use on the lagged level of substance use, plus the present level of differential association and the lagged levels of peer pressure and attitudes favorable to substance use. The attitude equation involves regressing the present level of attitudes on the lagged level of attitudes, plus the present levels of differential association and substance use. The peer pressure equation involves regressing the present level of peer pressure on the lagged level of peer pressure, plus the present level of differential association. The differential association equation involves regressing the present level of differential association on the lagged level of differential association, plus the present level of substance use and the lagged levels of peer pressure and attitudes favorable toward substance use. We also estimate

<sup>22</sup>The  $\chi^2$  difference between Model IC and Model ID is 174.02 with 13 df ( $P < 0.001$ ). The  $\chi^2$  difference between Model IIC and Model IID is 280.98 with 13 df ( $P < 0.001$ ).

Table IV. Generalized Least-Squares Parameter Estimates for Measurement Model ID  
(*N* = 589)

	Error variance	Metric slope	Validity coefficient
Differential association at Time 2			
Use alcohol (PALCH2)	0.284	1.000 <sup>a</sup>	0.920
Got drunk (PDRK2)	0.268	0.946	0.916
Use marijuana (PPOT2)	0.385	0.660	0.799
Differential association at Time 3			
Use alcohol (PALCH3)	0.237	1.000	0.939
Got drunk (PDRK3)	0.332	0.949	0.909
Use marijuana (PPOT3)	0.356	0.771	0.864
Peer pressure at Time 2			
Friends put pressure on you to drink (PPALCH2)	0.145	1.000	0.611
Friends suggested you have to get drunk (PPDRK2)	0.156	1.591	0.763
Friends suggested you have to get high (PPHIGH2)	0.087	1.316	0.794
Friends put pressure on you to use drugs (PPDRUG2)	0.058	0.806	0.701
Peer pressure at Time 3			
Friends put pressure on you to drink (PPALCH3)	0.139	1.000	0.756
Friends suggested you have to get drunk (PPDRK3)	0.158	0.941	0.714
Friends suggested you have to get high (PPHIGH3)	0.123	0.694	0.649
Friends put pressure on you to use drugs (PPDRUG3)	0.082	0.486	0.590
Attitudes favorable toward substance use at Time 2			
Use alcohol (AALCH2)	0.191	1.000	0.893
Get drunk (ADRK2)	0.230	0.970	0.868
Use marijuana (APOT2)	0.206	0.826	0.844
Attitudes favorable toward substance use at Time 3			
Use alcohol (AALCH3)	0.193	1.000	0.897
Got drunk (ADRK3)	0.264	0.967	0.859
Use marijuana (APOT3)	0.224	0.885	0.858
Substance use at Time 2			
Drink beer (BEER2)	1.111	1.000	0.817
Drink hard liquor (LIQ2)	0.517	0.583	0.770
Use marijuana (POT2)	0.958	0.726	0.742
Substance use at Time 3			
Drink beer (BEER3)	1.185	1.000	0.857
Drink hard liquor (LIQ3)	0.881	0.643	0.778
Use marijuana (POT3)	1.616	0.763	0.788

<sup>a</sup>Fixed coefficient.

the effects of the sociodemographic variables on the endogenous latent variables; however, the causal paths are excluded from the structural model in Fig. 3 in order to reduce visual clutter.

The standardized generalized least-squares (GLS) parameter estimates for Models ID and IID are displayed in Figs. 4 and 5 (see Appendix B,

Tables BI and BII for zero-order correlations).<sup>23</sup> Inferences about statistical significance are based on unstandardized coefficients; however, for the sake of comparison, standardized coefficients are presented here.<sup>24</sup> Examination of the stability coefficients (i.e., lagged effects of the same variables) reveals that the effects of differential association, peer pressure, and substance use are large and remain consistent over time. The stability effects for attitudes are not as large, although they increase over time. This suggests that the nature (conventional versus delinquent) of attitudes is likely to shift over time, although there is some movement toward more stable attitudes.

The socialization model posits that differential association increases substance use indirectly through its effect on attitudes. The results presented in Figs. 4 and 5 offer partial support for this assertion. Attitudes favorable toward substance use significantly increase substance use, but only at Time 4. Differences in attitudes are influenced by differential association at Times 3 and 4. A causal pattern is suggested whereby differential association affects attitudes favorable toward use, which, in turn, influences individual use. We conclude that differential association increases individual use of alcohol and marijuana partly because adolescents internalize attitudes.

Researchers claim that, despite the presence of socialization effects, a direct peer effect still persists. This effect has been identified as situational group pressure. If group pressure is assumed to be the social process linking peer and individual substance use, then the effect of differential association should be reduced substantially once we control for peer pressure. Estimation of the reciprocal effects model yields several important findings. Consistent with the group pressure model, we demonstrate that differential

<sup>23</sup>We reestimated the structural model depicted in Fig. 3, but including the causal path from peer pressure to attitudes. The findings indicate that the effect of overt peer pressure on attitudes at Time 3 is statistically significant, but the effect is negative ( $\beta = -0.11$ ). At Time 4, the overt peer pressure effect is also negative ( $\beta = -0.03$ ) but is statistically insignificant. The causal effects of the other variables in the models remain unaffected. Next we reestimated the model, including the causal path from substance use to overt peer pressure. The findings indicate that the effect of substance use on overt peer pressure is statistically insignificant at Time 3 ( $\beta = -0.16$ ) and Time 4 ( $\beta = 0.16$ ). The causal effects of the other variables in the models are not altered significantly.

<sup>24</sup>Throughout these analyses, sex, race, and age are held constant. The effects are not presented in Figs. 4 and 5 because they add considerable visual clutter. Few are statistically significant and the effects tend to be small. Also, the structural parameter estimates remain consistent across the four different measurement restrictions. First, at Time 3, males are more likely to use alcohol and marijuana than females. Second, at Times 3 and 4, males are less likely to associate with friends who use alcohol and marijuana than females. Third, at Times 3 and 4, whites are more likely to associate with friends who drink alcoholic beverages and smoke marijuana than nonwhites. Fourth, at Time 3, attitudes favorable to substance use increase as adolescents get older. Fifth, at Time 4, alcohol and marijuana use decreases as adolescents get older.

Table V. Generalized Least-Squares Parameter Estimates for Measurement Model IID  
( $N = 637$ )

	Error variance	Metric slope	Validity coefficient
Differential association at Time 3			
Use alcohol (PALCH3)	0.264	1.000 <sup>a</sup>	0.925
Got drunk (PDRK3)	0.332	0.976	0.904
Use marijuana (PPOT3)	0.353	0.738	0.841
Differential association at Time 4			
Use alcohol (PALCH4)	0.200	1.000	0.944
Got drunk (PDRK4)	0.334	0.959	0.905
Use marijuana (PPOT4)	0.393	0.768	0.844
Peer pressure at Time 3			
Friends put pressure on you to drink (PPALCH3)	0.171	1.000	0.679
Friends suggested you have to get drunk (PPDRK3)	0.173	1.061	0.699
Friends suggested you have to get high (PPHIGH3)	0.143	0.833	0.644
Friends put pressure on you to use drugs (PPDRUG3)	0.079	0.704	0.691
Peer pressure at Time 4			
Friends put pressure on you to drink (PPALCH4)	0.207	1.000	0.548
Friends suggested you have to get drunk (PPDRK4)	0.136	1.657	0.802
Friends suggested you have to get high (PPHIGH4)	0.118	1.454	0.783
Friends put pressure on you to use drugs (PPDRUG4)	0.097	0.602	0.499
Attitudes favorable toward substance use at Time 3			
Use alcohol (AALCH3)	0.179	1.000	0.908
Got drunk (ADRK3)	0.264	0.931	0.856
Use marijuana (APOT3)	0.236	0.853	0.849
Attitudes favorable toward substance use at Time 4			
Use alcohol (AALCH4)	0.195	1.000	0.899
Got drunk (ADRK4)	0.220	0.936	0.875
Use marijuana (APOT4)	0.254	0.881	0.845
Substance use at Time 3			
Drink beer (BEER3)	1.132	1.000	0.857
Drink hard liquor (LIQ3)	0.880	0.610	0.755
Use marijuana (POT3)	1.342	0.734	0.747
Substance use at Time 4			
Drink beer (BEER4)	1.597	1.000	0.819
Drink hard liquor (LIQ4)	1.174	0.703	0.760
Use marijuana (POT4)	0.977	0.824	0.833

<sup>a</sup>Fixed coefficient.

association significantly increases overt peer pressure at Times 3 and 4. However, contrary to our prediction, we find that the effects of overt peer pressure ( $\beta = -0.049$  at Time 3,  $\beta = -0.004$  at Time 4) are insignificant in both models. Overt peer pressure does not mediate the effect of differential

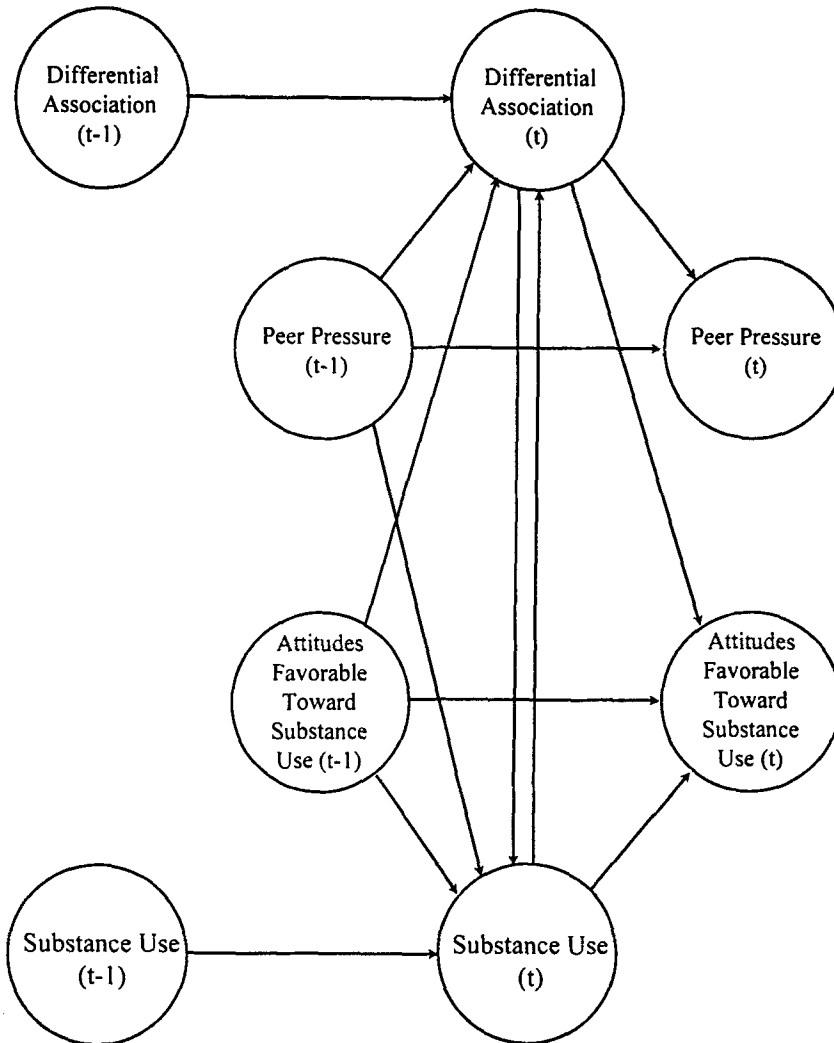


Fig. 3. Structural model.

association on substance use. Contrary to popular belief, we find that overt peer pressure does not influence substance use directly.

There is considerable support for the rationalization model at Times 3 and 4, demonstrating that substance use leads to an increase in attitudes favorable toward substance use. In our reciprocal estimations between attitudes and substance use, we observe bidirectional effects among these variables, although only at Time 4. We also find greater support for the



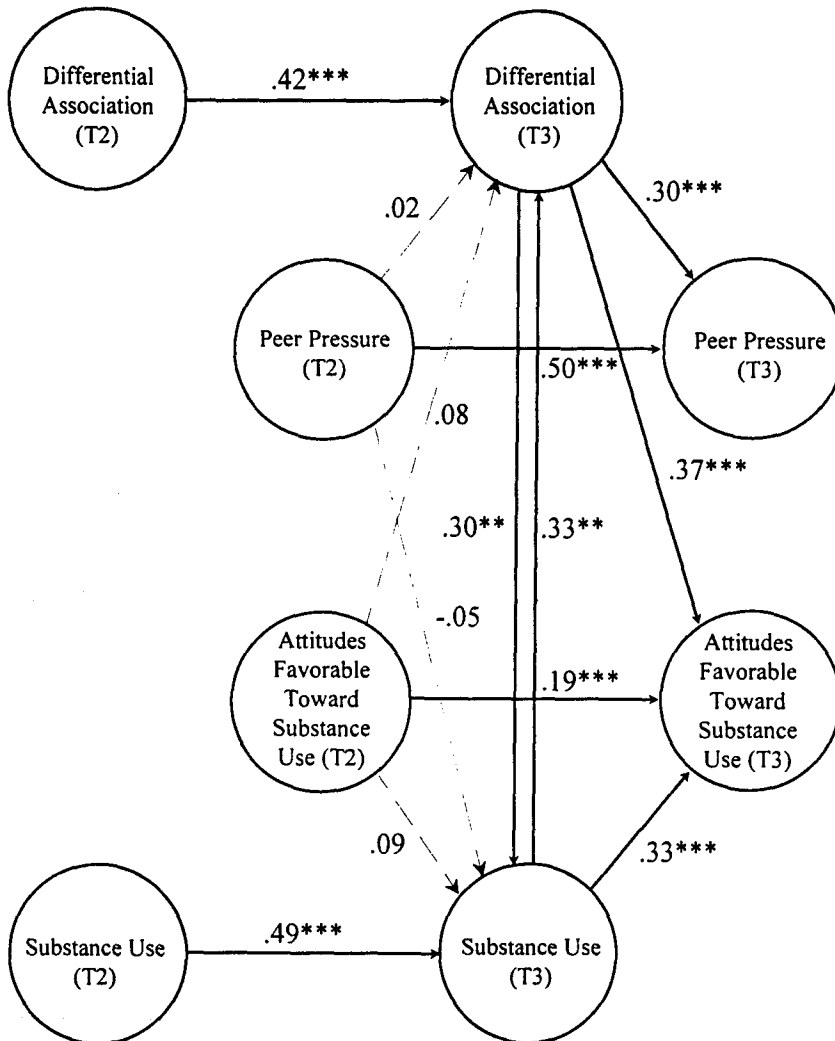


Fig. 4. GLS standardized estimates for Model ID. \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

rationalization model than for the socialization model across both models.

The social selection model also proposes that differential association is a function of attitudes and substance use. In our reciprocal estimations, we find greater support for the behavior similarity linkage than for the attitude similarity linkage at Times 3 and 4. Teenagers who drink alcohol and smoke marijuana seek out and associate with peers because of similarities in

behavior. Results from the reciprocal effects model also demonstrate that the link between differential association and substance use is bi-directional.<sup>25</sup>

## 8. SUMMARY AND DISCUSSION

There has been a tremendous upsurge of interest in the causal modeling of delinquency and substance use over the past 10 years. The use of longitudinal designs remains a valuable research tool among criminologists despite recent criticisms outlined by Gottfredson and Hirschi (1987, 1990). Students in criminology have shifted their attention toward the specification of causal order and causal direction among sets of predictor variables and deviance. Recent nonrecursive studies indicate that confounding social processes often underlie the associations between various predictor variables and crime and deviance. This study extends this line of research by specifying and estimating the reciprocal causal structure underlying differential associations, peer pressure, attitudes, and adolescent substance use. Of particular interest was to estimate the relative contributions of differential association (socialization and group pressure), social selection, and rationalization processes.

### 8.1. Socialization

Differential association theory emphasizes the important mediating role of socialization in explicating the link between delinquent peer associations and delinquency. Numerous delinquency researchers provide crucial tests of the socialization model and confirm its influence. The bulk of the findings in our study, too, supports the socialization model. In the cross-sectional analyses, attitudes play an important role in mediating partly the effect of differential association on individual use. In contrast, there is less support

<sup>25</sup>Previous cross-sectional research, including this study, indicates significant interactions between peer pressure and delinquent associates involving the latter's effect on delinquent behavior (Agnew, 1991a; Johnson, 1979). There are two essentially different procedures for handling interactions in LISREL (Hayduk, 1987). One strategy used if the modeled concepts are suspected of being involved in many interactions is the test of equality between subsamples. This procedure is especially appropriate when modeling causal structures across subgroups. We were unable, however, to perform a multisample analysis for peer pressure because the degrees of freedom required for the covariance model exceeded the reduced sample size in each subgroup. If only a few interactions are suspected, an alternative approach is recommended that mimics multiple regression procedures. In our measurement model, the fundamental modeling strategy is to create a convenience latent variable with 12 indicators that represents the interaction between two concepts, differential association and peer pressure, with the former having three indicators and the latter having four indicators (see Hayduk, 1987, pp. 232-237, for a detailed discussion of how the convenience latent variable is constructed). We were unable to estimate an interaction model using this approach since the degrees of freedom required for the covariance model exceeded the total sample size.

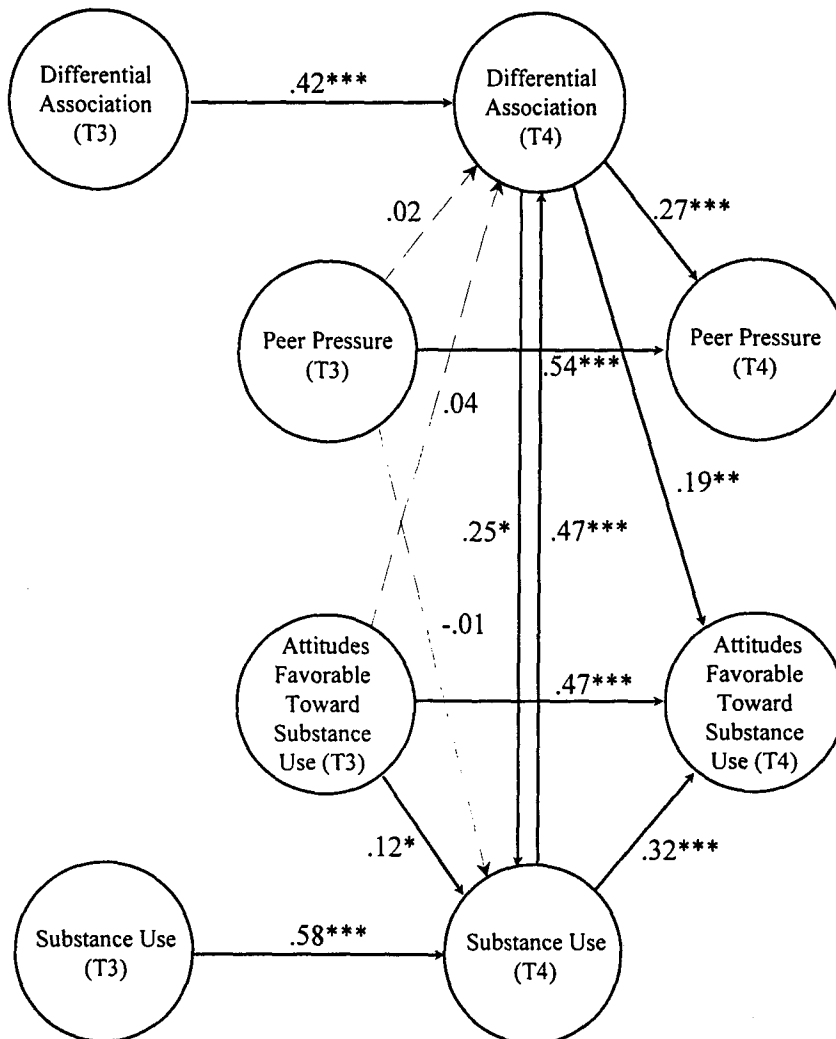


Fig. 5. GLS standardized estimates for Model IID. \* $P < 0.05$ ; \*\* $P < 0.01$ ; \*\*\* $P < 0.001$ .

for the socialization hypothesis when estimating the reciprocal effects model. There are at least two reasons for the weakened effect of attitudes. First, it must be understood that socialization involves more than the moral condemnation of alcohol and marijuana use. There are other specific definitions (e.g., harm or risk of injury) that orient the person to particular acts and many general definitions (e.g., moral and religious beliefs) that are relevant to socialization which may be more salient in explaining the link between

differential associations and substance use. Additional research is needed to examine more fully the importance of general and specific definitions in the socialization into substance use. Second, previous studies demonstrate that lagged effects of predictor variables tend to underestimate their total influence on crime and deviance. This may be the case in our reciprocal effects model where lagged instead of contemporaneous effects of attitudes are estimated.

Imitation, or modeling the behavior of others, is yet another mechanism which potentially merits further attention. However, limited research incorporating imitation has shown little support for its significance in explaining the direct effect of associations (Akers *et al.*, 1979). Moreover, it is more important in the initial acquisition and performance of novel behavior than in the maintenance or cessation of behavioral patterns once established (Akers, 1994).

## 8.2. Situational Group Pressure

Many of the same researchers finding support for the socialization model also assume that the causal mechanism underlying the direct link between peer associations and delinquency is situational group pressure. They go on to argue that a demonstration of a strong, direct effect of associations on behavior is sufficient as a test of the group pressure model. We have argued in this paper that most studies have failed to conduct a definitive test of the group pressure model. A few recent studies have addressed this criticism by controlling for the effects of overt and subtle forms of peer pressure; however, these studies assume that peer pressure is a cause rather than a consequence of delinquency and substance use. This research provides a test of the group pressure hypothesis using a measure of overt peer pressure but finds minimal support for the hypothesis in the cross-sectional analysis and no evidence to support the hypothesis in the reciprocal causal effects model.<sup>26</sup> In other words, while many researchers assume that a direct relationship between peer associations and individual

<sup>26</sup>Failure to find any significant effects of peer pressure may be attributed to the way different people respond to peer pressure. For example, prior research indicates that boys and girls and blacks and whites do not respond to peer pressure in the same way. Giordano *et al.* (1986) found that females, regardless of their level of delinquent involvement, are likely to be involved in more intimate relationships than males. Similar findings emerge in the Giordano *et al.*, (1993) research of race differences in the role of group processes in the etiology of delinquency. We consider both gender and race as moderators of the hypothesized relationship between peer pressure and substance use. Our analysis, however, does not indicate any significant sex  $\times$  peer pressure and race  $\times$  peer pressure interactions (at the 0.05 level) in either the cross-sectional or the nonrecursive models.

behavior is evidence of overt peer pressure, our findings suggest that such an assumption may be largely incorrect.

If overt peer pressure does not mediate the effect of peers, then, what does? Our research findings suggest that this is an important question to consider if we are to fully understand the role that peers play in affecting individual action. One possible explanation for the direct relationship between differential associations and substance use comes from the norm qualities perspective (see the review discussion by Krohn *et al.*, 1982).<sup>27</sup> Borrowing from this approach, adolescents' alcohol and drug behavior is congruent with the normative climate to which they are exposed through peer groups. Permissive norms, most often condoned in peer groups, positively define and sanction drinking alcohol and smoking marijuana without setting guidelines or limits (Krohn *et al.*, 1982; Akers, 1992). The general American youth cultural orientation toward underage drinking and marijuana use is seen as a normal part of learning adult role behavior. Studies show that the greatest impact on teenage drinking and smoking comes from the permissive normative climate generated in interaction with peers (Krohn *et al.*, 1982). Thus, permissive group norms may serve as a form of "self-induced" group pressure to the individual experiencing it; while there is no overt pressure from the group, if the individual does not want to appear "different," he or she acts in accordance with group norms. This idea of pressure stemming from a permissive normative climate resembles largely Akers' conceptualization of a more subtle form of peer pressure or "peer influence." Future research needs to examine the more subtle aspects of peer influence that might mediate the effects of differential association on teenage substance use.

Delinquent opportunity may provide another explanation for the direct link between differential association and substance use. From a criminal opportunity perspective, criminal occurrences are largely understood as an outcome of criminogenic situations stemming from the routine activities of individuals in society. In short, opportunity theory assumes that motivated offenders, attractive targets (for victimization), and an absence of capable guardians must all converge in time and place if successful crime is to occur (see, e.g., Cohen and Felson, 1979; Cohen *et al.*, 1981). Although the peer group has never been studied from an opportunity perspective, it is conceivable that the context of an alcohol- and marijuana-using peer group provides easy opportunity for alcohol and marijuana use among individuals within

<sup>27</sup>A similar argument, borrowing from an emergent norm perspective (Turner and Killian, 1987), is made regarding the appropriateness of drinking alcohol and smoking marijuana within a group context. From an emergent norm perspective, a member of a group of drinkers and smokers could decide to use despite the fact that this behavior violates his or her independent values if drinking and smoking appear to be the norm in a particular situation.

the group. For instance, alcohol and, to a lesser degree, marijuana are often very accessible in peer-group situations, and parental or other-adult supervision is usually lacking. With alcohol and marijuana readily available and effective guardianship (intervention) absent, opportunity for individual consumption is apparent. Thus, irrespective of the peer pressure, permissive norms, or imitation that occurs within the peer group, the direct effect of differential associations on substance use may simply be characteristic of opportunistic behavior.

Finally, despite its insignificance in our study, peer pressure may still operate, but at different stages of the life course. It seems reasonable to expect that peer pressure, if it is going to have any effect, may be more important in explaining early onset of substance use. Additional research is required to examine the early development of peer-group formation and the initial acquisition and performance of substance use during preadolescence.

### **8.3. Rationalization**

Our test of the rationalization process consisted of examining the role of attitudes as a consequence rather than a cause of substance use. In the study, there was strong evidence in support of the rationalization argument. Of particular significance in this study is the stronger effect of substance use on attitudes than the effect of attitudes on substance use. This suggests that adolescents who use alcohol and marijuana are more likely to retroactively neutralize their conduct than attitudes are to orient their behavior. We offer a word of caution regarding the relative contribution of the rationalization and socialization models since different time lags are used in our estimations. The socialization model involves estimating a lagged effect of attitudes on substance use, while the rationalization model consists of estimating a contemporaneous effect of substance use on attitudes. Previous research has shown that contemporaneous effects are usually stronger than lagged effects.

### **8.4. Social Selection**

Not only may prodelinquent attitude formation occur after the delinquent behavior (via rationalization) but the formation of peer groups may *result* from drug behavior. Consistent with previous longitudinal research, we find that the causal structure involving differential association and substance use is indeed reciprocal. Regarding the behavior similarity linkage posited by the social selection approach, we find substance use to significantly affect differential association. However, we do not find evidence to support the attitude similarity linkage, where attitudes favorable to substance use affect differential association. It can be concluded therefore that

teenagers who use alcohol and marijuana tend to seek out and associate with peers who share a similar behavioral repertoire.

In summary, the suggested reciprocal causal effects indicate that there are several social processes operating simultaneously. Thus, the adherence to a single social process will likely result in the oversimplification of the causal mechanisms underlying substance use. Our study suggests that the interrelatedness of social interaction and individual behavior is indeed quite complex, with socialization, rationalization, and social selection all being viable processes. Ironically, only overt situational group pressure plays a minor role, which is a finding in stark contrast to previous research. In many respects, these findings are consistent with recent theoretical respecifications within the social learning tradition (see, e.g., Akers, 1994). Nonetheless, we feel that the modifications made with respect to social learning theory are, at present, somewhat underdeveloped. As such, our findings serve as a basis for continued refinement in the specification of the sequence of events involved in the social learning process.

Beyond the implications of this work in terms of ongoing theoretical development, our findings seemingly have important implications regarding our perceptions of social influence and individual behavior within the policy arena as well. Many practical solutions aimed at reducing delinquency—and adolescent drug and alcohol use, in particular—seem to adhere to the view that peer pressure and socialization are the major processes linking differential association and individual behavior. Resistance to pressure and drug norms is commonly taught as a drug/alcohol intervention strategy, while rationalization and social selection processes are ignored. In contrast, the findings presented here regarding the minimal role of overt peer pressure challenge conventional wisdom, extant research, and current policies and, thus, invite scholars to revisit this issue. While we are not suggesting that peer pressure be rejected altogether as an important variable in explaining and addressing delinquency—particularly drug use—this study certainly provides some evidence to suggest that we should examine the role of peers more closely and comprehensively. In particular, we need to extend the conceptualization of the potential effects of group pressure beyond narrowly defined overt pressure from peers, to broaden our conceptualization of the role of peer influence in understanding delinquency and drug use in terms of recognizing that influence can be a *result* of behavior in the form of rationalization, and to consider also that social selection may be just as important a process as social influence in understanding the linkages among peers, attitudes, and behavior. While recent theoretical developments in the area of social learning certainly hint at the complexity uncovered here regarding the relationships among peers, attitudes, and substance use, our study examines and estimates such linkages more fully. In doing so, we have

hopefully established an improved, more concise framework on which to build future work in the development of theory, research or policy pertaining to the social learning process and adolescent drug or alcohol use.

## APPENDIX A

Table AI. Error Correlations (Standardized Coefficients) for Models ID and IID

	Model ID		Model IID
Cross-sectional error			
PALCH2 ↔ BEER2	-0.010	PALCH3 ↔ BEER3	-0.021
PDRK2 ↔ LIQ2	-0.001	PDRK3 ↔ LIQ3	-0.003
PPOT2 ↔ POT2	0.141***	PPOT3 ↔ POT3	0.046*
PALCH3 ↔ BEER3	-0.017	PALCH4 ↔ BEER4	-0.015
PDRK3 ↔ LIQ3	-0.016	PDRK4 ↔ LIQ4	-0.007
PPOT3 ↔ POT3	0.058**	PPOT4 ↔ POT4	0.043*
PALCH2 ↔ AALCH2	0.011	PALCH3 ↔ AALCH3	0.015
PDRK2 ↔ ADRK2	0.025	PDRK3 ↔ ADRK3	0.041***
POT2 ↔ APOT2	0.105***	PPOT3 ↔ APOT3	0.039*
PALCH3 ↔ AALCH3	0.014	PALCH4 ↔ AALCH4	0.020
PDRK3 ↔ ADRK3	0.058***	PDRK4 ↔ ADRK4	0.044***
PPOT3 ↔ APOT3	0.052**	PPOT4 ↔ APOT4	0.070***
Autoregressive error			
PALCH2 ↔ PALCH3	0.029**	PALCH3 ↔ PALCH4	0.009
PDRK2 ↔ PDRK3	0.015	PDRK3 ↔ PDRK4	0.028*
PPOT2 ↔ PPOT3	0.012	PPOT3 ↔ PPOT4	0.069***
PPALCH2 ↔ PPALCH3	0.009	PPALCH3 ↔ PPALCH4	0.137***
PPDRK2 ↔ PPDRK3	0.034	PPDRK3 ↔ PPDRK4	-0.003
PPHIGH2 ↔ PPHIGH3	0.078*	PPHIGH3 ↔ PPHIGH4	0.090**
PPDRUG2 ↔ PPDRUG3	-0.058	PPDRUG3 ↔ PPDRUG4	0.139***
AALCH2 ↔ AALCH3	0.030*	AALCH3 ↔ AALCH4	0.021
ADRK2 ↔ ADRK3	0.054***	ADRK3 ↔ ADRK4	0.055***
APOT2 ↔ APOT3	0.061***	APOT3 ↔ APOT4	0.082***
BEER2 ↔ BEER3	0.127***	BEER3 ↔ BEER4	0.135***
LIQ2 ↔ LIQ3	0.124***	LIQ3 ↔ LIQ4	0.159***
POT2 ↔ POT3	0.118***	POT3 ↔ POT4	0.127***

\*  $P < 0.05$

\*\*  $P < 0.01$ .

\*\*\*  $P < 0.001$ .

## ACKNOWLEDGMENTS

The data utilized in this study were made available by the Inter-University Consortium for Political and Social Research. Neither the collector of the original data nor the Consortium bears any responsibility for the analyses



**APPENDIX B**

**Table B1. Zero-Order Correlations, Means, and Standard Deviations for Model I**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1. PALCH2	1.00																										
2. PDRK2	0.83	1.00																									
3. PPOT2	0.69	0.69	1.00																								
4. PPALCH2	0.28	0.27	0.18	1.00																							
5. PPRK2	0.26	0.31	0.20	0.47	1.00																						
6. PPHIGH2	0.23	0.22	0.30	0.31	0.51	1.00																					
7. PPRUG2	0.15	0.14	0.15	0.39	0.41	0.59	1.00																				
8. AALCH2	0.71	0.68	0.54	0.19	0.17	0.22	0.12	1.00																			
9. ADRK2	0.68	0.72	0.56	0.19	0.20	0.20	0.09	0.77	1.00																		
10. APOT2	0.64	0.64	0.75	0.14	0.11	0.25	0.10	0.71	0.70	1.00																	
11. BEER2	0.61	0.62	0.53	0.18	0.17	0.20	0.13	0.59	0.58	0.54	1.00																
12. LIQ2	0.60	0.60	0.56	0.18	0.12	0.17	0.10	0.54	0.51	0.56	0.63	1.00															
13. POT2	0.52	0.56	0.75	0.11	0.08	0.26	0.12	0.48	0.48	0.66	0.55	0.61	1.00														
14. PALCH3	0.67	0.64	0.51	0.18	0.13	0.16	0.10	0.59	0.58	0.54	0.52	0.48	0.43	1.00													
15. PDRK3	0.62	0.65	0.51	0.22	0.19	0.16	0.12	0.56	0.61	0.54	0.54	0.44	0.43	0.84	1.00												
16. PPOT3	0.58	0.62	0.64	0.15	0.12	0.18	0.10	0.50	0.52	0.62	0.47	0.48	0.60	0.73	0.71	1.00											
17. PPALCH3	0.20	0.23	0.16	0.36	0.32	0.31	0.42	0.14	0.18	0.12	0.17	0.17	0.11	0.09	0.27	0.30	0.21	0.47	1.00								
18. PPRK3	0.23	0.21	0.12	0.29	0.34	0.25	0.23	0.16	0.18	0.11	0.22	0.11	0.09	0.27	0.30	0.21	0.47	1.00									
19. PPHIGH3	0.13	0.10	0.14	0.16	0.23	0.27	0.14	0.10	0.09	0.08	0.06	0.02	0.11	0.21	0.21	0.28	0.32	0.50	1.00								
20. PPRUG3	0.13	0.15	0.09	0.27	0.19	0.17	0.21	0.07	0.11	0.07	0.05	0.06	0.09	0.18	0.19	0.25	0.51	0.36	0.40	1.00							
21. AALCH3	0.58	0.55	0.42	0.11	0.05	0.11	0.00	0.64	0.58	0.52	0.51	0.44	0.36	0.70	0.64	0.54	0.09	0.16	0.09	0.03	1.00						
22. ADRK3	0.55	0.55	0.42	0.12	0.10	0.13	0.08	0.59	0.64	0.54	0.51	0.42	0.38	0.67	0.71	0.57	0.15	0.20	0.12	0.10	0.76	1.00					
23. APOT3	0.53	0.54	0.56	0.10	0.04	0.09	-0.02	0.55	0.57	0.67	0.45	0.46	0.51	0.63	0.62	0.72	0.12	0.14	0.12	0.14	0.12	0.70	0.69	1.00			
24. BEER3	0.56	0.59	0.46	0.17	0.13	0.13	0.07	0.54	0.55	0.51	0.71	0.50	0.46	0.63	0.66	0.55	0.18	0.22	0.11	0.11	0.63	0.62	0.57	1.00			
25. LIQ3	0.51	0.54	0.43	0.18	0.12	0.12	0.07	0.49	0.49	0.46	0.57	0.59	0.41	0.57	0.56	0.49	0.19	0.24	0.14	0.15	0.55	0.51	0.49	0.67	1.00		
26. POT3	0.49	0.53	0.61	0.08	0.09	0.13	0.01	0.47	0.61	0.48	0.46	0.68	0.52	0.56	0.49	0.73	0.13	0.21	0.17	0.45	0.48	0.67	0.58	0.52	1.00		
Mean	2.56	2.51	1.93	1.19	1.28	1.18	1.08	2.11	2.28	1.81	2.73	1.67	1.90	2.94	2.87	2.30	1.28	1.29	1.21	1.11	2.47	2.59	2.08	3.21	2.03	2.37	
SD	1.43	1.41	1.27	0.53	0.66	0.53	0.38	1.01	1.02	0.99	1.96	1.24	1.88	1.44	1.45	1.39	0.63	0.61	0.53	0.40	1.05	1.07	2.23	1.57	2.20		



or interpretations presented here. We thank Al Liska, the three anonymous referees, and the Editor of the *Journal of Quantitative Criminology* for helpful suggestions for revision of an early version of the manuscript.

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