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Social Learning and Structural Factors in Adolescent Substance Use*

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ABSTRACT

Akers' (1998) Social Structure and Social Learning (SSSL) model of crime and deviance posits that social learning is the principal social psychological process by which the social structural causes of crime and deviance have an impact on individual behavior. The central hypothesis of this model is that the effects of social structural factors on deviant behavior are substantially mediated by the variables specified in social learning theory. The SSSL model is tested here with data from the Boys Town study of adolescent substance use utilizing the LISREL program. The structural variables are gender, class, and age as indicators of differential location in the social structure; family structure, as a measure of differential social location; and community size, as an indicator of differential social organization. The social learning variables are differential peer association, differential reinforcement, definitions favorable and unfavorable to substance use, and imitation. The dependent variables are adolescent alcohol and marijuana behavior. The imitation variable does not fit into stable measurement models of the latent social learning construct and has weaker mediating effects. The other social learning variables do fit in stable models as indicators of the social learning construct in Structural Equation Models (SEM) and have substantial mediating effects on the relationships between the structural variables and substance use. The findings tend to support the theoretical expectations, but caveats and limitations of the study are outlined that have implications for future research to test the theory more fully.

KEYWORDS: social learning; social structure; alcohol; marijuana; differential association; differential reinforcement; gender; age; family structure; community size; mediating effects.

Structural theories of crime concentrate on the larger social context and characteristics that give rise to higher rates of crime and deviance while social psychological explanations focus on individual-level relationships and the process by which individuals' criminal behavior is influenced (Vold, Bernard and Snipes 1998; Akers 2000). The propositions and explanatory concepts in each approach are not necessarily contradictory, and indeed existing empirical evidence supports hypotheses derived from both perspectives. Integrating the two levels of explanation by specifying the links between the larger social context and the individual relationships that lead to criminal behavior seems a logical step (Messner, Krohn and Liska 1989).

One direction which such integration may take has been outlined by Akers (1998), who elaborates social learning theory to propose a Social Structure and Social Learning (SSSL) model in which the general proposition is that:

> variations in the social structure, culture, and locations of individuals and groups in the social system explain variations in the crime rates, principally through their influence on differences among individuals on the social learning variables -- mainly differential association, differential reinforcement, imitation, and definitions favorable and unfavorable and other discriminative stimuli . . . (Akers 1998:322).

The general culture and structure of society and the particular communities, groups, and other contexts of social interaction provide learning environments in which the norms define what is approved and disapproved, behavioral models are present, and the reactions of other people (for example in applying social sanctions) and the existence of other stimuli attach different reinforcing or punishing consequences to individuals' behavior. Social structure can be conceptualized as an arrangement of sets and schedules of reinforcement contingencies and other social behavioral variables. The family, peers, schools, churches, and other groups provide the more immediate contexts that promote or discourage the criminal or conforming behavior of the individual. Differences in

> the societal or group rates of criminal behavior are a function of the extent to which cultural traditions, norms, social organization, and social control systems provide socialization, learning environments, reinforcement schedules, opportunities, and immediate situations conducive to conformity or deviance (Akers 1998:322-23).

Thus, according to Akers, structural variables that produce variations in crime rates do so by affecting the process by which individuals learn to refrain from or commit acts that comprise the crime rate. One's location in the social structure, as indicated by characteristics such as age, gender, race, social status, family makeup, and community of residence affects one's chances of learning deviant and criminal behavior; because these locations structure one's exposure to models, associations, reinforcements, attitudes, and other aspects of the learning process. Although Akers discusses some relevant empirical research to support his theoretical ideas (1998:371), he characterizes the SSSL model as "a work in progress" that calls for further "critiques, tests, and modifications." The purpose of this paper is to offer an empirical test of hypotheses, derived from the SSSL model, that the impact of social structure--as indicated by gender, social class, age, family composition, and community size--on adolescents' alcohol and marijuana use will be mediated through the social learning variables of differential association, differential reinforcement, definitions, and imitation.

SOCIAL STRUCTURE AND SOCIAL LEARNING

Akers' social learning theory proposes that:

> The probability that persons will engage in criminal and deviant behavior is increased and the probability of their conforming to the norm is decreased when they differentially associate with others who commit criminal behavior or espouse definitions favorable to it, are relatively more exposed in-person or symbolically to salient criminal/deviant models, define it as desirable or justified in a situation discriminative for the behavior, and have received in the past and anticipate in the current or future situation relatively greater reward than punishment for the behavior (Akers, 1998:50; emphasis added).

Akers maintains that these social learning concepts identify the principal (albeit not the only) variables in the process by which social structure influences individual conduct. That is, structural variables affect behavior *through* their impact on the social learning variables of *differential association*, *differential reinforcement*, *definitions* and *imitation*. The various dimensions of social structure provide the general context (Bursik and Grasmick 1996) that increases or decreases the probability of crime and account for variations in group, community, or societal rates of crime and deviance. This context affects an individual's likelihood of committing crime by having an impact on the nature and content of the learning processes to which he or she is exposed.

Social structure generally refers to macro-level collectivities, institutional arrangements of roles and statuses, and systems of patterned interaction. However, what constitutes "social structure" and a "macro" or a "micro" level of analysis are somewhat ambiguous in the literature (Alexander et al. 1987; Rytina 1992). Although Akers does not attempt to resolve that ambiguity fully, he does specify four major dimensions of social structure that provide the contexts within which the social learning variables are hypothesized to operate. These are: (1) structural correlates of crime indicating differential social organization; (2) sociodemographic and socioeconomic correlates of crime indicating differential location in the social structure; (3) theoretically defined criminogenic aspects of the social structure, such as social disorganization; and (4) differential social location in primary, secondary and reference groups (Akers, 1998:330-335).

(1) The structural correlates of crime are the integral or aggregate-level characteristics of different social systems that have been shown empirically, or are theoretically expected, to affect, the rates of crime and deviance. The concept of "differential social organization" in the SSSL model incorporates these factors measured at the community or societal level such as population size and density, demographic composition such as the age, gender, and racial distributions or proportions in the population, and other regional, geographical, and economic attributes. These describe how societies, cultures, communities, and subcultural systems are organized. Criminological research has shown how certain levels of these characteristics of a social system may "lean it toward relatively high or relatively low crime rates" (Akers 1998:332). Often these are included in research simply as control variables or as empirical correlates of differing rates of crime and deviance, but they have also been used as indicators of theoretical constructs.

(2) The concept of "differential location in the social structure" in the SSSL model refers to ascribed and achieved attributes and social characteristics such as gender, race, marital status, socio-economic status, and age. Akers argues that while these describe individual social characteristics, they also locate where those individuals stand in the overall social structure with regard to their roles, groups, or social categories. To the extent that crime rates differ by these social characteristics or define categories of people with differing risks of criminal involvement they are defined in the model as social structural variables.

(3) "Theoretically defined" constructs refer to explanatory concepts found in various structural theories of crime and deviance such as anomie, class oppression, social disorganization, and patriarchy that identify societal or group conditions that are hypothesized in

those theories to produce higher crime rates. These concepts are not usually measured directly but rather are measured indirectly by population, sociodemographic, or socio-economic measures. For instance, Bursik (1988) and Sampson and Groves (1989) define the concept of social disorganization as the breakdown or absence of informal social control in the community. They note that researchers generally do not measure neighborhood or community social disorganization directly but use proxy measures such as high levels of poverty, high concentrations of lower status or minority groups, and high levels of inequality that are assumed to be causes of social disorganization.

(4) "Differential social location" of individuals in primary, secondary, and reference groups such as the family, friendship/peer groups, leisure groups, groups of colleagues, and work groups provides socialization and informal/formal social controls that regulate or encourage deviance. Individuals learn behavior patterns of deviance and conformity primarily within and through these groups.

If social learning mediates structural effects, then empirical models incorporating one or more of these dimensions of social structure and social learning with measures of crime or deviance as the dependent variables should show: (1) direct significant effects of the structural factors on social learning variables, (2) non-significant or at least substantially reduced direct effects of the structural factors on the dependent variables, and (3) substantial and significant direct effects of social learning variables on the dependent variables (Baron and Kenny 1986). Our analysis below evaluates these general expectations with data measuring social structural and social learning variables as the explanatory variables and adolescent drinking and marijuana behavior as the dependent variables. The models tested include measures of three of the dimensions of social structure identified by Akers as outlined above: (1) differential location in the social structure as indicated by gender and class, (2) differential social location as indicated by measures of family structure, and (3) differential social organization as indicated by size of community in which respondents reside. The data set do not include direct or indirect indicators of theoretical constructs from structural theories. Measures of these three dimensions of social structure as identified by Akers (1998) suffice for purposes of empirical tests of SSSL, but obviously the model would be more fully tested if measures of this fourth dimension were included.

We focus our remaining conceptual discussion on measures of the structural dimensions included in the analysis and on the proposed relationships among them, the social learning variables, and the likelihood of adolescent alcohol and marijuana use. This section also identifies the empirical hypotheses specifying the expected relationships among the variables as suggested by the SSSL model.

Gender

One of the most well-established empirical findings is that rates among males are higher than rates among females for most types of crime and deviance. Feminist theorists identify this as the "gender ratio problem" (Daly and Chesney-Lind 1988). Power-control theorists (Hagan, Gillis and Simpson 1987; Hagan 1990; Grasmick, Blackwell and Bursik 1996) argue that gendered authority relations characteristic of the work setting have implications for power relationships between parents within the household. These in turn influence the socialization of daughters and sons, particularly in terms of their tendencies toward risk-taking. In patriarchal families, girls are more closely supervised and monitored, whereas boys are more strongly encouraged to explore and engage in risky behavior. The result is a differential preference for risk-taking and, insofar as delinquency often involves risk, a greater likelihood for boys rather than girls to become involved in delinquent activity (Grasmick, Blackwell and Bursik 1993). Whether they reflect the balance of power between the sexes, styles of parental control in the family as power-control theory would propose, or other aspects of the social structure related to gender, SSSL theory would suggest that gender differences in rates of crime and delinquency can be approached by examining differences between males and females in social learning experiences, environments, and situations conducive to deviant rather than conforming behavior. The impact of patriarchal structures and the gendered nature of social relationships on female offending may not be adequately captured merely by insertion of a gender variable in an empirical model (see Chesney-Lind 1997). Nevertheless, one outcome of such structures is that sex role socialization and exposure to opportunities, beliefs and attitudes, models, and rewards are differentially distributed in society in ways that tend to encourage norm-violating behavior in boys more than in girls.

In the SSSL model, such gendered learning holds for group differences but is not assumed to be uniformly distributed among all males and all females. Therefore, "if an individual female scores higher on these [social learning] variables in the deviance-prone direction for a particular type of behavior than an individual male, she will have a higher probability than he will of committing the deviant act" (Akers 1998:339).

In sum, the ratio of male to female deviance is a reflection of the extent to which socialization practices and behavioral learning are gendered within society. These theoretical links suggest our first set of hypotheses:

Hypothesis 1a. The bivariate relationship between gender and adolescent drinking and drug behavior will be significant: boys will be more likely than girls to report smoking marijuana and drinking alcoholic beverages and to do so more frequently.

Hypothesis 1b. In a multi-variate model, the direct effect of gender on adolescent drinking and marijuana

smoking behavior will be mediated through the social learning variables. That is, gender will have a significant direct effect on social learning variables and a non-significant effect on adolescent substance use. The social learning variables will have a substantial and significant direct effect on drinking and marijuana behavior.

Social Class

Social class is another factor that has long been treated in sociological theory as an important factor in crime. Anomie, social disorganization, conflict, and Marxist theories hypothesize an inverse relationship between socioeconomic status and deviant or criminal behavior (Merton 1957; Shaw and McKay 1969; Lynch and Groves 1986; Quinney 1980; Vold et al. 1998). Nevertheless, the exact relationship of social class to various types of crime and deviance remains much debated and is not as well established empirically as is the relationship between gender and crime. While some researchers have found that social class is either not significantly related to or only weakly related to criminal and deviant behavior, others have found significant effects under certain conditions (Tittle and Meier 1990).

In the SSSL model proposed by Akers, socioeconomic status would be expected to influence crime and deviance to the extent that it is associated with different patterns of association, reinforcement, imitation, and definitions. One route by which social class might affect social learning is class-related interpersonal stresses. McCord (1991) hypothesizes that hostile fathers provide their sons with poor behavioral role models against which to pattern their future adult conduct. To the extent that fathers from lower class households undergo more stress due to financial hardship and hence may be more likely to have negative family relationships, the role models they provide their children may be more conducive to criminal behavior.

Another way in which social class may influence social learning variables is through social capital. If members of middle and upper class groups have more extensive social networks, then these associations should offer adolescents and young adults concrete economic opportunities as well as role models for attaining success through legitimate activities (Krivo and Peterson 1996). Disadvantaged families with sparser social networks are less able to provide their children with these associations or role models. Likewise, conformist behavior is less likely to be reinforced if there are fewer individuals within a social network who can or would provide that encouragement.

Class might also affect social learning processes by having an impact on what behavior, conforming or deviant, is more likely to be economically or socially reinforced for persons in different class positions. Lower status youth may have fewer opportunities for conforming behavior to be rewarded and lower expectations that conventional educational and occupational behavior will pay off. In contrast, middle and upper status youth may have more to lose by engaging in deviant behavior. That is, from a social learning perspective, differential opportunities (Cloward and Ohlin 1960) and different investments in conformity (Hirschi 1969) related to socio-economic status affect behavior through the process of differential reinforcement (Akers 1989). However, the mediation of structural effects by social learning variables is not dependent on the direction of those effects. Alcohol consumption, for instance, may be positively related to social status (Akers 1992). Whatever the direction, the theory hypothesizes that differences by class in behavior reflects class-related differences in associations, modeling, definitions, and reinforcement.

Hypothesis 2a. The bivariate relationship between social class and adolescent drinking and marijuana behavior will be significant.

Hypothesis 2b. In a multi-variate model, the direct effect of social class on adolescent drinking and smoking behavior will be mediated through the social learning variables. That is, social class will have a significant direct effect on social learning variables and a non-significant effect on adolescents' drinking alcohol and smoking marijuana. The social learning variables will have a significant direct effect on the dependent variables.

Age

As with other sociodemographic factors, age is routinely included as a control variable in research on criminal, delinquent, and deviant behavior. But the theoretical significance of age has also been the subject of extensive debate and empirical testing (see for instance, Gottfredson and Hirschi 1990; Sampson and Laub 1993; Warr 1993; Tittle 1995; Jang and Krohn 1995; Akers and Lee 1999). Prior research has measured age both by age categories over the life span and by specific ages within a particular age category such as adolescence. Although the exact shape of the curve is strongly contested, there is general agreement in the literature that during the adolescent years there is a positive relationship of deviance to age; in later adulthood it becomes a negative relationship. The findings of much of the research is consistent with the prediction from the SSSL model regarding age as an indicator of location in the social structure. As such, the effect of age on behavior should be mediated by the social learning process.

Hypothesis 3a. The bivariate relationship between age and adolescent drinking and marijuana behavior will be positive and significant.

Hypothesis 3b. In a multi-variate model, the direct effect of age on adolescent drinking and smoking behavior will be mediated through the social learning variables. That is, age will have a significant direct effect on social learning variables and a non-significant effect on adolescents' drinking alcohol and smoking

marijuana. The social learning variables will have a significant direct effect on the dependent variables.

Family Structure

The most consistent focus of research on family and deviance has been on the two-parent, single-parent, or no-parent makeup of the family. Generally, that research has found that children in families in which both mother and father are present are less likely to engage in deviant and delinquent behavior than children reared in single-parent homes (Friedman et al. 1980; Ben-Yehuda and Schindell 1981; McLanahan and Bumpass 1988; McLanahan and Booth 1991).

A parallel finding at the aggregate level is that neighborhoods with higher proportions of single-parent households have higher crime rates. Since most single parents are women, prominent explanations for this relationship focus on the consequences of the absence of males at the community level. Such communities typically lack the strong, positive role models that employed and socially integrated males, particularly fathers, provide. Additionally, the absence of a significant population of males, again particularly fathers, with strong commitments to their homes and a firm stake in the safety and stability of their communities further erodes informal social control and consequently encourages the likelihood of juvenile delinquency and criminality (Krivo and Peterson 1996; Sampson, Raudenbush and Earls 1997).

The SSSL theory would hypothesize that social learning variables mediate family and neighborhood effects on delinquency. Kids in single-parent households are at higher risk of differential exposure to pro-deviant associations, reinforcements, role models, and definitions. All else being equal, two parents are in a better position than a single parent to provide supervision and control of conformity in the family, counter associations with deviant peers, exposure to conforming models and attitudes, isolation from deviant media and peer influences, and construction of a more rewarding environment for conformity than for rule violation. Of course, other factors such as the quality of parent-child interaction, parental acceptance, children's attachment and identity with parents, and intra-family conflict are not always equal. Thus, the children of a single parent who provides consistent discipline, a loving environment, adequate supervision, firm but fair parental control, and insulation from deviant peer and other influences would be less likely to be involved in deviant activity than children from a two-parent family in which these elements of family socialization and control are lacking. Nevertheless, these elements are expected to be present more in two-parent families, and therefore, the hypotheses regarding family structure are:

Hypothesis 4a. The bivariate relationship between family structure and adolescent drinking and marijuana behavior will be significant, with children of single-parent and non-parental households more likely than those of two-parent households to report using alcohol and marijuana.

Hypothesis 4b. In a multi-variate model, the direct effect of family structure on adolescent drinking and smoking behavior will be mediated through the social learning variables. That is, family structure will have a significant direct effect on social learning variables and a non-significant effect on adolescent substance use. The social learning variables will have a significant direct effect on substance use.

Community Size

Various social and demographic aspects of community structure; including population size, composition, and density; regional location; economic conditions; and community type (rural, urban, or suburban) have been related to crime and delinquency (Sampson 1986; Krohn, Lanza-Kaduce and Akers 1984). As noted earlier, the SSSL model defines such community variations as indicators of differential social organization. The data set does not allow examination of these various dimensions of community, but it does have a measure of the size of the communities in which the adolescents reside that is used here as the indicator of community structure. The expectation is that the larger the community the greater the likelihood that adolescents in it will consume alcohol and marijuana.

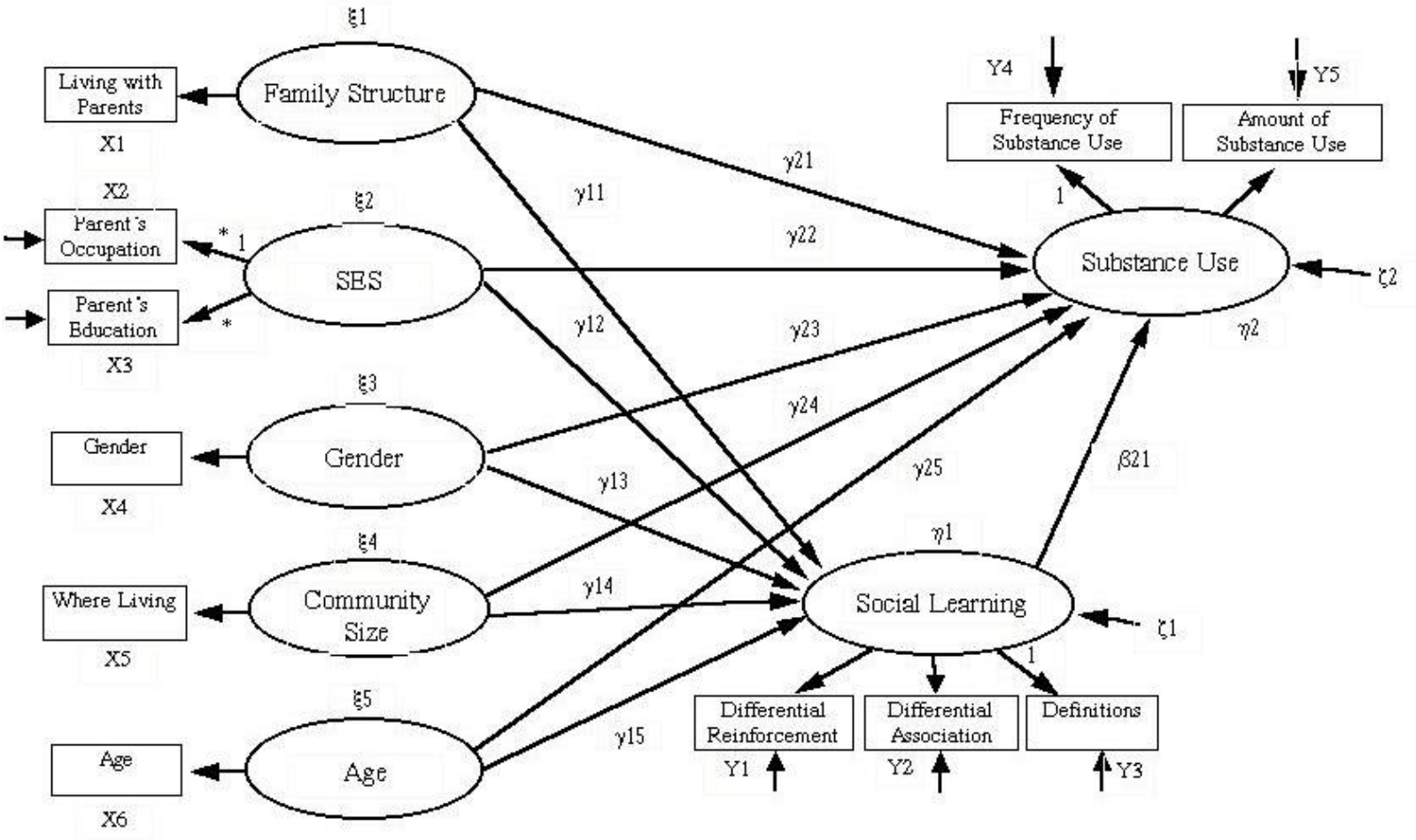
Hypothesis 5a. The bivariate relationship between community size and adolescent drinking and marijuana behavior will be positive and significant.

Hypothesis 5b. In a multi-variate model, the direct effect of community size on adolescent drinking and smoking behavior will be mediated through the social learning variables. That is, community size will have a significant direct effect on social learning variables and a non-significant effect on adolescents' drinking alcohol and smoking marijuana. The social learning variables will have a significant direct effect on the dependent variables.

METHODS

Figure 1 presents the general SSSL tested here. The empirical analysis evaluates a direct effect and a mediated effect model for both alcohol use and marijuana use to test the general proposition, and the specific hypotheses above, that social learning mediates the relationship of substance use by adolescents to family structure, socioeconomic status, gender, community size, and age. In the models the exogenous latent variables of family structure, gender, community size, and age each has a single indicator with an assumption of no measurement error ($x_1=\xi_1$, $x_4=\xi_3$, $x_5=\xi_4$ and $x_6=\xi_5$). The measures of the other exogenous variable, socioeconomic status, SES, (ξ_2), are parents'occupation (x_2) and education (x_3). The social learning variables of differential reinforcement (y_1), differential association (y_2), and definitions (y_3) are viewed as indicators of the latent construct (η_1) "Social

Figure 1. Theoretical Model for Social Structure, Adolescent Substance Use, and Social Learning



Correlations among exogenous variables not shown.
* Lamda 2 2 and 3 2 are constrained to be equal.

Learning." Figure 1 does not include imitation because, for reasons noted below, imitation effects are tested in a separate model. Frequency and amount of use are the two indicators of a single latent construct (η_2) of substance use (either alcohol or marijuana). The LISREL 8 program (Joreskog and Sorbom 1996) is used for estimation of the SSSL models of adolescent drinking behavior and marijuana use.

Our data originate in the Boys Town study of adolescent drug and alcohol use in Midwestern communities (Akers et al. 1979; Akers 1998). They were collected from 3,065 male and female students attending grades 7 through 12, using a two-stage sample design. First, schools from each participating district were selected by school size and location within the district. Secondly, depending on school and average class size, two or three classrooms per grade level were selected. Questionnaires were administered to all students who had obtained written parental permission and who were in attendance on the day of the survey. Attrition from the selection procedure and absenteeism was reasonable; of the total number of students enrolled in the sampled classes, 67% completed the questionnaires.

Measurement of Variables

Adolescent substance use. Response categories for frequency of alcohol and marijuana use range from never used (coded 1) to used every day (coded 6). Response categories for amount of alcohol and marijuana use range from "never used" in any amount (coded 1) to have "used large amounts" (coded 4). Measures of both the alcohol and marijuana variables are highly reliable with strong consistency of responses among interlocking items on the questionnaire and between the questionnaire responses and responses in a retest interview administered to a subsample of respondents sometime after they had completed the questionnaire (Akers et al. 1979).

Structural factors. Our research includes three of the four dimensions of social structure specified in the SSSL model. First, gender, age, and socioeconomic status (SES) are our indicators of "differential location in the social structure." Fifty-six percent of the respondents are female (coded as "0") and forty-four percent are male (coded as "1"). The mean age of the sample is 15.3 years with an effective range of 12 to 18 (one respondent reported age as 10 and four reported an age of 19). Because the sample in this study consists of adolescents who were still in school and not employed full-time, SES is measured by the occupation and education of the parents (Elliott and Ageton 1980; Elliott and Huizinga 1983; Sampson 1986). Parents' occupation is coded from 1 (unskilled laborers) to 7 (professional). Parents' education is measured as the highest level of school completed and coded from 1 (eighth grade or less) to 6 (post-graduate education). In two-parent families, the occupation and education of the parent with the higher levels are used as the measures of socioeconomic status. In non-parental household, the SES of the principal income earner is used.

Second, "differential social location in primary groups" is indicated by family structure. Two-parent families (whether or not both are biological parents of the respondent), in which 84% of the respondents lived at the time of the study, are coded 3, single-parent families are coded 2, and households in which neither parent was present (for instance, living with some other relatives or unrelated adults) are coded 1. Third, "differential social organization" is indexed by size of the communities in which respondents were living at the time of participating in the study. These are categorized as: living on a farm (coded 1), in a rural area but not on a farm (coded 2), in a small town (coded 3), in a suburban community outside of a large city (coded 4), and in a large city (coded 5). Slightly over half of the respondents lived in a large city, a third resided in a small town or suburb, and about one in ten lived in a rural area or on a farm.

Social learning variables. *Differential peer association* is measured with the question, "How many of your friends use [alcohol] [marijuana] at least sometimes?" asked separately for friends known for the longest time (duration), friends most often associated with (frequency), and best friends (intensity). The response categories are none (coded 1), less than half (coded 2), more than half (coded 3), or almost all (coded 4). These three highly inter-correlated items are combined into a scale (range of scores = 3-12) for alcohol use and for marijuana use (item to scale correlations range from .83 to .96). The use of these three items to measure differential peer association goes beyond the single-item measure of proportion of friends who engage in deviant behavior commonly found in the literature. There is a fourth modality of association, priority, identified in the literature (Akers 1998), but the Boys Town Study data do not include a measure of priority.

Using the respondents' report of proportion of friends' deviant behavior as a measure of differential peer association and then using that to explain the respondents' self-report of their own deviant behavior has been criticized as producing an empirical tautology. That is, it is claimed that one is measuring the same phenomenon whether respondents are asked about the delinquency of their friends, as the independent variable, or about their own delinquency, as the dependent variable (Gottfredson and Hirschi 1990). A related critique is that any relationship found between the two variables is a methodological artifact because one's reports of others' behavior, even if it is not measuring the same thing as asking about one's own behavior, is based on the respondent's perception of what others are doing, a perception that is said to be shaped mainly or wholly by one's own behavior (Kandel 1996). But cross-sectional and longitudinal research has shown that the

two, in fact, are not alternative indicators of the same underlying construct, and the respondent's reports of friends' behavior is not simply a reflection of one's own behavior. Rather, the measures tap empirically distinct phenomenon, and self-reported delinquency remains strongly related to peer associations even when measured independently of the respondents' report of friends' behavior (Warr 1993; Thornberry et al. 1994; Elliott and Menard 1996; Haynie 2002).

Differential reinforcement is measured by asking respondents, again separately for alcohol and marijuana, whether they perceive the consequences of use to be mainly negative, mainly positive, or balanced between negative and positive outcomes. One's own *definitions* favorable or unfavorable to alcohol and marijuana use are measured by asking the respondent "what is your attitude toward using . . . [alcohol; marijuana]." Responses on this item are "disapprove" (coded 1), "don't care one way or the other" (coded 2), "sometimes approve and sometimes disapprove" (coded 3), or "approve" (coded 4) of the use of the substance by adolescents.

Imitation is measured by asking respondents if they had "observed or watched anyone whom you admire" using alcohol or marijuana; parents, other adults, or peers ("others about your own age"); and forming an index of exposure to alcohol use by admired models (with scores ranging from 0-3) and the same index for marijuana use. In preliminary data analysis (not shown) it was found that the lambda loadings for imitation were low and not reliable in Structural Equation Models for both alcohol and marijuana, preventing good fitting models when imitation was included along with the other social learning variables as indicators of the latent construct of Social Learning. Since imitation cannot be included in the SEM models with differential association, differential reinforcement, and definitions as the indicators of the social learning process (see Figures 2 and 3), its effects are analyzed separately (see Table 2).

FINDINGS

Table 1 presents the zero-order correlation matrix for all variables used in the analysis. The great majority of both boys and girls in this sample live in two-parent homes and there is no difference in family structure by gender. The skewed distribution of the sample on the family structure variable also probably accounts in part for its very modest relationship with both substance use (-.05 and -.10) and the social learning variables (-.03 to -.09). These relationships are statistically significant and support hypothesis 4a, but their lower magnitude requires caution in reaching conclusions about the effects of family structure on substance use in this sample.

The relationships of the adolescents' substance use to parents' occupation and education are weak and, with a couple of exceptions, non-significant. Hypothesis 2a is supported only for marijuana use. Alcohol and marijuana behavior are more clearly and more often significantly associated with gender (Hypothesis 1a). Even here the relationships tend to be weak to moderate (.06 to .15). Given the magnitude of these correlations, the theoretical expectation is that the relationships between SES and the social learning variables would also be relatively weak and that is what is found (-.01 to -.06). Marijuana smoking is positively and significantly related to community size (Hypothesis 5a), but again the correlations are weak. Only the frequency of alcohol use is significantly, but negatively, related to community size. Age is substantially and significantly related to all measures of the dependent variables (Hypothesis 3a).

Both marijuana smoking and drinking of alcohol by the boys and girls in this sample are strongly and significantly related to the social learning variables of differential peer associations, definitions, and differential reinforcement (correlations ranging from .44 to .68 for alcohol and .58 to .78 for marijuana). Imitation is significantly correlated with marijuana smoking (.34 to .35) and drinking of alcohol (.24 and .25), but not as strongly as the other social learning variables. The stronger effects of the proximal social learning variables, rather than of the more distal social structural variables, are not surprising. Age has robust effects, but the effects of gender, socio-economic status, family structure, and community size on substance use are not strong. Thus, there is less structural effect to be mediated by the social learning variables. As noted, SSSL theory would expect that whatever the magnitude of the effect of a social structural variable on the dependent variable, it will be largely mediated by the social learning variables. Of course, if the relationship is zero or close to zero, there is nothing to mediate. In that case the theory expects essentially a zero effect of the structural variables on the social learning process. "Some structural variables are not related to crime and do not explain the crime rate because they do not have a crime-relevant effect on the social learning variables" (Akers, 1998:322). Thus, although there are limitations that will be noted later, the relevant hypotheses can be tested and the theoretical model evaluated with the data at hand.

The results of testing the theoretical model, with standardized coefficients, are shown in Figure 2, adolescent alcohol use, and in Figure 3, adolescent marijuana use. The level of intercorrelation among the structural variables shown in Table 1 indicates little cause for concern about multicollinearity, but nonetheless all of the exogenous variables in Figures 2 and 3 are correlated to control for any potential problems with multicollinearity among social structural variables. Since differential association, differential reinforcement, and definitions are all indicators of the same underlying construct of Social Learning, there is no problem of multicollinearity among the social learning variables. The direct effects of the family structure, SES, gender,

Table 1. Correlation Matrix for study variables[1]

		1	2	3	4	5	6	7	8	9
	MEAN	3.80	4.98	3.96	0.44	4.06	15.3	2.82	2.47	2.42
	STDDEV	0.54	2.03	1.21	0.50	1.21	1.72	0.95	1.09	0.76
1	Family Structure	1.00								
2	Parents Occupation	0.16**	1.00							
3	Parents Education	0.04*	0.42**	1.00						
4	Gender (0=girl, 1= boy)	0.01	-0.03	0.02	1.00					
5	Community Size	-0.07**	-0.01	0.02	-0.05**	1.00				
6	Age	-0.01	0.09**	0.03	0.02	0.03	1.00			
7	Definitions (Alcohol)	-0.04*	0.04*	-0.04*	0.04*	-0.05	0.24**	1.00		
8	Diff. Asso. (Alcohol)	-0.04*	0.03	-0.01	0.04*	0.00	0.45**	0.49**	1.00	
9	Diff. Reinfor. (Alcohol)	-0.03	-0.00	-0.03	0.04*	-0.03	0.22**	0.47**	0.42**	1.00
10	Imitation (Alcohol)	-0.01	0.05**	0.02	-0.04*	0.04*	0.22**	0.22**	0.32**	0.19**
11	Definitions (Marijuana)	-0.08**	-0.01	-0.02	0.04*	0.03	0.21**	0.46**	0.51**	0.31**
12	Diff. Asso. (Marijuana)	-0.09**	-0.03	-0.06**	0.03	0.03	0.27**	0.34**	0.67**	0.27**
13	Diff. Reinfor. (Marijuana)	-0.09**	-0.01	-0.02	0.07**	0.02	0.22**	0.39**	0.48**	0.43**
14	Imitation (Marijuana)	-0.05*	0.01	0.01	-0.03	0.02	0.23**	0.26**	0.38**	0.23**
15	Frequency of Alcohol	-0.08**	0.01	-0.02	0.13**	-0.04*	0.39**	0.53**	0.68**	0.45**
16	Amount of Alcohol	-0.05*	0.02	-0.01	0.15**	-0.02	0.31**	0.52**	0.62**	0.44**
17	Frequency of Marijuana	0.10**	-0.03	-0.04*	0.08**	0.04	0.25**	0.31**	0.52**	0.23**
18	Amount of Marijuana	-0.10**	-0.02	-0.04*	0.06**	0.05**	0.24**	0.33**	0.53**	0.23**

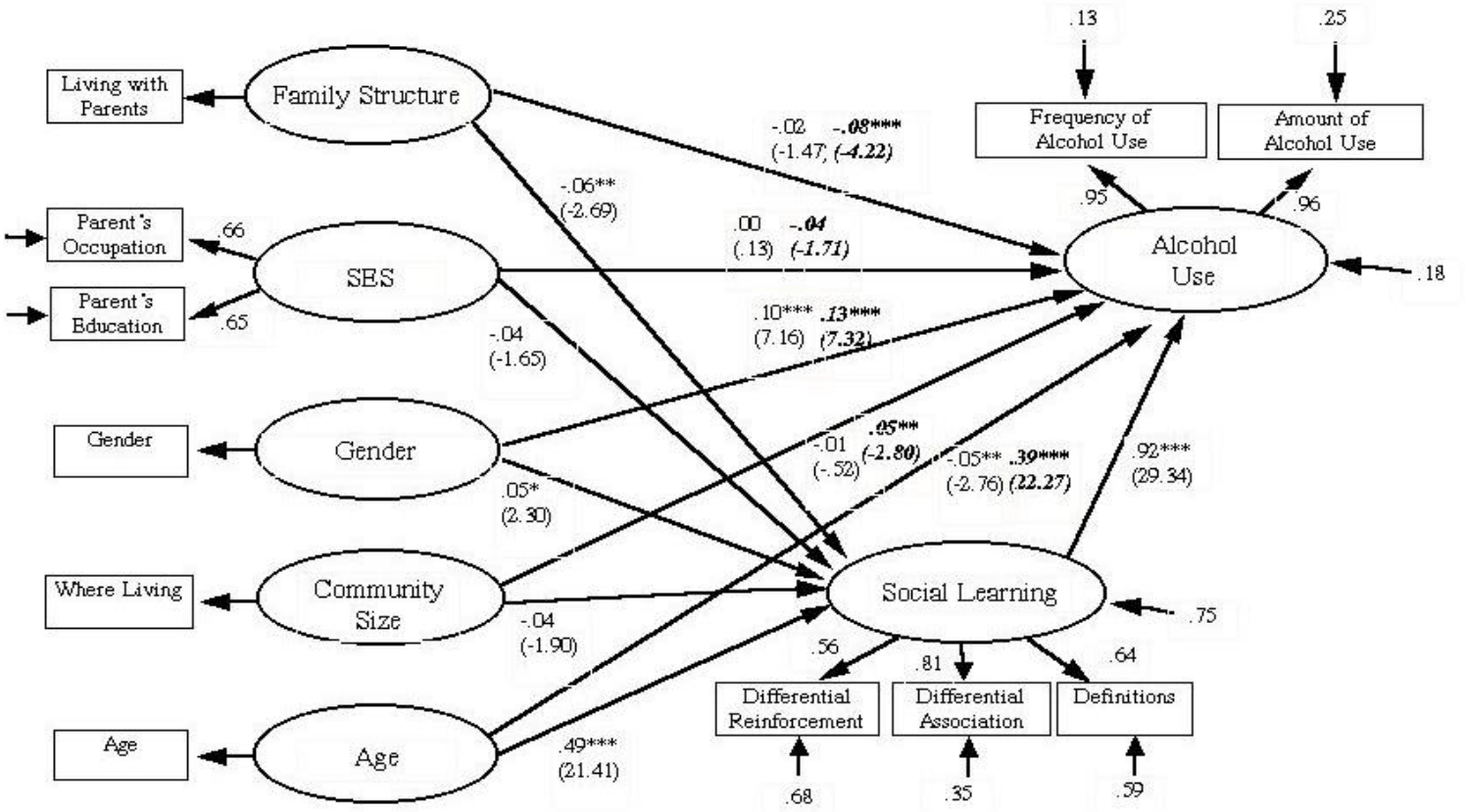
1. Pairwise deletion
*P<.05; **p<.01

Table 1. Continued[1]

		10	11	12	13	14	15	16	17	18
	MEAN	1.16	2.12	1.89	2.12	1.01	2.99	2.35	2.17	1.75
	STDDEV	1.01	1.16	1.01	1.16	0.94	1.45	0.91	1.67	1.02
10	Imitation (Alcohol)	1.00								
11	Definitions (Marijuana)	0.18**	1.00							
12	Diff. Asso. (Marijuana)	0.19**	0.70**	1.00						
13	Diff. Reinfor. (Marijuana)	0.18**	0.67**	0.57**	1.00					
14	Imitation (Marijuana)	0.54**	0.38**	0.40**	0.36**	1.00				
15	Frequency of Alcohol	0.25**	0.53**	0.57**	0.49**	0.34**	1.00			
16	Amount of Alcohol	0.24**	0.49**	0.49**	0.46**	0.32**	0.81**	1.00		
17	Frequency of Marijuana	0.15**	0.71**	0.78**	0.58**	0.34**	0.59**	0.49**	1.00	
18	Amount of Marijuana	0.15**	0.71**	0.76**	0.59**	0.35**	0.58**	0.54**	0.91**	1.00

1. Pairwise deletion
*P<.05; **p<.01

Figure 2. Maximum Likelihood Estimates for Social Structure and Social Learning of Adolescent Drinking Alcohol

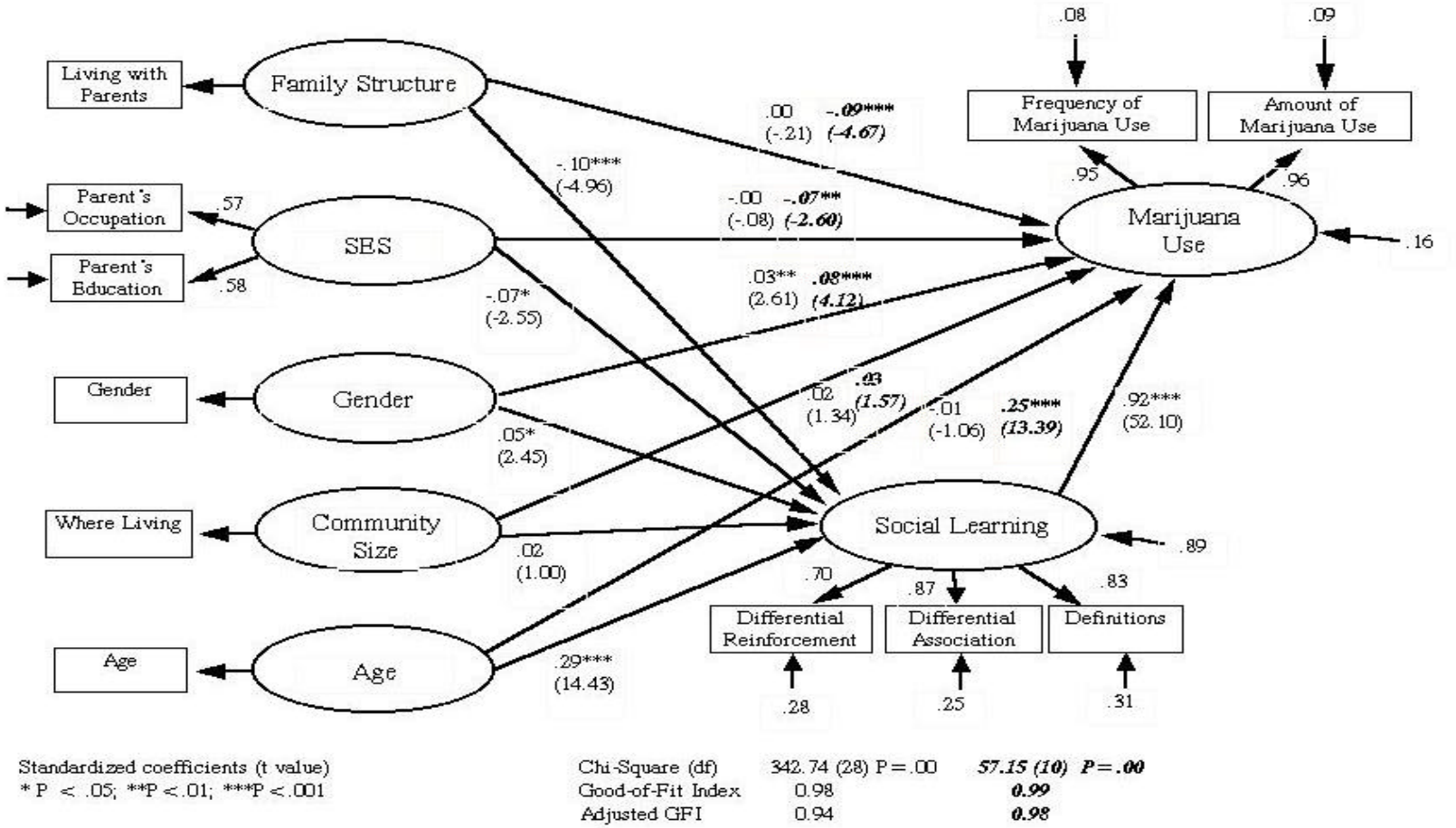


Standardized coefficients (t value)
* P < .05; **P < .01; ***P < .001

Chi-Square (df)	298.55 (28) P = .00	***67.13 (10) P = .00***
Good-of-Fit Index	0.98	***0.99***
Adjusted GFI	0.95	***0.98***

Correlations among exogenous variables not shown.
Italic and **Bold** indicate coefficients and t-value for direct effect model without social learning mediation.

Figure 3. Maximum Likelihood Estimates for Social Structure and Social Learning of Adolescent Marijuana Smoking



Standardized coefficients (t value)
* P < .05; **P < .01; ***P < .001

Chi-Square (df)	342.74 (28) P = .00	***57.15 (10) P = .00***
Good-of-Fit Index	0.98	***0.99***
Adjusted GFI	0.94	***0.98***

Correlations among exogenous variables not shown.
Italic and **Bold** indicate coefficients and t-value for direct effect model without social learning mediation.

community size, and age on adolescents' alcohol use without taking into account the effects of social learning are displayed in italics and bold font. As adumbrated by the zero-order correlations, drinking alcohol by adolescents is significantly associated with all structural variables except socioeconomic status. Theoretically then we would expect that the structural factors that have significant effects on substance use would have significant effects on the social learning variables and that structural factors with no significant direct effect on substance use will tend to have no significant direct effect on social learning. That is close to what the results reveal; all but community size have significant effects on the variables in the social learning process and, with the exception of gender, at about the same magnitude as their direct effects on substance use.

The findings in Figures 2 and 3 support the mediating effects hypothesized in Akers' SSSL model. The Goodness-of-Fit Indexes demonstrate that these models fit the data very well. The social learning construct is strongly related to both adolescents' alcohol and marijuana behavior, and its introduction into the model substantially reduces the effects of the structural factors on alcohol and marijuana use. Indeed, the effects of the social structural variables on marijuana use are reduced to virtually zero. Even in the case of gender, the remaining effect on marijuana use (.03) not mediated by social learning, while statistically significant, is substantively small. However, it should be noted that gender, while mediated to some extent, retains significant and non-trivial effects on alcohol use (.10) unmediated by the social learning variables. Further, while the substantial direct age effect (.39) on alcohol is very largely mediated by the social learning construct, age retains some statistically significant, unmediated effect (-.05).

Table 2 presents the standardized coefficients with imitation as the only social learning variable in the models. Column 1 presents the findings on alcohol use, and Columns 2 shows the results of the analysis for marijuana use. As shown in Table 2, imitation has significant net effects on marijuana use and significant, albeit moderate, effects on alcohol use. However, of the structural variables, only age has significant effects on imitation, and imitation only partially mediates the age effects on substance use. Thus, observation of others'

Table 2. Maximum Likelihood Estimates for Social Structure and Imitation of Adolescent Substance Use

	Alcohol use (N=2,705)	Marijuana use (N=2,700)
	Mediated Model	Mediated Model
Variables		
Family structure	-0.08 ***	-0.08***
to substance use	(-4.42)	(-4.36)
Socioeconomic status	-0.02	-0.03
to substance use	(-0.92)	(-1.56)
Gender	0.13 ***	0.09 ***
to substance use	(7.79)	(4.99)
Community level	-0.05 **	0.02
to substance use	(-3.12)	(1.21)
Age	0.35 ***	0.18 ***
to substance use	(20.00)	(9.77)
Family structure	-0.01	-0.05
to imitation	(-0.75)	(-1.02)
Socioeconomic status	0.01	-0.02
to imitation	(-0.63)	(-2.55)
Gender	-0.04	-0.03
to imitation	(-1.95)	(-1.83)
Community size	0.03	0.01
to imitation	(1.35)	(0.57)
Age	0.22 ***	0.22 ***
to imitation	(11.50)	(11.93)
Imitation to substance use	0.17 ***	0.30 ***
	(9.45)	(16.83)
Chi-Square (df)	3397.14 (15) P=.00	5389.75 (15) P=.00
Good-of-Fit Index	0.84	0.82
Adjusted GFI	0.53	0.45

Standardized coefficients (t value)
*P < .05; **P <; ***P < .001

using substances by itself plays a relatively minor role in understanding the social learning process by which social structure has an impact on adolescent substance use in this sample. This may result in part from the different role that imitation is hypothesized to play in the social learning process. It is expected to have some effect at any stage, but theoretically should play a relatively larger role in the onset or initiation of use "than in the maintenance or cessation of behavioral patterns once established . . ." (Akers 1998:75). The measures of substance use in this data set reflect maintenance of use or non-use, not initiation. One may rightly conclude from the findings that structural effects on maintenance of adolescent substance use for the most part are substantially mediated by the social learning process, but the findings also indicate this mediation is based primarily on the other aspects of the social learning process (association, definitions, and reinforcement) and less on modeling/imitative dimensions of the process.

CONCLUSIONS, LIMITATIONS, AND IMPLICATIONS

Finding a substantial and significant relationship between age and substance use supported the bi-variate hypothesis 3a. Further the bi-variate hypotheses (1a, 4a, and 5a) linking gender, family, and community size to alcohol and marijuana use in our sample of adolescents were also supported by findings of statistically significant, although weak to modest, relationships. But the hypothesized relationship of substance use to socioeconomic status held only for marijuana use; socioeconomic status had no independent effect on adolescent alcohol use. Given these findings, the theory would propose statistically significant and substantial effects of age on the social learning variables and statistically significant but weak to modest effects of gender and family structure for marijuana and alcohol behavior, with little effect of socioeconomic status in the case of alcohol use and community size in the case of marijuana use, on variations in the social learning variables. These expectations were met.

The major purpose of the empirical evaluation was examination of SEM models incorporating the social structural, social learning, and substance use variables. These models permitted testing hypotheses (1b to 5b) that whatever effects (whether strong or weak) gender, socio-economic status, age, family structure, or community have on adolescent substance use, they would be substantially mediated by the social learning process, as measured by differential peer association, definitions, and differential reinforcement. These hypotheses were supported, and the data fit theoretical expectations. Akers makes it clear that empirical support for the SSSL model does not require that social learning processes mediate all of the structural effects (although obviously that outcome would be maximally supportive). Rather the expectation is that:

> the variables specified in the social learning process account for a *substantial portion* of the individual variations and stabilities in crime and deviance and mediate a *substantial portion* of the relationship between *most* of the structural variables in the model and crime.
>
> If substantial portions of the variations (by normally accepted standards in social science) are accounted for by the variables in the theory, then it is confirmed. Weaker relationships can still be taken as support for the theoretical model in its weak form. […] Adequate and acceptable tests of the theory, then, do not need to demonstrate absolute confirmation or falsification, but only the preponderance of credible evidence […]. Are the direction and relative magnitude of relationships in support of or counter to the theory? (Akers 1998:340-41, emphasis in original)

The findings of the LISREL analysis sustained the conclusion that variations in the behavioral and cognitive variables specified in the social learning process (1) account for substantial portions of the variations in adolescent use of drugs and alcohol and (2) mediate substantial, and in some instances virtually all, of the effects of gender, socio-economic status, age, family structure, and community size on these forms of adolescent deviance. We found, as proposed by the SSSL model, that social learning theory offers a useful and empirically supported set of concepts and principles for understanding how social environmental factors have an impact on behavior (Burgess and Youngblade 1988).

While the results of the analysis provide general support for the SSSL model, there are caveats and limitations of the present study that argue for caution in evaluating the empirical soundness of the model and suggest issues for attention in future research.

First, the models tested here did not incorporate indicators of some important concepts. We were not able to measure one of the major elements identified by Akers (1998) as "theoretically defined" criminogenic characteristics of social structure proposed in sociological theories such as social disorganization, conflict, or anomie. We believe that the SSSL model was fairly tested with three of the major elements of social structure (differential social organization, differential location in the social structure, and differential location in primary groups) included for both alcohol and marijuana use. Nonetheless, future research should address social learning links between criminal and deviant behavior and measures of social disorganization or other aspects of social structure that macro theories of crime have identified as causes of crime.

Recall that imitation had to be excluded from the main analysis to obtain stable models. A separate analysis showed that imitation without other social

learning variables in the model provided only a little mediation of the effects of structural variables. We contend that the measures of social learning remaining in the final models provide a fair test of the theory and conform to measurement models of social learning in previous research (Akers and Lee 1996). Nevertheless, future research should empirically evaluate models containing measures of all dimensions of social structure and social learning specified in the SSSL model. This will entail improved measures of imitation that retain strength in models with measures of the other social learning concepts. Previous research has shown that, with different measures, imitation can have stronger effect (Spear and Akers 1988; Boeringer, Shehan and Akers 1991), but other measures of imitation were not included in the Boys Town data set (Akers 1998). These dimensions should be incorporated into multilevel studies (Simcha-Fagan and Schwartz 1986; Flay and Petraitis 1994; Sampson et al. 1997) and contextual analyses of the type outlined by Bursik and Grasmick (1996).

Second, there are limitations in the measures of dimensions of the SSSL model that were included in the present study. "Differential location" in the social structure was measured by gender and socio-economic status (parents' occupation and education), and "differential social location" in primary and other groups was measured by family structure. Our measure of class location by socio-economic status is a common one in research, but it had essentially no relationship to adolescent drinking. Therefore, there was no class effect for the social learning variables to mediate. This finding is consistent with previous research on teenage drug and drinking behavior. But as Tittle and Meier (1990) found, measures of social class that distinguish an "underclass" may reveal significant relationships between class and deviant behavior that variable measures of socio-economic status do not. Future research should include such operationalization of social class and re-evaluate how well social learning processes mediate the class-crime relationship. Also, there are other dimensions of "differential social organization" beyond community size that should be measured in future research. Community size had a small, but significant effect on alcohol use that was mediated almost completely by social learning, and it had an even smaller and non-significant effect on marijuana use. The structural impact of community was probably underestimated by the measure of size used here, and future research might more accurately gauge community effects by using different measures of community structure.

As noted earlier, over 80 percent of the adolescents in our data set lived in two-parent homes, clearly suggesting the need for additional analyses of samples that include respondents with more varied experiences on this measure. Furthermore, while certainly an important primary group, family is but one of several that may influence criminal and deviant behavior. Church membership, friendship networks, work relationships, and others all contribute to one's overall social group location, and they are all settings in which social learning variables may exert their mediating influence on behavioral outcomes. (For a study of social learning and the group context of youth gangs, see Winfree, Vigil-Backstrom and Mays 1994; for evidence of the centrality of differential association in friendship networks see Haynie 2002). Future analyses attending to a more adequate evaluation of the effects of family structure as well as broadening the measurement of the underlying concept of differential social location are clearly needed.

Third, this sample had too few non-white respondents (86 or 1.9% of the sample) to utilize race as a structural variable. Race is usually not a good predictor of drinking and marijuana use or most other substance use among adolescents, and that holds true for the present study as well. The proportion of marijuana users among the non-white respondents in this study was slightly higher than that among the white respondents, while non-white respondents were less likely to have reported drinking alcohol. Thus the absence of race as a structural factor did not pose a major problem for the present study. But race is obviously an important indicator of location in the social structure and may be related to other types of deviance and crime. Future research should more adequately address the question of whether differences in crime and deviance by race are mediated by differences in exposure to social learning experiences.

Fourth, the fact that gender retained significant net effects in the models for both alcohol and marijuana suggests that social learning may not mediate as much as it moderates (Baron and Kinney 1986) the gender ratio. But the magnitude of the net effects were proportionately quite a bit weaker than the direct effects of gender on substance use, which were themselves not strong. The findings supported the theoretical expectation that social learning substantially mediates the relationship of gender to substance use, but more for marijuana than for alcohol use. In another sample and with a different dependent variable, such as sexual aggression or violence, the bi-variate direct effects of gender would be much stronger, and it may be that with a dependent variable more strongly linked to gender the social learning variables would mediate the effects less than was found here. Net gender effects in that case may be much more substantial and raise a more serious question about the ability of the social learning variables to mediate or account for the differences in male and female offense rates. However, it should be noted that the direct age effects on substance use in this sample were strong, and the social learning variables mediated virtually all of those effects on marijuana use and mediated all but a small portion (albeit statistically significant) of the age effect on alcohol use.

There is nothing in the theory that expects the same magnitude of relationship or the same magnitude of mediation regardless of the dependent variables. The magnitude of the differences in mediation of structural effects on alcohol compared to marijuana behavior was not large in this study. In the case of age, there were almost no unmediated effects (-.01) for marijuana and little unmediated effects for alcohol (-.05), but the latter was statistically significant. Therefore, there was some difference in the mediation of gender effects on marijuana compared to mediation of gender effects on alcohol behavior. Does this raise an issue of why there would be a difference in mediated effects by dependent variable? Perhaps it does, but we are unpersuaded at this point that it poses an important theoretical issue. It is common to find in research that the same independent variables, regardless of the theory from which they are taken, account for different levels of variance in different dependent variables. How large must that difference be before it calls for an explanation? Both of the dependent variables in this study were adolescent substance use, and one would expect somewhat similar (though not identical) findings for them, and that is what was found. Adolescent marijuana use is somewhat more deviant than adolescent drinking, and seriousness of the deviance may be one reason for the difference in mediation of structural effects on the two kinds of substance use found in this research. However, if one of the dependent variables were to be even more seriously deviant there is apt to be a more truncated and skewed frequency distribution, and that usually produces weaker relationships regardless of the independent variable, counter to the seriousness argument. We have no persuasive answer at this time, but the findings do suggest that future research be alert to the issue of differences by dependent variable in level of mediation. This is another reason for suggesting that future research test the SSSL model on a variety of dependent variables including "testing of general social learning models on serious crime in adult samples, white-collar crime, violence, and organized crime" (Akers 1998:370). We would argue that proper interpretation of finding differences in how much structural effects are mediated by social learning variables from one dependent variable to another would require comparing findings regarding other theoretical models on the same set of dependent variables.

For this and other reasons, in addition to evaluating models which incorporate more indicators of social structure and different dependent variables, future studies should test models that include, besides social learning variables, good measures of other potential mediating processual or micro-level variables. The most obvious of these would be social bonding (Hirschi 1969), self-control (Gottfredson and Hirschi 1990), or other social psychological or personality variables (Andrews and Bonta 1994). Akers and Lee (1999) have done something like this in comparing the relative mediating effects of social learning and social bonding, but only with regard to the age/deviance relationship. Krohn, Lanza-Kaduce and Akers (1984) have done this for drug use in different community contexts along the rural-to-urban continuum. In both of these studies, the social learning variables had stronger mediating effects than did social bonding variables. But future research along these lines should examine not only these but also other structural and mediating variables in empirical assessments of the general SSSL model.

Additional empirical work linking social structure to individual and small group processes may not only encourage continued theoretical integration, but also provide additional guidelines for public policy and programs. The social learning principles included in the research here have long been applied in adult and juvenile justice and corrections as well as in community-based delinquency prevention programs working both with the schools and with families (Wright and James 1974; Patterson 1975; Morris and Braukmann 1987; Patterson, Capaldi and Bank 1991; Hawkins et al. 1992).

The SSSL theory does not exclude any of these suggested research and policy avenues as potentially significant to the overall explanation and control of criminal and deviant behavior. Rather, it offers a model sufficiently broad to accommodate these links and predicts how the relationships should play out empirically. The research here has contributed to the empirical evaluation of the SSSL model. Even with limited data and measures we found support, with some caveats, for the SSSL model and its underlying premise that social learning mediates the effects of social structure on behavior.

ENDNOTE

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