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**Risk Factors for Illicit Drug Use:
A Longitudinal Study**

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INTRODUCTION

Public concern about drug use and abuse escalated during the late 1980s, particularly with the introduction of crack cocaine and the health problems and violence associated with it. This concern often focused on young people both because use typically begins and rises rapidly during the adolescent years (Kandel & Logan, 1984) and because drug use during these ages has the potential for leading to harmful long-term effects (Clayton, 1986; Dembo et al., 1990; Yamaguchi & Kandel, 1987).

Although concern about drug use has been rising, data from *Monitoring the Future*, an annual survey of high school seniors, show varying trends in the actual use of drugs over the last decade (Johnston et al., 1975-1990). For example, use of marijuana and PCP declined. LSD use fluctuated slightly from year to year. Heroin use, always infrequent, remained about the same. Cocaine use, after increasing dramatically, has begun to show a decline during the last few years. Data from the National Household Survey on Drug Abuse from 1988 show that just over 1 percent of teens aged 12-17 years used cocaine in the last month. Marijuana use, after increasing between 1974 and 1979, has declined; in 1988, 6 percent of youth aged 12-17 had used marijuana in the month preceding the survey (NIDA, National Household Survey on Drug Abuse, Table 55, 1990). However, data

from several surveys estimate that 3 out of 5 youth have ever tried marijuana, while a smaller, though still substantial, proportion have ever tried harder drugs (Mensch & Kandel, 1988). Thus, despite some evidence of recent declines in the use of some illicit substances, the number of youth who have used drugs remains quite high.

Theoretical perspectives used in prior research

A large body of research has accumulated on the factors that are associated with, predict, or explain drug use. (See Hawkins et al., 1985, for a review.) From this work a number of theoretical perspectives have developed (Lettieri, 1985). Prominent among these theories are those that focus on the stages of drug use development (Kandel, 1975); that explain drug use and other deviant behaviors in terms of alienation, or weak attachment to societal norms (Hirshi, 1969); that view drug use as one of a number of interrelated problem behaviors (Jessor & Jessor, 1977); and that view the development of drug use as a socially learned behavior (Bandura, 1977). These theoretical perspectives are not necessarily mutually exclusive, but they do give varying emphasis to the kinds of explanatory variables that are important, and even varying views on the nature of the dependent variables.

Stages of development. Prominent in the work of Kandel and her associates is the notion that drug use develops in a fairly standard progression of stages (Kandel, 1975; 1980). Typically, alcohol or cigarette use precedes marijuana use, and marijuana

use precedes use of illicit and psychoactive drugs. (See Kandel et al., 1985, for a precise definition of stages and variations by sex.) Contributing to the staged development of drug use is the fact that the initiation of drug use is strongly age graded and that the age curves differ for the various categories of drugs (Kandel & Yamaguchi, 1985). Other researchers have shown that there are different etiological paths for initiation of drug use, occasional use, regular use, and drug abuse. (See Hawkins et al., 1985 for a review.) Moreover, much research has focused on the issue of the role played by marijuana use as a gateway to the use of other illicit drugs (Kandel, 1978; O'Donnell & Clayton, 1982).

Attachment to conventional norms or alienation. Another approach to explaining the etiology of drug use among teenagers stems from work on juvenile delinquency and criminal behavior. From the standpoint of social control theory, Hirshi (1969) posits that deviant behavior in general (including use of illicit drugs) stems from a weak attachment to or alienation from conventional society. Among the factors that may be associated with alienation or weak attachment are economic deprivation, poor family relationships, and self-rejecting attitudes (Kaplan et al., 1982).

Alienation in turn leads to rejection of some or all conventional values, such as the value of educational achievement, parental authority, or religious affiliation. Among these values are prohibitions on the use of certain drugs.

Either because these specific values are not accepted, or as explicit rebellion against them, alienated individuals are more likely to try, to adopt, and to abuse various drugs (Jessor & Jessor, 1978).

A theoretical perspective closely related to the above views drug use as one of a number of problem behaviors, such as juvenile delinquency, school failure, rebelliousness, and precocious sexual behavior. Youth exhibiting one problem behavior are likely to be involved in many others as well (Robins, 1980; Jessor & Jessor, 1977). From this perspective, the explanation of drug use cannot be divorced from the explanation of other problem behaviors; all have their roots in common causal factors: personality, perceived environment, and systems of behavior. Moreover, the problem behaviors are themselves mutually reinforcing (Jessor & Jessor, 1977).

Social learning theory. Another theoretical perspective views the development of drug use behavior as caused in exactly the same way any other behavior is developed -- through the schedule of rewards and punishments the behavior receives in the social environment. Built upon the foundation of behavioral theory, social learning theory (Bandura & Walters, 1964; Krohn et al., 1981) posits that behavior is mainly a function of an accumulated history of positive and negative social reinforcement. Whereas knowledge of past history may be important in understanding how the behavior was originally learned, current behavior is maintained only if it continues to

be rewarding. Important advances of social learning theory over its behavioral theory foundations include the recognition that modeling is an important way in which new behaviors are first acquired, and that cognitions -- beliefs and attitudes -- are part of the learning and reinforcement process. Both parents and peers are especially important as models for new behavior.

A socialization perspective: parents and peers. From a more sociological perspective, childhood socialization is seen as a function initially and largely carried out by the family. The values of the family, the closeness of the parent-child relationship, and the childrearing skills of the parents are all important components in determining what values children adopt and how well they adopt them. Use of illicit substances may be explained either by socialization into their use by parent or peers who are themselves users, or by poor or incomplete socialization to family and societal values.

Social developmental integration

The differences in these theoretical approaches are largely ones of emphasis. They do not, in general, lead to competing hypotheses that would allow one to reject one in favor of the other on the basis of an empirical test. Rather, they focus on different sets of explanatory variables, or on different parts of the process of drug use. Recently, Hawkins and his associates (Hawkins et al., 1985; Hawkins & Weiss, 1985) have attempted to set out an integrated theory -- the social development model -- that draws on the main features of many of these approaches. In

particular, they seek to integrate social learning theory with social control theory, adding a strong developmental component to the mix.

Moreover, they point out that the research studies from these different theoretical perspectives are all consistent with the importance of three domains or contexts within which drug use behavior develops: the family, peer group, and school. According to this integrated point of view, the balance of rewards and punishments (from family and peers) strongly affects the development of drug behavior. In addition, the development of strong bonds first to the family, then transferred to the school, decrease the likelihood of attachments to drug abusing peers (Hawkins, et al.,1985).

Thus, despite theoretical differences in approach, a consensus has developed on a number of conceptual issues and on the domains of explanatory variables that are important in the etiology of drug use. Among the most important of these areas of consensus are the following: a developmental perspective is critically important in understanding the development of drug use behavior; a distinction must be made between drug use and drug abuse; and the use of a single drug cannot be understood in isolation from the use of other drugs and of other problem behaviors.

The importance of a developmental perspective has been argued by several researchers in the field (Baumrind, 1985; Kandel, 1982). For many persons, first use of drugs takes place

in the pre-adolescent to mid-adolescent years. This span of years is also a time of rapid physical, cognitive, and social development. Moreover, the relative influence on children and youth of the family, friends, school, and the broader social and economic climate varies strongly by age. Consequently, the factors that influence the initiation and continued use of drugs are likely to be different depending on the developmental stage of the child. Moreover, the age at onset of use of various categories of drugs is itself a strong predictor of later patterns of use (Flemming et al., 1982; Kandel, 1982; Brunswick & Boyle, 1979; Kleinman, 1978).

Research has increasingly shown that experimental or occasional use of drugs is different from abuse of drugs. The former is more broadly distributed in the population and even seen by some as a normal stage of development (Baumrind, 1985). Furthermore, the antecedents and consequences of experimental use are different from those of heavy use and addiction. Consequently, it is important to differentiate use from abuse in the selection and measurement of drug involvement.

One category of drug involvement in particular deserves special attention -- **multiple drug use**. Much drug research focuses on the use of a single drug. However, some users have not only had experience with more than one drug, but typically use two or more drugs in combination on the same occasion (Clayton, 1986).

Domains of explanatory variables. As indicated above, the cumulated research has converged in identifying a set of predictor variables that are important in explaining drug use. The importance of a particular variable may vary depending on the developmental stage of the child or youth, whether use or abuse is the dependent variable, and the stage in the progression of drugs being predicted. These predictor variables fall primarily into three domains: family, peers, and schools. The personal characteristics of the child also affect the risk of drug use, often in interaction with influences from the three domains.

Personal characteristics. Drug use is often linked with various personality deficits or traits, such as low self esteem, poor coping skills, high dependency needs, propensity for risk-taking, an external locus of control, lack of self discipline, lack of assertiveness, and antisocial tendencies (Braucht et al., 1973; Smith & Fogg, 1978; Jessor & Jessor, 1977; Rhodes & Jason, 1990; Kandel et al., 1978).

While the evidence for some of these factors is mixed, early antisocial behavior is consistently found to be a good predictor of later drug involvement (Kandel, 1990; and see Hawkins et al., 1985, for a review). Among other factors sometimes found to protect youth from drug involvement are religiosity (Jessor et al., 1980; Flewelling & Bauman, 1990), a high tolerance of deviance (Brook et al., 1977), attachment to parents (Chassin, et al., 1981; Kim, 1979), commitment to school and education (Friedman, 1983), belief in societal norms and values (Hindelang,

1973; Krohn et al., 1983), and conventionality and social control (Brook et al., 1989). Although the specific rationale for the link to drug abuse may differ from trait to trait, the general process that is proposed argues that inadequate socialization leads to a personality characteristic that generates a need that can be met in some way by drug use. For example, drug use may provide a means of psychic escape for someone with low coping ability, or it may induce a sense of power or ability in a person lacking self-esteem or an internal locus of control.

Some demographic variables are found to be associated with different patterns of drug use. For example, race and ethnic differences exist in the use of some drugs (Oetting & Beauvais, 1990; Headen et al., 1991). The evidence on sex differences is mixed (Ensminger et al., 1982).

Family. A number of family characteristics have been found to be important predictors, especially of early drug use. Moreover, family variables are often strongly associated with those variables, such as peer associations, that later become more proximal predictors of drug involvement. Family factors may be categorized into three broad categories: family management, parent-child relations, and role modeling. Inconsistent and unclear limits set by parents and negative communication patterns are associated with greater risk (Reilly, 1979), while children's attachment to parents, good family relationships, and children's involvement with the family (Jessor & Jessor, 1977; Kim, 1979; Weiss et al., 1980) have been found associated with a lower risk.

Family structure has also been linked prospectively with earlier substance use (Flewelling & Bauman, 1990). In addition, parent involvement with drugs or permissive attitudes towards drugs have also been found associated with a higher probability that a child will become involved with drugs (Kandel, 1982, Bushing & Bromley, 1975).

Peers. Whereas family factors play an early but diminishing role, peer factors take on increasing importance as a child moves into adolescence. Indeed, peers' use of drugs is often found to be the strongest predictor of current patterns of drug involvement (Elliot et al., 1982; Jessor et al., 1980; Kandel & Adler, 1982; O'Donnell & Clayton, 1979; Catalano, 1982; Kaplan et al., 1982). One of the difficulties of research on peer drug use is that it is hard to measure directly. Typically, researchers must rely on youths' perceptions of the drug use of their peers. On the other hand, perceptions may be as important as -- or more important than -- actual use by friends. (That is, heavy drug use by a friend may not be a risk factor if it is unknown, while boasting of drug use by a non-user may be a risk factor.) One of the research issues in the influence of peers is the order of precedence of factors: is one introduced to drugs by drug-using peers, or does one otherwise inclined to drugs choose drug-using friends?

School. Finally, a teenager's experiences with school are also predictive of drug involvement. Most of the variables found to be important in this domain have to do with the youth's own

performance rather than with organizational and social characteristics of the school. Among the factors found important are poor school performance (Jessor & Jessor, 1977; Brook, et al., 1977; and Kandel, 1982), school failure and dropping out (Robins, 1980; Brook et al., 1977; Annis & Watson, 1975), underachievement (Robins, 1980), school liking (Kelly & Balch, 1971), and time on homework (Friedman, 1983).

Limitations of prior research and overview of study

The literature on the etiology of adolescent drug use is quite large. However, the explanatory power of these studies and their ability to produce generalizable results is often handicapped by limitations in study design, samples, and theory. For example, few longitudinal studies exist (Shedler & Block, 1990, and Flewelling & Bauman, 1990, are recent exceptions). In addition, most of the studies on which the current literature is based have relied on small or narrowly defined samples that are not nationally representative. Also, there is a strong need for analyses of more contemporary data, that is, data collected during the 1980s, since it cannot be presumed that the predictors of substance use have remained stable across time (Shedler & Block, 1990).

Furthermore, most studies proceed from a single theoretical perspective, using only a limited range of explanatory variables. It is unlikely, however, that the etiology of so complex a behavior as drug use can be explained by a single theory or model. Due to the approach taken and the nature of the data set

employed, this analysis is able to address some of the issues identified above.

This analysis investigates the first stage in the progression of drug use: initiation. We focus on this stage because researchers have found that early initiation of drug use, when the individual is less mature physically, cognitively, and emotionally, is more serious than later initiation. Early initiation extends the potential duration of use, and predicts continued drug use and later abuse (Robins & Przybeck, 1985; Kandel, 1981; Kleinman, 1978). (A second paper focuses on current use.)

The data used in this study -- a longitudinal survey using a nationally representative sample of children as they moved through their teen years into early adulthood -- provide rich antecedent information enabling us to address questions of causal ordering. Because the sample is nationally representative, results can also be generalized to the population of youth 18 to 22 in 1987. In contrast, much of the previous research often relies on point-in-time, retrospective data and/or non-representative samples.

In addition, unlike many theoretically-driven analyses which proceed from a single theoretical perspective, this analysis will draw on constructs from all four domains suggested by the various theories of drug use behavior: personal characteristics, family, school, and peers. It is obvious from the discussion above that the different theories overlap and complement each other in many

important ways. Indeed, those researchers employing more than one theory in a single investigation find that the theories do provide complementary insights (Osgood et al., 1988; Battjes & Jones, 1985). Prior to describing the constructs we sought to examine and how they were operationalized, we describe the data employed and our analytic approach.

DATA AND METHODS

The data used in this paper are from the National Survey of Children (NSC). The NSC is a nationally representative household survey of children aged 7-11 who were living in the contiguous United States in 1976. A subset of the children were re-interviewed in 1981 when they were ages 11-16 and again in 1987 when they were ages 18 to 22. The original wave of interviews, sponsored by the Foundation for Child Development, was designed to be a broad assessment of the social, physical, and psychological characteristics of U.S. children, and of the family and neighborhood circumstances in which they were growing up. Up to two children between the ages of 7 and 11 in each household and the parent most knowledgeable about them, usually the mother, were interviewed in person, yielding a sample of 2,301 children from 1,747 households.¹ Black households were oversampled and approximately 500 black children were in the sample.

¹Both siblings were included in these analyses. As discussed elsewhere, final models were also run selecting just one sibling from each household. These analyses showed our conclusions to be unaffected by the presence of one versus one siblings.

The primary focus of the second wave of interviews conducted in 1981 was to examine the consequences of marital disruption for children's development and well-being. Funding for the second wave was provided by the Foundation for Child Development and the National Institute of Mental Health. Budgetary constraints necessitated a reduction in sample size. All children who had been living in families that had experienced a marital disruption as of the 1976 interview or who were living in high conflict families in 1976 were re-interviewed as were a subsample of children living in intact families with low or medium conflict. This procedure yielded a sample of 1,423 children. Again, the parent most knowledgeable about the child was also interviewed. In 97 percent of the cases, this was the same person who had been interviewed in the first wave of interviews. Many of the background and outcome measures collected in 1976 were repeated in the 1981 survey. In addition, new data were gathered on patterns of parent-child interaction and on outcome areas more relevant for teenage children, including dating and sexual activity, drinking, smoking, drug use, and delinquency. The interviews were conducted via telephone, with a subsample conducted in person to evaluate the quality of the telephone interviews. No differences were discerned between the in-person and telephone interviews.

The third wave of interviews, conducted during the spring and summer of 1987, were funded by the National Institute of Child Health and Human Development, the Assistant Secretary for

Planning and Evaluation of the Department of Health and Human Services, the Ford Foundation, and the Robert Wood Johnson Foundation. The primary aim of the third wave was to obtain data on the impact of early pregnancy and parenthood on the lives of teenage parents. To this end, information was obtained on family relationships, educational aspirations, school progress, and substance use (including information on current use of varied substances), the timing of initial use, and problems related to current use. Over 1150 youth were interviewed via telephone, as was one of the youth's parents, usually the mother.

In spite of good response rates at each wave (80% for the first wave; 82% of the designated respondents for the second wave; and 82% for the third wave), accumulated attrition from the NSC over the three waves has been considerable. About 46 percent of the original sample has been lost to non-response; and nearly one-third of the 1976 respondents did not complete the final interview. As in most longitudinal surveys, attrition has been greatest among youths from disadvantaged backgrounds and youths having problems (as indicated by their responses to questions in the wave 1 interview). Therefore, the possibility exists that this sample underestimates the true incidence of drug use among adolescents. However, because it is a household survey and not a school-based survey, youth who have dropped out of school or who are chronically absent have not been lost.

The existence of such rich antecedent information on young people's aspirations, experiences, and family background in the

first two waves of the NSC provides an unusual opportunity to study the personal and familial antecedents of drug initiation.

Methods

In this paper, the events of interest are the timing of first use of marijuana and the use of illicit drugs other than marijuana, as measured by age of the youth at first use of each of these substances or age at interview if the youth had not yet tried a particular substance. Questions about drug use were asked in both the 1981 and the 1987 interviews. While some slippage occurs in recall of age at first use, consistency in reports of ever-use is quite high. Only 12 youth who reported in 1981 that they had used marijuana reported never using marijuana at the time of the 1987 interview. Similarly, only 8 of those reporting use of other drugs in 1981 said in 1987 that they had never used hard drugs. The most common pattern was non-use in 1981 and non-use also in 1987 ($n = 507$), with a slightly smaller number (474) reporting non-use in 1981 but use initiated by 1987.

Among youth reporting use at both interviews, the ages reported tended to be a year or two older in 1987 than in 1981. Given memory decay, the younger report was presumed to be more accurate. In the case of hard drugs, very few reports of use were made in 1981. Consequently, data on the use of hard drugs come primarily from the 1987 interview.

Event history hazard models are used to estimate the risk of first substance use. These are elaborations of the standard life table used by demographers. As in the life table, it is assumed

that there is a risk or "hazard" of an event occurring at any given point in time. However, where life tables assume that all individuals have the same conditional probability of an event occurring, event history models allow the hazard of an event to vary depending upon individual characteristics.

Event history methods are ideal for studying the causes of events, such as first substance use, because they are capable of handling censored data (Allison, 1984). Censored data occur when an arbitrary cut-off point, such as the timing of an interview, prevents the observation of an event for persons who have not yet experienced it at the cut-off point but who may experience the event in the future. Excluding censored cases can lead to serious biases in the results (Tuma & Hannan, 1978).

The SAS procedure PROC PHGLM is used to estimate the models.² This procedure fits the Cox proportional hazards linear regression model to a single dependent variable (Harrell,

²Although it is not feasible to run the PHGLM models with non-integer-weighted data, we have run the final models with ordinary least squares regression both weighted and unweighted, using a dummy variable measuring ever-use of marijuana or drugs within age groups. Results from these OLS comparisons indicate few substantive differences. For example, comparing unweighted and weighted models of marijuana use at ages 14-17, all non-significant variables remain non-significant and all significant variables remain significant, with one exception: when the data are weighted, maternal drug use goes from $p < .07$ to $p < .02$, though the value of the coefficient is unchanged. One difference occurs in the models estimating use of hard drugs. With weighted data, parental drug use is statistically significant ($p < .04$), while it falls short in the unweighted run ($p < .12$).

Weighting the data in no instance changes the direction of a significant coefficient. Indeed, changes in the magnitude of coefficients are generally trivial, and in only the two cases mentioned do the changes alter the formal level of significance.

1986; Teachman, 1982). A coefficient, e^β , is associated with each independent variable in the model; it indicates the effect of the variable on the likelihood that individuals will experience the event. A positive coefficient indicates an acceleration in the timing of the event, as well as an increased risk of the event occurring. A negative coefficient indicates a postponement of the event and/or a decreased risk that the event will ever occur. A coefficient of 1.0 indicates that the variable has no effect. Computing $100(e^\beta - 1)$ gives the percentage change in the hazard with each unit change in the variable. Thus, if $e^\beta = 1.5$, each unit increase in the variable increases the hazard of experiencing the event by 50%.

Separate analyses were conducted for marijuana use and use of illicit drugs other than marijuana (e.g., cocaine, crack, LSD, uppers, downers, etc.), as it is likely that different processes lead to initiation into drug use for different drugs. We examined the risk of first marijuana use and use of other drugs separately during distinct developmental periods, specifically during the pre-adolescent years -- ages 13 and younger, during the adolescent years -- ages 14-17, and during the post-high school years -- from ages 18-22. Because most youth live at home through high school and begin to leave home in large numbers after high school (Waite & Goldscheider, 1987), the importance of family factors is expected to decline as youth go beyond the high school years. Because few youth tried drugs other than marijuana

prior to age 13, initial use of hard drugs was estimated only for ages 14-17 and 18-22.

Separate models were initially estimated for young men and young women, since we hypothesized that different factors predict drug use for males and females. For example, Ensminger and her colleagues find that sex differences pervade antecedent, concurrent, and mediating variables related to adolescent substance use and conclude that "it can no longer be assumed that the developmental paths leading to alcohol, drug, and cigarette use for females are the same as those for males" (Ensminger et al., 1982, p.40). In the final models presented here, males and females were combined and sex differences are represented by interaction terms.

RESULTS

First Use of Marijuana

First Use at Age 13 or Younger Three types of variables were found to predict initial use of marijuana at a very young age: parent substance use, family socioeconomic status, and early child behavior problems.

Regardless of whether behavior problems are reported by the parent or by the child, those children with behavior problems in elementary school are clearly a group at risk for very early marijuana use (see Table 1, Model 1). Among daughters, having arguments with the mother also predicts very early use.

Substance use by the mother elevates the risk that the child will try marijuana at these young ages by nearly a quarter. Although use by the father is also associated with an increased risk, the association falls short of being statistically significant. On the other hand, children who have a college educated parent have only half the risk of using marijuana at these very young ages. This reduction in risk associated with parent education is found only at these very young ages.

First Use at Ages 14 to 17. While parental education level predicted very early marijuana use, during the middle teen years it is no longer a significant predictor, suggesting that the opportunity for adolescents to use marijuana is fairly widespread. However, early behavior problems and parental substance use as reported by the child remain important predictors at these middle ages. Interestingly, during the teen years, parent-report measures of misbehavior have no bearing on marijuana use, while the child's self-reported misbehavior (as measured on an eleven-point scale) continues to be very important. For every point of increase on this scale, the probability that the child initiated marijuana use during the teen years rises by 9 percent. The discrepancy between self-reported and parent-reported misbehavior may reflect a tendency for children who are acting out in visible ways (that their parents and others can see and report to an interviewer) attract friends who use and encourage the use of illicit substances. If

this is so, controlling for peer use may attenuate any relationship between parent-reported misbehavior and drug use.

Involvement in religious activities during childhood and the teen years strongly reduces the probability of marijuana use at ages 14-17. Every one point increase on a four-point scale measuring religious activities reduces the risk by 17 percent.

During the adolescent years, main effects for parental marital conflict and family structure are not significant. However, there are some highly significant interactions between gender and family characteristics. Daughters whose parents argued and daughters raised by a single parent are about twice as likely as those in more harmonious or two-parent families to try marijuana. This finding does not hold for boys. Thus, despite an overall lower likelihood of using marijuana, girls seem to be at an elevated risk when there are family problems.

In predicting initiation of marijuana use at ages 14-17, we are able to include measures of peer influence and school involvement in addition to personal and family characteristics. These constitute Model 2 in Table 1. Although the precise causal ordering of first use relative to peer influence and school activities cannot be sorted out with these data, the variables are strongly associated. Both measures of the substance use of friends are highly significant. Each increase on a three-point scale measuring whether friends encouraged substance use is associated with a 73 percent increase in risk, while each one-point increase on a seven-point scale of reported substance use

by friends is associated with a 25 percent increase in risk. Involvement in school activities, unlike involvement in religious activities, is not statistically significant.

Thus, the peer influence variables are strongly associated with marijuana experimentation, and in some cases their inclusion in the model causes other variables to cease to be significant. For example, the lower risk of girls relative to boys, while statistically significant in Model 1, declines in importance and becomes non-significant when school and peer influences are added. This suggests that the greater risk faced by boys occurs because of more peer pressure and fewer school activities. Indeed, boys experience stronger peer influences and are involved in fewer activities (analyses not shown), indicating that further research on gender differences in this domain may be fruitful.

While both self-report and parent-report measures of early acting out predict to marijuana use, only the outward and visible manifestations of problem behavior are supplanted by the peer and school variables; the self-reported misbehavior variable continues to be a predictor, despite the addition of peer and school variables. Presumably, the forms of behavior problems that are visible to the parents of grade schoolers are not identical to those known to and reported by the child.

Two other important differences occur when the peer and school variables are added into the model. While Model 1 shows significant effects of parental substance use on child's initiation of marijuana use, Model 2 shows that maternal, though

not paternal, substance use becomes non-significant when peer and school variables are included (again, see footnote 2).

Furthermore, the interaction term between gender and family structure is no longer significant in Model 2.

First Use at Ages 18-22. Among youth who have not used marijuana by age 18, few of the variables measured during childhood and adolescence predict to first use during these years. Many youth have left the parental home to attend school or form their own households by this time, of course, so it is not surprising that family variables are less important predictors (Waite & Goldscheider, 1987).

At these ages, young women continue to be less likely to try marijuana, though gender again becomes non-significant when peer variables are added (in Model 2), strengthening the suggestion that the effect of gender is transmitted by peer influences. Early misbehavior, hard drug use by fathers, and marital conflict between parents continue to be associated with the initiation of marijuana use during the young adult years, but are only marginally predictive ($p < .06$) during these ages.

In addition, maternal substance use and parent-reported child misbehavior are only significant at the 10% level. It is interesting to note that the importance of maternal substance use declines in older age periods, while use by the father has about the same magnitude of effect for all three age groups. It should be further noted that few mothers were reported by their children to have been high substance users, whereas a fairly large

proportion of fathers were so reported. It is high substance use which we find poses the greatest risk for the child.

The most significant predictor of initiation of marijuana use at these ages is peer pressure. Youth who received peer pressure to use substances during their teen years but who did not try marijuana at that time continue to be at an elevated risk of trying marijuana at ages 18-22.

First Use of Hard Drugs Other than Marijuana

First Use at Ages 14-17. Only nine respondents in the National Survey of Children reported being younger than 13 when they first used some type of hard drug. Hence, we begin our analysis with youth when they were aged 14 to 17, having dropped those youth who reported being 12 and younger when they first used hard drugs. As with the models of marijuana use, a first model reports family and background predictors, while a second model adds school and peer variables. A third model is then presented which also includes marijuana use as a predictor of the use of other drugs, such as LSD, cocaine, crack, etc.

Teenagers with college-educated parents, youth who scored very low (below 40) on the Peabody Picture Vocabulary Test (a measure of cognitive achievement given at the time of the first interview), and black teens are substantially less likely to have tried hard drugs.

In addition, youth who scored higher on a measure of self esteem administered in the initial interview are less likely to try hard drugs during their middle teen years. As with marijuana

use, self-reported early misbehavior predicts to trying hard drugs almost a decade later. Again, however, parent-reported misbehavior is not a significant predictor compared with self-reported misbehavior.

While family structure and conflict and religiosity have a weak association with initiation of hard drug use, it is non-significant. On the other hand, parental use of any drug when the child was aged 8-14 is a highly significant predictor: children whose parents used drugs were twice as likely to have tried hard drugs.

However, as with marijuana, when the peer and school measures are added, many of the personal and family background variables become non-significant. Specifically, parental education, the child's vocabulary score, and the measure of parent-daughter arguments become non-significant; nevertheless, parental drug use, self-reported misbehavior, and race all remain statistically significant predictors of first use of hard drugs.

While many personal and family characteristics lose their magnitude or significance, school and peer variables demonstrate strong significance. For example, as with marijuana use, youth whose friends encouraged or used illicit substances are substantially more likely to have tried hard drugs. However, while involvement in school activities was not an important predictor of a lower risk of trying marijuana, youth involved in school activities are 60 percent less likely to have tried hard drugs.

Tabulations of the data indicated that, among youth who had used both substances, the use of marijuana preceded the use of harder drugs in virtually every instance. (In 50 cases, the youth first tried both in the same year so that the order cannot be known definitely; but the pattern is so strong for the rest of the sample that it seems likely that marijuana use preceded hard drug use even when both were tried in the same year.) Because of this pattern, we were able to include use of marijuana as a predictor of the use of hard drugs.

Marijuana use is a very strong predictor of the use of harder drugs. Youth who used marijuana are more than eleven times more likely to have progressed on to harder drugs; or, alternatively, youth who never tried marijuana are substantially less likely to ever try hard drugs.

When marijuana use is added to the model, the magnitude of the effects of peer, parent and school influences declines. When marijuana use is entered, the only significant predictors from the family domain are race and arguments with the mother. Parental drug use falls just short of being significant ($p < .06$). These results suggest that part of their influence is transmitted through marijuana use. It is important to note, however, that involvement in school activities and not having friends who use or encourage the use of illicit substances remain powerful correlates, even when experimentation with marijuana is included. Youth involved in school activities are half as likely to have tried hard drugs. Youth one point higher on the scale of

friend encouragement of drug use are 40 percent more likely to have tried hard drugs, while each one-point increase on the seven-point scale measuring friends' use of substance is associated with an elevation of the risk of trying hard drugs by a third. Moreover, although parental drug use falls from significance, it retains a substantial coefficient and remains significant at the .12 level (see again footnote 2).

First Use of Hard Drugs at Ages 18-22. Among that majority of youth who have not used hard drugs by age 18, what factors predict first use during the years after high school? Unfortunately, our data provide little information that helps understand this transition. During these post secondary years, the only family factor that continues to affect the risk of using hard drugs is parental drug use. The effect remains even after controlling for school and peer influences.

It should be noted that, unlike the models predicting drug use at the younger ages, when prior marijuana use is entered as a predictor, all measures of school and peer influences become non-significant. We do not interpret this to mean that these factors are really unimportant, but that initial marijuana use is the conduit by which they have their influence. Among youth who did not use hard drugs during their high school years, those who have tried marijuana are 24 times more likely to try hard drugs. Even controlling for marijuana use, having parents who used drugs continues to be associated with an elevated probability of trying

hard drugs as well; these youth are 84 percent more likely to try hard drugs.³

DISCUSSION AND CONCLUSIONS

The hypotheses motivating this study were developed on the basis of a number of existing studies, most of which were cross sectional or local or based on a single theoretical perspective. Our study confirms results based on these more limited samples and extends them in a number of ways.

First, the role of socioeconomic and demographic variables is found to be quite limited, except for what might be viewed as extreme circumstances. Thus, while having a college-educated parent is associated with just half the risk of using marijuana at a very early age (age 13 or younger), it is unassociated with later use. Use of hard drugs other than marijuana is also lower among teens with college-educated parents, though this effect disappears when school and peer variables are entered. Low family income (plus a number of neighborhood measures that were tried and dropped) was not found to predict drug use. Overall, the limited effect of SES suggests that drugs were rather widely available to U.S. teenagers growing up during the 1980s, and parental status measures were only protective for young teens and children, and against hard drugs rather than marijuana.

³In the final model based on just one sibling from each household, the effect of marijuana use continues to dominate. The effect of paternal drug use becomes marginally significant ($p < .06$), but the magnitude of the coefficient remains essentially unchanged.

Results from this study confirm findings derived from several theoretical perspectives. Our data strongly support Kandel's finding that marijuana use precedes and predicts subsequent use of hard drugs. In fact, the primary predictor of the use of hard drugs is having used marijuana, substantiating earlier findings suggesting that marijuana is a "gateway" drug (Kandel, 1978). Furthermore, very few respondents in the National Survey of Children used any hard drug who had not also used marijuana. Exactly how marijuana serves this "first drug" function has not been empirically dissected, nor is it yet clear when and for whom marijuana use accelerates into the use of harder drugs. These represent a series of questions for further research.

Our results also suggest that youth involved in conventional pursuits are at lower risk. For example, attendance at religious services is associated with a lower risk of marijuana use, while school activities are associated with a lower likelihood of trying both marijuana and other illicit drugs. Religious involvement does not predict that youth are protected from friends who use or encourage the use of drugs; however, religiosity is a significant predictor of involvement in school activities (results not shown), suggesting that involvement in religious activities may affect experimentation with substances by increasing involvement with other conventional activities, in addition to its own independent effect on marijuana use. Religiosity also appears to reflect more than simple selection,

since the influence of this variable on marijuana use holds even controlling for friends' use, friends' encouragement of use, and parental substance use. We cannot distinguish, however, between the influence of doctrine and self-discipline and the more general patterns of obedience to rules and authority learned in most religious environments.

Our results also provide strong support for the notion that drug use is learned either through exposure and modeling of substance use by peers or selection of friends who use drugs. Peer substance use and encouragement seem to be of greater importance than parental use in multivariate models; however, as noted above, family factors seem to affect selection of peers, making early family factors a critical conduit both directly and indirectly.

Parent substance use as perceived by the child is another clear risk indicator. Since conflict between the parent and youth as well as conflict between the parents are controlled, it would seem that this variable represents modeling of youthful behavior on the parent. Interestingly, the mother is the more important model for early initiation of marijuana use, while the father's use becomes more important during the teen years. Since the importance of parents tends to give way in turn to peers, the data suggest a natural progression over time from mother to father to friends outside the family. (We cannot examine this pattern for harder drugs; since few parents were reported to have

used hard drugs themselves, the categories for mother's and father's use were combined.)

A clear indicator of being at risk of later drug use is early misbehavior, although self-reported misbehaviors seem to be better predictors than parent-reported misbehaviors. These data indicate that "acting out" behavior in childhood needs to be taken seriously. Although many "grow out of it," for other children early misbehavior is a marker of more serious acting out during the teen years. It would be useful to examine whether early misbehavior in interaction with later family dynamics or psychological help for the child predict differing levels of later substance use.

Numerous measures of personality found to be associated with substance use on a bivariate level, such as shyness and self-esteem, became non-significant in multivariate models and were thus dropped. Whatever influences these factors bear, they seem to be transmitted by later factors, such as the friends that are selected, or, alternatively, to be a reflection of some common antecedent factor, such as family problems, which leads to both personality deficits and to drug use.

Similarly, youth experiencing conflict with parents or conflict between parents during the elementary school years and those raised in a single-parent family are more likely to try drugs. Related multivariate analyses (not shown) indicate that measures of family structure and conflict predict having friends that use and encourage the use of illicit substances, suggesting

that the early experience of conflict may be among the factors that drive youth into friendships that increase in turn the risk of substance abuse.

Interestingly, these results suggest that family conflict and disruption have more effect on the subsequent drug use of daughters than of sons. Despite a generally lower propensity to try marijuana, girls who argued with their mothers, whose parents experienced substantial conflict, or who lived with a single parent during the elementary school years were more likely to try marijuana as teenagers. Other gender interaction terms were examined, but it was found that gender affected primarily variables in the family domain. The pattern of results suggests the conclusion that family problems sharply increase the probability that a daughter will try drugs. The magnitude of the coefficients or significance levels tends to fall when peer variables are added to the models, further suggesting that this pattern reflects a tendency for girls in troubled families to have friends who are involved in substance use and/or who encourage it for the young woman.

The results from this study must be considered in view of fairly high attrition in the National Survey of Children. We speculate that these relatively more troubled youth who were lost to follow-up would have strengthened the findings that we report; however, we cannot be certain of this.

By way of conclusion, it seems important to identify some methodological issues inherent in this analysis which not only

point to some drawbacks of this particular analysis, but also suggest implications for future data collection and analysis efforts whose goal is to gain an understanding of the etiology of drug use among children and youth.

First, it is important to repeat that many of our measures, particularly those measuring peer and parent use of drugs, are retrospectively reported by the youth. Given the pace of events and development during the teen years, combined with the inevitable memory loss that occurs when respondents are asked to date events that may have occurred four or five years ago, the need for regularly and frequently collected data from U.S. children and youth and their parents becomes obvious.

Another problem with reliance upon self-reported data is the possibility that parents and children who are willing to describe the child in negative terms are also more willing to acknowledge substance use by themselves, their family and peers. Few studies have been able to overcome this difficulty; nevertheless, unknown biases may result because of it. Although data from the National Survey of Children are unusual in that data are provided by both the child and a parent, the availability of data from the friends and peers of the youth would enhance our ability to examine the relative influences of the several domains.

It is also important to acknowledge that this study examines only a limited portion of the drug use process -- first use. Most of those youth reporting that they have tried marijuana at some time also reported that they had used marijuana in the

twelve months prior to the third and final interview. (We are addressing current use in a subsequent paper.) First use is nevertheless an important transition, without which more regular drug use and drug dependency would not occur.

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APPENDIX A

VARIABLE DEFINITIONS

FEMALE - Whether the sample youth was female.

COLLEGE - Whether the sample youth had one or more parents who are college graduates.

BLACK - Whether the sample youth was black.

LOW INCOME - Whether the sample youth came from a family whose total family income before taxes, in 1975, was less than \$5,000.

LOW VOCABULARY SCORE - Whether the sample youth scored below 40 on the Peabody Picture Vocabulary Test, a measure of cognitive achievement given to the child during the course of the 1976 interview. This test is now given in the National Longitudinal Survey of Youth - Child Supplement, in part due to its successful use in the 1976 National Survey of Children.

SELF-ESTEEM - Score for the sample youth on a 1976 10-point scale measuring self-esteem. The scale used the following items: I am lucky; wish I were someone else; am easy to like; can make up my mind; children follow my ideas; don't like to be with others; do many things well; like being the way I am; do many bad things; happy about self.

SELF-REPORT MISBEHAVIOR - Score of the sample youth on an 11-point scale measuring child's misbehavior in 1976. The child was asked whether s/he: fooled around in class; fought in school during the week preceding the interview; was ever in trouble for fighting; ever pretended to be sick or hurt; did "many bad things."

PARENT-REPORT MISBEHAVIOR - Score of the sample youth on a 24-point scale measuring child's misbehavior in 1976. This scale is based on the parents' report of whether his/her child: had ever stolen, and if so, how many times; fought, teased, bullied; was deceitful; broke things frequently; etc.

RELIGIOSITY - Sample youth's score on a religiosity measure. Using items from all three waves, this assesses the frequency of attendance at religious services and the importance of religion for the child, and the importance the parent placed on religion and religious training for the child, from 1976 until the child was 16 years old. The collapsed scale used in these analyses has a range of 1-4.

FAMILY ANXIETY - Score for the sample youth on a 9-point scale measuring the child's feelings of anxiety towards his/her family, in 1976. The scale is comprised of items which ask the respondent if s/he: worries about his/her family; feels ashamed of the things his/her parents do; feels afraid when his/her parents argue; and feels angry when no one pays attention to him/her at home.

ARGUE WITH MOTHER - Score for the sample youth on a measure of how often the child argues with his/her mother, using a question from the 1976 interview, with responses ranging from often to never.

PARENTAL MARITAL CONFLICT - Whether parent of sample youth reported medium or high levels of parental conflict in 1976. The extent of conflict was measured using items about spousal arguments on the following topics: chores and responsibilities, children, money, sex, leisure time, drinking, and other women/men.

NO SPOUSE - Whether the sample youth, in 1976, was living in a single parent household.

DAUGHTER/MOTHER ARGUED - Whether sample youth was female and argued often with her mother in 1976.

DAUGHTER'S PARENTS ARGUED - Whether sample youth was female and her parents reported medium or high levels of marital conflict in 1976.

DAUGHTER HAD SINGLE PARENT - Whether sample youth was female and lived with a single parent in 1976.

MOTHER'S SUBSTANCE USE - Score of the sample youth on a 1987 retrospective measure of the child's report of mother's drinking, smoking, and drug use when the child was 8-14 years old. The range is 0-9.

FATHERS' SUBSTANCE USE - Whether the sample youth reported retrospectively in 1987 that his/her father used substances when the child was 8-14 years old. This is a child report measure developed from a series of questions, identical to the questions asked about the mother, regarding his/her father's drinking, smoking, and drug use when the child was 8-14 years old, regardless of whether the father lived with the child.

PARENTS' DRUG USE - Whether the sample youth reported that one or both of his/her parents had ever used illegal drugs (including marijuana, LSD, cocaine, etc.) when the child was 8-14 years old. These items are 1987 retrospective measures. This measure is used in models predicting use of hard drugs other than marijuana.

SCHOOL ACTIVITIES - Whether the sample youth responded in 1987 that s/he had participated in school activities (such as drama, pep club, music, or student government) when he/she was in high school.

FRIENDS ENCOURAGED SUBSTANCE USE - A 1987 retrospective measure using questions which ask the respondent whether when s/he was a teenager, his/her friends encouraged him/her to try illegal drugs, and/or discouraged him/her from using alcohol. The range is 2-4.

FRIENDS' SUBSTANCE USE - Score on a 1987 retrospective 7-point measure of the extent to which the respondent's friends, when the respondent was 16, used either alcohol or illegal drugs, or both.

Table 1. Models Predicting the Probability of Initiating Marijuana Use, Youth Ages 18-22, 1987.

	Initiated Use at Age 13 or younger		Initiated Use at Ages 14-17		Initiated Use at Ages 18-22	
	Model <u>1</u>		Model <u>1</u>	Model <u>2</u>	Model <u>1</u>	Model <u>2</u>
<u>PERSONAL AND FAMILY BACKGROUND</u>						
Female	.69		.62*	.85	.52*	.64
College educated parent	.46*		1.07	1.18	1.26	1.29
Black	.98		.84	.82	1.35	1.40
Low income	1.03		.78	.76	.59	.60
Low vocabulary score	.73		.79	.88	.82	.78
Self esteem	1.05		.99	.97	1.09	1.08
Self report misbehavior	1.17***		1.09**	1.08**	1.01	1.02
Parent report misbehavior	1.16***		1.01	.98	1.05	1.06
Religiosity	.91		.83***	.84**	.92	.91
Family anxiety	1.09		1.02	1.01	1.07	1.07
Argue with mother	.73		.95	.94	1.01	1.00
Parental marital conflict	1.39		.78	.87	.60	.67
Single parent	1.12		.83	1.13	.87	.97
Daughter/mother argued	3.04**		1.35	1.32	1.82	1.73
Daughters' parents argued	.75		2.05**	1.73*	1.39	1.11
Daughter had single parent	1.18		1.90*	1.34	1.40	1.17
Mother's substance use	1.22***		1.10**	1.05	1.10	1.05
Father's high substance use	1.36		1.44**	1.34**	1.39	1.34
<u>SCHOOL AND PEERS</u>						
School activities				.82		1.07
Friends encouraged substance use				1.73***		1.73***
Friends' substance use				1.25***		.98

Note: The coefficients shown in the table are the antilogs (e^{beta}) of the coefficients obtained using PROC PHGLM in SAS.

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2. Models Predicting the Probability of Initiating Use of Hard Drugs Other Than Marijuana, Youth Ages 18-22, 1987.

	Initiated Use at Ages 14-17			Initiated Use at Ages 18-22		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
<u>PERSONAL AND FAMILY BACKGROUND</u>						
Female	.61	1.16	1.05	.37**	.52	.61
College educated parent	.53*	.73	.70	.84	.95	.85
Black	.23**	.27**	.32**	.66	.71	.65
Low income	.77	.63	.76	.62	.61	.72
Low vocabulary score	.26*	.33	.33	.77	.76	.75
Self esteem	.90*	.92	.93	.94	.94	.91
Self report misbehavior	1.13**	1.09*	1.04	1.06	1.04	1.01
Parent report misbehavior	1.04	1.01	1.00	1.02	1.00	.98
Religiosity	.91	.97	1.07	1.04	1.05	1.17
Family anxiety	1.01	1.04	1.01	1.03	1.02	1.00
Argue with mother	1.67	1.66	1.72*	.76	.77	.81
Parental marital conflict	.87	.96	.99	.94	.95	1.05
Single parent	1.11	1.73	1.44	.93	1.08	1.13
Daughter/mother argued	1.04	1.04	.96	1.73	1.72	1.35
Daughters' parents argued	2.34	1.84	1.69	2.05	1.80	1.68
Daughter had single parent	2.23	1.22	1.22	1.59	1.25	1.06
Parents' drug use	2.01**	1.75*	1.64	2.39***	1.87*	1.84*
<u>SCHOOL AND PEERS</u>						
School activities		.42***	.51***		.83	.84
Friends encouraged substance use		1.81***	1.40*		1.85***	1.23
Friends' substance use		1.42***	1.34***		1.10	1.06
<u>MARIJUANA USE</u>			11.32***			24.40***

Note: The coefficients shown in the table are the antilogs (e^{beta}) of the coefficients obtained using PROC PHGLM in SAS. A coefficient of 1.0 indicates no effect.

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.