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Adolescent Precursors of Intensity of Marijuana and Other Illicit Drug Use Among Adult Initiators

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ABSTRACT. This study examined (a) adolescent psychosocial risk factors for frequency (intensity) of marijuana use and for other illicit drug use among those who started using these drugs in early adulthood (adult initiators) and (b) the protective role of parent–adolescent relations in reducing or preventing drug use when adolescents enter early adulthood. The study's participants were male and female youth from a longitudinal prospective study. The participants' mean ages were 17 and 22 years at late adolescence and early adulthood, respectively. Independent measures assessed personality, parental, peer, and self-drug-use factors during late adolescence; dependent measures assessed frequency of marijuana use and other illicit drug use during early adulthood for initiators of the respective drug categories. The authors found that intensity of marijuana use was directly associated with the personality, parental, and self-drug-use domains and indirectly associated with the peer domain. Intensity of other illicit drug use was directly associated with personality and self-drug use. Analyses also revealed that some parent–adolescent relations factors buffered the effects of risk factors for both marijuana and other illicit drug-use intensity, whereas others enhanced the effects of protective factors against other illicit drug-use intensity. The results indicate that there are both commonalities and differences in precursors of marijuana and other illicit drug-use intensity among initiators of these drugs during early adulthood.

Key words: adolescents, initiation of drug use, marijuana, other illicit drugs

THIS STUDY, which builds upon previous research, is unique in three respects. First, it focuses on those who start using drugs (initiate drug use) between late adolescence and adulthood, a group that has received little attention. Second, it differentiates between the initiation of marijuana use and the initiation of other illicit drug use. Third, in contrast to work by other researchers (e.g., Bailey & Hubbard, 1990; Chilcoat & Anthony, 1996; Kandel & Davies, 1992; Kandel &

Logan, 1984; Yamaguchi & Kandel, 1984), it uses a frequency measure of drug use, from here on defined as *intensity of use*. Such a measure allows for initiation into varying levels of drug use, which can range from very infrequent use (e.g., among experimenters) to very frequent use (e.g., among those who come to use drugs on a near-daily or daily basis).

Studies have demonstrated that psychosocial risk factors for initiation of drug use fall primarily within the intrapersonal, family, peer, and self-drug-use domains. Research concerning marijuana-use initiation, specifically, has confirmed the importance of risk factors within the personality (Brook, Cohen, Whiteman, & Gordon, 1992; Kandel & Logan, 1984), peer (Bailey & Hubbard, 1990; Brook, Cohen, et al., 1992; Kandel & Davies, 1992; Kandel & Logan, 1984; Kandel & Raveis, 1989; Stevens, Freeman, Mott, & Youells, 1996), and family domains (Bailey & Hubbard, 1990; Brook, Cohen, et al., 1992; Kandel & Davies, 1992; Stevens et al., 1996).

Risk factors for initiation of use of other illicit drugs derive from similar domains and have included intrapersonal (Kandel & Davies, 1996; Kandel & Raveis, 1989), parental (Kandel & Davies, 1996; Kandel & Raveis, 1989), and peer (Cadoret, 1992; Kandel & Davies, 1996) factors. (Note: Throughout this article, *other illicit drugs* refers to illicit drugs other than marijuana.) The few studies that have specifically compared risk factors for initiation of different categories of drugs among adolescents (e.g., Kandel & Davies, 1992; Kandel, Kessler, & Margulies, 1978) and adults (e.g., Brook, Lukoff, & Whiteman, 1980; Huba & Bentler, 1982; Kandel & Logan, 1984; Yamaguchi & Kandel, 1984) have shown commonalities and differences among those factors. They have also suggested that marijuana-use initiators tend to be less deviant on various psychosocial factors than initiators of other illicit drug use, but more deviant than those who do not initiate illicit drug use at all. However, the relative importance of those psychosocial factors in accounting for the intensity with which these different categories of drugs are used among their respective initiators cannot be ascertained from the research. Ascertaining the relative importance of those factors was the main focus of this study.

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This study was conducted within the framework of the family interactional perspective proposed by Brook, Brook, Gordon, Whiteman, and Cohen (1990). That perspective specifies the nature of interrelationships among family, personality, peer, and drug-use domains as they relate to drug use. In terms of the family domain, Brook, Brook, Gordon, et al. proposed that parental drug use and parent-adolescent relations are influential in adolescents' drug use. Indeed, parental drug use has often been associated with adolescent drug use (Brook, Whiteman, Gordon, & Brook, 1983; Hops, Duncan, Duncan, & Stoolmiller, 1996; Peterson, Hawkins, Abbott, & Catalano, 1995; Stephenson, Henry, & Robinson, 1996). The attachment and control dimensions of the parent-child/adolescent relationship have also been proposed to be related to the adolescent's drug taking. Parental display of affection (parental warmth) has been found to be associated with reduced drug involvement (Brook, Brook, Gordon, et al., 1990), as has the child's identification with the parent (Brook, Whiteman, Gordon, & Cohen, 1986b). Regarding control dimensions, parental permissiveness (as opposed to restrictiveness) has been shown to be related to greater drug use (Brook, Cohen, et al., 1992; Brook, Whiteman, & Gordon, 1982; Dishion & Loeber, 1985), as has the use of overly power-assertive disciplinary practices (Brook, Whiteman, Nomura, Gordon, & Cohen, 1988).

The family interactional perspective also postulates that the link between the parent-adolescent relationship and adolescent drug use is mediated by the adolescent's adherence to values and practices of conventional society (referred to here as personality factors). Highly conventional (deviance-averse) adolescents are less likely to take up drugs than are their less conventional (more deviance-prone) counterparts (Brook, Balka, Gursen, Brook, & Shapiro, 1997; Brook, Whiteman, Gordon, & Cohen, 1986a). Societal attitudes tend to be more accepting of marijuana use than of other illicit drug use; consequently, other illicit drug use represents even greater deviation from conventional society than does marijuana use. Thus, we predicted that personality attributes that reflect unconventionality would be directly associated with both marijuana use and other illicit drug use among initiators of the respective drugs, and we expected that those who initiate the use of other illicit drugs would be even more unconventional than marijuana initiators.

A third main domain of the family interactional perspective involves peer influences. With few exceptions (e.g., Brook, Lukoff, et al., 1980), researchers have long considered drug-using peers to have the greatest influence on adolescents' drug use (see Brook, Richter, & Whiteman, in press). However, several investigators have noted that the role of peers has been somewhat overestimated, particularly in comparison to that of adults (Aseltine, 1995; Kandel, 1996). Still, we predicted that peer factors would be significantly related to both marijuana-use and other illicit drug-use initiation.

The family interactional perspective is in agreement with the drug stage hypothesis (Kandel & Faust, 1975; Kandel et al., 1978) or sequence of drug use (described by Brook, Hamburg, Balka, & Wynn, 1992). According to this hypoth-

esis, drug use progresses sequentially beginning with the use of legal drugs, followed by the use of marijuana, and finally by the use of other illicit drugs. With a few exceptions, this sequence has been confirmed repeatedly (Mackesy-Amiti, Fendrich, & Goldstein, 1997). Therefore, we predicted that prior use of a drug related to a given drug stage would be directly associated with an increased risk for use of a drug related to a later stage.

The family interactional perspective also focuses on risk/protective and protective/protective mechanisms in relation to drug use. These are mechanisms whereby protective factors attenuate the effects of risk factors for drug use (risk/protective) and enhance effects of other protective factors against drug use (protective/protective; Brook, Brook, Gordon, et al., 1990; Brook, Richter, et al., in press). Such protective factors derive from the family domain (e.g., parent-child/adolescent attachment; Brook, Brook, De la Rosa, Whiteman, & Montoya, 1999; Brook, Whiteman, Balka, & Hamburg, 1992; Brook, Whiteman, Balka, Win, & Gursen, 1997), intrapersonal domain (e.g., adolescent conventionality; Brook, Balka, et al., 1997; Brook, Whiteman, et al., 1986b; Brook, Whiteman, Gordon, & Cohen, 1989), and peer domain (Brook, Balka, et al., 1997; Brook, Cohen, et al., 1992), among others. Previous research on the protective role of parent-adolescent relations, in particular (Brook, Brook, De la Rosa, et al., 1999; Brook, Whiteman, Balka, et al., 1992; Brook, Whiteman, Balka, et al., 1997), has focused on adolescence. Hence, such research has not indicated whether the protective effects of positive parent-adolescent relations can persist into adulthood. In this study, we assessed whether positive parent-adolescent relations can serve a protective role against two types of risk factors for drug use: (a) high exposure to the youth's (self) drug use and other people's drug use and (b) high unconventionality. We also examined whether parent-adolescent relations, in addition to protecting against risk factors, can enhance protective factors of low exposure to self- and others' drug use and low unconventionality, thereby leading to even lower intensity of drug use among marijuana and other illicit drug-use initiators.

This study differed from much of the previous research on adolescent psychosocial risk factors for initiation of illicit drug use during adulthood. Specifically, in addition to comparing the relative importance of risk factors for initiation of two different categories of illicit drugs, we used dependent measures that took into account not only the fact of initiation of illicit drug use but also the frequency (or intensity) of use of the newly initiated drug. In this research we used data of a community sample of respondents from a longitudinal prospective study (see P. Cohen, Cohen, et al., 1993). Focusing specifically on the period between late adolescence and early adulthood, we assessed (a) which variables of personality, parental, peer, and self-drug-use domains can distinguish between noninitiation of use of any illicit drug, initiation of marijuana use, and initiation of other illicit drug use; (b) the commonalities and differences between the pathways to marijuana use and other illicit drug use among initiators of the respective categories of drugs; and (c) those

protective aspects of the positive parent-adolescent relationship during late adolescence that can offset personality- and drug-use-related risk factors for drug use or further enhance personality- and drug-use-related protective factors against drug use among marijuana and other illicit drug-use initiators.

Method

Participants

The study sample was derived from a cohort of 976 youngsters who were first assessed for a longitudinal study in 1975 (P. Cohen, Cohen, et al., 1993). At the first assessment, Time 1 (T1), participants were aged 1 to 10 years and were members of randomly selected families living in two counties in upstate New York (Kogan, Smith, & Jenkins, 1977). Of these original participants, 85% agreed to take part in the present study. Follow-up contacts with the participants were made on four occasions between 1983 and 1997. Our analyses related to Time 3 (T3; late adolescence) and Time 4 (T4; early adulthood) data of 686 individuals for whom complete data were available at both times. They were predominantly (92%) White and included 333 male (48.5%) and 353 female (51.5%) youth; the average age of the sample was 16.7 years ($SD = 2.71$ years) and 22.08 years ($SD = 2.61$ years) at T3 and T4, respectively.

On most demographic variables the study sample did not differ significantly from the individuals of the initial study who were not included in the sample. However, the study sample consisted of a significantly lower proportion of male youth than the excluded sample ($p < .01$) and of people of a higher socioeconomic status ($p < .0001$) than the excluded sample. The excluded individuals were significantly different from the study sample on only 3 of the 15 psychosocial variables under investigation. Specifically, those who were excluded had a significantly higher mean score on the measure of deviance ($p < .05$) and lower mean scores on measures of parental warmth ($p < .05$) and parental identification ($p < .001$) than the study sample.

Measures and Procedures

At initial contact (T1) and at each follow-up contact, the mothers in the sample underwent structured, face-to-face interviews in their homes by lay interviewers, who had been trained specifically for this study. Prior to the study, the interviewers met with the project director, who reviewed the interview questions. The interviewers questioned the participants, and afterward the completed interviews were evaluated by the project director, who provided feedback to the interviewers on each interview. The mothers were asked questions about their child-rearing techniques, family structure and health and demographic characteristics, and about their child's personality and behavior. At Time 2 (T2), T3, and T4, the

participating children/adolescents completed self-administered, structured questionnaires, which were completed in participants' homes at the time that the mothers were interviewed. These questionnaires contained closed-ended questions concerning the adolescents' own attitudes, behaviors, personality attributes, and drug involvement and their peers' unconventional behaviors and drug use. The interviews and questionnaires each took approximately 1 hr to complete. The youngsters and mothers received monetary compensation for their participation; they were informed of the confidentiality of their responses; and they signed consent forms. Further details about the original sample and procedures can be found in P. Cohen, Cohen, et al. (1993).

Psychosocial measures at T3. The psychosocial measures of interest for this investigation were based on responses at T3 and were used to contrast three drug-stage comparison groups and to predict drug use at T4. The measures were organized into the following domains: (a) youth personality, (b) parental factors, (c) peer drug use, and (d) youth self-drug use. The adolescents supplied the data concerning each of these domains, whereas information regarding their parents' drug use was obtained via interviews with their mothers. For the most part, we used existing scales and adaptations of existing scales with adequate psychometric properties. The scales making up each domain and their respective Cronbach's alpha (α) internal consistency coefficients are indicated for each domain in turn.

Psychosocial measures at T3: Youth personality. The personality measures included (a) a five-item deviance scale (Gold, 1966; $\alpha = .72$), (b) an eight-item rebelliousness scale (Smith & Fogg, 1979; $\alpha = .79$), (c) a seven-item sensation-seeking scale (Zuckerman, Eysenck, & Eysenck, 1978; $\alpha = .56$), and (d) a seven-item tolerance of deviance scale (Jessor, Graves, Hanson, & Jessor, 1968; $\alpha = .76$). Higher scores on the scales denote greater unconventionality.

Psychosocial measures at T3: Parental factors. This domain included four measures concerning parent-adolescent relations and three measures concerning the drug use of the adolescents' parents. Each parental factor measure was created by summing the total score for the respective maternal scale together with the total score for the respective paternal scale (as described later). Measures of parent-adolescent relations assessed parental warmth, parental identification, parental permissiveness, and parental discipline.

Parental warmth concerned the adolescents' perceptions that their parents exhibited and felt concern about their well-being. It was based on the sum of their maternal warmth and paternal warmth scores. The maternal warmth scale combined a four-item maternal affection scale (Schaefer, 1965; $\alpha = .72$) and a five-item maternal child-centeredness scale (Schaefer; $\alpha = .80$). Similarly, the paternal warmth measure resulted from summing scores on a four-item paternal affection scale (Schaefer; $\alpha = .76$) and a five-item paternal child-centeredness scale (Schaefer; $\alpha = .85$).

Parental identification concerned the degree to which the youth identified with their parents. We used a combined measure that summed scores on a maternal identification scale ($\alpha = .92$) and a paternal identification scale ($\alpha = .85$). The original identification scales (five items each) were developed by Brook, White-man, and Gordon (1982). They were also composite measures that were derived from a five-item admiration scale ($\alpha = .82$ and $.85$ for mothers and fathers, respectively), a five-item emulation scale ($\alpha = .83$ and $.85$ for mothers and fathers, respectively), and a four-item similarity scale ($\alpha = .75$ and $.86$ for mothers and fathers, respectively).

Parental permissiveness concerned the reported degree to which the adolescents' actions were monitored by their parents. We used a composite measure, developed for the purpose of this study, that summed scores on the four-item maternal permissiveness ($\alpha = .61$) and paternal permissiveness ($\alpha = .55$) scales. Our combining the maternal and paternal permissiveness scales is supported by the following analyses: There was a high correlation between the maternal and paternal permissiveness scales ($r = .60$, $p < .0001$) and no significant difference between the mean score on the maternal permissiveness scale ($M = 11.29$, $SD = 2.57$) and the paternal permissiveness scale ($M = 11.22$, $SD = 2.56$), $t(687) = .65$, $p > .50$. Furthermore, when we examined the relationship of maternal and paternal permissiveness with drug use and the composite measure of parental permissiveness with drug use, we found no appreciable differences. Higher scores denote greater parental permissiveness.

Parental discipline concerned the parents' use of power-assertive techniques to control their children. We used a measure that summed scores on five-item maternal and paternal discipline scales (Avgar, Bronfenbrenner, & Henderson, 1977; $\alpha = .74$ and $.76$, respectively). The higher the score, the greater the degree of discipline used.

We used three measures to assess parental drug use. A parental legal drug-use measure asked about both parents' frequency of consumption of beer/wine and hard liquor and parental smoking, with scales ranging from 1 (*never*) to 5 (*3 or more drinks every day*) and 1 (*never*) to 5 (*more than one pack per day*), respectively. A parental marijuana-use measure combined scores on separate mother and father marijuana-use measures that ranged from 1 (*not at all*) to 5 (*once a week or more*). Last, a composite parental other illicit drug-use measure assessed parents' frequency of nonprescriptive use of cocaine and illicit drugs other than marijuana, on a 5-point scale ranging from 1 (*not at all*) to 5 (*once a week or more*).

Psychosocial measures at T3: Peer drug use. For peer drug use, the measure peer legal drug use was used to assess the proportion (*most*, *some*, *only a few*, or *none*) of the adolescents' friends who drank beer/wine or hard liquor at least once a week and smoked cigarettes on a regular basis. We used a peer marijuana-use measure to assess the proportion of the respondents' friends (*none to most*) who used marijuana or hashish at least once per month on average. A peer illegal drug-

use measure was used to assess the proportion of the respondents' friends (*none to most*) who used amphetamines, barbiturates, cocaine, heroin, LSD or other psychedelics, quaaludes, and tranquilizers for nonmedical purposes.

Psychosocial measures at T3: Youth drug use. We assessed the frequency that tobacco, alcohol, marijuana, and other illicit drugs were used. Tobacco use was assessed with a 7-point scale ranging from 0 (*none*) to 6 (*about 1½ packs per day*). The frequency-of-alcohol-use measure combined scores on beer/wine and hard liquor use frequency, each of which was recorded on a 5-point scale ranging from 1 (*never*) to 5 (*3 or more drinks daily*). Frequency of marijuana use was assessed with a scale that ranged from 1 (*never*) to 7 (*every day*). Frequency of other illicit drug use was assessed on a 6-point scale ranging from 1 (*not at all*) to 6 (*every day*); this measure referred to the frequency of use for the past 2 years of any of the following drugs for nonmedical purposes: amphetamines, barbiturates, cocaine, heroin, LSD or other psychedelics, quaalude, and tranquilizers. A self legal drug-use measure was created that combined respondents' frequency of consumption of alcoholic beverages and tobacco.

A body of research results supports the validity of the personality measures (Jessor, Donovan, & Costa, 1991), parental factors measures (Avgar et al., 1977; Brook, Whiteman, Gordon, & Brook, 1984; P. Cohen & Cohen, 1996; Kogan et al., 1977; Schaefer, 1965; Wagner & Cohen, 1994), and peer and self-drug-use measures (Brook, Brook, Gordon, et al., 1990).

Comparison groups at T4. The three comparison groups consisted of (a) nonusers of illicit drugs (noninitiators) between T3 and T4 ($n = 255$), (b) initiators of marijuana use (marijuana initiators) between T3 and T4 ($n = 144$), and (c) initiators of other illicit drug use (other illicit drug initiators) between T3 and T4 ($n = 101$). These comparison groups excluded the 186 respondents who had used illicit drugs ($n = 77$) and marijuana ($n = 109$) at T3. The rationale for the creation of these three groups is consistent with Kandel's (1975) stages of drug-use sequence. According to this theory, an individual's drug use progresses from no drug use (Stage 1), through a legal drug-use stage, then through a marijuana-use stage, and finally to an other illicit drug-use stage (Stage 4). Because of the present focus on illicit drugs and the small number of individuals in Stage 1 at T4, we included both legal drug users and nondrug users in the nonuser category.

Drug-use dependent measures at T4. For both categories of drugs, we sought to account for the extent of involvement in the drug in early adulthood (T4) among individuals who were not involved in using the respective drug during late adolescence (T3). Thus, we devised drug-use dependent measures that took into account not only initiation of a particular drug category but also intensity (frequency) of involvement in that drug. The two dependent measures were T4 marijuana-use frequency for T3 abstainers and T4 other illicit drug-use frequency for T3 abstainers.

Drug-use dependent measures at T4: T4 marijuana-use frequency for T3 abstainers. This dependent measure assessed frequency of marijuana use at T4 for those not previously involved in it. Noninitiators of marijuana use at T4 ($n = 255$) were assigned a score of 0 on this measure. Initiators of marijuana use ($n = 144$) were those who reported having started to use marijuana between T3 and T4. (Their scores on the dependent measure were identical to their scores derived from the T4 marijuana-use frequency scale.) Thus the T4 marijuana-use frequency for the T3 abstainers' dependent measure was applicable to 399 of the 686 respondents. Those excluded from these analyses were those who had already initiated marijuana use (i.e., used marijuana at T3) and those who used other illicit drugs at T3 or at T4 (or at both times). The final measure consisted of an 8-point scale ranging from 0 (*no use of marijuana*) to 7 (*daily use of marijuana*).

Drug-use dependent measures at T4: T4 other illicit drug-use frequency for T3 abstainers. This second dependent measure assessed the frequency of use of other illicit drugs at T4 for those not involved in using them at T3. Noninitiators of other illicit drugs at T4 ($n = 508$) were assigned a score of 0 on this measure. Initiators of other illicit drugs were those who reported having started to use illicit drugs between T3 and T4 ($n = 101$). This dependent measure had an 8-point scale ranging from 0 (*no use of other illicit drugs*) to 7 (*daily use of other illicit drugs*). Data on prior users of other illicit drugs ($n = 77$) were not included in any analyses.

Statistical Analysis

We conducted the first set of analyses to contrast the three drug-stage comparison groups. First we ran 15 one-way analyses of variance (ANOVAs) to statistically compare the mean scores of the three comparison groups on each of the psychosocial variables within the personality, parental, peer, and self-drug-use domains. We corrected for the increased probability of occurrence of a Type I error that results when conducting multiple comparisons by using a more conservative level of alpha than .05. With a Bonferroni correction approach (Hays, 1981), the alpha level used was .003, which was calculated by dividing alpha (i.e., .05) by the number of comparisons (i.e., 15). We used the Student-Newman-Keuls multiple range post hoc test to determine the significance of the difference between pairs of means for each variable. In order to determine whether the obtained results of the mean comparisons between the three groups were an artifact of the respondents' age, we conducted 15 analyses of covariance (ANCOVAs) in which age was entered as a covariate. In addition, we conducted 15 two-way ANOVAs to control for the effect of gender in the comparisons.

By conducting Jonckheere-Terpstra tests (Robertson, Wright, & Dykstra, 1988), we also assessed each of the psychosocial variables separately to determine whether the groups' relative scores at T3 revealed an increasing degree of risk (drug conduciveness), with the nonusers having been at the lowest level of

risk at T3, followed by the marijuana initiators at a higher risk, and then by the other illicit drug initiators at the highest risk. A significant Jonckheere-Terpstra test statistic suggests a linear trend.

The second (pathway) set of analyses involved a series of hierarchical multiple regression analyses that used the dependent variables (a) T4 marijuana-use frequency for T3 abstainers and (b) T4 other illicit drug-use frequency for T3 abstainers. We tested the model outlined in the introduction using the approach suggested by Baron and Kenny (1986). Underlying this approach is the fundamental assumption that in a mediational model the statistical patterning is such that potential mediators, if controlled, would significantly reduce the relationship between the independent and dependent variables. We used hierarchical multiple regression analysis to examine the direct and indirect effects of each of the domains on the dependent variables (J. Cohen & Cohen, 1983). First, we examined the association of each of the four psychosocial domains with the dependent variable. Then we assessed the significance of each individual domain, controlling for the effects of each other domain on the dependent variable, thereby determining direct and indirect effects.

The third (interactional) set of analyses was conducted to determine which parent-adolescent relations variables can serve as protective (non-drug-conductive) factors in moderating the risk (drug-conductive) effects or enhancing the protective effects (with respect to drug-use frequency) of corresponding drug-use and youth personality psychosocial variables. Accordingly, we conducted a series of multiple regression analyses. For each analysis we entered (a) one youth personality or drug-use variable (of the parents, peer, or adolescent), (b) one parent-adolescent relations variable, and (c) one youth personality/drug use by parent-adolescent relations interaction variable. In the case of interaction terms that were statistically significant predictors of the dependent variable ($p < .05$, two-tailed), we plotted graphs to facilitate interpretation of the interactional effects of the two variables on the dependent variable. We used the same two dependent variables in these analyses that we used in the previous set of regression analyses.

Results

Intergroup Comparisons on Psychosocial Measures

Using one-way ANOVAs, we compared participants' psychosocial variable scores taken at T3 with the those taken at T4 for noninitiators, marijuana initiators, and other illicit drug-use initiators. Results and subsets for each of the group means based on Neuman-Keuls post hoc tests are shown in Table 1. After using a Bonferroni correction ($p < .003$), we found significant differences among the comparison groups on 9 of the 15 psychosocial variables of the personality, family, peer, and self legal drug-use domains (see Table 1). The results of the post hoc analyses revealed that the noninitiators could be distinguished from the mar-

TABLE 1
T3 Means of Psychosocial Variables for Noninitiators, T4 Marijuana Initiators,
and T4 Other Illicit Drug Initiators

Domain/Variable	Noninitiators (<i>n</i> = 255)	T4 marijuana initiators (<i>n</i> = 144)	T4 other illicit drug initiators (<i>n</i> = 101)	<i>F</i> (2, 497)
Personality				
Deviance	7.54 _a	8.70 _b	10.41 _c	27.48*
Rebelliousness	15.26 _a	16.88 _b	17.73 _b	17.40*
Sensation seeking	9.06 _a	9.66 _b	10.41 _c	28.41*
Tolerance of deviance	12.13 _a	13.01 _a	15.01 _b	20.60*
Parental factors				
Parental warmth	57.78 _a	55.44 _a	55.42 _a	4.14
Parental identification	101.95 _a	95.07 _b	93.09 _b	10.31*
Parental permissiveness	22.65 _a	21.50 _b	23.58 _a	6.52*
Parental discipline	24.93 _a	25.24 _a	25.27 _a	.15
Parent legal drug use	11.73 _a	13.17 _b	13.85 _b	16.57*
Parent marijuana use	2.07 _a	2.18 _{ab}	2.27 _b	3.95
Parent illegal drug use	6.02 _a	6.05 _a	6.12 _a	1.82
Peer drug use				
Legal drug use	4.12 _a	4.12 _a	4.66 _b	3.17
Marijuana use	1.61 _a	1.46 _a	2.02 _b	11.63*
Illegal drug use	1.38 _a	1.35 _a	1.45 _a	.38
Self-drug use				
Legal drug use	3.51 _a	3.83 _a	5.00 _b	20.57*

Note. T3 = Time 3. T4 = Time 4. Subscript letters indicate the subset based on Newman-Keuls tests. Within each row, differing pairs of subscripts indicate significant differences between group means. **p* < .003 (Bonferroni correction for multiple comparisons).

ijjuana initiators on their T3 scores on variables in the personality domain (i.e., lower deviance, rebelliousness, and sensation-seeking scores) and the parental domain (i.e., greater parental identification and permissiveness and less parental legal drug use). However, the noninitiators' scores were not significantly different from those of the marijuana initiators on measures in the peer and self-drug-use domains. Compared with the other illicit drug-use initiators, the marijuana-use initiators had significantly different scores on measures within each domain, including three measures from the personality domain (lower deviance, sensation seeking, and tolerance of deviance scores); one measure from the parental domain (lower parental permissiveness); two measures from the peer drug-use domain (less peer legal drug use and peer marijuana use); and the one legal drug-use variable (less legal drug use at T3). Analyses of covariance (ANCOVAs), with age entered as a covariate, revealed that none of the observed results was an artifact of age. Two-way ANOVAs revealed that the associations between group mem-

bership and the psychosocial variables were a function of gender on parental warmth, parental permissiveness, and parental marijuana use.

According to Jonckheere-Terpstra analyses, there was a significant linear trend (with Bonferroni adjustments, $p < .003$) in the scores of the three groups on 9 of 15 of the psychosocial variables. These were in the expected direction of least risk for the nonusers and progressively greater risk for the marijuana initiators, with the greatest risk for the other illicit drug-use initiators. There was no significant trend on the variables parental permissiveness, parental discipline, and parental illegal drug use, or on the three peer drug-use variables. Further details concerning the results of the Jonckheere-Terpstra tests are available on request.

Pathway Analyses

With the next two sets of analyses, we intended to account for the two dependent variables—T4 marijuana-use frequency for T3 abstainers and T4 other illicit drug-use frequency for T3 abstainers—using variables within the youth personality, parental, peer drug-use, and prior self-drug-use domains based on T3 assessments. The self-drug-use measure was based on one variable (legal drug use) when predicting T4 marijuana-use frequency and two variables (self-legal drug use and marijuana use) when predicting T4 other illicit drug-use frequency. Hierarchical multiple regression analyses revealed that each of the four domains accounted for a statistically significant proportion of the variance in T4 marijuana-use frequency for abstainers at T3 (see the top half of Table 2). The parental domain accounted for the greatest proportion of the variance in marijuana-use frequency, whereas the peer drug-use domain accounted for much less of the marijuana-use variance.

Next, hierarchical multiple regression analyses were conducted in which the variables within each of the domains were entered, controlling for the effects of each of the other domains. As shown in the top half of Table 2, each of the personality, parental, and self-drug-use domains remained significant after controlling for each of the other domains. The peer domain failed to reach statistical significance after controlling for each of the personality, parental, and self-drug-use domains. The results suggested that the personality, parental, and legal drug-use domains were each independent and direct predictors of T4 marijuana-use frequency for T3 abstainers, whereas the effects of the peer drug-use domain were mediated by the personality, parental, and self-drug-use domains.

The second set of hierarchical multiple regression analyses revealed that each of the four psychosocial domains were significant predictors of T4 other illicit drug-use frequency for T3 abstainers (see the lower half of Table 2). In this case the youth personality domain accounted for the greatest proportion of the variance in other illicit drug-use frequency, and as was the case for marijuana-use initiation, peer drug-use accounted for the smallest (although a significant) proportion of the variance. We then ran hierarchical multiple regression analyses in

TABLE 2
Multiple Correlations (R^2) for T3 Psychosocial Domains
With T4 Drug-Use Frequency

Domain	R^2 no control	R^2 controlling for other domains			
		1	2	3	4
<i>T4 marijuana use</i>					
1. Personality (youth)	.06**	—	.04**	.05**	.04**
2. Parental factors	.08**	.06**	—	.08**	.08**
3. Peer drug use	.02*	.01	.02	—	.01
4. Self-drug use ^a	.03**	.01*	.02**	.02*	—
<i>T4 other illicit drug use</i>					
1. Personality (youth)	.04**	—	.03**	.04**	.02*
2. Parental factors	.03**	.02	—	.03*	.02
3. Peer drug use	.02*	.01	.01	—	.01
4. Self-drug use ^b	.04**	.01*	.02**	.03**	—

Note. T3 = Time 3. T4 = Time 4.

^aThis domain contains only the T3 frequency of legal drug-use variable. ^bThis domain contains the T3 frequency of legal drug use and frequency of marijuana-use variables.

* $p < .05$. ** $p < .01$.

which we entered variables within each domain, controlling for each other domain. As shown in the lower half of Table 2, the youth personality domain continued to be a significant predictor of T4 other illicit drug-use frequency for T3 abstainers, even after controlling for the other three domains. The variance explained by the parental domain remained significant after controlling for the effect of the peer drug-use domain, but its association with other illicit drug use ceased to be significant after controlling for the youth personality and self-drug-use domains. The peer drug-use domain accounted for a nonsignificant proportion of the variance in T4 illicit drug-use frequency after controlling for the effects of youth personality, parental factors, and self-drug use at T3. Finally, self-drug use at T3 continued to account for a significant proportion of the variance in T4 illicit drug-use frequency for T3 abstainers after controlling for the other three domains.

Interactional Analyses

Our final set of analyses examined whether parent-adolescent relations can play a protective role in moderating the risk effects or enhancing the protective effects of psychosocial variables (i.e., adolescent conventionality, adolescent

drug use, parental drug use, and peer drug use) with respect to each of the dependent variables. Five of 44 interactions were statistically significant in terms of T4 marijuana-use initiation for T3 abstainers (see Table 3). Plots of these interactions suggested that the risk of frequency of marijuana use at T4 that was associated with adolescents' use of legal drugs and their unconventionality at T3 could be offset by the nature of the parent-adolescent relationship at that time. In particular, among adolescents who used legal drugs and who were prone to unconventionality, those whose parents had been relatively permissive at T3 were less inclined to use marijuana frequently at T4 than those whose parents had been more restrictive. Furthermore, parental warmth offset the risk associated with being tolerant of deviance on T4 marijuana-use frequency for T3 abstainers. That is, the greater the degree of warmth exhibited by parents toward the adolescent who was tolerant of deviance, the lower the level of marijuana use at T4.

Similar interactional analyses, using the T4 other illicit drug-use frequency for T3 abstainers as the dependent variable, revealed 9 of 48 instances in which parent-adolescent relations factors played a protective role (see Table 4). As shown in the upper portion of Table 4, there was evidence of a protective/protective mechanism for the parent-adolescent warmth factor (in one instance) and the parental identification factor (in 4 instances). These parent-adolescent relations variables enhanced the protective effect of low scores on peer drug use and measures of unconventionality at the level of other illicit drug use at T4. Finally, high parental restrictiveness played a protective role against risks for other illicit drug use at T4 in 4 instances (see the lower portion of Table 4). Unlike the analysis conducted with marijuana use as the dependent variable, low permissiveness (or high restrictiveness) rather than high permissiveness (or low restrictiveness) was protective against other illicit drug use. At T3, high parental restrictiveness protected against the effects (a) of having parents or peers who were marijuana users,

TABLE 3
Interactions of Personality and Drug-Use Variables With Parent-Adolescent Relations Variables in Predicting Low T4 Marijuana-Use Frequency

Personality, self-, and others' drug-use variable/risk factor	Parent-adolescent relation/protective factor	<i>F</i> (3, 395)
Self- (legal) drug use/high	Parental permissiveness/high	6.33***
Self-deviance/high	Parental permissiveness/high	5.24**
Sensation seeking/high	Parental permissiveness/high	8.58***
Tolerance of deviance/high	Parental permissiveness/high	7.20***
Tolerance of deviance/high	Parental warmth/high	5.57***

Note. T4 = Time 4. The analyses were conducted among abstainers at Time 3.

p* < .01. *p* < .001.

TABLE 4
Interactions of Youth Personality and Drug-Use Variables With Parent-Adolescent Relations Variables in Predicting Low T4 Other Illicit Drug-Use Frequency

Personality, self-, and others' drug-use variable	Parent-adolescent relation	<i>F</i> (3, 605)
<i>Protective/protective mechanism</i>		
Peer legal drug use/low	Parental identification/high	2.75*
Peer marijuana use/low	Parental warmth/high	5.32**
Peer marijuana use/low	Parental identification/high	5.26**
Self-deviance/low	Parental identification/high	6.83***
Rebelliousness/low	Parental identification/high	4.84**
<i>Risk/protective mechanism</i>		
Parent marijuana/high	Parental restrictiveness/high	9.56***
Peer marijuana/high	Parental restrictiveness/high	4.63**
Peer other illicit drug use/high	Parental restrictiveness/high	3.64*
Rebelliousness/high	Parental restrictiveness/high	6.73***

Note. T4 = Time 4. High parental restrictiveness is equivalent to low parental permissiveness. The analyses were conducted among abstainers at Time 3.

* $p < .05$. ** $p < .01$. *** $p < .001$.

(b) of having peers who were other illicit drug users, and (c) of having rebelliousness at the level of other illicit drug use at T4.

Discussion

To the best of our knowledge, this is the only longitudinal, prospective study that has examined the relative importance of adolescent risk factors for intensity of drug use among initiators of marijuana use and among initiators of other illicit drug use during early adulthood. The risk factors under investigation were drawn from four domains (youth personality, parental factors, peer drug-use, and self-drug-use). Their predictive roles with respect to marijuana use and other illicit drug-use intensity are discussed for each domain in turn.

Domains

Personality domain. We found that the mean level of unconventionality (e.g., deviance) during adolescence was lowest among the noninitiators, became progressively higher among the marijuana initiators, and was highest among the other illicit drug-use initiators. The pathway-regression analyses revealed that the personality domain was a direct predictor of drug-use intensity for both the marijuana-use initiators and the other illicit drug-use initiators. The results of the

interactional analyses suggest that favorable parent–adolescent relations can both offset personality risk factors for drug use and enhance personality protective factors against drug use. In particular, the findings suggest that the effects of adolescent unconventionality may be mitigated by parental permissiveness and parental warmth leading to less intense marijuana use in adulthood. Conceivably, such unconventional youngsters are less likely to rebel and turn to marijuana use than those whose parents demonstrate less warmth and permissiveness.

In contrast, we found that for the initiators of other illicit drugs, drug-use intensity that is associated with unconventional personality attributes can be offset by high parental restrictiveness. Seemingly, if adolescents already use marijuana (and are in a drug-using environment), parental restrictiveness may shield them from using other illicit drugs during early adulthood. In terms of protective/protective interactions, our results suggest that adolescents who are protected against using other illicit drugs (because of being more conventional and not being in a drug-using environment) can be further protected from such use by identifying with their parents.

Parental domain. The pathway analyses revealed a direct association between parental factors and marijuana-use intensity, but an indirect association between other illicit drug-use intensity and parental factors that was mediated by the personality and self-drug-use domains. These results differ from that of Kandel et al. (1978), who found that family factors are more strongly associated with other illicit drug-use initiation than they are with marijuana-use initiation. Unlike the present study's foci on early adulthood initiation and on the prediction of drug-use intensity, however, Kandel and colleagues' (1978) longitudinal study was conducted among high school seniors for whom the family may have had a particularly influential role. We also found that although three parental factors (i.e., greater parental identification, parental legal drug use, and parental marijuana use) distinguished between noninitiation of illicit drugs and marijuana-use initiation, only one parental factor (less parental permissiveness) distinguished between initiation of marijuana use and initiation of other illicit drug use. The parents of youth who started using marijuana had been less permissive during the youth's adolescence than the parents of the youth who began using other illicit drugs. In contrast, the parents of youth who did not start using drugs had been more permissive during adolescence than the parents of the youth who started using marijuana. This finding supports the previously noted interactive effect of parental permissiveness, whereby its benefits and drawbacks are a function of the attributes (e.g., personality) of the adolescent with whom the parent is dealing.

Peer domain. Overall, we found that peer drug use during adolescence was not a strong predictor of drug-use initiation during early adulthood. Although two peer drug-use variables (peer legal drug use and peer marijuana use) distinguished between initiation of other illicit drug use and initiation of marijuana use during

early adulthood, none of the specific peer variables distinguished between the marijuana initiators and the noninitiators of any illicit drugs. Furthermore, the finding that the peer drug-use domain had an indirect association with both the marijuana-use and the other illicit drug-use dependent variables highlights the importance of other mediating factors, such as those of the personality, parental, and self-drug-use domains.

These results are in accordance with and help to clarify recent research suggesting that the role of peers as an important influence in adolescent drug-use initiation and frequency of use has been overestimated (Aseltine, 1995; Kandel, 1996). In addition, the diminished role of the peer group found in this study may be a result of the developmental stage studied: There is a reduction in the influence of peers as adolescents enter adulthood, with its new roles and responsibilities (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). These results are supported by Brook, Lukoff, et al. (1980), who found that peer factors were not directly related to marijuana-use initiation when there was a relatively lengthy (3-year) interval between the first and second waves of data collection. In that study, the older participants were 20 years of age.

Self-drug-use domain. The self-drug-use domain was a direct predictor of both marijuana-use and other illicit drug-use intensity in early adulthood. As expected, the respondents' frequency of involvement in drug use during late adolescence was associated with their initiation into and intensity of involvement in the newly started drug during early adulthood. For example, the trend analysis revealed that the frequency of the respondents' legal drug use at T3 had been highest among the other illicit drug users and lowest among the noninitiators of any illicit drugs. These results add to the findings of previous research that have shown the progressively important role of self-drug use in predisposing individuals toward more serious forms of drug use (Mackesy-Amiti et al., 1997).

Limitations

Limitations of this study are worth considering when interpreting the findings. First, despite the practical and theoretical reasons for developing the other illicit drug-user group, there are also shortcomings resulting from combining respondents into this group. This group consists of those who had initiated use of any of a range of categories of drugs that have different properties and effects. Arguably, we might have distinguished among users of these different subgroups in our analyses. However, the number of users of any specific illegal drug (barring marijuana) was small and, consequently, precluded conducting analyses with more specific groups. Moreover, most of the relevant research has revealed that marijuana use tends to precede involvement in other illicit drugs of any type (Mackesy-Amiti et al., 1997), thus justifying our combining the various drugs into one group. Second, despite the value of the longitudinal design over cross-

sectional designs with respect to the time-ordering of variables, the longitudinal design of the study is not appropriate for establishing causality in the relationships. The obtained associations could be due to a third variable that precedes and is associated with both the independent and dependent variables.

Conclusions and Implications

Intervening with respect to a broad array of risk factors drawn from the various domains may serve the dual function of preventing movement from nonuse or legal use of drugs to marijuana use, thereby preventing movement from marijuana use to the use of other illicit drugs. Support for this conclusion derives from the findings of the trend analyses. They indicated a general difference among the three groups of noninitiators of illicit drugs, marijuana initiators, and other illicit drug-use initiators with respect to the risk factors. This finding suggests that an appropriate change in the risk factors (i.e., an increase in more conventional behavior) would result in less movement from nonuse or legal drug use to marijuana use, or from marijuana use to more serious other illicit drug involvement.

Three types of psychosocial factors assume great importance with respect to drug-use intensity. Our pathway analysis suggests that family factors are the most proximal correlates of intensity of marijuana use, and personality attributes and prior self-drug use are the most proximal correlates of intensity of both marijuana use and other illicit drug use among those who begin to use these drugs during early adulthood. Moreover, these relatively proximal factors serve to mediate the more distal influences of peer drug use. Consequently, these three types of psychosocial factors would be good candidates for intervention. For example, therapies and programs that include the parents and particularly emphasize the strengthening of the parent-adolescent bond should prevent movement into marijuana use or increased intensity of the behavior. The significance of the study also stems from the age range of the sample, because it points to the relevance of parental factors (and especially parental relations) during adolescence to later (i.e., early adulthood) drug use.

The study also suggests a dual-natured association of parental permissiveness with drug use. Program developers, clinicians, and parents would benefit from the knowledge that the direction of the association of parental permissiveness may vary as a function of the stage of drug use. Thus, as suggested by our interactional findings, at the earlier stage of drug use a certain degree of parental tolerance with respect to the adolescent's unconventional behaviors may be advisable. When the adolescent is at greater risk of movement from marijuana use to more serious drug involvement, however, a more restrictive parental approach may be called for.

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