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Ecology and Drug Use: Universal Predictors Across Time and Place

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Abstract

The interrelation of ecological and psychosocial risk factors and adolescent marijuana use is examined in this three-sample longitudinal data analysis. Participants included: (a) White children from the Northeast of the United States; (b) African-American and Puerto Rican adolescents from New York City; and (c) Adolescents living in Colombia. Adolescents were interviewed in their homes. Independent measures were from the ecological, personality, peer, and family domains. Logistic regression analysis revealed that the majority of ecological variables were related to adolescent marijuana use. Hierarchical regression analysis demonstrated that the ecological domain was directly and indirectly related to adolescent marijuana use (via the family, peer, and personality domains). Intervention programs should focus on adolescents' unique ecological settings while targeting universal risk factors (e.g., low ego integration, low parental identification) that predict adolescent marijuana use. Similarities among the ecological predictors of adolescent marijuana use in three samples, across time and place, allow for a more universal approach to substance use prevention.

Many studies have examined adolescent substance use with respect to risk factors drawn from the personality, family, and peer psychosocial domains (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Brook, Brook, De La Rosa, Whiteman, Johnson, & Montoya, 2001; Bahr, Hoffmann, & Yang, 2005; Epstein, Bang, & Botvin, 2007). According to Family Interactional Theory (FIT) (Brook, et al., 1990), family factors are associated with personality factors, which in turn predict peer associations and ultimately marijuana use as shown in Figure 1. As regards family factors, a positive mutual attachment relationship characterized by parental identification insulates the individual from marijuana use (Brook, et al., 2001). According to Social Learning Theory, modeling of parental drug use increases the probability of marijuana use by the adolescent (Bandura, 1977). In line with FIT, two components of personality that are associated with marijuana use are unconventionality (e.g., rebelliousness) and intrapersonal distress (e.g., low ego integration) (Brook, et al., 1990). Numerous studies have shown that involvement with a marijuana-using peer group predicts marijuana use in the individual (e.g., van den Bree & Pickworth, 2005). Similarly, associating with marijuana-using peers predicts personality characteristics. Finally, ecological factors have both direct and indirect effects as noted below.

This paper is the first to examine the relative importance of several psychosocial, cross-cultural risk factors compared within the context of a longitudinal design for three samples from different cultures. Research has identified some broader ecological factors that might enhance or diminish the likelihood that an adolescent would engage in substance use (Swaim, Beauvais,

Chavez, & Oetting, 1997; van den Bree & Pickworth, 2005; Reid, Peterson, Hughey, & Garcia-Reid, 2006). However, no previous study, to our knowledge, has focused on how the ecological risk factors are mediated by such important domains as the personality, family and peer group in relation to the adolescent's marijuana use. Furthermore, the study of a broad range of ecological variables is necessary in order to gain a better understanding of the nature of drug use behavior and the contextual variables that influence drug use behavior. Focusing on both ecological and cultural factors in marijuana use will promote a better understanding of the interacting forces that shape drug behavior. Thus, we explore differences and similarities in the predictors of marijuana use among three different cultures.

The three different samples we examine derive from three longitudinal studies we have conducted in two countries--the United States and Colombia, South America. The first study, "Childhood Etiologic Determinants of Adolescent Drug Use," is a 20-year longitudinal study of children living in two cities in upstate New York. The second study, "Drug Use and Problem Behavior in Minority Youth," deals with a different cultural region and is an ongoing longitudinal study of minority adolescents living in East Harlem, New York. The third study, "Drug Use and Problem Behavior Among Colombian Adolescents," is a longitudinal study conducted in Colombia, South America. Since each of the three studies assessed similar drug-related dimensions using similar measures, cross-cultural comparisons can be made. Our aim was also to use the analyses of the three samples to explore the common and differentiating risk factors for adolescent marijuana use.

The main difference among the studies lies in the ecological and cultural backgrounds of the participants. One major ecological difference pertains to the extent to which the three samples differ in terms of their exposure to environmental stress. In the Childhood Etiologic Study in upstate New York, drug availability, violence, and crime are relatively low. In contrast, participants in the Minority Youth Study in East Harlem live in an inner-city area distinguished by a higher prevalence of drug availability and crime. Finally, participants in the Colombian Youth Development Study might have experienced severe adverse economic and political conditions (Salazar, 1990; Terris, 1998). Not only were many Colombian adolescents living in the path of violence, but drugs and crime were also quite prevalent. These youth were highly vulnerable to engaging in delinquent behaviors involving drugs and violence (Aptekar, 1991; Tyler, Tyler, Echeverry, & Zea, 1991). The different degrees of environmental stress experienced by the adolescent participants in these three studies lead us to believe that there might be variation in marijuana use and in the predictors of marijuana use across the three samples.

Other ecological differences characterize the three samples. Most important in preventing substance use may be the institutions that serve as a source of structure and control for youth. Two such institutions are the church and the school. For example, in the East Harlem community, the church serves as an important resource for providing assistance with coping, community relations, and social support (Krause, 2006). Similarly, the church is important to Colombians as well. Thus, we hypothesize that church affiliation (i.e., frequency of church attendance) might play a particularly important protective role with regard to adolescent marijuana use among participants in the Minority Youth and Colombian Youth Development studies.

The diminished quality of one's schooling and lessened satisfaction with school might serve as a risk factor for participants. Hispanic and African American students are at a high risk for dropping out of school (Martinez, DeGarmo, & Eddy, 2004; Neblett, Philip, Cogburn, & Sellers, 2006; Dunham & Wilson, 2007), perhaps due to low academic achievement, financial difficulties, discrimination, or low socioeconomic status (Fergusson, Horwood, & Beaudrais, 2003; Dunham & Wilson, 2007). Children who are dissatisfied or have difficulty with school

are more likely to engage in substance use (Swaim, et al., 1997; van den Bree & Pickworth, 2005).

“Familism,” which refers to the importance of the family unit, is often a primary child-rearing force in Hispanic cultures. In contrast, there is less emphasis in overall American culture on the importance of the extended family in child-rearing. These variations among the cultures encompassed in the three samples to be examined in the present analysis may be important in helping to understand differences and similarities in drug-use behaviors of youth across different cultures and ecological backgrounds.

Investigating cross-cultural risk factors for marijuana use will allow us to have a better appreciation of the extent to which intervention programs can be generalized to different groups living in different locations and different time periods. Furthermore, our analysis may highlight certain psychosocial risk factors that are unique to particular cultures or demographic areas and, as such, require specifically tailored prevention programs that would be most beneficial to particular target groups.

This study examined the following hypotheses: (1) The domains of personality, peer, and family factors represent risk factors for marijuana use in the three samples described above; (2) The family domain is related to the personality and peer domains, which in turn are related to marijuana use; (3) The relation of the domain of ecological/cultural factors and marijuana use is mediated by the domains of personality, family, and peer marijuana use; (4) There is a direct effect of each of the domains on marijuana use; and, (5) The strength of the associations between the risk factors and marijuana use are approximately equal in the three studies.

Method

Procedure

The analyses incorporated data from three different longitudinal studies. All three studies were approved by an Institutional Review Board, and in all cases informed consent was obtained from both the child and his/her legal guardians. For all three studies, participants and their mothers were interviewed separately via a structured questionnaire, which collected data on various demographic factors (see Table 1), personality attributes, peer and family relations, ecological/cultural factors, and marijuana use.

Recruitment methods for the Child Etiologic, Minority Youth, and Colombian Youth Development Studies are described in several papers (Brook, Zhang, & Fagan, 2008; Brook, Balka, Ning, & Brook, 2007; Brook, Brook, Rosen, De la Rosa, Montoya, & Whiteman, 2003, respectively). As regards participation rates, 85%, 90%, and 86% agreed to participate in the Childhood Etiologic Study, the Minority Youth Study, and the Colombian Youth Development Study, respectively. Retention rates for these three studies were 98%, 90%, and 85%.

The three studies primarily differed, in addition to different environmental stresses, along the following dimensions: the location where the data were collected (i.e., Upstate New York, East Harlem, NY, and Colombia, South America, respectively); the ethnic and cultural backgrounds of the participants; the times (e.g., years) of the data collection; the percent of participants living with their father; and the participants' ages. In Table 1, we present the key demographic data from each of the three studies.

There were slight differences in the measures. The Minority Youth Study did not include a measure of Masculinity, and the Childhood Etiologic Study did not have a measure of Drug Availability. There were also differences in the incentives given to the participants.

Childhood Etiologic Study

This study is a five-wave longitudinal study of 739 participants who were first studied in 1975 when they were between the ages of 1 and 10 years old. The sample was chosen to be representative of children living in the Northeast of the United States in 1975, and consisted of a primarily white sample. The participants were followed over 20 years from 1975 to 1996 via five waves of data collection. The data collected from the participants who were interviewed at T1 in 1986 (the third wave) and at T2 in 1992 (the fourth wave) are included in this analysis.

Minority Youth Study

This study is a four-wave longitudinal study of 1,190 African-American and Puerto Rican adolescents who were living in East Harlem, New York, in 1990. The data collected from the participants who were first interviewed at T1 in 1990 (the first wave) and at T2 in 1995 (the second wave) are included.

Colombian Youth Development Study

This study is a two-wave longitudinal study of 1,374 Colombian adolescents who were living in two urban communities in Colombia, South America. The city of Baranquilla was selected because it is a large, city on the coast of Colombia and embodies the “costeño” (Caribbean-like) culture. The city of Medellin was selected because it is a large inland commercial and industrial center. Participants were first interviewed in 1996 (T1) and followed up in 1998 (T2).

Measures

The T1 measures that were selected for analysis in this integrated study were those from the psychosocial domains of personality, peer, and family, that have emerged as being most powerful in predicting drug use (Brook, Kessler, & Cohen, 1999; Brook, et al., 2001; Bahr, et al., 2005; Nation & Heflinger, 2006). In addition to these variables, we examined a number of ecological/cultural variables. Measures of parental substance use were taken from the mothers' interviews and measures of youth substance use were taken from the youths' interviews. The remainder of the measures were obtained from the adolescents.

The personality, attitude, and behavior domain (Set A) included three measures: Rebelliousness (Smith & Fogg, 1979; Cronbach's $\alpha=.66$; sample item: 'Do you sometimes enjoy seeing how much you can get away with?'), Intolerance of Deviance (Jessor & Jessor, 1977; $\alpha=.76$; sample item: 'How wrong do you think it is to get together with others to drink?'), and Ego Integration (Brook, et al., 1990; $\alpha=.56$; sample item: 'How true is it that you generally rely on careful reasoning in making up your mind?').

The family relations domain (Set F) was comprised of four measures: Identification with Mother (Brook, et al., 1990; $\alpha=.90$; sample item: 'How much do you admire your mother's moral character?'), Identification with Father (Brook, et al., 1990; $\alpha=.85$; sample item: 'How much do you want to be like your father in your professional career?'), Mother's Marijuana Use (Original; single item: 'How frequently does your mother use marijuana?'), and Father's Marijuana Use (Original; single item: 'How frequently does your father use marijuana?').

The perceived peer domain (Set P) included two measures: Perceived Peer Achievement (Brook, Nomura, & Cohen, 1989; $\alpha=.53$; sample item: 'How many of your friends have planned to go (or have gone) to graduate or professional school after college?'), and Perceived Peer Marijuana Use (Brook, et al., 1990; single item: 'How many of your friends have ever used marijuana?').

There were seven measures in the ecology/culture domain (Set E). They included the following measures: Church Attendance (Brook, et al., 1990; single item: ‘How often do you attend religious services?’), Familism ([Rogler & Cooney, 1984; Rodriguez, 1989]; alpha=.64; sample item: ‘How true is it that nothing in life is worth the sacrifice of moving away from your parents?’), Masculinity (Bem, 1974; alpha=.65; sample item: ‘Are you competitive, self-reliant, independent, assertive, ambitious, etc.’), School Satisfaction (Brook, et al., 1989; alpha=.75; sample item: ‘Do you enjoy your studies?’), Violence Towards the Subject (Chavez, Oetting, & Swaim, 1994; alpha=.69; sample item: ‘How often have you experienced someone beating you up or throwing something at you?’), Drug Availability (Johnston, Bachman, & O’Malley, 1987; alpha=.79; sample item: ‘How difficult is it to get marijuana?’), and Drug Offering (Original; alpha=.84; sample item: ‘How often have your best friends offered you any illegal drugs?’).

The demographic domain (Set D) consisted of the youth’s age and gender, the father’s educational level (assumed to be an indicator of SES), and whether or not the youth came from an intact family (i.e., whether or not the father was living in the home with the child).

The dependent measure for the integrated analysis and for each of the samples was whether the youth used marijuana in the two years prior to the T2 interviews. The measure of marijuana use was dichotomized such that a “0” indicated no marijuana use during the designated time period and a “1” indicated marijuana use. In the combined study, 23.3% of the participants used marijuana at T1, and 33.8% used marijuana in the two years prior to T2. Analyses were also conducted to distinguish between adolescents who used marijuana once a week or more with those who used marijuana less than once a week. The findings for this analysis were not appreciably different from analyses comparing marijuana users with nonusers (results not shown).

Statistical Analysis

Each independent variable in Sets E, F, A, and P was transformed to a risk variable. A participant who scored in the 75th percentile or higher was assigned a score of “1” in each sample. A score of “0” was assigned otherwise. Odds ratios were obtained from the combined studies with comparable predictors of marijuana use. We employed logistic regression analysis in order to examine each psychosocial risk variable and each ecological risk variable as it related to marijuana use controlling for Set D, the set of demographic variables.

For each independent variable in Tables 2 and 3, we compared the logistic regression coefficients in each pair of studies. For example, the test statistic to compare the coefficient from the Minority Youth Study $\hat{\beta}_{I,M}$ to the coefficient for the Childhood Etiologic Study for

independent variable I is
$$T_I = \frac{\hat{\beta}_{I,M} - \hat{\beta}_{I,C}}{\sqrt{(SE(\hat{\beta}_{I,M}))^2 + (SE(\hat{\beta}_{I,C}))^2}}$$
. The null distribution of T_I is approximately $N(0,1)$ with these sample sizes. This test was the basis of our comparisons of the odds ratios since the odds ratio is e^{β} , where β is the logistic regression coefficient.

We employed hierarchical regression analysis to examine the interrelation of the T1 domains of ecology/culture, personality, family, and peer factors (Cohen & Cohen, 1983). The demographic variables (Set D) were entered as control variables. The dependent variable was adolescent marijuana use in the two years prior to T2. First, we report the fraction of variance explained using the independent variables in each domain and Set D of the demographic variables (called $R^2_{X,D}$ where X is E, F, P, or A). We also compute the R^2 controlling for each of the other domains separately (called Set Z) listed in the column and the demographic variables of Set D (called $R^2_{X,Z,D}$). In Table 4, we report the resulting increase in the R^2 (that is, $R^2_{X,Z,D} - R^2_{X,D}$) in the column for Set Z and the row for Set X.

Results

We began by examining the risk variables in the personality, family, and peer domains employing logistic regression analysis (see Table 2). Each of the personality variables contributed significantly to T2 marijuana use. In the family area, parental drug use and adolescent low identification with parents were significantly related to T2 marijuana use. Perceived peer marijuana use and low perceived peer achievement predicted adolescent marijuana use. It is important to note that the findings described above emerged in each of the samples as well as in the integrated analysis.

Results of the logistic regression analysis involving the risk variables in the ecological/cultural domain appear in Table 3. As shown in Table 3, in the integrated study and in each of the samples, familism and masculinity were not related to T2 marijuana use. Church attendance and school satisfaction acted as restraining forces on the adolescents' use of marijuana in the integrated study. Infrequent church attendance was related to T2 marijuana use in the integrated study as well as in each of the samples studied, whereas school satisfaction was related to less marijuana use in two of the three samples. Other aspects of the macroenvironment (violence, drug availability, and drug offering) were related to T2 marijuana use in the integrated analysis as well as in two of the three samples.

The odds ratios for three of the risk variables differed in the samples (see Analysis Section for the statistical approach). The odds ratio for perceived peer marijuana use was greater in the Colombian Youth Development Study than in the Minority Youth Study (6.07 vs. 2.83, $p < 0.001$). The odds ratio for perceived peer marijuana use was also greater in the Colombian Youth Development Study than in the Childhood Etiologic Study (6.07 vs. 2.82, $p < 0.01$). The odds ratios for violence in the Minority Youth and the Colombian Youth Development Studies were greater than the odds ratio in the Childhood Etiologic Study (3.54 vs. 1.00, $p < 0.0001$; and 2.59 vs. 1.00, $p < 0.01$, respectively). The odds ratios for drug offering for the Minority Youth Study and the Childhood Etiologic Study differed from the Colombian Youth Development Study (2.39 vs. 1.02, $p < 0.001$; and 3.41 vs. 1.02, $p < 0.0001$, respectively).

We describe the findings of the hierarchical regression analysis for the integrated model (see Table 4).

It shows that each domain and the set of demographic factors, without control on the other domains, was significantly related to T2 marijuana use. The ecological domain explained a greater percentage of the variance than the other domains. We then examined each of the domains with control on each of the other domains (family, peer, personality) more proximal to T2 marijuana use. The findings indicated the following: (a) The ecological/cultural domain was significantly related to marijuana use despite control on each of the subsequent domains. However, the increase in R^2 for the ecological/cultural domain dropped with control on each of the other domains, suggesting that effects of the ecological/cultural domain were mediated by the family, personality, and peer domains. (b) The family domain was significantly related to marijuana use with control on the subsequent domains. However, as shown by the smaller increases in R^2 , many of the effects of the family domain were mediated by the personality and peer domains. (c) The personality domain had both direct and indirect effects (via the peer domain). (d) The influences of the peer domain were both direct and indirect via the personality domain.

The analyses were then performed separately for each of the samples, and the results were not appreciably different from the findings reported for the integrated model as shown in Table 4. The one exception was the Childhood Etiologic sample, in which the family domain was mediated by the personality domain.

Discussion

To our knowledge, this is the first longitudinal study to assess the relationship between a range of ecological risk variables and adolescent marijuana use among samples from two different countries and three different cultural regions. Even within one country, few studies have assessed the association between ecological and cultural factors and adolescent marijuana use (Swaim, et al., 1997; van den Bree & Pickworth, 2005; Reid, et al., 2006). Contrary to our hypothesis, familism and masculinity were not significantly associated with T2 marijuana use. However, other ecological factors were indeed quite important in predicting marijuana use across the three separate samples. In general, our findings in the integrated study are in accord with the relatively few studies that examined associations between ecological factors, such as drug availability and violence directed toward the subject, and adolescent drug use (Unger, Ritt-Olson, Teran, Huang, Hoffman, & Palmer, 2002; Reid, et al., 2006).

Consistent with prior studies conducted in the U.S., our results suggest that institutional attachments to the church and school serve to deter adolescents of different ethnic and cultural backgrounds from marijuana use. Previous research conducted in the United States demonstrates a link between high school achievement, or low dropout rates, and infrequent drug use (Swaim, et al., 1997; Bryant & Zimmerman, 2002; Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003). In addition, the results of this study indicate that the extent to which the adolescent experienced violence and had ready access to drugs was significantly related to his or her marijuana use. Prior research conducted in the U.S. also indicates that both the adolescent's exposure to violence (Vermeiren, Schwab-Stone, Deboutte, Leckman, & Ruchkin, 2003; Brady, 2006) and the availability of drugs (Swaim, 2003) are significantly associated with drug use.

The similarities in the ecological predictors of marijuana use across the three different sites located in two different countries support the findings of ethnographic research, which highlights the significance of ecological dimensions deemed important for drug behavior. The ecological/cultural dimensions assumed greater importance since they proved significant despite differences in cultural regions. For example, church attendance, school satisfaction, and drug availability were significant in each of the three studies. Familism was not related to T2 marijuana use in Colombia or in the United States. In contrast to the more general family values, as noted below, the more specific familial measures (e.g., parental identification) do serve to protect the adolescent from marijuana use.

The findings of the present study lend support to our five hypotheses as specified in the Introduction Section. Our results supported a model incorporating both direct effects and mediational features. Consistent with an independent model, each of the domains was significantly related to T2 marijuana use despite control on the mediating domains. The majority of the specific ecological and psychosocial predictors of marijuana use were found to be significantly associated with T2 marijuana use. As was found in other studies conducted in the U.S. (Brook, et al., 1990; Brady, 2006), specific psychosocial factors such as intrapersonal distress and unconventional behavior emerged as independent predictors of drug use (Brook, et al., 1990; Brook, et al., 1999; Ernst, Luckenbaugh, Moolchan, Leff, Allen, Eshel, et al., 2006) among adolescents from different regional and cultural backgrounds and from data collected at different time periods. Likewise, in the family domain, the present analysis replicated previous findings (Fergusson, et al., 2003; Tilson, McBride, Lipkus, & Catalano, 2004), demonstrating the importance of parental drug use and low identification with parents as significant risk factors for adolescent marijuana use across cultures and across time. Finally, perceived peer marijuana use emerged as a significant predictor of T2 marijuana use in each of the samples examined in this analysis, further replicating previous findings (Bahr, et al., 2005; van den Bree & Pickworth, 2005).

In addition to the independent aspects of the model, there were mediational aspects as well. The ecological variables, particularly violence directed toward the individual, were more strongly related to adolescent marijuana use in the two regions where these variables are more problematic--East Harlem, New York, and Colombia, South America. About half of the variance explained by the domain of ecological/cultural values was mediated by the adolescents' personality attributes and their relationships with their family members and with their peer groups. Consequently, adverse ecological experiences may affect youngsters on a number of levels. First, adverse ecological events may have a direct impact on the adolescent's marijuana use. Second, adverse ecological events may interfere with family functioning and responsible behavior, increasing the likelihood that adolescents will fall prey to peer pressure to use marijuana. These findings support FIT and document its applicability to youngsters living in different countries as well as youngsters from different ethnic and cultural backgrounds.

An interesting difference emerged between the samples, which may be attributable to a number of potential factors including cultural differences, variant times of data collection, or slight variations in the methodologies of the studies. Ecological factors such as violence appeared to be of less importance in predicting marijuana use in the Childhood Etiologic sample than in the other samples. This difference might be best explained by the ecological milieu itself. The upstate New York counties, from which this sample was recruited, is representative of areas in the northeastern part of the United States where violence is relatively limited as compared with East Harlem and Colombia. Another instance of ecological difference relates to our measure of drug offering. Drug offering was not related to marijuana use at T2 in the Colombian Youth Development Study. This may be due to less variability in drug offering in Colombia.

Overall, the findings demonstrate generalizability insofar as the dimensions in each of the domains are significantly related to adolescent marijuana use despite the fact that there were major differences among the samples in terms of: (a) the time periods during which the data were collected; (b) the countries from which the data were obtained; and (c) the different ethnic and cultural groups that were studied. Thus, one can conclude with greater confidence that adolescents from different countries, different cultures, and different periods in time share quite a number of common risk factors and respond to these risk factors by using marijuana.

Limitations

Some limitations should be considered with regard to the present research. First, the present study does not include genetic variables. The work of Grant and her colleagues notes the importance of genetic and genetic/family ecological factors as related to various forms of drug use behavior (Grant, Scherrer, Lynskey, Lyons, Eisen, Tsuang, et al., 2005). Future research might focus on the interactional contributions of genetic and environmental influences. Second, the time periods during which the data were collected were different for each of the three studies. Related to this, the time intervals between the two data collections in each of the samples differed. It is important to note, however, that despite these differences similar patterns did emerge among the three samples. Future cross-cultural research using constant time intervals and ages could explore adolescent marijuana use within different countries and among different ethnic groups. Third, our measure of perceived peer marijuana use is based on the participant's perception of peer marijuana use. It is possible that the participants are projecting their own marijuana use onto their peers and over- or underestimating peer marijuana use. In the future, research might study the peers of adolescents directly in order to obtain a more direct measure of peer marijuana use instead of relying on measures of perceived peer marijuana use. Finally, the wording of the questions in the three studies varied slightly. This was done to make sure that the questions were culturally relevant and linguistically appropriate.

Despite these limitations, the data used in the analyses were longitudinal, which allows for greater developmental and temporal understanding of how the various factors interrelate. Because each of the domains examined in this study had a direct relationship to adolescent marijuana use, intervention programs should be designed to target risk factors within the ecological/cultural, personality, family, and peer domains. Furthermore, the relationship between the ecological/cultural domain and marijuana use was mediated in part by the family, personality, and peer domains, suggesting that reducing risk factors in the ecological/cultural domain will also reduce the risk factors for marijuana use in these other domains. Unfortunately, some of the ecological/cultural risk factors may not be amenable to change at this time.

As noted above, the findings from these analyses are important in that they demonstrate the robust nature of many of the ecological/cultural and psychosocial predictors of adolescent marijuana use. The similarity in predictors of marijuana use in adolescents living under such different conditions is particularly notable. The fact that there are such strong similarities in the predictors of adolescent marijuana use across time and place allows for a more uniform approach to substance use prevention. Attachments to institutions appear to be important in both countries. Perhaps the moral teaching and structure that occurs in school and church settings help to insulate the adolescent from marijuana use. Consequently, efforts made to strengthen adolescent attachment to those institutional settings should help reduce marijuana use. It was also clear from the present analyses that youngsters from certain ecological/cultural backgrounds may be particularly at risk due to the volatile nature of their surrounding environments. For example, because drug availability and violence are such important predictors of marijuana use, particular attention needs to be paid to preventing marijuana use and abuse among children living under these conditions. To reduce marijuana use, therefore, prevention programs should aim to target the more general predictors of marijuana use within the various psychosocial domains while still keeping in mind the specific and unique ecological/cultural conditions under which the adolescents live.

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Figure 1.
Domains of Earlier Psychosocial Risk Factors Related to Later Marijuana Use.

Table 1

Summary of Demographic and Marijuana Use Statistics of United States and Colombian Studies

	Childhood Etiologic Study	Minority Youth Study	Colombian Youth Development Study
Gender of Adolescent at First Interview			
Female	369	650	676
Male	370	540	698
Mean Age of Adolescents			
First Interview	16.7 (SD=2.8, 1986)	14.1 (SD=1.3, 1990)	15.1 (SD=1.7, 1996)
Second Interview	22.1 (SD=2.7, 1992)	19.2 (SD=1.5, 1995)	16.2 (SD=1.8, 1998)
Ethnicity of Adolescents (Self-Identified)	White (92%)	African-American (53%)	Mestizo (62.6%), (Indian Heritage)
	Other (8%)	Puerto Rican (47%)	Spanish (29.2%), Other (7.2%)
Sample Location	Upstate New York	East Harlem, New York	Colombia, South America
Percent Living with Father	68.1%	37.8%	66.4%
Retention	98% (Wave 3– Wave 4)	90%	85%
Percent of Marijuana Use at T1	33%	8%	31%
Percent of Marijuana Use at T2	51%	31%	27%

Table 2

Odds Ratios and 95% Confidence Intervals Indicating the Odds of Marijuana Use as a Function of Earlier Psychosocial Variables

Risk Variables	Marijuana Use in Two Years Prior to T2			
	Integrated Study OR (95%CI)	Colombian Youth Development Study OR (95%CI)	Minority Youth Study OR (95%CI)	Childhood Etiologic Study OR (95%CI)
A - Personality, Attitude, and Behavior Domain				
Rebelliousness	2.04 (1.73, 2.40)***	2.43 (1.84, 3.20)***	2.01 (1.55, 2.61)***	2.04 (1.43, 2.93)***
Intolerance of deviance	0.64 (0.53, 0.77)***	0.64 (0.46, 0.89)**	0.59 (0.43, 0.81)**	0.40 (0.27, 0.60)***
Ego integration	0.52 (0.43, 0.63)***	0.55 (0.40, 0.76)***	0.44 (0.31, 0.62)***	0.57 (0.41, 0.81)**
F - Family Relations Domain				
Mother identification	0.65 (0.55, 0.78)***	0.66 (0.48, 0.90)**	0.61 (0.46, 0.81)***	0.64 (0.45, 0.92)*
Father identification	0.62 (0.52, 0.75)***	0.64 (0.46, 0.88)**	0.62 (0.44, 0.85)**	0.58 (0.41, 0.83)**
Mother marijuana use	4.55 (3.20, 6.47)***	3.08 (1.36, 6.97)**	5.96 (3.80, 9.36)***	2.56 (1.04, 6.32)*
Father marijuana use	2.63 (2.04, 3.38)***	1.79 (1.08, 2.97)*	3.10 (2.22, 4.34)***	3.01 (1.36, 6.66)**
P - Peer Domain				
Perceived peer achievement	0.59 (0.50, 0.69)***	0.51 (0.39, 0.67)***	0.51 (0.37, 0.69)***	0.75 (0.53, 1.05) [†]
Perceived peer marijuana use	2.92 (2.49, 3.44)***	6.07 (4.39, 8.38)***	2.83 (2.16, 3.72)***	2.82 (1.98, 4.01)***

Note. Integrated Study consists of a combination of data from the three studies.

We controlled for adolescents' age and gender, father's education, and intact family.

[†] $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 3

Odds Ratios and 95% Confidence Intervals Indicating the Odds of Marijuana Use as a Function of Earlier Ecological/Cultural Variables

Risk Variables	Marijuana Use in Two Years Prior to T2			
	Integrated Study OR (95%CI)	Colombian Youth Development Study OR (95%CI)	Minority Youth Study OR (95%CI)	Childhood Etiologic Study OR (95%CI)
E - Ecological/Cultural Domain				
Familism	0.93 (0.78, 1.11)	0.93 (0.70, 1.24)	0.98 (0.72, 1.33)	0.78 (0.56, 1.09)
Masculinity	0.97 (0.78, 1.21)	0.93 (0.68, 1.26)	----	0.96 (0.69, 1.34)
Church attendance	0.65 (0.55, 0.77) ***	0.66 (0.50, 0.89) **	0.63 (0.47, 0.85) **	0.61 (0.44, 0.84) **
School satisfaction	0.52 (0.43, 0.63) ***	0.48 (0.35, 0.65) ***	0.51 (0.36, 0.72) ***	0.78 (0.54, 1.12)
Violence	2.05 (1.72, 2.44) **	2.59 (1.97, 3.41) ***	3.54 (2.61, 4.79) ***	1.00 (0.58, 1.72)
Drug availability	1.35 (1.12, 1.62) **	1.42 (1.09, 1.83) **	1.50 (1.14, 1.99) **	----
Drug offering	1.51 (1.27, 1.80) ***	1.02 (0.76, 1.36)	2.39 (1.73, 3.30) ***	3.41 (2.31, 5.04) ***

Note. Integrated Study consists of a combination of data from the three studies.

We controlled for adolescents' age and gender, father's education, and intact family.

---- No data was obtained assessing this dimension.

*
p < .05;

**
p < .01;

p < .001.

Table 4R² for T2 Marijuana Use: Personality, Perceived Peer, Family, and Ecology/Culture Predictors

Independent Domain	Each Domain Without Control On Other Domains ¹	Increase in R^2 For Each Domain Controlling For:		
		Personality ²	Peer ³	Family ⁴
Integrated Study				
Personality	.10**	---	.02**	---
Perceived peer	.11**	.03**	---	---
Family	.11**	.03**	.03**	---
Ecology/Culture	.15**	.07**	.07**	.07**
Childhood Etiologic Study				
Personality	.13**	---	.04**	---
Perceived peer	.11**	.02*	---	---
Family	.07**	N.S.	.02 [†]	---
Ecology/Culture	.13**	.04**	.05**	.08**
Minority Youth Study				
Personality	.09**	---	.03**	---
Perceived peer	.09**	.02**	---	---
Family	.14**	.08**	.08**	---
Ecology/Culture	.17**	.10**	.10**	.09**
Colombian Youth Development Study				
Personality	.16**	---	.02**	---
Perceived peer	.20**	.06**	---	---
Family	.17**	.02**	.01**	---
Ecology/Culture	.25**	.09**	.08**	.09**

Note. The control Set D is the adolescents' age and gender, father's education, and intact family.

¹R² (Domain, D)

²R² (Domain, Personality, D) - R² (Personality, D)

³R² (Domain, Peer, D) - R² (Peer, D)

⁴R² (Domain, Family, D) - R² (Family, D)

[†]p<.10

*p<.05

**p<.01