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Ecodevelopmental × Intrapersonal Risk: Substance Use and Sexual Behavior in Hispanic Adolescents

Guillermo J. Prado, PhD, **Seth J. Schwartz, PhD**, **Mildred Maldonado-Molina, PhD**, **Shi Huang, PhD**, **Hilda M. Pantin, PhD**, **Barbara Lopez, PhD**, and **Jose Szapocznik, PhD**
Guillermo J. Prado and Seth J. Schwartz, University of Miami, Florida. Mildred Maldonado-Molina, University of Florida, Gainesville. Shi Huang, Hilda M. Pantin, Barbara Lopez, and Jose Szapocznik, University of Miami, Florida.

Abstract

Hispanic adolescents are a rapidly growing population and are highly vulnerable to substance abuse and HIV infection. Many interventions implemented thus far have been “one size fits all” models that deliver the same dosage and sequence of modules to all participants. To more effectively prevent substance use and HIV in Hispanic adolescents, different risk profiles must be considered. This study’s purpose is to use intrapersonal and ecodevelopmental risk processes to identify Hispanic adolescent subgroups and to compare substance use rates and sexual behavior by risk subgroup. The results indicate that a larger proportion with high ecodevelopmental risk (irrespective of the intrapersonal risk for substance use) report lifetime and past 90-day cigarette and illicit drug use. In contrast, a larger proportion with high intrapersonal risk for unsafe sex (irrespective of ecodevelopmental risk) report early sex initiation and sexually transmitted disease incidence. Implications for intervention development are discussed in terms of these Hispanic adolescent subgroups.

Keywords

Hispanic; drugs; sexual behavior; adolescents; ecodevelopmental

Hispanics are the largest minority group in the United States, accounting for approximately 14% of the total U.S. population (Ramirez & de la Cruz, 2003). Hispanics are also a young population, with 39% younger than age 19 (Marotta & Garcia, 2003). In addition to their large and growing numbers, Hispanic adolescents are disproportionately affected by substance use and HIV/AIDS (Centers for Disease Control and Prevention [CDC], 2004; Johnston, O’Malley, Bachman, & Schulenberg, 2006). Although population-based data indicate that Hispanic adolescents as a group are at elevated risk of substance use (CDC, 2004) and HIV (Johnston et al., 2006), Hispanics are a heterogeneous population that are not all at equivalently increased risk of substance use and/or HIV. To better understand and explain this variation among Hispanics, it is important to classify Hispanics into distinct subgroups (Pantin, Prado, Schwartz, & Sullivan, 2005). Although demographics characteristics such as country of origin and nativity (i.e., United States born vs. foreign born) have been the traditional form of choice for subgrouping Hispanics (and other ethnic groups), some have argued that identifying subgroups using data-driven (i.e., empirical) methods may be more beneficial than subgrouping by demographic characteristics (Dierker, Avenevoli, Goldberg, & Glantz, 2004). The purpose of

Address correspondence to Guillermo J. Prado, Department of Epidemiology and Public Health, University of Miami, Room 301 Sieron, 1400 N.W. 10th Avenue, Miami, FL 33136. phone: (305) 243-2748; gprado@med.miami.edu.

this study is, therefore, (a) to empirically identify subgroups of Hispanic adolescents based on their ecodevelopmental/contextual and intrapersonal risk processes and (b) to determine whether and to what extent rates of cigarette, alcohol, and illicit drug use as well as sex initiation, unsafe sex, and self-reported incidence of sexually transmitted diseases (STDs) differ by subgroup in a sample of Hispanic adolescents. This study is the first in a series of studies in a program of research. This program of research will focus on identifying Hispanic subgroups based on risk and protective processes.

EPIDEMIOLOGY OF SUBSTANCE USE AND HIV AMONG HISPANIC ADOLESCENTS

Hispanic adolescents are at increased risk for substance use (Johnston et al., 2006) and for HIV contraction (CDC, 2004) compared to adolescents of other ethnic groups. Hispanic 8th and 10th graders report more alcohol, cigarette, and illicit drug use (with the exception of amphetamines) than their non-Hispanic White and African American counterparts (Johnston et al., 2006). Similar data indicate that Hispanic adolescents are less likely to use a condom when engaging in sexual intercourse (57%) than are either non-Hispanic White (63%) and African Americans (73%; CDC, 2006). These higher levels of unprotected sex among Hispanic youth may help explain why Hispanic adolescents (ages 13–19) are five times more likely to contract HIV than are similarly aged non-Hispanic Whites (CDC, 2006).

It is also important to acknowledge that there is considerable variation across Hispanic adolescents in terms of substance use and sexual behavior. Two primary sources, nativity and country of origin, have been identified in the literature to help explain these differences (Canino et al., 2002). For example, data from the Monitoring the Future Survey (1997–1999 and 2000–2002) suggest that Cuban American eighth graders have the highest rates of 1-year marijuana use compared to Mexican American, Puerto Rican, and other Latin American eighth-grade adolescents living in the United States (Delva et al, 2005). Epidemiologic data also suggest that U.S.-born Hispanic adolescents report higher cigarette and drug use rates than do foreign-born Hispanics (Vega et al., 2002). Further, data suggest similar variation with respect to sexual behavior and HIV contraction. For example, data (not specific to adolescents) indicate that among Hispanics, U.S.-born Puerto Ricans have the highest HIV death rates, followed in descending order by island-born Puerto Ricans, Cubans, Mexicans, and “Other” Hispanic (CDC, 1999). Although these data indicate that there are considerable variations among Hispanics in substance use and HIV rates across nativity status and country of origin, there is still considerable heterogeneity within these finer groupings (e.g., within Cubans). Therefore, subgrouping Hispanics using approaches alternate to demographic characteristics may provide a better understanding of the variations in substance use and HIV rates within the broad Hispanic population.

SUBGROUPING INDIVIDUALS INTO EMPIRICALLY DERIVED CLUSTERS

Subgrouping or clustering individuals by risk profiles may be important for more effectively conveying the considerable heterogeneity that exists within Hispanics. We (Pantin et al., 2005; Prado et al., 2006) and others (e.g., Dierker et al., 2004) have argued that creating subgroups based on risk and protective processes is more advantageous from a prevention perspective than demographics factors because risk and protective processes are amenable to intervention, whereas demographic factors are not amenable to intervention. In addition, some studies have shown that risk and protective processes account for the national origin and nativity differences in substance use and unsafe sexual behavior among Hispanics (Gil, Wagner, & Vega, 2000). Thus, deriving subgroups by risk profile (e.g., intrapersonal and ecodevelopmental risk profiles) and using these subgroups to examine differences in substance

use and sexual behavior can help researchers identify subgroups at risk as well as inform researchers as to what risks need to be targeted for intervention with specific subgroups.

INTRAPERSONAL AND ECODEVELOPMENTAL RISK PROCESSES

Research has identified a number of risk processes that predispose adolescents to substance use and unsafe sexual behavior (Hawkins, Catalano, & Miller, 1992). These risk processes can be grouped into two domains: intrapersonal (e.g., attitudes regarding substance use and sexual behavior) and ecodevelopmental (e.g., negative parenting). These domains represent the primary predictors that have been studied vis-à-vis adolescent substance use and unsafe sexual behavior (e.g., Barkin, Smith, & Durant, 2002). Intrapersonal predictors are often derived from the theory of reasoned action (Ajzen & Fishbein, 1980), whereas ecodevelopmental predictors are drawn from Bronfenbrenner's (1979, 1986) work on the social ecology of human development. However, the overlap between these two sets of predictors, as related to adolescent substance use and unsafe sexual behavior, has received scant empirical attention (Pantin et al., 2005). To derive a more complete and accurate portrayal of the sources of risk for substance use and unsafe sexual behavior in Hispanic adolescents, as well as those from other ethnic groups, an empirical integration of intrapersonal and ecodevelopmental predictor sets is needed.

Intrapersonal Risk Processes

Intrapersonal risk processes, derived from the theory of reasoned action (Ajzen & Fishbein, 1980), such as attitudes regarding substance use and sexual behavior have been found to be related to substance use and unsafe sexual behavior (Jemmott, Jemmott, & Fong, 1998). For example, findings have supported the relationship of attitudes and social norms regarding sex to unsafe sexual behaviors. Specifically, adolescents who hold strong attitudes and beliefs that using condoms will protect against STDs and HIV, that using condoms is not "unnatural," and that using condoms does not diminish the pleasure of sex are more likely to protect themselves during sex (DiClemente, Durbin, & Siegel, 1992; Jemmott et al., 1998).

Ecodevelopmental Risk Processes

Ecodevelopmental theory is a conceptual model that describes the interconnections among various sources of risk and protection in adolescents' lives. We focus here on only the first element of ecodevelopmental theory, drawn from Bronfenbrenner's (1979, 1986) work on the social ecology of human development. Microsystems, which represent contexts in which the adolescent participates directly, such as the family, school, and peers, have by far the strongest effects on adolescent development (e.g., Coatsworth et al., 2002). Among the various microsystems, the family is the most influential on adolescent development (Perrino, Gonzalez Soldevilla, Pantin, & Szapocznik, 2000). Risk and protective processes within the family microsystem include parental involvement and parent–adolescent communication, among others. Ecodevelopmental variables such as parent–adolescent communication, parental involvement, positive parenting, and family support have been found to be related to substance use and unsafe sexual behavior. For example, poor parent–adolescent communication has been indicated as a major risk factor for drug use (Ellickson & Morton, 1999).

HISPANIC SUBGROUP CLASSIFICATIONS BASED ON RISK AND PROTECTION PROFILES

The two general domains of risk and protection (i.e., intrapersonal and ecodevelopmental) described earlier have, for the most part, been treated separately in the extant research literature. However, some studies suggest that intrapersonal and ecodevelopmental processes may combine to influence adolescent substance use and unsafe sexual behavior (Kaplan, Napoles-

Springer, Stewart, & Perez-Stable, 2001). Although intrapersonal and ecodevelopmental influences on substance use and unsafe sexual behavior may be related, it is quite plausible that a given adolescent could be exposed to high levels of ecodevelopmental risk but low levels of intrapersonal risk, or vice versa (Pantin et al., 2005). Accordingly, the hypothesis advanced here is that four classes of Hispanic adolescents based on "high" and "low" intrapersonal risks and "high" and "low" ecodevelopmental risks will emerge from the sample of Hispanic adolescents. We review the four hypothesized classes.

Low Ecodevelopmental Risk and Low Intrapersonal Risk

Research has shown that the likelihood of engagement in problematic behavior is largely a function of the number and extent of risks present (Deater-Deckard, Dodge, Bates, & Pettit, 1998). As a result, adolescents with low risk in both the intrapersonal and ecodevelopmental domains are unlikely to use substances, initiate early sexual behavior, or engage in unsafe sexual behavior.

Low Ecodevelopmental Risk but High Intrapersonal Risk

Adolescents with low ecodevelopmental risk but high intrapersonal risk intend to engage in substance use or sexual behavior and perceive these behaviors positively. These youth are likely to become "experimenters" who sample alcohol and drugs or engage in sexual behavior but may not progress to substance abuse or unsafe sexual behavior (cf. Shedler & Block, 1990), because their experimental substance use or sexual behavior is not reinforced by ecodevelopmental conditions (e.g., poor family communication) that promote substance use or unsafe sexual behavior.

High Ecodevelopmental Risk but Low Intrapersonal Risk

Adolescents with high ecodevelopmental risk but low intrapersonal risk may not intend to engage in substance use or unsafe sexual behavior despite the risk factors across their social and contextual context (Masten & Coatsworth, 1998; Masten & Curtis, 2000). These adolescents generally have ecodevelopmental risk factors/circumstances that promote substance use and unsafe sexual behavior but do not have intrapersonal level risk factors. For example, although parental alcoholism strongly predicts adolescent and adult substance abuse (Chassin, Pitts, DeLucia, & Todd, 1999), some adolescents from alcoholic or substance abusing families may be quite adamant that they do not intend to engage in substance use.

High Ecodevelopmental Risk and High Intrapersonal Risk

Adolescents with high ecodevelopmental and high intrapersonal risks may be most likely to use substances and progress to abuse and to engage in high-risk sexual behavior, because they both (a) are influenced by contextual processes that promote substance use and HIV risk behaviors (high ecodevelopmental risk) and (b) view these behaviors positively and express intentions to engage in them (high intrapersonal risk). Thus, these adolescents are at high risk, because the risk factors span across both ecodevelopmental and intrapersonal domains (Szapocznik & Coatsworth, 1999).

METHOD

Participants

Participants in our study were 254 Hispanic adolescents (123 male, 131 female; *M* age = 13.4, *SD* = .70) enrolled in a substance abuse and HIV prevention study in Miami-Dade County (Prado et al., in press).[1] The largest percentage of adolescents were born in the United States (41%) and Cuba (23%), and smaller percentages were born in Nicaragua (15%), Honduras (6%), and other Hispanic countries (15%). Of foreign-born adolescents (*n* = 150), 49% had

been living in the United States for less than 3 years, 35% had been living in the United States between 3 and 10 years, and 16% had been living in the United States more than 10 years. The median annual family income was between $15,000 and $20,000.

Recruitment

Recruitment for the study took place from April through June of the adolescents' seventh-grade year. During the recruitment phase, all seventh-grade students in each of the three participating middle schools were asked to take home a recruitment letter to their parent(s). The letter briefly described the study and the potential benefits associated with participation. Adolescents were asked to return the letter signed by their parents indicating whether or not the parents were interested in learning more about the study. Parents who responded that they were interested in learning more about the study were contacted by project staff. Provided that parents were still interested after speaking with project staff, they and their adolescents were screened for eligibility. Eligibility criteria for the study are described elsewhere (Prado et al., in press).

Procedures

Data for our study were taken from the baseline assessment of the larger study. This baseline assessment was conducted after participants were assented but before participants were randomized to one of three interventions. The larger prevention study was approved by the University of Miami Institutional Review Board and by the Research Committee of the Miami-Dade County School Board. In addition, the secondary data analysis presented in our study was also approved by the Institutional Review Boards at both the University of Miami and Florida International University.

Measures

Adolescent-report measures were completed on laptop computers using the audio computer-assisted interviewing system. The content of each questionnaire item, along with the response choices, were read aloud and accessed by the adolescent through a headphones set that was connected to the laptop computer. The adolescent indicated her or his response using the keyboard or mouse. Adolescents completed the assessment battery in the language of their choice (i.e., Spanish or English). Forty-three percent (n = 109) of participants completed the assessment in Spanish. For measures for which an established Spanish translation was not available, Spanish translations were created by integrating back-translation and committee resolution approaches, as recommended by Kurtines and Szapocznik (1996).

Adolescents completed a self-report assessment battery that broadly assessed five domains: (a) intrapersonal risk for substance use, (b) intrapersonal risk for unsafe sexual behavior, (c) ecodevelopmental risk, (d) substance use, and (e) sexual behavior outcomes. The intrapersonal risk measures were drawn from the theory of reasoned action, and the ecodevelopmental measures are drawn from Bronfenbrenner's (1986) operationalization of the family microsystem.

Intrapersonal Risk for Substance Use—Intrapersonal risk for substance use was measured using two subscales from the University of Southern California's Health Behavior Survey (Pentz et al., 1989): parent social norms regarding substance use (seven items) and peer social norms regarding substance use (seven items). For each of these two scales, adolescents rated on a 4-point Likert scale ranging from *very much* to *not at all* how much their parents and peers would disapprove of their using different illegal substances including alcohol,

[1]Twelve (of the N = 266) participants enrolled in the larger substance abuse and HIV prevention study could not be included in the data analyses, because of missing data on one or more of the risk and protective processes. Hence, the resulting sample size for our study is 254.

cigarettes, marijuana, and other drugs. Sample items for each of the subscales are "How much would your parents disapprove if they found out that you were smoking marijuana?" and "How much would your friends disapprove if they found out that you were smoking marijuana?" respectively. For our study, Cronbach's alpha was .99 and .97 for the parent norms and peer norms, respectively.[2] Both intrapersonal substance use variables are scored so that higher scores indicate higher intrapersonal risk for substance use.

Intrapersonal Risk for Unsafe Sexual Behavior—Intrapersonal risk for unsafe sexual behavior was assessed using the social norms regarding sex (e.g., 12 items; e.g., "Would your mother approve or disapprove of you having sex in the next 3 months?"), social norms regarding condom use (5 items; e.g., "Would your mother approve or disapprove of you using a condom if you have sex in the next 3 months?"), attitudes about sex (8 items; e.g., "Not having sex will help me focus on getting a job."), and attitudes about condoms (12 items; e.g., "How do you feel about using a condom if you have sex in the next 3 months?") subscales from the Sexual Behavior Survey (Jemmott et al., 1998). In addition, 1 item was used to assess intentions to have sex ("How likely is it that you will decide to have sex in the next 3 months?"), and 1 item was used to assess intentions to use condoms ("How likely is it that you will decide to use a condom if you have sex in the next 3 months?"). Both of these items have been repeatedly used in research with adolescents (e.g., Jemmott et al., 1998). For our study, Cronbach's alpha estimates were .83, .95, .84, and .78 for the social norms regarding sex, social norms regarding condom use, attitudes about sex, and attitudes about condoms subscales, respectively. All subscales are scored so that higher scores on the variable correspond to higher intrapersonal risk for unsafe sexual behavior.

Ecodevelopmental Risk—Ecodevelopmental risk was assessed using six subscales: Lack of parental involvement, negative parenting, lack of family cohesion, poor overall family communication, poor communication within the parent–adolescent relationship, and lack of overall family support. Lack of parental involvement (12 items) and negative parenting (6 items) were assessed using the corresponding subscales from the Parenting Practices Scale (Gorman-Smith, Tolan, Zelli, & Huesmann, 1996). Lack of overall family cohesion (6 items) and poor communication (3 items) were assessed using the corresponding subscales from the Family Relations Scale (Tolan, Gorman-Smith, Zelli, & Huesmann, 1997). Poor parent–adolescent communication (20 items) was assessed using the Parent–Adolescent Communication Scale (Barnes & Olson, 1985), and lack of family support (11 items) was assessed using the corresponding subscale from the Social Support Appraisal Scale (Dubow & Ullman, 1989). Sample items include, "How often do you and your child do things together at home?" (parental involvement), "When your child did something you liked or approved of, how often did you give him/her a wink or smile?" (parenting), "Family members feel very close to each other" (family cohesion), "My family and I have the same views about what is right and wrong" (family communication), "When we are having a problem, I often give my mother the silent treatment" (parent–adolescent communication), and "Can you count on your family for help or advice when you have problems?" (family support). For our study, Cronbach's alpha estimates were .79, .86, .81, .77, .88, and .89 for the lack of parental involvement, negative parenting, lack of family cohesion, poor overall family communication, poor communication within the parent–adolescent relationship, and lack of overall family support subscales, respectively. All ecodevelopmental variables are scored so that greater scores reflect higher ecodevelopmental risk.

[2]Reliabilities were also computed separately by language. Reliabilities for the English-speaking and Spanish-speaking samples were acceptable (i.e., above .70) and similar to those reported for the overall sample.

Substance Use—Substance use was assessed using items similar to those used in the Monitoring the Future Study (Johnston et al., 2006). Adolescents were asked whether they have used cigarettes, alcohol, or any illicit drug (e.g., marijuana, cocaine, amphetamines) in their lifetimes and in the 90 days prior to assessment. Cigarette and alcohol use were measured as dichotomous (*yes/no*) variables, where as both dichotomous and continuous (i.e., frequency) data were collected (and hence reported) for illicit drug use.

Sexual Behavior—Sexual behavior was measured using Jemmott et al.'s (1998) Sexual Behavior Survey. This measure assesses adolescents' sexual behavior, condom use, and STD contraction during their lifetime and in the 3 months prior to assessment. The instrument is gated so that adolescents who report never having had sex are not asked about condom use or past-3-month sexual behavior. Only dichotomous (*yes/no*) data were gathered on sexual behavior, condom use, and sexual transmitted diseases.

Data Analytic Strategy

As described earlier, the purpose of this study was to empirically identify subgroups of Hispanic adolescents and to determine whether and to what extent rates of substance use as well as sex initiation, unsafe sex, and self-reported incidence of STDs differed by subgroup. To address these issues, the data analytic plan consisted of four steps. First, we computed bivariate correlations to examine the association between the intrapersonal and ecodevelopmental risk variables. Second, to identify the "risk" classes or subgroups of Hispanic adolescents, we used a latent class analysis (McLachlan & Peel, 2000) by using 14 continuous items (representing the 14 intrapersonal and ecodevelopmental risk subscales previously described). Latent class analysis with continuous items is also known as latent profile analysis. Similar to factor analysis and cluster analysis, the purpose of latent class analysis (e.g., Lanza, Flaherty, & Collins, 2003) is to create subgroups or classes on the basis of the similarities with respect to the selected variables, so that participants in the resulting classes are as similar as possible to other participants within the same class (with respect to the selected variables) and as different as possible from those in other classes. The difference between factor analysis and latent class analysis is that in factor analysis the estimates are interpreted as regression weights, whereas in latent class analysis, the estimates are interpreted as probabilities.

The use of a latent class analysis was selected over more traditional methods of clustering for two reasons. First, model selection tools such as the Bayesian Information Criterion (BIC; Schwartz, 1978) can be used to help select a model that appropriately describes the number of classes in the population. Lower values of the BIC correspond to better fitting solutions. For our study, we estimated and compared a two-, three-, and four-class solution. Second, latent class analysis allows for the estimation of measurement error. In latent class analysis, it is also possible to estimate the average latent class probabilities, which are used to obtain an estimate that the participants are assigned to the most likely class.

The third step in the analysis plan was to conduct an analysis of variance to compare the classes on their intrapersonal and ecodevelopmental risk variables. Significant results were explored by Bonferroni pairwise comparisons to determine which pairs of classes were significantly different from each other on each of the intrapersonal and ecodevelopmental risk variables. The fourth and final step of our data analytic plan was to examine differences in cigarette, alcohol, and illicit drug use as well as sexual behavior, unsafe sex, and sexually transmitted disease rates by class. Chi-squares or Fisher's Exact Test (for small sample sizes) were used for all outcomes, except for drug use frequency. Because drug use frequency is continuous (and not normally distributed), we conducted a Kruskal-Wallis (nonparametric) test.

RESULTS

Correlations Among Ecodevelopmental and Intrapersonal Risk Variables

Correlations among the ecodevelopmental and intrapersonal risk factors reveal both expected and unexpected relationships. First, as would be expected given their embeddedness in the family domain, all of the ecodevelopmental variables are highly correlated (*M r* = .58, range = .48–.72[3]). As would also be expected, the correlation among the intrapersonal risk variables for substance use (i.e., parent social norms and peer social norms) was strong ($r = .84$, $p < .01$).

Unlike the ecodevelopmental risk factors and the intrapersonal risk factors for substance use, not all of the intrapersonal risk factors for sexual behavior were intercorrelated. Condom use social norms were not significantly correlated with sex attitudes, sex social norms, or sex intentions. Condom use intentions were not correlated with intentions to have sex ($r = -.05$, *ns*). All other intrapersonal risk factors for sex were significantly correlated (*M r* = .38, range = .14–.69). Finally, it is interesting to note that the ecodevelopmental variables were either marginally related or unrelated to the intrapersonal risk factors for both substance use and sex, suggesting that these sets of variables were largely independent of one another (*M r* = .10, range = .0031–.28).

Identification and Interpretation of Classes

The latent class analysis using the 14 ecodevelopmental and intrapersonal risk factors for substance use and sexual behavior suggested that the four-class solution (BIC = 20, 493.6) provided a better fit to the data than did the two-class (BIC = 21, 231.7) and three-class (BIC = 20, 595.2) solutions. The four classes were quite distinct from each other, and class assignment appeared to be highly reliable.[4] The average class probabilities for the four classes were .97, .92, 1.00, and .96. The average class probabilities for the two- and three-class solutions were lower than the average class probabilities for the four-class solution, once again suggesting that the four-class solution was superior to the others.

As noted in Table 1, the largest class ($n = 129$) contained 51% of the total sample. The Low Risk class was characterized by adolescents with low ecodevelopmental risk, low intrapersonal risk for substance use, and low intrapersonal risk for unsafe sex. The High Intrapersonal Risk for Sex class contained 19% of the sample ($n = 47$) and was characterized by adolescents with low to moderate ecodevelopmental risk, moderate intrapersonal risk for substance use, and high intrapersonal risk for unsafe sex. The High Intrapersonal Risk for Substance Use class contained 13% of the sample ($n = 33$) and was characterized by adolescents with moderate ecodevelopmental risk, high intrapersonal risk for substance use, and moderate intrapersonal risk for unsafe sex. The High Ecodevelopmental Risk class ($n = 45$, 18% of the sample) was characterized by adolescents with high ecodevelopmental risk, moderate intrapersonal risk for substance use, and moderate intrapersonal risk for unsafe sex.

As expected, the analysis of variance results indicated a significant presence of between-cluster differences on the ecodevelopmental and intrapersonal risk processes used to create the clusters. As shown in Table 2, both intrapersonal risk processes for substance use and all ecodevelopmental risk processes significantly differed by class (all *p*s < .001). Furthermore, all but one of the intrapersonal risk processes for sexual behavior (i.e., condom social norms), $F(3, 250) = 1.40$, $p = .244$, significantly differed by class.

[3]All mean correlations and ranges are reported in absolute value. A complete correlation table is available from the senior author.
[4]We also estimated a five- and a six-class solution, but it did not converge, presumably because of the small number of participants in each class.

Substance Use by Ecodevelopmental × Intrapersonal Risk Subgroups

Cigarette Use—Significant associations emerged between class membership and lifetime cigarette use, $\chi^2(3) = 21.32$, $p < .001$, and past 90-day cigarette use (Fisher's Exact, $p < .02$). No signification association was found between class membership and past 30-day cigarette use. For lifetime cigarette use, the class reporting the most cigarette use was the class with High Ecodevelopmental Risk, whereas the class reporting the least cigarette use was the Low Risk class (Table 3). The High Intrapersonal Risk for Substance Use and High Intrapersonal Sex Risk classes reported moderate levels of cigarette use, relative to the other two classes.

Alcohol Use—A significant association emerged between class membership and lifetime alcohol use, $\chi^2(3) = 7.91$, $p < .05$. The classes reporting the most lifetime alcohol use was the High Ecodevelopmental Risk (31%) and the High Intrapersonal Risk for Substance Use (30%), whereas the classes reporting the least alcohol use were the Low Risk (16%) and the High Intrapersonal Risk for Sex (15%). No associations were found between class membership and past 90-day alcohol use.

Illicit Drug Use—Significant associations emerged between class membership and lifetime, Fisher's Exact, $p < .01$ and past 90-day, Fisher's Exact ($p < .001$) drug use, as well as between lifetime *frequency*, $\chi^2(3) = 15.55$, $p < .001$ and past 90-day *frequency*, $\chi^2(3) = 13.61$, $p < .01$, drug use (see Note [3]). For each of the significant associations previously reported, the class reporting the most illicit drug use was the High Ecodevelopmental Risk class followed by the High Intrapersonal Sex Risk, High Intrapersonal Risk for Substance Use, and Low Risk classes.

Sexual Behavior by Ecodevelopmental × Intrapersonal Risk Subgroups

Significant associations[5] emerged between class membership and lifetime vaginal sex ($p < .001$), past 90-day vaginal sex ($p < .05$), lifetime oral sex (fellatio; $p < .001$), past 90-day oral sex (fellatio; $p < .005$), lifetime oral sex (cunnilingus; $p < .001$), past 90-day oral sex (cunnilingus; $p < .05$), lifetime anal sex ($p < .001$), past 90-day anal sex ($p < .05$), sexually transmitted infections ($p < .05$). Results indicate (Table 4) indicate that most adolescents reporting any type of lifetime or past 90-day sexual behavior belonged to the class with High Intrapersonal Sex Risk followed by the High Ecodevelopmental Risk, High Intrapersonal Risk for Substance Use, and Low Risk classes. Also, all adolescents reporting unsafe sex in the past 90 days (i.e., sex without a condom) were in the class with High Intrapersonal Sex Risk. Similarly, all adolescents reporting ever having had a sexually transmitted infection were in the High Intrapersonal Sex Risk class. Thus, adolescents with high intrapersonal risk for sex reported more sexual behavior, more unsafe sex, and greater frequency of sexually transmitted diseases than adolescents with low or moderate intrapersonal risk for sex.

DISCUSSION

Substance use and HIV risks are important to study in Hispanic adolescents because of their rapidly growing numbers and because of their heightened vulnerability to substance use and HIV contraction (Prado, Schwartz, et al., 2006; Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007). Our study was designed to subgroup Hispanics adolescents based on their intrapersonal and ecodevelopmental risk profiles and to compare rates of substance use, sexual behavior, and STD rates across subgroups.

Several noteworthy findings emerged from our study. First, as hypothesized, four distinct risk subgroups of Hispanic adolescents emerged in our sample. As expected the level of ecodevelopmental risk was not always highly correlated with the level of intrapersonal risk.

[5]All analyses reported for sexual behavior were conducted using Fisher's Exact test, and hence, only *p* values are reported.

For example, some moderate intrapersonal risk for substance use adolescents reported low to moderate ecodevelopmental risk, whereas others reported high ecodevelopmental risk. This finding suggests that Hispanic adolescents can be uniquely identified based on their ecodevelopmental and intrapersonal risk processes. Future research needs to examine what cutoffs of ecodevelopmental risk place adolescents in the “high” versus “low” ecodevelopmental risk subgroup. However, the classes that emerged were somewhat different from those that were hypothesized. For example, it was hypothesized that intrapersonal risks for substance use and sexual behavior would be positively highly correlated. However, the results of the latent class analyses reveal that adolescents reporting moderate levels of intrapersonal risk for substance use reported high levels of intrapersonal risk for sexual behavior.

The findings from our study also highlight the differences that exist among Hispanic adolescent subgroups in our sample. Like other populations, Hispanics are a heterogeneous subgroup, and hence, there are differences in substance use and sexual behavior within Hispanics. The results suggest that there are differences in substance use and sexual behavior by ecodevelopmental and intrapersonal risk profiles. The findings from this study suggest that substance use is mostly driven by ecodevelopmental risks and not intrapersonal risk for substance use. Thus, the findings suggest that adolescents with high ecodevelopmental risk should be targeted for substance abuse prevention. It should be noted, however, that most of the adolescents in this sample were 13 years of age, and substance use rates would be expected to increase as youth enter mid- and late adolescence. It is not clear whether intrapersonal risks for substance use begin to influence drug use as Hispanic adolescents progress through adolescence and into young adulthood.

Although future research is warranted with larger and more representative samples, substance abuse preventive interventions for Hispanic adolescents may need to target ecodevelopmental risk factors such as parent–adolescent communication. A limited number of ecodevelopmental substance abuse interventions with demonstrated efficacy for Hispanic adolescents (e.g., Prado et al., in press) have begun to emerge in the literature (see Szapocznik et al., 2007, for a review). On the other hand, the number of substance use intrapersonal interventions demonstrating efficacy for Hispanic adolescents ismore limited (Szapocznik et al., 2007). Is this purely a coincidence or a reflection that ecodevelopmental interventions may be more efficacious than intrapersonal interventions in preventing Hispanic adolescent substance use? Future studies should first replicate these findings with other samples, and if replicated, future research should then examine the relative efficacy of ecodevelopmental and intrapersonal interventions for different Hispanic adolescent risk subgroups.

The findings emerging for sex initiation, unsafe sex, and STD outcomes also have important implications. The findings indicate that most adolescents reporting lifetime and past 90-day sexual behavior, and all adolescents reporting unsafe sex and STDs were those reporting high intrapersonal sex risk. The adolescents in this high intrapersonal sex risk class also reported low to moderate levels of ecodevelopmental risk, thus suggesting that (at least in our sample) ecodevelopmental risk variables have less influence on sexual behavior than intrapersonal risks for sexual behavior. It should be noted, however, that most of the adolescents in this sample were 13 years of age and that relatively few of them had engaged in any type of sexual behavior. It is not clear whether ecodevelopmental risks will have an influence on sexual behavior as Hispanic adolescents progress through adolescence and into young adulthood. Our findings, however, suggest that adolescents with high intrapersonal risk for sexual behavior may be more likely to initiate sex early, have unprotected sex, and be more likely to contract a sexually transmitted infection and thus should be targeted for sexual risk reduction intervention. After replication of these findings, future research should examine if interventions that target

intrapersonal risk factors for sexual behavior (e.g., Villarruel, Jemmott, & Jemmott, 2006) are most efficacious in preventing unsafe sex among Hispanic adolescents.

Limitations

Our findings must be considered in light of several limitations. First, Miami-Dade County is a Hispanic enclave and may not be generalizable to other parts of the country. Second, although cluster analytic data-driven approaches "have the potential to make major contributions to applied health psychology research" (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005, p. 330), our findings should be replicated using population-based samples to provide increased confidence in the generalizability of the findings. Third, the present cross-sectional design has helped us to explore the relationship between risk subgroup and substance use and sexual behavior. However, longitudinal studies will be required to make directional inferences. Fourth, only self-report data were used. Research has shown that adolescents may underreport sensitive behaviors such as substance use and unsafe sex (Tourangeau, Rips, & Rasinski, 2000). Fifth, because of the moderate sample size, we were unable to estimate a five- or six-class model. Such a model may possibly better describe the heterogeneity across risk subgroups. Finally, only family data were collected to assess ecodevelopmental risk. Because family, peer, and school microsystems all exert influences on adolescent risk-taking behavior, we recommend that future studies include measures of peer and school, as well as family, processes.

CONCLUSIONS AND PRACTICAL IMPLICATIONS

Despite these limitations, the results of this study suggest that Hispanic adolescents are not a homogeneous group and that they can be subgrouped by ecodevelopmental and intrapersonal risk and protective factors. The advantage of subgrouping adolescents on risk processes is that such processes are amenable to intervention (Dierker et al., 2004). Indeed, as Collins, Murphy, and Bierman (2004) suggested, it may be necessary to adapt interventions for use with different subgroups of adolescents by identifying which components are most efficacious for which subgroups. As Pantin et al. (2005) and Prado, Schwartz, et al. (2006) have stated, such subgroups should be based on intrapersonal and ecodevelopmental processes that can be changed through intervention, rather than on demographic variables such as nationality or nativity. Following from our results, studies should test the relative efficacy of preventive interventions for different risk subgroups, where these subgroups are identified through cluster-analytic procedures. It is also important to develop cutoffs to identify which adolescents may be at high versus low ecodevelopmental and intrapersonal risk. These two research directions will allow clinicians to match adolescents to the intervention programs that are most likely to be beneficial for them. Provided that further research supports the method and typology created here, such innovations may help to increase the efficacy of preventive interventions for Hispanic adolescents.

Our findings also suggest that, for Hispanic early adolescents, ecodevelopmental risk and protective factors may be most related to substance use, whereas intrapersonal risk and protective factors for sexual behavior may be most related to sexual behavior in this sample. Further empirical support will be needed, however, before the results can be used to guide public health practice. Such future research should both replicate the present results with more representative samples and examine whether substance abuse preventive interventions for Hispanic early adolescents may be most efficacious if they target ecodevelopmental factors, whereas HIV preventive interventions may be most efficacious if they target intrapersonal risk and protective factors for sexual behavior. This information may be useful to clinicians and/or public health practitioners as they serve adolescents with different risk and protection profiles. Such efforts may begin to reduce the disparities in substance use, unsafe sexual

behavior, and other health outcomes that exist between Hispanics and other segments of the population.

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Table 1

Ecodevelopmental × Intrapersonal Risk Subgroups

N	Ecodevelopmental Risk	Intrapersonal Risk for Substance Use	Intrapersonal Risk for Sexual Behavior
129 (50.7%)	Low	Low	Low
47 (18.5%)	Low to Moderate	Moderate	High
33 (13.0%)	Moderate	High	Moderate
45 (17.7%)	High	Moderate	Moderate

Table 2

Means and Standard Deviations of Ecodevelopmental × Intrapersonal Risk Subgroup on Clustering Variables

Variables[a]	Risk Subgroup						
	Overall Sample	Low Ecodevelopmental Risk	High Intrapersonal Sex Risk	High Intrapersonal Risk for Substance Use	High Ecodevelopmental Risk	*F* (3, 250)	*p*
Eco risk							
Lack of parental involvement	18.4 (5.4)	16.6 (4.2)$_{b}$	17 (3.4)^{a}	19.3 (5.0)$_{b}$	24.6 (5.6)^{a}$_{,b}$	38.5	< .001
Negative parenting	3.5 (3.9)	2.1 (2.4)$_{c}$	2.1 (2.0)^{a}	3.5 (4.5)$_{b}$	8.7 (3.9)^{a}$_{,b,c}$	57.7	< .001
Lack of family cohesion	5.9 (3.6)	4.4 (2.8)$_{b}$	4.6 (2.8)^{a}	7.2 (3.6)^{a}$_{,b}$	9.8 (3.0)^{a}$_{,b}$	42.0	< .001
Poor family communication	3.7 (2.2)	2.8 (1.6)$_{b}$	2.8 (1.5)^{a}	4.4 (1.7)^{a}$_{,b}$	6.6 (1.8)^{a}$_{,b}$	65.8	< .001
Poor parent–adolescent communication	47.5 (14.2)	41.9 (12.5)$_{b}$	46.6 (10.5)^{a}	52.0 (15.0)$_{b}$	61.3 (11.0)^{a}$_{,b}$	29.9	< .001
Lack of family social support	9.6 (8.1)	6.0 (4.8)$_{b}$	8.4 (6.5)^{a}	11.9 (8.0)$_{b}$	19.7 (8.4)^{a}$_{,b}$	54.1	< .001
Substance use intra risk							
Parent substance use social norms	10.0 (6.9)	7.1 (0.6)^{a}$_{,b}$	7.8 (2.1)$_{b}$	27.4 (1.7)^{a}$_{,b}$	7.9(2.5)^{a}	1538.0	< .001
Peer substance use social norms	11.3 (6.6)	8.2 (2.7)^{a}$_{,b}$	10.5 (4.9)$_{b}$	24.8 (5.0)^{a}$_{,b}$	11.0 (4.4)^{a}	166.1	< .001
Sex intra risk							
Sex attitudes	18.0 (7.3)	14.7 (5.1)^{a}	24.7 (6.8)^{a}$_{,c}$	17.8 (6.7)$_{b,c}$	20.4 (8.2)^{a}3	31.6	< .001
Sex social norms	25.2 (8.3)	19.2 (5.0)^{a}$_{,c}$	34.1 (7.1)^{a}$_{,c}$	24.3 (9.1)$_{b,c}$	24.9 (6.9)^{a}	63.2	< .001
Sex intentions	1.6 (1.1)	1.1 (0.3)^{a}$_{,c}$	2.6 (1.2)^{a}$_{,c}$	1.9 (1.4)$_{b,c}$	1.8 (1.4)^{a}	35.0	< .001
Condoms attitudes	27.1 (8.0)	24.0 (7.0)^{a}	33.5 (7.0)^{a}$_{,c}$	27.1 (7.3)$_{b,c}$	29.2 (7.9)^{a}	21.6	< .001
Condoms social norms	10.3 (7.1)	10.1 (7.1)	11.7 (5.9)	9.5 (5.8)	11.8 (7.5)	1.40	.244
Condoms intentions	3.9 (2.2)	3.6 (2.1)$_{c}$	4.7 (2.3)$_{b,c}$	3.3 (1.6)$_{b}$	4.2 (2.5)^{a}	4.4	.005

NOTE: The same subscript letter means significant mean difference. Eco = ecodevelopmental; intra = intrapersonal.

[a]. A higher mean score represents higher ecodevelopmental and intrapersonal risk for all variables.

Table 3

Substance Use in Ecodevelopmental × Intrapersonal Risk Subgroups

Outcomes	Risk Subgroup			
	Low Ecodevelopmental Risk	**High Intrapersonal Sex Risk**	**High Intrapersonal Risk for Substance Use**	**High Ecodevelopmental Risk**
Lifetime smoking**	8 (6%)	7 (15%)	4 (12%)	15 (33%)
Lifetime alcohol use*	20 (16%)	7 (15%)	10 (30%)	14 (31%)
Lifetime illicit drug use**	5 (4%)	8 (17%)	5 (15%)	10 (22%)
Lifetime drug use frequency[a],**	118	135	133	142
Past 90-day smoking*	1 (1%)	0 (0%)	2 (6%)	4 (9%)
Past 90-day alcohol use	10 (8%)	5 (11%)	4 (12%)	7 (16%)
Past 90-day illicit drug use**	0 (0%)	4 (9%)	2 (6%)	5 (11%)
Past 90-day illicit drug use frequency[a],**	122	133	130	136

[a] We report the rank from the Kruskal-Wallis test (instead of the proportion) because the variable is continuous and non-normally distributed.

* $p < .05$.

** $p < .01$.

Table 4

Sexual Behavior in Ecodevelopmental × Intrapersonal Risk Subgroups

Outcomes	Risk Subgroup			
	Low Ecodevelopmental Risk	High Intrapersonal Sex Risk	High Intrapersonal Risk for Substance Use	High Ecodevelopmental Risk
Lifetime vaginal sex**	0 (0%)	7 (15%)	3 (9%)	2 (4%)
Past 90-day vaginal sex*	0 (0%)	3 (6%)	0 (0%)	1 (2%)
Lifetime anal sexual behavior**	0 (0%)	7 (15%)	0 (0%)	1 (2%)
Past 90-day anal sexual behavior*	0 (0%)	3 (6%)	0 (0%)	0 (0%)
Lifetime oral sex (fellatio)**	1 (1%)	7 (15%)	1 (3%)	2 (4%)
Past 90-day oral sex (fellatio)**	0 (0%)	4 (9%)	0 (0%)	1 (2%)
Lifetime done oral sex to you (cunnilingus)**	0 (0%)	8 (17%)	1 (3%)	0 (0%)
Past 90-day done oral sex to you (cunnilingus)*	0 (0%)	3 (6%)	0 (0%)	0 (0%)
Unprotected sexual behavior	N/A[a]	1 (33%)	N/A[a]	—[b]
Any sexual transmitted disease**	0 (0%)	4 (9%)	0 (0%)	0 (0%)

[a] This field does not apply for this subgroup of adolescents, because there were no adolescents reporting sexual behavior at this time.

[b] The adolescent reporting having had sexual intercourse in the past 90 days did not answer the question on unprotected sexual intercourse, and hence no value is reported.

* $p < .05$.

** $p < .01$.