The Role of Assertiveness and Decision Making in Early Adolescent Substance Initiation: Mediating Processes

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This study examined the mediating processes linking assertiveness and decision making to early adolescent substance initiation, along with the moderating effect of gender on those processes. Models specifying negative expectancies and refusal intentions as mediators of individual rights assertiveness and decision-making effects on substance initiation were evaluated across 18 months on a nontreatment cohort of young adolescents participating in a prevention trial (average age 12.3 years at baseline; \(N = 357\)). Results indicated that individual rights assertiveness and decision making had indirect effects on substance initiation through effects on negative outcome expectancies and refusal intentions. Gender differences were found in both the average level and the pattern of relationships among the variables. For girls, refusal intentions were negatively associated with later substance initiation. For boys, early levels of substance initiation were negatively associated with later levels of negative expectancies and refusal intentions. Implications for prevention programming are discussed.

A recent report suggests that substance use among young adolescents in the United States remains high (Johnston, O’Malley, & Bachman, 2002). Because substance use during early adolescence has been associated with multiple negative outcomes (Dryfoos, 1990; Riggs & Whitmore, 1999), the past two decades have seen an increase in approaches to delay and
prevent the initiation of substance use (see Institute of Medicine, 1994; Peters & McMahon, 1996; Spoth, Kavanaugh, & Dishion, 2002). In this context, prevention experts and federal agencies have emphasized the importance of designing preventive interventions based on sound theory and empirical science (Mrazek & Haggerty, 1994; National Institute on Drug Abuse, 1997).

Knowledge about adolescent psychosocial development contributes to the determination of appropriate timing and content of interventions to produce the greatest impact on early adolescent substance initiation (Langer, 1996). Regarding timing of interventions, for example, retrospective reports from the Monitoring the Future Study 1974–1994 (Johnston, O’Malley, & Bachman, 1996) indicate that cigarette initiation peaks during sixth and seventh grades, and alcohol initiation peaks during seventh through ninth grades. This pattern of initiation suggests the importance of early intervention. Regarding intervention program content, research indicates that adolescence is a time of considerable psychosocial development, including: cognitive growth (Keating, 1990); changes in peer group importance, composition, and acceptance (Brown, 1990; Dishion, Capaldi, & Yoerger, 1999); increasing influence of peer friendship and dating relationships (Brown, Dolcini, & Leventhal, 1997; Buhrmester, 1996) and struggles with identity issues (Erikson, 1968; Harter, 1990). In addition, the transition from elementary school to middle school is accompanied by increased autonomy and the necessity for more independent decision making (Entwistle, 1990). Appropriate interventions for early adolescence should consider developmental timing to target influences on cultural, interpersonal, and intrapersonal variables that can delay substance initiation.

Theories of adolescent development (Ausubel, Montemeyor, & Svajian, 1977; Feldman & Elliott, 1990), social cognition (Ajzen, 1985; Bandura, 1986), problem behavior (Jessor & Jessor, 1977), and personal and social development (Erikson, 1993; Rosenberg, 1989) have contributed to clarifying the etiology of substance use and mechanisms of behavior change that have guided the development of numerous prevention programs. Recently, researchers have drawn on this work to articulate integrated models related both to etiology of substance use and to mechanisms of intervention effects (Botvin, 1999; Petraitis, Flay, & Miller, 1995; Spoth & Redmond, 2002).

The current research contributes to the knowledge base by exploring mediational processes associated with models of intrapersonal influences on substance initiation during early adolescence and by examining gender moderation of those processes. Although constructs were selected that represent frequently targeted school- and family-based prevention
program content (see Botvin & Botvin, 1992; Kumpfer & Turner, 1990; Tobler et al., 2000), the current study assessed only nonintervention adolescents from a large-scale preventive intervention trial to evaluate naturally occurring changes and relevant influences on substance initiation. Subsequently, when additional waves of data are available, further analyses will evaluate intervention and control differences in change over time for proposed mediator variables and proposed processes of influence. These analyses will supplement intervention outcome analyses conducted earlier that demonstrated support for the efficacy of the interventions for substance use outcomes (Spoth, Redmond, Trudeau, & Shin, 2002).

For the current study, constructs were chosen that represent both more distal intrapersonal influences on substance initiation and more proximal attitudinal influences. The more distal intrapersonal influences we examined were individual rights assertiveness and decision-making skills. Individual rights assertiveness is defined as learned, goal-oriented, primarily verbal behavior that increases the likelihood that personal needs will be met in the context of interpersonal relationships (Lazarus, 1973; Wolpe, 1973). Decision-making skills are active strategies to gather information, weigh pros and cons, solve problems, and choose appropriate actions (Byrnes, 1998). The more proximal attitudinal influences we examined were negative expectancies and refusal intention. Negative expectancies are the perceived negative social and personal consequences of substance use (Bandura, 1997). Refusal intention is defined as the self-assessed likelihood of refusing or resisting substance offers. Substance initiation represents the initiation of one, two, or three substances: cigarettes, alcohol, and marijuana.

Petraitis and colleagues (1995; Petraitis, Flay, Miller, Torpy, & Greiner, 1998) described a matrix of substance use etiology integrating several developmental theories and etiological models. Petraitis and colleagues’ matrix identified three types and three levels of influence on substance use. Types of influence are cultural and attitudinal (e.g., public policy, conventional values), social and interpersonal (e.g., parental warmth, normative beliefs), and intrapersonal (e.g., temperament, coping skills). Levels of influence are proximal, distal, and ultimate. Intervention efforts have primarily targeted distal and proximal influences, presumably because they are more amenable to change than ultimate influences (e.g., parental divorce, neighborhood climate, biological dispositions).

Petraitis et al. (1995) also suggested that mediational processes related to more distal intrapersonal influences have not been explored and that the role of moderator variables has received little attention. Although Petraitis et al. (1998) acknowledged disagreements regarding the
placement or the ordering of variables within their matrix formulation, the organization of the variables assessed in the current study followed the Petraitis et al. (1995) model.

Petraitis et al. (1995) theorized that intrapersonal constructs such as “inadequate social skills” and “weak academic skills” (p. 82) are more distal influences on substance use. Those constructs correspond to the intrapersonal constructs we evaluated: individual rights assertiveness and decision-making skills. The Petraitis et al. model’s cultural and attitudinal constructs posited as more proximal predictors of substance use are “expected costs and benefits of substance use, evaluation of costs and benefits of substance use, and attitudes toward substance use” (p. 82). Negative expectancies and refusal intentions correspond to these more proximal attitudinal predictors.

Intrapersonal Influences

Assertiveness and decision making have often been explored as protective factors in research on substance use (Hawkins, Catalano, & Miller, 1992; Paglia & Room, 1999). Although higher levels of assertiveness have been found to be negatively associated with adolescent substance use (Epstein, Griffin, & Botvin, 2000; Pentz, 1985), results finding no relationship or a positive relationship with substance use also have been reported (Scheier, Botvin, Diaz, & Griffin, 1999; Wills, Baker, & Botvin, 1989).

Recent findings related to adolescent assertiveness and alcohol use shed some light on these conflicting findings. A study investigating assertiveness and its relationship to alcohol use and intentions found five factors in a commonly used measure of assertiveness (Lillehoj, Spoth, & Trudeau, 2002). One of those factors—individual rights assertiveness—was negatively associated with alcohol use intentions, whereas another factor—social approach assertiveness—was positively associated with both intentions and current use. These results and related findings (Epstein, Botvin, & Diaz, 1999; Scheier, Botvin, & Baker, 1997; Wills et al., 1989) suggest that the various measures of assertiveness in the literature may not have consistently measured the same construct and, furthermore, that various dimensions of assertive behavior differentially affect substance use. The current study examined individual rights assertiveness, which relates to assertive behavior in relatively close relationships. This dimension of assertiveness is relevant to adolescent substance use, which generally takes place within the peer group (Paglia & Room, 1999).

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1 Assertiveness has been defined as a social or interpersonal competency, rather than an intrapersonal competency, by some authors (e.g., Scheier et al., 1997; Scheier et al., 1999).
In contrast to assertiveness, decision-making skills have been found consistently to protect against substance use. For example, weak decision-making skills have been associated with adolescent cigarette and alcohol use (Epstein et al., 1999; Scheier & Botvin, 1998). Because of this significant association, decision-making skills are frequently included in adolescent substance use prevention programs (Tobler et al., 2000), and prevention programs have been shown to strengthen and improve decision-making skills (Gersick, Grady, & Snow, 1988). In addition, research has suggested that there may be gender differences in decision-making processes and problem-solving skills, with girls demonstrating higher levels of skill (Radecki & Jaccard, 1996).

Attitudinal Influences

The two relatively more proximal attitudinal influences on substance initiation, expectancies and intentions, have also frequently been examined in prevention research. Expectancies are considered by social-cognitive and learning theory to be a powerful motivator either to perform or to avoid a behavior (Bandura, 1997). Research findings have demonstrated that expectancies about the affective, behavioral, and social consequences of substance use are strong predictors of substance use (Petraitis et al., 1995; Scheier & Botvin, 1997). Intentions have been classified as the most immediate proximal predictor of substance use (Petraitis et al., 1995; Petraitis et al., 1998). Cognitive-affective theories of health behavior (Ajzen, 1985) have also posited behavioral intention as the most immediate cause of behavior and the mediator of more distal cognitive influences, such as expectancies and perceived norms.

Mediational Relationships

Research has suggested that individual rights assertiveness and decision making may influence expectancies and refusal intentions, which in turn influence substance initiation. Regarding individual rights assertiveness and expectancies, research suggests that individuals who lack assertiveness are more likely to expect substances to aid in coping, allowing them to relieve stress, increase positive affect, and increase social support (Wills & Shiffman, 1985). Also, earlier research found that individual rights assertiveness was negatively associated with future intentions to use (Lillehoj et al., 2002), suggesting that individual rights assertiveness also would be associated with future refusal intentions. For example, students who assessed themselves as highly assertive in interpersonal situations
also would be likely to assess their refusal self-efficacy as high, and refusal self-efficacy would likely be incorporated into a self-assessment of refusal intentions. In addition, students with higher levels of individual rights assertiveness would likely feel they had the capacity to meet their interpersonal needs; therefore, they would not be as likely to feel the need to relieve stress or increase positive affect through the use of substances. Extrapolating from these studies, we hypothesized that individual rights assertiveness would influence both negative expectancies and refusal intentions.

It also seemed likely that individual rights assertiveness may interact with both negative expectancies and refusal intentions, such that individual rights assertiveness would influence substance initiation differently depending on the levels of negative expectancies and refusal intentions. In other words, a higher level of individual rights assertiveness would be associated with a lower level of substance initiation only if levels of negative expectancies or refusal intentions were relatively high. We evaluated these potential interactions.

Regarding decision making, findings in previous studies suggest that decision-making skills (e.g., weighing alternatives and considering consequences) contribute to the decision to use or to refuse substance offers (Epstein et al., 1999; Epstein et al., 2000). Also, decision-making skills related to information processing (gathering relevant information) are used in forming expectancies (Langer, 1996). Based on this research, we hypothesized that decision-making skills would influence both negative expectancies and refusal intentions.

Although expectancies influence intentions (Webb, Getz, Baer, & McKelvey, 1999), it is likely that expectancies also exert an independent influence on early adolescent substance initiation. In support of that hypothesis, research has shown that early adolescent substance initiation is not entirely planned behavior. In the context of offers by peers, adolescent substance initiation may be independently influenced by expectancies regarding the immediate social consequences of use or refusal, in addition to intentions (Gibbons, Gerrard, Ouellette, & Burzette, 1998). Therefore, the current study specified negative expectancies as directly influencing substance initiation, as well as indirectly through effects on intentions.

Support for the mediational model is provided by research using the theory of reasoned action, where intention is specified as the most immediate cause of behavior (Sheppard, Hartwick, & Warshaw, 1988). However, research examining expectancies as a mediator of variables related to substance use has been mixed (Ennett & Bauman, 1991; Greenbaum, Brown, & Friedman, 1995; Webb, Baer, Francis, & Caid, 1993).
Such mixed results suggest that exploration of mediational relationships among the variables that influence substance use should continue with greater specificity. For example, it is possible that the variables and processes that influence substance use may differ depending on the outcome analyzed, (e.g., initiation, progression, or frequency; varying substance types), or by participants’ age, gender, or other moderators (MacKinnon et al., 1991; Spoth, Redmond, & Shin, 1998).

The mediational model to be tested is diagrammed in Figure 1. We hypothesized that individual rights assertiveness and decision making would demonstrate a positive relationship with later negative expectancies and refusal intentions, which would in turn show a negative relationship with substance initiation. Negative expectancies were specified as contributing to substance initiation directly, as well as indirectly, by influencing refusal intentions. In addition, we hypothesized that Time 1 substance initiation would negatively influence Time 2 negative expectancies and refusal intentions. A reciprocal relationship is predicted by social-cognitive learning theory (Bandura, 1997), where behavior at an initial assessment affects cognitions at a later assessment, and cognitions, in turn, affect later behavior. This reciprocity has been empirically demonstrated for substance use behavior and expectancies (Scheier & Botvin, 1997).

**Moderating Influences**

Research has found gender differences in substance initiation, with boys displaying both higher rates and earlier initiation than girls (Johnston...
et al., 1996, 2002). Gender differences also have been found in the strength and pattern of relationships among some predictors of substance use (e.g., stress was more associated with substance use among early adolescent girls than boys and early conduct problems were more strongly associated with later marijuana use among girls; Pedersen, Mastekaasa, & Wichstrom, 2001). Because evidence of differing influences on substance initiation for boys and girls could be important to prevention program developers and implementers, the current study evaluated gender differences in descriptive statistics and the pattern of relationships among the variables.

METHOD

Participants

Participants in the study were seventh graders at the time of pretesting enrolled in 36 rural schools in 22 counties in a Midwestern state. A randomized block design guided the assignment of the schools within each block into one of the three experimental conditions: (a) those receiving the 15-session in-school classroom-based Life Skills Training Program (LST; Botvin, 1996, 2000); (b) those receiving the LST plus the seven-session family-focused Strengthening Families Program: For Parents and Youth 10–14 (SFP 10–14; Molgaard, Kumpfer, & Fleming, 1997); or (c) those receiving minimal contact in a control condition. At the time they were recruited into the study, schools did not know the experimental condition to which they would be assigned. Only the control condition students were selected for this analysis.

All seventh-grade students in participating schools were recruited for participation. A total of 494 students (93% of eligible students) in the 12 schools assigned to the control condition completed the baseline (T1) assessment conducted when the students were in the first semester of seventh grade. Posttest (T2) assessments approximately 6 months after T1 were conducted with 463 (94%) of the students. Of these, 416 (90% of those posttested) students completed a 1 1/2-year follow-up (T3) assessment. The retention rate from T1 to T3 was 84%. On average, 41 students in each school completed the T1 assessment. Their average age was 12.3 years. Slightly more than half of the students were male (51%), and the majority were Caucasian (97%). Approximately 77% lived with both biological parents, and approximately 23% qualified for free or reduced-cost school lunches. Only students with complete information on the study measures were included in the analyses.
Procedure

The data collection was conducted in classrooms by a two- or three-person research team during regular school periods. A consent procedure allowed parents to decline participation for their adolescent, and adolescents could also decline on their own behalf. Participation rates did not differ by intervention condition. Students were assured, both verbally and in writing, that their responses to the questionnaires would be kept confidential. In addition, each student exhaled into a balloon that was connected to a carbon monoxide (CO) meter to provide a CO reading and to serve as a “bogus pipeline” to enhance validity in answering the smoking-related questions. This procedure provides an independent and objective physiological measure to compare with the adolescent’s self-report and is frequently used to increase the truthfulness of self-reported smoking behavior (Jones & Sigall, 1971; Murray, O’Connell, Schmid, & Perry, 1987). Students were told that CO readings could be used to validate self-reports. The same procedures were employed in each data-collection wave. For the current study, CO readings were not evaluated or correlated with smoking self-reports, primarily because the readings would only validate recent smoking, and our measure was a lifetime-use measure.

Measures

To assess individual rights assertiveness, six items were derived from the Gambrill and Richey Assertion Inventory (1975) and were modified to be suitable for adolescents (Wills et al., 1989). Previous research has demonstrated the validity of the factor structure of the original inventory and provided support for the scale integrity of a reduced set of items (Wills et al., 1989). A principal components exploratory factor analysis conducted on the modified 15-item inventory revealed four factors, including the dimension of individual rights assertiveness representing an adolescent’s willingness to express assertiveness skills in relatively close interpersonal relationships. The individual rights assertiveness scale has been used in previous research to predict adolescent substance intention and use (Lillehoj et al., 2002; Scheier & Botvin, 1998). The scale included six items, such as: “Say ‘no’ when someone asks you to do something you don’t want to do,” and “Say ‘no’ when someone wants to copy your homework.” Responses were on a 5-point scale ranging from 1 (definitely would) to 5 (definitely would not). Responses were rescaled so that higher scores represented a greater level of individual rights assertiveness.
Reliability at T1 was $\alpha = .78$. The six items were combined into three parcels and specified as indicators of the individual rights assertiveness construct for the structural equation modeling (SEM) analyses.\(^2\)

Decision making was measured with a 7-item scale derived from a modified 35-item version of the Coping Assessment Battery (Bugen & Hawkins, 1981). A factor analysis of the measure with a sample of adolescents revealed a 7-item decision-making dimension that assessed skills related to decision making through active strategies to gather information, make decisions, and solve problems. The 7-item decision making scale has been used extensively in previous research to predict adolescent substance use (Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Epstein et al., 1999; Wills, 1986). The stem for all 7 items was “When I have a problem, I...” Items included: “... think about what information is necessary for dealing with the problem” and “... think about choices that exist before I take any action.” Responses were scored on a 5-point scale ranging from 1 (never) to 5 (always). Reverse-scored items were rescaled so that higher scores represented more effective decision-making skills. Reliability at T1 was $\alpha = .92$. Items were combined into three parcels for the SEM analyses.

Negative expectancies included negative outcome expectancies related to three substances: cigarettes, alcohol, and marijuana. Items were adapted from a questionnaire to assess beliefs regarding the social and personal consequences of substance use (Epstein et al., 1999; U.S. Public Health Service, 1974) and are similar to expectancy items frequently assessed in adolescent substance use research (MacKinnon et al., 1991; Scheier & Botvin, 1997). Five items relating to cigarettes and marijuana and eight items relating to alcohol were included. All items were scored on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Examples include: “Kids who [smoke, drink, use marijuana] have more friends,” “[Smoking cigarettes, drinking alcohol, using marijuana] is a good way of dealing with your problems,” and “Kids who drink alcohol act crazy or stupid.” Items were rescaled and averaged so that a higher score represented a more negative expectancy regarding substance use. Alpha reliabilities at T2 were .91 for the Cigarette subscale, .78 for the

\(^2\)Combining individual items from a longer scale into parcels reduces the number of estimated parameters, which is advantageous for smaller samples. In addition, the parcels may be more strongly related to the latent factors, as they are less influenced by wording and other method effects. Except in very small samples, parceling does not have negative effects on model convergence or proper solution (Marsh & Hau, 1999). Item parcels were created using factor loadings from unidimensional constructs. Items with similar communalities were combined to form the parcels; parcels produced similar factor loadings within constructs (Bandalos & Finney, 2001).
Alcohol subscale, and .80 for the Marijuana subscale. Scores on the three measures were used as indicators of the expectancy construct for the SEM analyses.

Refusal intention was assessed with two scales. The first scale, adapted from a modified version of the Gambrill and Richey Assertion Inventory, assessed refusal intention for offers of specific substances. The item stem was “How likely are you to handle these situations in this way?” Responses identified whether the respondent would say no when asked by someone to try cigarettes, alcohol, or marijuana. Items were scored on a 5-point scale ranging from 1 (definitely would say no) to 5 (definitely would not say no). Reliability at T2 was $\alpha = .82$. The second scale assessed intentions regarding substance resistance strategies and included five items measured on a 5-point scale assessing responses to offers of substances ranging from 1 (definitely would) to 5 (definitely would not). Responses included: “Tell them ‘not now,’” “Change the subject,” and “Make up an excuse and leave.” Reliability at T2 was $\alpha = .85$. The two scales were used as indicators for the refusal intentions construct in the SEM analyses.

The substance initiation index was constructed by combining three dichotomous items regarding the lifetime use of cigarettes, alcohol, and marijuana. Participants were asked if they had ever “had a drink of alcohol,” “smoked a cigarette,” or “smoked marijuana.” Responses were coded 0 for “no” and 1 for “yes” and summed to compute the scale. For each wave of data, responses were corrected for consistency, so that if an individual answered “yes” at any time, the subsequent response to the same question was also coded “yes.” Scores ranged from 0 (no substance use) to 3 (initiation of all three substances). Test–retest reliability between T1 and T2 was $r = .76$. Because the scale was composed of dichotomous items, reliability was also assessed with the Kuder-Richardson (KR20) formula at .44 at T1 and .55 at T3. Reliability and validity of self-reported substance use for purposes of similar types of studies have been previously evaluated and considered acceptable (Murray et al., 1987; Oetting & Beauvais, 1990). Prior studies have reported the use and validity of similar substance use indexes (Han, McGue, & Iacono, 1999; Spoth, Redmond, & Shin, 2001; Spoth et al., 2002). This index was used as a single indicator of substance initiation in the SEM analyses.

Distributional characteristics of the variables were nonnormal. The substance initiation index was positively skewed at T1. That is, most of the students identified no or low levels of substance initiation; however, the distribution was less skewed at T3. The other variables all showed negative skew; that is, most of the students identified high levels of individual rights assertiveness, decision-making skills, negative
expectancies, and refusal intentions. Because of these distributional characteristics, supplemental analyses were conducted to address these violations of normality.

**Data Analyses**

Because students were nested within schools, analyses were conducted to assess the need for multilevel analyses. Attrition analyses were also conducted to determine whether study dropouts from T1 to T2 and from T2 to T3 differed on substance initiation status. Analyses were conducted to evaluate interactions between individual rights assertiveness and both negative expectancies and refusal intentions before SEM analyses. Next, SEM was used to assess the relationships among the variables. A confirmatory factor analysis (CFA) evaluated the factor loadings for the measured indicators and the overall fit of the model. The next step was to test the proposed mediational model to determine whether the model adequately described the sample data. Then, gender differences were evaluated for the model constructs and multigroup SEM evaluated gender differences in the pattern of relationships among the variables. Finally, because the data were not normally distributed, supplemental analyses were conducted to address nonnormality.

**RESULTS**

**School-Level Effects**

The intraclass correlations, evaluating the relationship between the school-level error term as a random variable and the individual-level error term, ranged from $\rho = .02$ to $\rho = .10$ across variables. Additionally, a multivariate analysis of variance (MANOVA) determined that the overall school-level effect on the model variables at the initial assessment was significant, $F(132, 4653) = 1.65, p < .001$. Although the intraclass correlations were not large, we concluded that analyses controlling for the multilevel effects were the most appropriate choice (Bryk & Raudenbush, 1992; Snijders & Bosker, 1999).

**Attrition Effects**

Attrition analyses were conducted using analysis of variance (ANOVA) and chi-square analyses for dropouts on the substance initiation index and demographic measures at both T2 and T3. Students who dropped out
between T1 and T2 \((n = 29)\) had significantly higher scores on the substance initiation index, \(F(1, 469) = 18.85, p < .001\) (2 students moved, changing conditions between T1 and T2 and were also eliminated from the analyses). In addition, students who dropped out between T2 and T3 \((n = 47)\) also had significantly higher scores on the substance initiation index at T2, \(F(1, 450) = 6.50, p < .05\). Further analyses revealed that students who dropped out following T1 were more likely to live in single-parent households, \(\chi^2(1, N = 486) = 7.04, p < .01\), and to receive free or reduced price school lunches, \(\chi^2(1, N = 452) = 8.34, p < .01\). These results suggest that the students who dropped out of the study assessments tended to be at greater risk for substance use and other problem behaviors than those remaining in the study.

### Continuous Variable Interactions

Analyses were conducted evaluating the interactions between individual rights assertiveness and both negative expectancies and refusal intentions using regression with SAS PROC MIXED to control for the clustered nature of the sample (Singer, 1998). We determined that a regression model with interactions using manifest variables should be tested before examining interactions using SEM. There are many complexities involved when modeling continuous variable interactions using SEM (Jaccard & Wan, 1996), and our sample size was not large; therefore, we wanted to determine whether interactions were likely to be significant before addressing such complexities. We standardized the variables and modeled regression effects on the T3 substance initiation index, using the T1 substance initiation index as a control variable. Models were estimated separately to test the interaction of individual rights assertiveness with negative expectancies and the interaction of individual rights assertiveness with refusal intentions. A model that included all variables and both interactions was also tested. None of the interactions was significant; therefore, continuous variable interactions were not modeled in the SEM.

### Mediational Model

SEM was conducted with LISREL 8.30 (Jöreskog & Sorbom, 1996) using maximum likelihood (ML) estimation to evaluate the relationships among the variables. The analyses controlled for the effects of the clustered nature of the sample by using the pooled within-variance/covariance matrices from the MANOVA as input matrices for SEM analyses (Muthén & Satorra, 1995; SPSS Incorporated, 1988).
Individual rights assertiveness, decision making, negative expectancies, and refusal intentions were all specified as latent variables with multiple indicators (see descriptions in the Measures section). The substance initiation index was a single indicator scale with the error term constrained to zero. The mediating latent variables, negative expectancies and refusal intentions, were assessed at T2. The T1 substance initiation index was used as a control variable so that effects of the predictor variables on T3 substance initiation could be interpreted as effects on changes in substance initiation from the T1 assessment (i.e., students who began using one or more substances or who used additional substances between T1 and T3). Paths from T1 substance initiation to negative expectancies and refusal intentions also were specified. A CFA was conducted for the six-factor model. The correlation matrix, means, and standard deviations of the variables used in testing the model are presented in Table 1. The indicators for each construct are more strongly intercorrelated than they are correlated with other constructs, suggesting both convergent and discriminant validity for the study constructs. Factor loadings and interfactor correlations are presented in Table 2. As can be seen by the interfactor correlations, all four predictor variables had significant negative zero-order correlations with the substance initiation index; all the predictor variables were significantly positively correlated with each other. The measurement model provided an acceptable fit to the data, $\chi^2(52, N = 357) = 76.99, p < .01$, goodness-of-fit index (GFI) = .97, comparative fit index (CFI) = .99, root mean square error of approximation (RMSEA) = .04, Hoelter’s critical N (CN) = 364.51.

Next, the structural model was tested. Individual rights assertiveness and decision making were specified as correlated exogenous variables with pathways to negative expectancies and refusal intentions. Negative expectancies were specified as influencing the T3 substance initiation index directly and indirectly through refusal intentions. A pathway from refusal intentions to the substance initiation index was specified. The structural model proved a good fit, $\chi^2(54, N = 357) = 77.71, p < .02$, GFI = .97, CFI = .99, RMSEA = .04, CN = 372.41. An alternative model that added direct effects from individual rights assertiveness and decision making to T3 substance initiation was not a significant improvement over the fully mediated model, $\Delta \chi^2(2) = 0.72, p < .70$. (See Figure 2 for standardized coefficients and $t$ values.)

Individual rights assertiveness and decision making were significant predictors of negative expectancies, but neither was directly related to refusal intentions. However, the indirect effects through negative expectancies of both individual rights assertiveness ($\beta = .17, p < .001$) and decision making ($\beta = .10, p < .05$) on refusal intentions were significant. As hypothesized, T1 substance initiation had a significant effect on negative
TABLE 1
Means, Standard Deviations, and Correlations for the Model Variables

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<td>0.61</td>
<td>0.78</td>
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Note. N = 357. Correlations ≥ .07 < .13 | p < .05 | ≥ .13 < .17 | p < .01 | ≥ .17 | p < .001 | .
Significance levels p < .05 in bold.
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</table>

Note. N = 357. Correlations < .15 | p < .05 | ≥ .15 < .25 | p < .01 | ≥ .25 | p < .001. Significance levels p < .05 in bold.

FIGURE 2  Latent variable model predicting substance initiation.
expectancies and refusal intentions, in addition to a highly significant
stability coefficient for the substance initiation index from T1 to T3. Negative expectancies exerted a significant direct effect on the T3 substance initiation index, whereas refusal intentions did not. The model explained 43% of the variance in the T3 substance initiation index. The indirect effects of individual rights assertiveness and decision making on T3 substance initiation index were significant ($\beta$s = $-.08$ and $-.04$, $p$s $<.05$, respectively).

**Gender Differences**

Gender differences on the variable means were first evaluated with $t$ tests (see Table 3). Girls were lower on T1 substance initiation index than boys; girls were higher on T1 decision making than boys. None of the other variable means was significantly different across gender. Second, gender difference in the pattern of relationships among the variables was evaluated with multigroup SEM. Factor loadings were constrained to equality between the two groups. To test alternate causal ordering, we simplified our models by specifying single indicators measured with error ($(1 - \varphi)$ * variance) for all of the variables, with the exception of substance initiation index. Substance initiation index was again specified as measured without error because an accurate estimate of error could not be assessed easily for a count variable. We then tested an alternate causal ordering for the T1 to T2 variables, with stabilities for all of the variables included. In other words, we first specified a model with our original causal order—paths from T1 assertiveness and decision making to T2 negative expectancies and refusal intentions—and an alternative model—paths from T1 negative expectancies and refusal intentions to T2 assertiveness and decision making. Although the models cannot be statistically compared because they are not nested, the model specifying the alternative causal ordering showed a relatively poorer fit to the data, $\chi^2_{(14)} = 40.59$, $p < .001$, CFI = .97, RMSEA = .07, CN = 267.40, compared with the originally ordered model, $\chi^2_{(14)} = 22.83$, $p < .06$, CFI = .99, RMSEA = .04, CN = 474.52. The difficulty of clearly determining causal ordering has often been discussed, and cross-lagged models are not necessarily determinant. It is crucial to consider theory, rather than statistics alone, in determining causal ordering (Rogosa, 1995).

Testing tau equivalence for the factor loadings between boys and girls demonstrated that five of the seven parameters were equivalent, whereas two were not. Nevertheless, we assumed measurement invariance to test a more restrictive model. Assuming measurement equivalence is theoretically sound because it defines the latent variables as identical between groups. Constraining the factor loadings to equality for five rather than seven parameters resulted in essentially the same results as in the fully constrained model. For the structural model gender equivalence tests, $\chi^2$ values were generally larger in the less constrained model.
were constrained to equality in one model and allowed to vary in another, and the difference in chi-square results between models was compared. Differences were significant, $\Delta \chi^2(10) = 30.28, p < .001$ (see Figure 3). In addition to the overall difference in the structural parameters, differences in individual parameters were evaluated. Significant gender moderation was found in the paths from T1 substance initiation to T2 negative expectancies, $\Delta \chi^2(1) = 4.03, p < .05$; T1 substance initiation to T2 refusal intentions, $\Delta \chi^2(1) = 4.98, p < .05$; and T2 refusal intentions to T3 substance initiation, $\Delta \chi^2(1) = 13.68, p < .001$. Gender moderation of the path from T2 negative expectancies to T3 substance initiation failed to reach significance, $\Delta \chi^2(1) = 1.85, p = .18$. These results suggest that the pattern of influences on substance initiation is different for girls and boys. Levels of T1 substance initiation are more strongly negatively related to levels of T2 negative expectancies and refusal intentions for boys than for girls; levels of T2 refusal intentions are significantly and negatively related to T3 substance initiation for girls but not for boys.6

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6 Variance–covariance matrices for the models are available from the first author.
Violations of the Normality Assumption

Nonnormal distribution of variables in SEM can lead to $\chi^2$ goodness-of-fit tests that reject too many true models and tests of parameter estimates that are biased, leading to too many significant results (Russell, 2002; West, Finch, & Curran, 1995). Because of the skew in the model variables, various transformations were conducted and evaluated to address this issue. The greatest improvement in multivariate normality was obtained by reversing the scores on the variables (highest value of the scale plus one minus the individual score) and using log base 10 transformations (Kline, 1998). Because the substance initiation index scores were less skewed than the other variables, multivariate skewness was closer to normal when the substance initiation index was not transformed. With the transformed variables, multivariate skewness was decreased from a $z$ score of 43.17 to a $z$ score of 20.30—still a highly significant departure from normality. The $z$ scores for individual transformed variables ranged from 2.12 to 4.25. Results found that models evaluated with transformed data varied only slightly from the models with nontransformed data. Significant gender differences in model pathways also were found in the model with transformed data. Although the ML estimator is relatively robust to violations of normality with larger sample sizes (Bollen, 1989), we also tested our models using the scaled $\chi^2$
statistic with robust standard errors (Satorra & Bentler, 1994). Results replicated the pattern of relationships among the variables and the significance of model parameters; in addition, the fit of the models improved.7

**DISCUSSION**

The purpose of the current study was to evaluate mediational relationships between more distal intrapersonal influences and relatively more proximal influences on substance initiation, as well as to evaluate potential differences in influence processes between boys and girls (Petraitis et al., 1995; Petraitis et al., 1998). To elucidate the psychological processes linking assertiveness and decision making to substance initiation, structural models with mediational pathways were tested, and gender differences in mean levels of the variables, as well as the processes of influence, were evaluated.

Because previous research has demonstrated that influences on substance use may vary across developmental stages, the current study evaluated mediational processes in a group of young adolescents. Early adolescence is the time when substance use typically begins (Johnston et al., 1996) and is a period of rapid change, including cognitive advances (Keating, 1990), changes in peer relationships (Brown, 1990), and exposure to peer offers of substances (Johnston et al., 1996). Therefore, it is important to study influences on substance initiation during this time. The negative effects of early substance initiation, including concomitant and subsequent increases in other problem behaviors (Hawkins et al., 1992; Riggs & Whitmore, 1999) and an increased likelihood of developing substance abuse problems in adulthood (Grant & Dawson, 1997) suggest that delaying substance initiation is an important goal. Empirical support for the gateway theory (Kandel, Yamaguchi, & Chen, 1992) has found that initiation typically progresses in stages, with earlier initiation of tobacco or alcohol, or both, and later progression to marijuana and other drugs.

For young adolescents, our findings suggested that individual rights assertiveness and decision-making skills were positively associated with negative expectancies and refusal intentions, directly or indirectly. In turn, negative expectancies and refusal intentions were negatively associated with substance initiation (although findings were mixed with respect to

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7 Models were estimated using the EQS Program (Bentler & Wu, 1995). This program provides the scaled $\chi^2$ statistic and robust standard errors, but has no method to control for the effects of intraunit dependency (clustering).
the influence of refusal intentions on subsequent substance initiation). This is consistent with earlier findings in which similar constructs, such as refusal assertiveness and alcohol expectancies, mediated the effects of intrapersonal variables on substance use (Epstein et al., 2000; Scheier & Botvin, 1997, 1998). Consistent with Scheier and Botvin (1997) and Webb et al. (1993), negative expectancies were influenced by individual rights assertiveness, decision-making skills, and earlier levels of substance initiation; negative expectancies also contributed to the variance in refusal intentions. These mediational processes were the same for boys and girls, although girls demonstrated significantly higher levels of decision-making skills in the fall semester of seventh grade than boys, as well as lower levels of substance initiation.

We also evaluated potential interactions between individual rights assertiveness and both negative expectancies and refusal intentions. Clearly, higher levels of individual rights assertiveness were associated with higher levels of later negative expectancies and refusal intentions, but there was no evidence that higher levels of individual rights assertiveness were associated with lower rates of increase in substance initiation only among students with higher levels of negative expectancies or refusal intentions. The lack of interactions can perhaps be explained by the limited variability in the constructs examined; also, the variables demonstrated a high degree of negative skew. In addition, varying dimensions of assertiveness have not been extensively explored, and it is likely that other assertiveness dimensions would be associated with negative expectancies, refusal intentions, and substance initiation in differing ways.

Drawing conclusions regarding the influence of negative expectancies and refusal intentions on substance initiation is less straightforward than the findings discussed earlier. Overall, students with more negative expectancies regarding substance use during spring semester of seventh grade were less likely to report increases in substance initiation between fall semester of seventh grade and spring semester of eighth grade, whereas students’ levels of intentions to refuse offers of substance use in that same period did not affect subsequent change in substance initiation. Further analysis found results differed by gender. Girls with higher levels of refusal intentions during the spring semester of seventh grade were less likely to report increases in substance initiation. However, for boys, levels of refusal intentions were not related to changes in substance initiation.

Across time, the process of influence was different for boys and girls with regard to the effects of refusal intentions on change in substance initiation; however, it is important to note that the level of refusal
intentions did not differ between genders. One possible explanation for the difference in influence patterns between boys and girls may be related to increases in exposure to peer substance use, a likely result of change in social and interpersonal factors during this time frame (Brown, 1990; Johnston et al., 1996). For example, during fall semester of seventh grade, 70% of the participants thought that less than half of people their own age drank alcohol; by spring semester of eighth grade, only 43% endorsed that response. As they progress through the middle school years, boys may be influenced more strongly than girls by peer substance offers in risk-conducive social situations (see Gibbons et al., 1998). Peer pressure to use substances is more intense for boys because substance use is often perceived as “macho” behavior (Brown, 1982).

In contrast, perhaps the earlier maturation of girls, especially in social-cognitive functioning and moral development (Silberman & Snarey, 1993), allows girls’ actions to align more closely with their intentions, even as peer substance offers increase. In addition, results suggest that boys initiate substances earlier and, furthermore, that early levels of initiation are more likely to lead to later decreases in negative expectancies and refusal intentions for boys than for girls, placing boys at greater risk for subsequent initiation of additional substances.

Results suggest that individual rights assertiveness and decision-making skills are important constructs related to substance initiation and should continue to be promoted as components of prevention programs. Regarding individual rights assertiveness, it is likely that bolstering this skill, specifically the ability to say no to inappropriate requests, will encourage young adolescents to refuse substance offers. In addition to the current study, earlier research also has found that individual rights assertiveness, in contrast to social assertiveness, is negatively associated with substance use intentions (Lillehoj et al., 2002). This suggests that prevention program strategies for young adolescents should emphasize content related to individual rights assertiveness rather than focusing on content related to social approach assertiveness (e.g., overcoming shyness).

Results also suggest that prevention program components related to decision-making skills should be presented to young adolescents. The use of these strategies should be strongly encouraged, especially in risk-conducive social situations. Because decision-making skills appear to be less developed in boys, it may be important to place stronger programmatic emphasis on decision-making skills for boys.

In addition, findings from this study suggest initiation begins earlier for boys and has a greater degree of negative consequences (i.e., effects on later negative expectancies and refusal intention). These findings
highlight the importance of appropriate developmental timing of preventive interventions, especially for boys.

There are several limitations to be kept in mind regarding the study. First of all, the study was conducted in rural Midwestern communities among primarily Caucasian students. Approximately 77% lived with both biological parents and approximately 23% qualified for free or reduced cost school lunch. Generalizations to populations with different demographic compositions should be made with caution. Also, students who dropped out of the study were significantly more likely to have used substances, to live in single-parent or stepparent households, and to have a lower socioeconomic status (i.e., school lunch program participation). Study loss of these more higher risk students may have biased results. Nevertheless, given the range of substance initiation and demographic characteristics that were evaluated with the available data, it is unlikely that the pattern of results reported was highly biased. In addition, all measures were self-reported. Although self-reports are the most appropriate measures for cognitive variables, such as negative expectancies and refusal intentions, self-reported measures of behavior would be bolstered with the addition of multiple reporters. Nevertheless, self-reported measures of substance use for this age group have been found to be reliable in past research, especially when bogus-pipeline procedures have been used with regard to smoking (Murray et al., 1987; Oetting & Beauvais, 1990; Pechacek et al., 1984). In addition, different influence patterns may be found for different outcome variables (e.g., substance frequency, varying individual substances).

A further limitation is suggested by the nonnormality of the assessed variables. As is usually true of young adolescents, rates of substance initiation, along with scores on the scales of correlates and predictors, were not normally distributed. Nevertheless, evaluation of models with transformed variables that attenuated the nonnormality found essentially similar results, demonstrating the same main effects and gender moderation as models with nontransformed variables. However, were the scores on the variables more normally distributed, it is likely that the strengths of the relationships detected in the models could be more accurately evaluated (Bollen, 1989).

As data become available, planned analyses will evaluate the effects of the LST school-based and SFP 10–14 family-focused interventions on program mediators and mechanisms of program effectiveness. Future analyses will extend evaluations of intervention-related changes that have been demonstrated to date (Spoth et al., 2002).
ACKNOWLEDGMENT

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REFERENCES


