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The Role of Attachment to Family, School, and Peers in Adolescents' Use of Alcohol: A Longitudinal Study of Within-Person and Between-Persons Effects

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Abstract

A great deal of time and money has been spent to understand why adolescents abuse alcohol. Some of the most fruitful work considers the social context navigated by adolescents, including family, school and peer contexts. However, most of this work focuses on differences between adolescents in these contexts. The present study adds to the literature by considering within-person changes in these contexts and examines the extent to which these changes are related to alcohol use. Significant changes in all three contexts were observed, and these changes were significantly related to alcohol use. The significant influence of intrapersonal variability highlights the importance of attending not only to chronic, between-individual issues facing at-risk youth, but emergent and transient issues that may temporarily heighten alcohol use risk.

Keywords

alcohol; adolescence; peers; family; school

Adolescent alcohol use is a serious public health concern; one that can and does produce harmful, even life-threatening, consequences in both the short and long-term (NIAAA, 2004/2005). Despite these consequences, alcohol use among youth in the U.S. is a relatively common behavior. According to the 2006 wave of the Monitoring the Future study (MTF–(Johnston, O'Malley, Bachman, & Schulenberg, 2007)), 6.2% of 8th graders, 18.8% of 10th graders and 30.0% of 12th graders reported getting drunk within the 30 days prior to the survey.

In response to the high prevalence of alcohol use and potential for deleterious effects, a great deal of time, money and energy has been spent to understand why adolescents abuse alcohol and how it may be prevented. Some of the most fruitful work in this area considers the social context navigated by adolescents. For example, several seminal studies have demonstrated that disengagement from pro-social entities (e.g., family and school) and either simultaneous or subsequent engagement with anti-social entities (e.g., delinquent or substance-using friends) is a critical contributor to adolescent alcohol use.

Primary socialization theory (Oetting, Deffenbacher, & Donnermeyer, 1998; Oetting, Donnermeyer, Trimble, & Beauvais, 1998; Oetting & Donnermeyer, 1998; Oetting, Donnermeyer, & Deffenbacher, 1998), peer cluster theory (Oetting & Beauvais, 1986, 1987), and the social development model (Catalano & Hawkins, 1996) describe the mechanisms by which attachment to family, school, and peers influences involvement in alcohol use. These models draw largely on the theoretical underpinnings of social control theory (Hirschi, 1971), differential association theory (Matsueda, 1988), and social learning theory (Bandura, 1977) to describe the transitions associated with pro-social and anti-social development (Fleming, et al., 2002).

For example, the social development model posits that children learn patterns of behavior from primary socialization units, including family, school, and peer groups. To the extent that children and adolescents are bonded or attached to prosocial primary socialization units then their involvement in problem behaviors (including alcohol use) is attenuated because they are motivated to conform to the norms, expectations, and values of the prosocial unit. However, weak bonds to prosocial units and strong bonds to antisocial units free young people from adhering to conventional norms that discourage alcohol use, and affected youth become more likely to follow the norms, expectations, and values of antisocial units (e.g., delinquent friends). As children progress into adolescence, peers become the dominant primary socialization unit and other entities, such as family and school, become less influential (Oetting & Donnermeyer, 1998).

Providing support for these theoretical frameworks, a great deal of empirical work has demonstrated that adolescent alcohol use is heavily influenced by attachment to the family (Brody & Forehand, 1993; Duncan, Duncan, & Hops, 1994; Velleman, Templeton, & Copello, 2005), school (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Maddox & Prinz, 2003), and peer groups (Andrews, Tildesley, Hops, & Li, 2002; Oetting & Beauvais, 1986; Piehler & Dishion, 2007). However, much of the work in this area examines differences *between* adolescents with respect to disengagement and its consequences. For example, we know that adolescents who are poorly bonded to school use more alcohol than adolescents who are well bonded to school (Bachman, O'Malley, Schulenberg et al. 2008; Henry, 2008). We do not, however, know enough about the effects of within-person changes in attachment to family, school and peers. The process of intra-individual change in attachment to these socialization sources may be an important factor in the evolution of alcohol use within individual students.

The present study makes a significant contribution to the literature by examining within-person or intra-individual variability in attachment to family, school and peers over a course of two school years and assessing the extent to which this variability is associated with alcohol use. This is accomplished by disentangling the effect of between-persons differences in attachment to family, school, and peers from the effect of within-person changes in attachment to family, school, and peers. The between-persons effect allows us to ask questions such as “Is an adolescent who is well attached to his or her family less likely to use alcohol than an adolescent who is poorly attached to his or her family.” The within-person effect allows us to ask questions such as “Does an adolescent use more alcohol during times when he or she demonstrates a relative decline in attachment to family.” It is our contention that understanding both between-persons and within-person relationships is essential, both theoretically and in order to better inform prevention/intervention initiatives.

The importance of understanding intra-individual change and intra-individual processes has been discussed in the recent literature. For example, Collins (2006) says analysis strategies that focus on inter-individual variation emphasize the formulation of general developmental principles that pertain to all individuals while strategies that focus on intra-individual variation

seek to understand within-person change and its associated consequences. Likewise Molenaar (2004) stated that “attention in psychological research is almost exclusively restricted to variation between individuals (inter-individual variation) to the neglect of time-dependent variation with a single participant’s time series (intra-individual variation)” (p. 202), and declared that more work is needed in which the individual is considered as a “unique system of interacting, dynamic processes” (p. 202). By contrasting inter-individual and intra-individual approaches and applying them to adolescent alcohol use in particular, it becomes apparent that the former seeks to consider characteristics of individuals that are related to alcohol use while the latter seeks to understand how within-person changes in salient constructs (i.e., attachment to family, school, and peers) may be related to within-person changes in alcohol use. By gaining a better understanding of how attachment to these critical socialization sources changes during the course of middle school and the relationship that these changes may have on an adolescent’s use of alcohol, we will be better equipped to design prevention and intervention initiatives that take into account the potentially dynamic relationship between these risk and protective factors and a student’s involvement in alcohol use. Since adolescence is a period of great change, it is important to understand how these changes influence behavior. This understanding may have important implications for prevention and intervention.

Hypotheses

In this study we focus specifically on alcohol, the most commonly used drug by adolescents in the U.S. Our central hypotheses, therefore, are that both between-persons differences and within-person changes in attachment to primary socialization units (family, school, and peers) will be associated with escalation of adolescent alcohol use. Specifically, looking at differences across students (inter-individual or between-persons differences), a low level of attachment to family and school will be related to heightened alcohol involvement. In addition, it is expected that within-person declines in attachment to family and school (intra-individual change) will be associated with increased alcohol involvement. Further, it is hypothesized that a higher involvement with alcohol-using peers (inter-individual or between-persons differences) will be associated with higher levels of alcohol use and that an increasing involvement with peers who use alcohol (intra-individual or within-person change) will be associated with increases in alcohol use.

Methods

Participants

Participants in this study were 1064 students from eight middle schools or junior high schools (in four communities) across the United States who were randomly assigned to the no-treatment control group of a larger prevention study that took place from 2000–2004 (see Slater et al. (2006) for details on the design of the study). These communities vary in population size (ranging from population <5000 to 50–60,000), and represent a range of rural through urban status. At the time of the study, the number of students per grade in each school ranged from 85–363, with a mean of 262 students. The percent of children in the school who qualified for free or reduced lunch ranged from 5.3% to 70.3%, with a mean of 40.1%.

Forty-five percent of the sample is male. The sample is 79% White and 9% Black. The remaining 12% of the subjects identify themselves as having an ethnic background other than White or Black, including American Indian, Asian, Mexican-American, Spanish-American, and/or Puerto-Rican. The mean age for the sample was 12.3 ($SD = .7$) at the first measurement occasion.

Measures

Sixty-six percent of all eligible students at the school returned signed informed consent forms and participated in the first survey, resulting in a N for this study of 1064. The students were in 6th or 7th grade at the initial survey and proceeded to provide survey data on three additional occasions over a period of two years (two surveys in the first school year and two surveys in the second school year). All data were collected using a paper and pencil survey that was conducted during school hours. The survey instrument drew almost entirely from the Community Drug and Alcohol Survey (CDAS), a 99-item survey that asks a variety of questions related to substance use, school attachment, relationships with family and peers, and other individual risk factors in substance use¹. The CDAS is a variation of the American Drug and Alcohol Survey (ADAS; Oetting, Beauvais, & Edwards (1984)— which is one of the instruments listed in the Substance Abuse and Mental Health Services Administration's (n.d.) Measures & Instruments Resource guide—and the Prevention Planning Survey (Oetting, Edwards, & Beauvais, 1996).

The means, standard deviations, and coefficient alphas for all scales are presented in Table 1. The primary dependent variable is a measure of alcohol use. The scale includes these three items: (1) "How often in the last month have you had alcohol to drink?" which is measured on a 5-point scale ranging from 1 (none) to 5 (20 or more times), (2) "How often in the last month have you gotten drunk?" measured on the same 5-point scale ranging from 1 (none) to 5 (20 or more times), and (3) "How do you like to drink?" which is rated on a 5-point scale ranging from 1 (I don't drink) to 5 (until I get really drunk).

The predictors of interest include peer alcohol use, school attachment, and family attachment. The scale measuring peer alcohol use asks, "How many of your friends do each of the following ___?" and includes the issues "Drink alcohol" and "Get drunk." Response choices are measured on a 4-point scale (1= none, 2 = a few, 3 = most of them, 4 = all of them). The scale on school attachment includes four items: "I like school," "My teachers like me," "I like my teachers," and "School is fun." The family attachment scale includes three items: "My family cares about me," "I care about my family," and "My family cares about what I do." Items of both the school and family attachment scales are measured on a 4-point scale (1 = not at all, 2 = not much, 3 = some, 4 = a lot). For all constructs, the average of the items was used as the scale score.

Although coefficient alpha was quite high for all scales at all four time points (see Table 1), a confirmatory factor analysis was also conducted on the items of all four scales considered in this study. We modeled the four time points in a single structural equation model, allowing the latent factors to correlate and each specific indicator across time points to correlate (i.e., frequency of intoxication at wave 1, wave 2, wave 3 and wave 4). The model fit the data reasonably well ($\chi^2(888)=2906$, $p<.01$; CFI=.937; RMSEA=.046). The standardized factor loadings for all latent constructs were strong. The CFA provides good support of the measurement of the four scales used in this study. The full results of the CFA are available upon request.

Several pertinent control variables were included: gender (coded 1 for male and 0 for female), ethnicity (coded as 1 for non-Hispanic White and 0 for all others), age at the first survey, and seven dummy coded variables to adjust for the nesting of students in schools. By including $k-1$ dummy codes for school membership (where k is the number of schools – 8 in this study)

¹These survey items were derived from either The American Drug and Alcohol Survey, by E. R. Oetting, F. Beauvais, and R. Edwards, 1984, Fort Collins, CO: Rocky Mountain Behavioral Science Institute (RMBSI), copyright 1984 by RMBSI, or The Prevention Planning Survey, by E. R. Oetting, R. Edwards, and F. Beauvais, 1996, Fort Collins, CO: RMBSI, copyright 1996 by RMBSI. This research project was granted permission to use and modify these survey items through a special agreement between RMBSI (1-800-447-6354, www.rmbsi.com) and the authors.

as predictors in the model, we account for all variation in alcohol use that is attributed to membership in a certain school. As a result, all other covariates in the model are only able to account for variation that cannot be attributed to school membership (Allison, 2005). Alcohol use at each measurement occasion was regressed on these dummies in all models, thereby removing the effects of nesting. Because these dummies are used to simply adjust for nesting and they are not of substantive interest in this paper, and in order to reduce clutter in the tables, the regression coefficients for school membership are not included in the Tables.

Analyses

Recent advances in statistical analysis allow us to utilize growth models to capture developmental trajectories of alcohol use, and assess the extent to which attachment to family, school, and peers (both the overall level and the presence of change) is associated with whether a student will demonstrate a level of alcohol use that is above or below what would be expected at a certain point in time given his/her own developmental trajectory.

A growth model is a specific type of multilevel model in which level 1 represents measurement occasions and level 2 represents individuals. To test these models, we began with a latent growth model of adolescent alcohol use. The following equation represents the unconditional, Level 1 model.

$$Alcohol_{ij} = \pi_{0i} + \pi_{1i}Time_{ij} + \varepsilon_{ij}$$

This model asserts that an adolescent's alcohol use measured over time can be described by an intercept (π_{0i}) and a slope (π_{1i}). The i subscript denotes that each individual (i) has their own trajectory that is described by their own intercept (level of alcohol use when time=0, which in this analysis is defined at the mid-point of the study) and slope (rate of change over time). The residual term in the Level 1 equation (ε_{ij}) captures the net scatter of child i 's observed alcohol use scores around that child's hypothesized growth trajectory (Singer & Willett, 2003).

A growth model is not complete until the Level 2 or between-persons model is considered. The Level 2 model tells us about the average trajectory in the population and how individuals differ on their growth parameters (e.g., alcohol use at the midpoint of the study and rate of change during adolescence). The unconditional, Level 2 model is written as follows:

$$\begin{aligned}\pi_{0i} &= \gamma_{00} + \zeta_{0i} \\ \pi_{1i} &= \gamma_{10} + \zeta_{1i}\end{aligned}$$

The Level 2 model in the baseline model is represented by two equations: The first equation indicates that the Level 1 intercept (π_{0i}) is described by a fixed effect (γ_{00} —the average value of alcohol use at the midpoint of the study) and a random effect ζ_{0i} —the extent to which individuals varied in their alcohol use at the midpoint of the study). Similarly, the second equation indicates that the Level 1 slope (π_{1i}) is described by a fixed effect (γ_{10} —the average rate of change in alcohol involvement) and a random effect (ζ_{1i} —the extent to which individuals varied in their rate of change).

From this baseline model we consider the model of interest. First, we included the time-dependent control variables – age at baseline, gender, and ethnicity. These variables were included as predictors of both the intercept and slope. Finally, we added the time-varying predictors of interest – family attachment, school attachment, and involvement with peers who

use alcohol. For all three predictors, we estimated three models. The first considered the contemporaneous effect of the time-varying predictor. This specification answers questions such as “Does a student’s level of family attachment at a certain point in time predict their alcohol use during that same point in time beyond their own expected developmental trajectory?” The second model considered the lagged effect of the time-varying predictor and answers questions such as “Does a student’s level of family attachment at a certain point in time predict their alcohol use during the subsequent measurement occasion beyond that predicted by their own developmental trajectory?” Finally, the third model assessed intra-individual change in the time-varying covariate by simultaneously estimating the within-person effect of the covariate and the between-persons effect of the covariate, thereby disentangling the effect of within-person change in the covariate from the effect of between-persons difference in the covariate over time. We remove any time-stable bias in assessing the effect of interest by only allowing the within-person effect of the time-varying covariate to account for variance in alcohol use that is due to *within-person change* in the covariate (e.g., within-person change in involvement with friends who use alcohol). This model specification answers questions such as “During times when an adolescent has increased his/her involvement with friends who use alcohol (relative to his/her average level of involvement during the 18 months of the study), is she predicted to escalate her use of alcohol beyond what would be predicted by her own developmental trajectory?”

The separation of within-person effects from between-persons effects is accomplished by implementing a technique recommended by Raudenbush and Bryk (2002). In describing this technique, Raudenbush and Bryk indicate that the “effect of a level 1 predictor can be biased if the aggregate of the level 1 predictor has a separate and distinct relationship with the intercept” (p. 183). Indeed, it is quite possible that, for example, the average level of association with alcohol-using peers during early adolescence has a unique relationship with a student’s alcohol use. That is, when regressing the alcohol use scores on involvement with alcohol-using peers, the within-person effect could be due to a characteristic of the adolescent (e.g., an adolescent who consistently associates with friends who use alcohol), rather than within-person changes (e.g., during times when a student’s involvement with alcohol-using peers is elevated, he/she will also demonstrate elevated use of alcohol). To deal with this problem, Raudenbush and Bryk (2002) recommend group-mean centering (around each individual’s own mean) the level 1 version of the time-varying covariate and adding the mean over the measurement occasions as a level 2 predictor in the equation in order to disentangle the true within-person effect from the between-persons effect. In this way, the level 2 mean captures between-persons differences, and the level 1 time-varying covariate is only able to capture variance due to individual variation from an individual’s own mean. For example, the extent to which an adolescent is more involved with alcohol-using peers in comparison to his/her norm. Others have also discussed and recommended this technique (Hedeker & Gibbons, 2006; Osgood, 2001; Schwartz & Stone, 1998).

All analyses were conducted in Mplus, Version 5.2 (Muthen & Muthen, 1998–2008). Due to the preponderance of students who did not use alcohol, the alcohol scores were treated as censored and tobit regressions were employed (Tobin, 1958). This estimator accounts for the fact that a student cannot have an alcohol score less than zero. In addition, robust standard errors were employed in order to account for the skewed nature of alcohol use in the sample.

As is the case in most longitudinal studies, there are missing data. Of the 1064 students considered in these analyses, 57.8% completed all four surveys, 22.6% completed three surveys, 14.8% completed two surveys, and 4.8% completed just one survey. In order to obtain unbiased and efficient parameter estimates in the presence of missing data, multiple imputation (MI) was employed. The imputation was carried out using SAS, Version 9.13. In total, ten imputed datasets were created. All analyses were performed on each of the imputed datasets,

and the parameter estimates were then combined using the procedures outlined by (Rubin, 1987).

Results

The means and standard deviations of all time-varying study variables are presented in Table 1. The table shows that the average level of family and school attachment declined over time while the average level of involvement with alcohol-using peers and alcohol use increased over time. Table 1 also presents the intraclass correlation (ICC) for each variable. For example, the family attachment ICC was calculated as the variance in family attachment between-persons divided by the total variance in family attachment. The ICC for family attachment is .34, indicating that about 34% of the variance in family attachment scores was accounted for by between-persons differences. Therefore, about 66% was accounted for by within-person differences (e.g., within-person change over time). For each variable, there is a relatively large interclass (differences between individuals) and intraclass variance (change within individuals).

A conditional growth model with only the time-independent control variables (gender, ethnicity, age and school membership) was first estimated. Only age at baseline significantly predicted the intercept ($b=.29$, $t=2.68$, $p<.01$), indicating that the older students in the sample reported higher levels of alcohol involvement at the midpoint of the study. This conditional growth model accounted for a total of 10.8% of the variance at level 1 (the individual alcohol use scores nested within adolescent) and 9.3% of the variance at level 2 (the average level of alcohol use for each adolescent during the course of the study, see Snijders & Bosker, 2002).

Table 2 presents the effects of family attachment. The results indicate that family attachment was significantly associated with alcohol use contemporaneously (the first model results titled “Contemporaneous”) and prospectively (the second model results titled “Lagged”). Specifically, higher family attachment scores were associated with less alcohol use at each measurement occasion. Finally, the third model (labeled “Change”) indicates that significant between-persons (i.e., students who reported an overall higher average level of family attachment reported an overall lower average level of alcohol use – the inter-individual effect) and within-person (during times when a student’s attachment to his family was attenuated, relative to his own norm, he used more alcohol than would otherwise be predicted – the intra-individual effect) effects of family attachment were present. Using the proportion of variance explained formulas for level 1 and level 2 scores proposed by Snijders and Bosker (2002), the contemporaneous model explained 14.4% of the variance at level 1 and 14.0% at level 2. For the lagged model, 12.3% of the variance was explained at level 1 and 13.5% was explained at level 2. Finally, for the change model 15.8% of the variance was explained at level 1 and 15.7% was explained at level 2.

Table 3 presents the effects of school adjustment. As with family attachment, school attachment was a significant predictor of alcohol use both contemporaneously and prospectively. Higher levels of school attachment were associated with less alcohol use at each measurement occasion. Moreover, both within and between-persons effects were present in the change model. Within-person improvements in school attachment (or a smaller deterioration of school attachment) as well as overall higher levels of school attachment appear to have been protective against adolescent alcohol use. For the contemporaneous model, 18.4% of the variance was explained at level 1 and 20.1% was explained at level 2. For the lagged model, 18.9% of the variance was explained at level 1 and 22.6% was explained at level 2. For the change model 21.7% of the variance was explained at level 1 and 23.8% was explained at level 2.

The effects of involvement with friends who use alcohol are reported in Table 4. Involvement with friends who use alcohol was a significant predictor of alcohol use both contemporaneously and prospectively. More involvement with alcohol-using friends was associated with more alcohol use. In addition, a very large, deleterious intra-individual (within-person) and inter-individual (between-person) effect of association with alcohol-using peers emerged. That is, students who overall were more involved with friends who use alcohol reported overall higher levels of alcohol involvement and during times when a student's involvement with alcohol-using friends was heightened (relative to his or her own norm during the course of the study), he or she reported higher levels of alcohol use. For the contemporaneous model, 44.7% of the variance was explained at Level 1 and 52.9% was explained at Level 2. For the lagged model, 29.4% of the variance was explained at Level 1 and 38.1% was explained at Level 2. For the change model, 50.5% of the variance was explained at Level 1 and 59.4% was explained at Level 2.

The percentage of variance explained appears to be consistently larger for the peer models than for the family and school models, indicating that peer involvement in alcohol use may explain more variance in a student's own alcohol use than family or school attachment. Because these sets of models are not nested (e.g., comparison of the three contemporaneous models for family, school, and peers include a different primary predictor of interest), deviance statistics cannot be used to determine if the peer models explain significantly more variance. Instead, we may use the Bayesian Information Criteria (BIC) to compare the goodness of fit across models (Singer and Willet, 2003). Raftery (1995) indicates that a BIC difference of 10 or more between models provides very strong evidence that one model is better than another (where the model with a lower BIC is a better model). Table 5 presents the difference in BIC for each of the models. For each set of models (contemporaneous, lagged, change), the BIC for the peer model is substantially lower than the family and school model, exceeding 10 in all comparisons, and providing support for the proposition that peer influences (i.e., involvement with peers who use alcohol) appear to exert the largest direct effect on an adolescent's alcohol use. Moreover, a substantially better BIC (i.e., larger than 10 units) is noted for each set of models comparing school attachment to family attachment, indicating that school attachment better predicted alcohol use than family attachment.

Discussion

Support for Peer Cluster and Related Theories of Adolescent Socialization and Deviance – Inter-individual Effects

The contemporaneous and prospective (lagged) effects of all three primary socialization variables (i.e., family, school, and peer) are consistent with theoretical expectations produced by most of the theories that focus on the influence of socialization sources on adolescent alcohol use, including control theory (Hirschi, 1971), peer cluster and primary socialization theories (Oetting & Beauvais, 1986, 1987; Oetting & Donnermeyer, 1998), and Catalano & Hawkins (1996) social development model. Different theories may present differing descriptions of this process. For example, this may be due to the direct effect of reduced involvement in prosocial settings, a la Hirschi (1971), or to that combined with increased exposure to deviant influences, a la Elliott et al. (1985) and Thornberry (1987). In each of these cases, one would expect that adolescents who are less attached to their families and/or disengaged from the conventional venue of the school, will exhibit higher levels of alcohol use. Likewise, students who are more involved with alcohol-using peers will exhibit higher alcohol use.

Of these three socialization sources, peers accounted for the largest amount of variance. Peer cluster theory proposes that substance use is primarily a social behavior that is dominated by peer influence, particularly during the adolescent years. Peer clusters consist of best friends, couples, or small groups of close friends; they share drugs (by drugs we refer to alcohol and

tobacco as well as more fully controlled substances), use drugs together, and through verbal and behavioral interactions develop shared attitudes, values, and beliefs about drugs, including whether drug use is appropriate, what drugs should be used, and how, where, and when drugs should be used. Drug use occurs almost entirely in the context of these peer clusters and, even when drugs are used when alone, it is typically a behavior that is encouraged and approved of by the individual's peer clusters. The average level of alcohol use, therefore, should be strongly linked to association with alcohol-using peers, and the results of this study, consistent with the results of many prior studies that have looked at inter-individual differences, show this to be true.

Examining Intra-Individual Fluctuation in School, Family, and Peer Bonding: Insights Regarding Other Paths to Alcohol Use

This study also looked at the effect of changes in alcohol involvement and the primary socialization sources independent of differences across individuals. Our original expectation was that we would see similar relationships related to change that we see when we look at differences across individuals. That is, in fact, what occurred when we looked at the relationship between changes in the three socialization sources and their relationship to alcohol use (the "Change Model" in Tables 2–4). All three show the expected pattern: intra-individual declines in family and school attachment, and intra-individual increases in association with alcohol-using peers were all significantly related to increased alcohol use. In addition, in the change models, involvement with alcohol-using peers accounted for the largest amount of variance.

This study adds to the literature by demonstrating that these three socialization sources have both between-persons and within-person effects on alcohol use. That is, students who are less well attached to family and school, and more involved with alcohol-using peers use more alcohol than students who are well attached to family and school, and less involved with alcohol-using peers. Moreover, during times when an individual student becomes less attached to family or school, or more involved with alcohol-using peers (relative to his/her own attachment to these socialization sources), he or she becomes more likely to increase use of alcohol.

These results serve to strengthen the afore-mentioned theories of adolescent development and deviant behavior in two respects. First, finding support for intra-individual influences provides a more compelling test of theoretical predictions than the between-individual tests that have previously appeared in the literature. It is difficult to control for all individual differences that might confound between-individual analyses; such differences are controlled as a matter of course in intra-individual analyses. Second, a substantial amount of explanatory power for these theories is uncovered in examining effects of intra-individual difference that might otherwise be overlooked. In other words, these theories offer greater explanatory power than is evident when intra-individual difference is neglected.

Limitations of the study

A major limitation, and strength, is the relative youth of these junior high school students. Except for a very few children who start exceptionally early, these are the years where experimentation with substances is just getting started. Future studies should assess these relationships into middle and late adolescence.

The study also spans a very short developmental period, less than two years, so the results, thus far, must be considered to be only a relatively crude picture of what is actually occurring in the development of these children. Future research is needed to track changes in detail, to identify groups that have specific alcohol involvement trajectories over a longer period of time, and to isolate their characteristics and develop specific prevention and treatment interventions

based on that knowledge. However, even this short time period proved to be adequate to demonstrate utility of intra-individual as well as inter-individual variability, showing how strong and how important these links between socialization factors and alcohol use can be.

Family attachment, school attachment, and association with alcohol-using peers are clearly correlated and we could have estimated them in a single model or created a single variable to assess risk in social bonding. But theory views all three as important and unique elements in the socialization process, and theory also indicates that peers are likely to mediate the relationship between family and school attachment and subsequent alcohol use. Eventually, it is essential to develop a clear understanding of the temporal relationships that produce correlations between these socialization characteristics. These characteristics are all correlated and likely to influence each other as well as influence alcohol use. For example, does a decline in school attachment precede a decline in family attachment or does family attachment decline first? As another example, does an increase in involvement with alcohol-using peers feed back to produce problems in family attachment? This study shows that it is essential to study this process of change. The fact that there are significant relationships between changes within individuals beyond those that occur between individuals shows that we cannot assume that the differences between individuals can account for what is occurring. But the studies that are needed to explicate the fine details of this process will require larger numbers of subjects, longer temporal periods, more measurement occasions and shorter times between measurement occasions to explore them adequately. Our current plans are to collect that kind of data with larger data sets and over a longer span of time, but those analyses are beyond the scope of this study.

Another limitation is the lack of adequate numbers of ethnic minorities in the study. While there were no differences between minority and non-minority youth in alcohol involvement, that does not mean that such differences do not exist. There may be specific patterns of change that occur in specific groups of minority youth, but the numbers of minorities in this study were so low that we could not adequately explore differential effects of the processes under consideration, so those questions will have to be answered in future studies.

Finally, the measures used to assess the constructs of primary interest (alcohol use, family attachment, school attachment, and involvement with alcohol-using peers) may be conceptualized and measured in a variety of ways. In this study, we focus on conceptualizations based on scales and items developed for the ADAS. Future work is needed to determine if similar results are found when other measures of these constructs are employed.

Summary and Implications

This study tested a series of hypotheses about the links between family attachment, school attachment, peer alcohol associations and alcohol use. The results confirmed all of the hypotheses relating to differences across individuals. Alcohol involvement was related to weaker family attachment, poorer school attachment, and associations with alcohol-using peers both contemporaneously and prospectively. Further, the study showed that this short time in junior high school is a period of important change for some individual adolescents. Within students, there were significant changes in family and school attachment, and significant changes in association with alcohol-using peers. These within-person changes were accompanied by within-person changes in alcohol use.

The implications for counseling are relatively clear. When the counselor encounters problems in one of these primary socialization areas, it is likely that either there are associated problems in the other areas (i.e., alcohol use) or that those problems are likely to emerge. Moreover, the significant influence of intrapersonal variability, within person changes, highlights the importance of attending not only to chronic issues facing at-risk youth, but emergent and

transient issues that may temporarily heighten alcohol involvement risks apart from more orderly transition to higher risk status associated with ongoing life problems leading to involvement with deviant peer groups. Finally, since findings for intrapersonal variability examined such variability across all respondents, not just clearly at-risk respondents, it seems likely that such transient negative experiences with school, family, or peers may at least temporarily increase risk even for youth who wouldn't otherwise be considered at high risk.

The implications for prevention are also clear. The study shows that important changes are already taking place among junior high school students. The changing tensions and disappointments taking place over a short period of time characterizing family, school, and peer experiences in early adolescence appears related to alcohol involvement risk apart from the more orderly progression to risky behavior patterns which we and others have documented. Prevention efforts, then, may do well to consider both youth going through changing troubling times as well as for youth who more chronically may be at risk.

From a research perspective, these findings evidence the utility of examining intra-individual variability. In so doing, we are able to demonstrate the impact of changing problems with family and school attachment and heightened association with alcohol-using peers independent of the more stable developmental patterns leading to early alcohol involvement, and identify the relative impact of these fluctuations.

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Table 1

Descriptive Statistics for Alcohol and Primary Socialization Variables

Scale	Survey 1			Survey 2			Survey 3			Survey 4			ICC
	<i>M</i>	<i>SD</i>	<i>α</i>	<i>M</i>	<i>SD</i>	<i>α</i>	<i>M</i>	<i>SD</i>	<i>α</i>	<i>M</i>	<i>SD</i>	<i>α</i>	
Family attachment	3.89	0.46	.44	3.87	0.45	.91	3.81	0.57	.94	3.77	0.63	.95	.34
School attachment	3.09	0.76	.87	2.94	0.81	.88	2.92	0.81	.89	2.86	0.81	.90	.49
Peer alcohol use	1.28	0.55	.88	1.39	0.66	.93	1.47	0.73	.92	1.56	0.74	.91	.48
Alcohol use	1.15	0.43	.82	1.22	0.53	.80	1.27	0.59	.86	1.35	0.68	.86	.64

Note. ICC = intraclass correlations.

Table 2
Results of the Multilevel Regression Models for Family Attachment on Alcohol Use

Fixed effects	Contemporaneous		Lagged		Change	
	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	0.01	0.07	-0.01	0.08	0.01	0.07
Time	0.45	0.07**	0.44	0.11**	0.46	0.07**
Age at baseline	0.24	0.11*	0.24	0.12*	0.19	0.11
Male	-0.13	0.10	-0.17	0.11	-0.19	0.10
White	0.01	0.13	-0.09	0.15	0.03	0.13
Time × Age at Baseline	0.00	0.08	-0.04	0.11	0.00	0.08
Time × Male	-0.09	0.10	0.09	0.14	-0.07	0.10
Time × White	-0.01	0.11	0.23	0.16	-0.02	0.11
Family attachment (within-person)	-0.30	0.06**	-0.22	0.07**	-0.19	0.06**
Family attachment (between persons)					-0.86	0.15**

* p<.05.

** p<.01.

Table 3
Results of the Multilevel Regression Models for School Attachment on Alcohol Use

Fixed effects	Contemporaneous		Lagged		Change	
	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	0.02	0.07	0.03	0.08	0.00	0.07
Time	0.40	0.08**	0.34	0.11**	0.45	0.07**
Age at baseline	0.25	0.10*	0.23	0.11*	0.23	0.10*
Male	-0.18	0.10	-0.24	0.10*	-0.31	0.10**
White	-0.01	0.13	-0.11	0.14	0.00	0.13
Time × Age at Baseline	0.04	0.08	-0.01	0.11	0.02	0.08
Time × Male	-0.05	0.10	0.09	0.14	-0.06	0.10
Time × White	0.00	0.11	0.28	0.16	-0.01	0.11
School attachment (within-person)	-0.33	0.05**	-0.35	0.06**	-0.14	0.05*
School attachment (between persons)					-0.85	0.08**

* p < .05.

** p < .01.

Table 4
Results of the Multilevel Regression Models for Involvement With Alcohol-Using Peers on Alcohol Use

Fixed effects	Contemporaneous		Lagged		Change	
	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	0.17	0.06**	0.12	0.07	0.16	0.06**
Time	0.25	0.06**	0.26	0.11*	0.36	0.06**
Age at baseline	0.16	0.08*	0.19	0.10	0.09	0.07
Male	0.08	0.08	-0.05	0.10	0.23	0.08**
White	0.02	0.10	-0.07	0.13	0.04	0.11
Time × Age at Baseline	-0.03	0.07	-0.07	0.11	0.00	0.07
Time × Male	-0.05	0.09	0.13	0.14	-0.06	0.09
Time × White	-0.01	0.10	0.18	0.15	-0.03	0.10
Alcohol-using peers (within-person)	0.77	0.06**	0.55	0.08**	0.46	0.05**
Alcohol-using peers (between persons)					1.53	0.08**

*
p < .05.

**
p < .01.

Table 5
Bayesian Information Criterion (BIC) and Average Difference in BIC Across Models

Variable	Contemporaneous		Lagged		Change	
	M	SD	M	SD	M	SD
Average BIC across imputations						
Family attachment	4,761.9	2.0	3,854.1	2.2	4,746.9	5.5
School attachment	4,729.2	2.3	3,814.3	4.2	4,673.2	5.0
Peer alcohol use	4,428.3	3.1	3,784.2	5.9	4,261.4	9.7
Average difference in BIC across imputations ^a						
Family attachment and school attachment	32.7	3.4	39.9	3.9	73.7	4.9
Peer alcohol use and family attachment	333.6	4.0	70.0	6.8	485.5	14.3
Peer alcohol use and school attachment	300.9	3.5	30.1	7.0	411.8	13.9

Note. Means and standard deviation are across 10 imputations.

^a Average differences were obtained by first computing the difference in BIC between comparison models for each imputation and then averaging these differences.