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# Why Do High School Seniors Drink? Implications for a Targeted Approach to Intervention

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**Abstract** The transition from high school to college provides a potentially critical window to intervene and reduce risky behavior among adolescents. Understanding the motivations (e.g., social, coping, enhancement) behind high school seniors' alcohol use could provide one important avenue to reducing risky drinking behaviors. In the present study, latent class analysis was used to examine the relationship between different patterns of drinking motivations and behaviors in a sample of 12th graders (N=1,877) from the 2004 Monitoring the Future survey. Unlike previous variable-centered analyses, this person-centered approach identifies types of motivations that cluster together within individuals and relates membership in these profiles to drinking behaviors. Results suggest four profiles of drinking motivations for both boys and girls, including Experimenters, Thrill-seekers, Multi-reasoners, and Relaxers. Early initiation of alcohol use, past year drunkenness, and drinking before 4 P.M. were associated with greater odds of membership in the Multi-reasoners class as compared to the Experimenters class. Although the strength of these relationships varied for boys and girls, findings were similar across gender suggesting that the riskiest drinking behavior was related to membership in the Multi-reasoners class. These findings can be used to inform prevention programming. Specifically, targeted interventions that tailor program content to the distinct drinking motivation profiles described above may prove to be effective in reducing risky drinking behavior among high school seniors.

Alcohol use by high school students is a widely recognized international public health issue (e.g., Chassin et al. 2004; Hulse et al. 2001; Johnston et al. 2005; Kuntsche et al. 2004). High school drinking is associated with numerous specific and serious health risks. Consequences may include immediate and tragic events, such as drunk driving fatalities (U.S. Department of Transportation & Administration 2002), as well as long-term negative effects, such as alterations of the developing brain (Spear 2000) and development of alcohol abuse and dependence. In addition, alcohol use undermines prosocial motivation and interferes with cognitive processing abilities (Hawkins et al. 1992). These concerns are well-recognized by parents, educators, and policy makers, such that reducing alcohol use and its associated harm among young people is a goal of the United States Federal Government's Healthy People 2010 Initiative (Centers for Disease Control 2003).

Alcohol use reaches its peak level during and immediately following the time of high school graduation, and remains at its height between the ages of 18 and 25 (Johnston et al. 2005). Thus, the senior year of high school is a critical point for which to understand drinking motives and to establish healthier alcohol use behaviors. Overall, patterns of adolescent alcohol use behavior differ by gender. For instance, 36% of male 12th-graders have been drunk in the past 30 days, compared to 29% of female 12th-graders (Johnston et al. 2005). In addition to behavioral differences, differences in motivation for drinking have been documented. Cooper (1994) reported that males had significantly stronger social, enhancement, and conformity reasons for drinking as compared to females. Endorsement of coping reasons for drinking did not significantly differ by gender among adolescents in her sample. The current study will investigate potential gender differences in motivations for drinking and drinking behavior.

### Motivations for Alcohol Use

More than three-quarters of high school seniors have already experimented with alcohol in their lifetime (Johnston et al. 2005). Therefore, the large majority of students are no longer candidates for primary prevention programs that would focus solely on delaying the initiation of alcohol use. Among individuals who have already formed and
acted on beliefs regarding alcohol use and its consequences (Dunn and Goldman 1998; Schulenberg and Maggs 2002), programs that ignore the perceived and subjective rewards of alcohol use may be unsuccessful. Rather, in order to most appropriately intervene with those students who have already initiated use, intervention strategies should address the existing motivations for drinking.

Past work has shown that adolescents typically drink to get perceived social rewards, to enhance positive mood, to reduce negative mood, or to avoid social alienation (Cox and Klinger 1988; Kuntsche et al. 2005). Furthermore, different types of drinking motivations have been associated with distinct patterns of alcohol use. For example, social drinkers tend to exhibit moderate alcohol use, enhancement drinkers tend to engage in heavy alcohol use, and individuals with coping motivations tend to manifest drinking problems and addictions (Cooper et al. 1995; Cox and Klinger 1988; Kuntsche et al. 2005). This research

provides a foundation for the current study by establishing that different reasons for drinking exist and that these reasons may be important in understanding and explaining alcohol use behavior.

**Person-centered Approach**

The majority of research on drinking motivations has used variable-centered analytic techniques. However, we have chosen a person-centered approach in order to identify types of motivations that cluster together within individuals, allowing for a fuller understanding of why high school seniors use alcohol. Interventions deal with people, not variables; therefore, it is important to address individual motivational profiles. In addition, previous work has focused on motivational variables one at a time. Because individuals likely have multiple motivations underlying their behavior, identifying subgroups of individuals who endorse combinations of motivations, versus a single motivation, will more fully inform intervention strategies.

Latent class analysis has been previously employed in the analysis of substance use data (Lynskey et al. 2006), alcohol use disorders (Chung and Martin 2001; Thatcher et al. 2005), antisocial personality disorder symptoms among alcohol-dependent subjects (Kovac et al. 2002), and the comorbidity of adolescent problem behaviors (Fergusson et al. 1994). However, the class structure of alcohol use motivations in a non-clinical sample of adolescents has not been examined.

**Research Questions**

In order to build on previous research addressing alcohol use motivations, we focus on three related research questions. First, we explore whether it is possible to identify person-specific motivational profiles for alcohol use among high school seniors. Second, we address whether the motivational profiles differ for boys and girls. Third, we assess the degree to which covariates such as grade at drinking initiation, frequency of drunkenness, and drinking during the daytime are associated with individuals' motivational profiles.

**Materials and Methods**

Participants

The present study utilizes data from the 2004 12th-grade Monitoring the Future (MTF) survey. MTF is an ongoing survey of a nationally representative sample of United States 8th, 10th and 12th graders conducted by the University of Michigan's Institute for Social Research (Johnston et al. 2004). The overall aim of this survey is to examine ongoing trends and associations among risk behaviors (e.g., drinking, drug use), values, lifestyle orientations, and attitudes. More detailed descriptions of the study design and procedures can be found in Bachman et al. (2002), Johnston et al. (2004), and on the study web site (www.monitoringthefuture.org).

The total sample was divided into six subsamples, and each subsample received a core questionnaire and one of six subset questionnaires. For the purposes of the present study, data collected from Form 1 were used, which included information about reasons and contexts for alcohol use. This provided an initial sample of 2,556 students. Our analyses aimed to examine motivations for drinking; therefore, we excluded students who reported they had never consumed alcohol in their lifetime and those who had not consumed alcohol in the past year because these students were not given the motivation items of interest. Twenty-seven percent (n=678) of the total sample reported that they did not drink in the past year. Within this group, 450 students (18% of the total sample) reported they had never consumed alcohol in their lifetime. Thus, the final sample used for analysis included 1,877 students who reported drinking at least once in the past year. The sample was 54% girls and predominantly Caucasian (88% non-Hispanic, White; 11% Black).

Measures

*Drinking Motivations* Drinking motivations were measured by asking participants, "What have been the most important reasons for your drinking alcoholic beverages?" Respondents were given 15 choices and were instructed to mark all that applied. The possible choices and endorsement probabilities for each are shown in Table 1. Due to extremely low frequencies of endorsement, the options 'to gain insight,' 'hooked,' 'to fit in,' 'to decrease the effect of other drugs,' 'to increase the effect of other drugs,' 'to get through the day,' and 'to sleep' were dropped for the present analyses.

*Risky Drinking Behavior* Several items assessing various aspects of risky drinking behavior were used in the present analyses. *Grade level of alcohol use initiation* was measured with one item that asked, "When did you first try an alcoholic beverage—more than just a few sips?"

Response options ranged from "6th grade or below" to "12th grade," in increments of one grade level. *Frequency of drunkenness* in the past year was measured with one item that asked on how many occasions the respondent had been drunk or very high from drinking alcoholic beverages in the past 12 months. Responses were based on a 7-point scale ranging from 0 to 40+ times. Finally, respondents were asked how often they used *alcohol before 4* P.M. in the past year. Responses were on a 5-point scale from never to every time, but for the purpose of the present analyses responses were dichotomized. The item was coded zero if the respondent had never used alcohol before 4 PM. within the past year and was coded one if the respondent had used alcohol before 4 P.M. at least once within the past year.

**Table 1** Percentage endorsement for drinking motivation items by gender

| Item | Males n=775 | Females *n*=905 |
|---|---|---|
| Experiment | 20.80 | 28.21 |
| Good time | 33.95 | 39.82 |
| Get high | 20.23 | 19.78 |
| Get away from problems | 8.68 | 13.08 |
| Relax | 22.02 | 23.10 |
| Boredom | 11.04 | 11.04 |
| Tastes good | 18.25 | 22.91 |
| Anger/frustration | 6.19 | 8.68 |
| Hooked* | 1.34 | 0.70 |
| Decrease effect of other drugs* | 0.57 | 0.38 |
| Increase effect of other drugs* | 3.25 | 2.49 |
| Get through day* | 1.91 | 1.21 |
| Sleep* | 3.77 | 2.36 |
| Fit in* | 3.70 | 3.83 |
| Insight* | 3.51 | 1.72 |

Those items marked with an asterisk were dropped from analyses due to low endorsement.

Statistical Analyses

Latent class analysis (LCA) was used to determine whether indicators of reasons for drinking could be used to identify profiles of meaningful drinking motivations among high school seniors. LCA estimates the proportion of individuals expected to be in each latent class (i.e., membership probabilities for each subgroup of people based on motivational profile) and a set of measurement parameters that link the drinking motivation items to the latent classes (item response probabilities). We used SAS PROC LCA (Lanza et al. 2006, 2007) to conduct all analyses. The estimation procedure allows for missing values on the motivation items but not for missing values on the covariates.

First, we selected the number of latent classes based on a balance of parsimony, interpretability, and fit. There is a trade-off between fit and parsimony in that fit, as measured by the likelihood ratio test statistic, can be improved by adding more classes. However, adding more classes also adds more parameters and thus the model is less parsimonious and less interpretable. The likelihood-ratio statistic for testing a model with $C$ classes against a model with ($C$ + 1) classes does not have a limiting chi-square distribution and thus, nested tests may not be performed. Therefore, we used $G^2$, the Akaike Information Criterion (AIC; Akaike 1987) and the Bayesian Information Criterion (BIC; Schwarz 1978) to assess model fit (see Lanza et al. 2003 for a discussion of model fit in LCA models). Smaller values of the BIC and AIC indicate better fit.

Next, the LCA model was extended to include gender as a grouping variable to investigate whether a common latent class structure held across groups. In other words, we constrained the item response probabilities across gender to test measurement invariance (Meredith 1993). If the class structure does not hold across gender, then the meaning of the latent classes differs for male and female students.

Recent extensions of LCA allow the use of covariates to predict class membership (Bandeen-Roche et al. 1997; Chung et al. 2006). We included the drinking behavior covariates in the model and estimated the parameters relating the covariates to class membership for each gender. The significance of each covariate was tested by taking the difference between the log-likelihood for a model including the covariate and a model excluding the covariate. The log-likelihood difference is distributed as chi-square with degrees of freedom equal to the difference in the degrees of freedom between the two models.

It is important to note that these analyses do not speak to the odds of engaging in a particular drinking behavior given membership in a particular class. Rather, the present analyses show the odds of belonging to a particular motivational class given engagement in a particular drinking behavior.

## Results

Latent Class Structure

Models with three, four, five, and six latent classes were compared using the criteria described above. The log-likelihood values, deviance statistic ($G^2$), degrees of freedom (df), BIC, and AIC for each model are shown in Table 2. The four class model was selected because the BIC was slightly lower. Although the AIC continued to decrease as the number of classes increased, the four class model was more clearly interpretable and more parsimonious than the five or six class models.

Table 3 shows the class membership probabilities and item response probabilities. Examining the item response probabilities for each of the classes, we labeled Class 1 Experimenters because the motivation ‘to experiment’ had the highest probability for this class. Class 2 was labeled Thrill-seekers because the motivations ‘to have a good time’ and ‘to get high’ had the highest item response

**Table 2** Measures of model fit

| Model | Log-likelihood | $G^2$ | df | BIC | AIC |
|---|---|---|---|---|---|
| Three class | -6,995.15 | 592.81 | 229 | 785.90 | 644.81 |
| Four class | -6,913.01 | 428.54 | 220 | 688.47 | 498.54 |
| Five class | -6,880.26 | 363.03 | 211 | 689.80 | 451.03 |
| Six class | -6,856.93 | 316.38 | 202 | 709.98 | 422.38 |
| Four class Constraints across gender | -6,907.09 | 641.58 | 217 | 923.79 | 717.58 |
| Four class No constraints across gender | -6,870.91 | 569.21 | 185 | 1,089.06 | 709.21 |

$G^2$ =deviance statistic, df=degrees of freedom, BIC=Bayesian Information Criterion, AIC=Akaike Information Criterion (for BIC and AIC, smaller values are better)

probabilities. Class 3 was labeled Multi-reasoners because they have many items with high response probabilities (‘ to have a good time’, ‘to get away from problems,’ ‘anger/ frustration,’ ‘to relax’). Class 4 was labeled Relaxers because the motivation with the highest item response probability was ‘to relax.’

Measurement Invariance

We tested for measurement invariance across gender by incorporating gender as a grouping variable and fitting two models: a model that constrained measurement to be equal across groups and a model that allowed the measurement of the four classes to vary across groups. The df, $G^2$, BIC, and AIC are presented in Table 2. We chose to constrain the item response probabilities across gender because the BIC for this model is smaller and because the item response probabilities differed only slightly between the constrained and unconstrained models. This shows that the four classes had similar meaning for both boys and girls and the class membership probabilities may be compared across gender. The class membership probabilities by gender are shown in Fig. 1. Boys had a higher probability than girls of being classified into the higher-risk Thrill-seekers class. Girls, on the other hand, had a higher probability than boys of being classified in the class with the lowest levels of risky drinking behavior (Experimenters). Next, we explored whether the association between drinking motivation profile and risky alcohol behavior differed by gender.

Drinking Behavior Covariates

The Experimenters class was used as the reference or baseline group because this class had the largest class membership probability (see Table 3) and because this class seemed more ‘normative’ compared to the other three classes. Additionally, measurement parameters were constrained across gender.

Grade at initial use of alcohol was significantly related to motivations for drinking ($G^2_{dif}$ (6) = 145.56, $p$<0.001). Figure 2a shows the odds ratios comparing the Experimenters class with each of the other classes by gender. Being a Relaxer, Multi-reasoner, or Thrill-seeker was associated with increased odds of initiating alcohol use earlier in comparison to the Experimenters. In other words, being in the Experimenters class was associated with a delayed initiation of alcohol use. Although this finding was true for both boys and girls, the increase in odds was greater for boys.

Frequency of drunkenness in the past year was also significantly related to motivations for drinking ($G^2_{dif}$ (6) = 536.71, $p$<0.001). Figure 2b shows the odds of member-

**Table 3** Class membership probabilities and item response probabilities for four-class model

| Class label | Experimenters | Thrill-seekers | Multi-reasoners | Relaxers |
|---|---|---|---|---|
| Class membership probabilities | 0.36 | 0.32 | 0.18 | 0.15 |
| | Item response probabilities | | | |
| Experiment | *0.60* | 0.50 | 0.47 | 0.24 |
| Good time | *0.53* | *0.93* | *0.95* | *0.58* |
| Get high | 0.05 | *0.74* | *0.84* | 0.02 |
| Get away from problems | 0.02 | 0.07 | *0.81* | 0.31 |
| Relax | 0.08 | 0.47 | *0.92* | *0.73* |
| Boredom | 0.08 | 0.29 | 0.44 | 0.14 |
| Tastes good | 0.37 | 0.40 | *0.55* | 0.37 |
| Anger/ frustration | 0.00 | 0.00 | *0.58* | 0.30 |

*Note:* Item response probabilities greater than 0.5 are in italics.

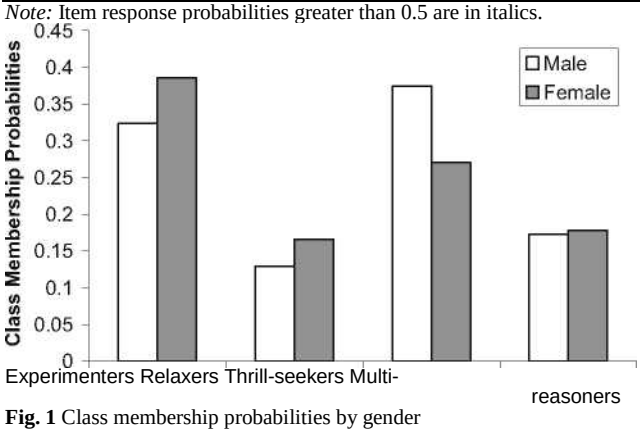


**Fig. 1** Class membership probabilities by gender

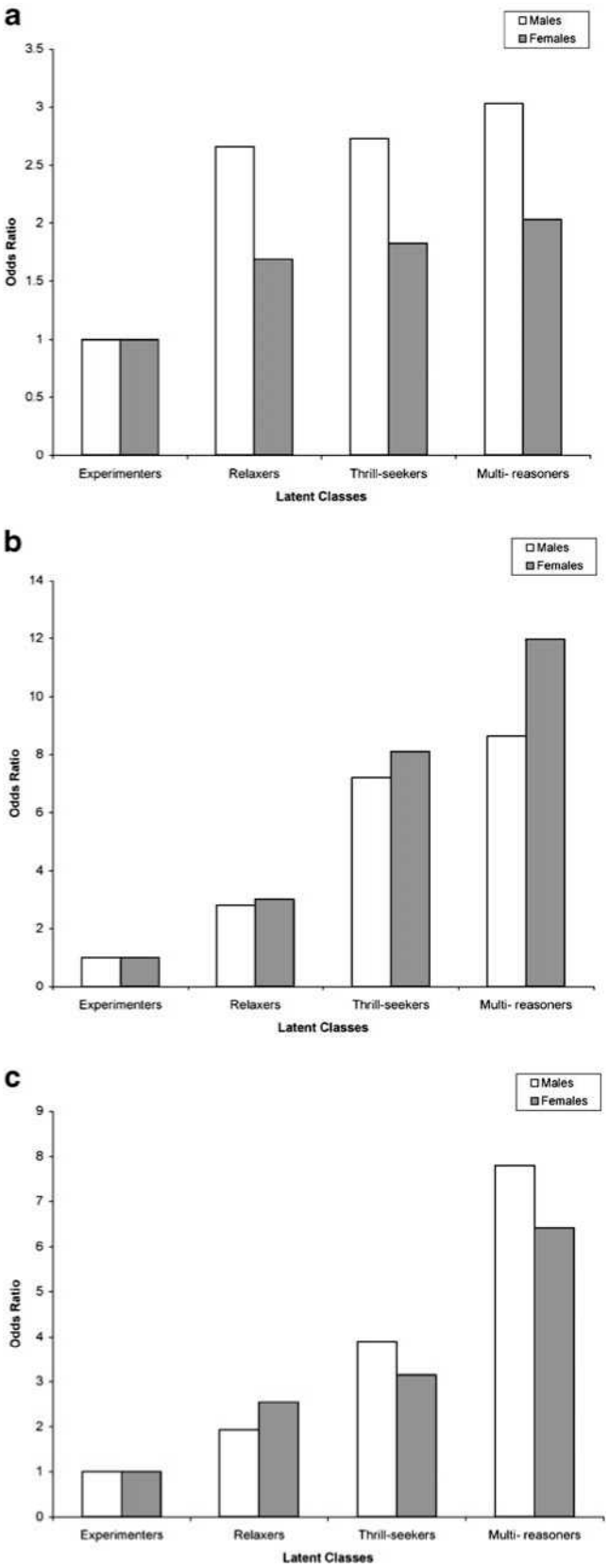


**Fig. 2** Odds ratios of each latent class by gender for: **a** early initiation of alcohol use, **b** frequency of drunkenness in the past year, and **c** drinking before 4 PM.
**Latent Classes**

ship in each class relative to the Experimenters class for each gender. For girls, greater frequency of drunkenness in the past year was associated with a large increase in the odds of belonging to the Multi-reasoner class compared to the Experimenters class. Although the odds of being a Multi-reasoner were also greater for boys who got drunk more frequently, the difference was much larger for girls. Greater frequency of drunkenness in the past year also resulted in an increase in the odds of belonging to each of the other classes (Thrill-seekers and Relaxers) in comparison to the Experimenters class. There were no differences by gender for Thrill-seekers and Relaxers.

Drinking before 4 P.M. was also significantly related to motivations for drinking ($G^2_{dif}$ (6) = 114.79, $p$<0.001). Figure 2c shows the odds ratios comparing the Experimenters class with each of the other classes by gender. Boys who reported drinking before 4 P.M. were eight times more likely to belong to the Multi-reasoner class as compared to the Experimenters class. Girls who reported drinking before 4 P.M. were six times more likely to belong to the Multi-reasoner class as compared to the Experimenters class. Drinking before 4 P.M. also resulted in an increase in the odds of belonging to each of the other classes (Thrill-seekers and Relaxers) in comparison to the Experimenters class. There were no differences by gender for Thrill-seekers and Relaxers.

## Discussion

The present sample of high school seniors was classified into four distinct profiles of motivations for drinking alcohol. The largest class was the Experimenters, who indicated that they use alcohol to experiment. Thrill-seekers tended to drink to get high, and Relaxers reported drinking to relax. Multi-reasoners reported drinking for a combination of escape and pleasure-seeking motivations. Members of all four profiles indicated that they drink to have a good time with friends. In addition, grade of initial use of alcohol, frequency of drunkenness in the past year, and drinking before 4 P.M. were significantly and meaningfully related to class membership. These four patterns of motivations and their associations with behavior illustrate that high school seniors have distinct motivational profiles that could be considered in targeted intervention programming.

The meaningfulness of these classes, or profiles, of drinking motivations was supported by the differential and plausible associations with various measures of risky drinking. This point is most clearly illustrated by the two classes with the most disparate drinking behavior. The Experimenters were the largest class and gave experimentation as one of their main reasons for drinking. Given the primacy of identity work as a developmental task in adolescence (e.g., Erickson 1963), and given the role of exploration and experimentation in the identity development process (e.g., Marcia 1980), it is expected that a large

proportion of adolescents drink as part of a more general pattern of exploration. Furthermore, since it is likely that their drinking patterns are not yet established, drinking for exploratory reasons is assumed to be less problematic at the current time (e.g., less consistent, lower likelihood of addiction), although it is important to understand exploration as a first step in the development of alcohol use behavior. In the present study, youth with the lowest levels of risky drinking behavior tended to be classified into the Experimenters class. Alternatively, youth who endorsed many reasons to drink, including reasons related to coping, were expected to exhibit the heaviest and most problematic drinking behaviors. Indeed, the Multi-reasoner class described a small but risky group of high school drinkers, with the overwhelming probability of early alcohol use initiation, frequent drunkenness, and drinking during the daytime. The motivational patterns for the remaining classes were also associated with behavioral indices. For example, adolescents who reported getting drunk more often in the past year were more likely to be classified as Thrill-seekers or Relaxers than as Experimenters.

Findings with regard to gender also underscore the meaningfulness of the classes uncovered in these data. First, the structure of these classes was invariant across gender indicating the motivational profiles had similar meanings for boys and girls. This suggests that the findings are robust and interventions designed to target particular motivation profiles would be valid for both genders. Second, the distribution of classes by gender was consistent with previous findings regarding gender differences in substance use that boys tend to engage in riskier levels of substance use than girls (Johnston et al. 2005).

### Implications for Targeted Interventions

Because high school seniors have diverse reasons for drinking, we propose that a targeted approach may be most appropriate for intervention efforts. In a targeted approach, the intervention is molded to each participant's needs based on tailoring variables and individual characteristics. Thus, instead of delivering the same program components to all participants, dosage and content can be modified to match an individual's specific needs. Collins et al. (2004) suggest that the increased individual relevance inherent in this strategy may result in more effective programs at a lower cost than traditional, fixed-component interventions. This approach may also be more efficient and less vulnerable to noncompliance (Collins et al. 2004). In order to intervene with students preparing for the transition out of high school, intervention programs may be tailored to the reasons why students currently use alcohol.

The results presented here can help inform efforts to create targeted interventions for youth (Collins et al. 2004). A first step to pilot testing such targeted interventions is basic research, as we have presented, that sheds light on the types of motivations individuals have. Adolescents in our sample tended to endorse multiple drinking motivations, including the alleviation of negative emotional states, the achievement of positive physical states, and experimentation. Therefore, intervention materials and activities may be most effective if they are able to address motivations particular to individuals. Targeted alcohol interventions for high school students could utilize computer technology by beginning with an electronic assessment of current drinking motivations (e.g., Skinner et al. 2001) and using the principles of motivational interviewing approaches (Burke et al. 2003).

### Limitations and Future Directions

Although this study does offer new and practical information to the field of adolescent drinking prevention, it has several limitations. First, we measured motivation using a yes/no checklist of potential motivations. This type of measurement is fairly straightforward and would be relatively simple to use in applied intervention settings. However, the degree to which the items on this checklist represent valid and important motivations for adolescent drinking behavior is unclear. It is also unknown whether the presence of a motivation (or constellation of motivations) is a sufficient predictor of drinking behavior; the relative prominence or importance of one motivation relative to the others might be more informative. Therefore, we recommend using recent and future qualitative work to refine the measurement strategy employed here.

Another limitation is that our sample was restricted to high school seniors. Therefore, it is unclear how the latent classes described here would generalize to younger adolescents, young adults, or dropouts. However, this question could be addressed by conducting additional cross-sectional studies of these different age groups.

These data are cross-sectional in nature. Therefore, we are unable to show the degree to which class measurement and membership are stable over time. Longitudinal research is required to establish the reliability of classes found here, as well as to describe how class membership may change over the course of development (i.e., latent transition analysis). It is possible that the classes found here represent stages of a developmental sequence, rather than distinct types of people. Perhaps Multi-reasoners started out as Experimenters and the current Experimenters would eventually become Multi-reasoners. Alternatively, it is possible that drinking motivations change in healthy ways, even in the absence of intervention. Future studies should explore these issues. Also, our cross-sectional results do not establish whether different motivations result in varying levels of drinking behavior, if behavioral motivation is constructed to justify behavior, or if the process is reciprocal (see Cooper et al. 1995; Greenbaum et al. 2005). Future work using prospective longitudinal designs could inform this causal distinction and would provide support for a targeted approach to intervention.

The senior year of high school represents a unique

opportunity to intervene to alter alcohol use behaviors, due to its developmental significance in the life course. Transition periods offer viable intervention opportunities during which individuals are evaluating their current and future directions, especially as adolescents enter young adulthood (Turrisi et al. 2001). The transition out of high school is an especially important time to affect drinking trajectories, because patterns of use developed during adolescence are likely to persist into adulthood (Maggs et al. 1997). However, despite the potential importance of the senior year of high school for the reduction of alcohol problems and alcohol-related harm, there are very few intervention programs designed for high school student alcohol use (Spoth et al. 2006). Therefore, the optimal content or delivery mechanism for this type of intervention requires further research. Also, while there are hypothesized practical and clinical advantages of adaptive interventions relative to universal strategies, this is an area that would benefit from empirical investigation.

**Conclusions**

In this study, we aimed to describe patterns of drinking motivations among high school seniors. Our approach was unique in that it was person-centered, incorporated multiple motivations, and employed a national dataset. We also went beyond a basic description of motivational classes to examine how each was associated with indicators of risky drinking behavior. The results indicate the potential for distinguishing four types of motivational profiles among high school seniors. This is a preliminary step in establishing the feasibility and utility of targeted intervention approaches that address the motivations most pertinent to individuals. However, effectively using this type of strategy will require additional research in areas including measurement, development, content, and delivery.

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