Are Certain College Students Prone to Experiencing Excessive Alcohol-Related Consequences? Predicting Membership in a High-Risk Subgroup Using Pre-College Profiles

LINDSEY VARVIL-WELD, M.S.,^{a,*} KIMBERLY A. MALLETT, PH.D.,^b ROB TURRISI, PH.D.,^{a,b}
MICHAEL J. CLEVELAND, PH.D.,^b AND CAITLIN C. ABAR, PH.D.^c

^aDepartment of Biobehavioral Health, The Pennsylvania State University, University Park, Pennsylvania

^bPrevention Research Center, The Pennsylvania State University, University Park, Pennsylvania

^cCenter for Alcohol and Addiction Studies, Brown University, Providence, Rhode Island

ABSTRACT. Objective: Previous research identified a high-risk subgroup of students who experience high levels of multiple and repeated alcohol-related consequences (MRC group). Although they consist of 20% of the population and account for nearly 50% of the consequences, the MRC group has not been the focus of etiological or prevention research. The present study identified pre-college profiles of psychosocial and behavioral characteristics and examined the association between these profiles and membership in the MRC group. **Method:** The sample consisted of 370 first-year college students (57% female) recruited in the summer before college. Participants reported on typical drinking, alcohol-related risky and protective drinking behaviors, alcohol beliefs, descriptive and injunctive norms, and alcohol-related consequences at three time points over 15 months. **Results:** Latent profile analysis

identified four baseline student profiles: extreme-consequence drinkers, high-risk drinkers, protective drinkers, and nondrinkers. Logistic regression revealed that, when the high-risk drinkers were used as the reference group, both the protective drinkers and the nondrinkers were significantly less likely to be members of the MRC group, whereas the extreme-consequence drinkers were at increased odds of being in the MRC group, even after first-year drinking was controlled for. Student profiles and previously identified parental profiles both had unique main effects on MRC group membership, but there was no significant interaction between parental and student profiles. **Conclusions:** Findings suggest ways that brief interventions can be tailored for students and parents in relation to the MRC group. (*J. Stud. Alcohol Drugs*, 74, 542–551, 2013)

HIGH-RISK DRINKING AMONG college students is often associated with negative consequences, including criminal offenses, driving after drinking, and unwanted sexual experiences (Fromme et al., 2010; Lee et al., 2011; Lefkowitz et al., 2011; Orchowski et al., 2012). Although many college students drink, there is considerable variability in how students experience alcohol-related problems (Mallett et al., 2011a; 2011b). Mallett and colleagues (2011b) identified a subgroup of students who experienced more than six different alcohol-related consequences and more than five of these consequences repeatedly during their first year of college (referred to hereafter as the multiple and repeated consequences [MRC] group). Experiencing different and repeated consequences was associated with higher levels of

peak and weekly drinking (Mallett et al., 2011b). The MRC group was approximately 20% of the sample but accounted for almost half of all the consequences reported. MRC group membership is a useful way to identify high-risk students experiencing excessive problems as a result of their drinking. Although interventions targeting the MRC group have the potential to considerably reduce alcohol-related problems on campuses nationwide, the MRC group has not yet been the focus of etiological or prevention research.

As an initial effort, Varvil-Weld and colleagues (2012) examined pre-college parental influences associated with membership in the MRC group. Latent profile analysis (LPA) identified four parental profiles assessed in terms of monitoring, positive and negative communication, orientation toward alcohol use, and modeling. Findings revealed students whose parental profile was characterized by positive communication with both parents coupled with conservative parental orientations toward drinking (i.e., positive, anti-alcohol) were least likely to be in the MRC group. In contrast, students whose parental profile was characterized by positive communication with both parents coupled with permissive parental orientations toward drinking (i.e., positive, pro-alcohol) were at significantly increased odds of being in the MRC group. Finally, students whose parental profile was

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*Correspondence may be sent to Lindsey Varvil-Weld at the Department of Biobehavioral Health, The Pennsylvania State University, 219 Biobehavioral Health Building, University Park, PA 16802, or via email at: lvweld@psu.edu.

characterized by considerable negative communication with their father (i.e., negative father) were at the highest odds of being in the MRC group (see Varvil-Weld et al., 2012). A fourth parental profile characterized by negative maternal communication (i.e., negative mother) was not significantly associated with membership in the MRC group.

Although Varvil-Weld and colleagues' (2012) study shed light on the importance of pre-college parental influences, its impact on prevention efforts was limited because it did not examine student-focused characteristics, such as risky drinking behaviors, drinking beliefs, and norms. These characteristics have all been shown to be associated with consequences (e.g., Borsari et al., 2007) but not as predictors of membership in the MRC group. Identifying student predictors that operate in conjunction with parental predictors could inform the content of brief motivational interventions (Borsari and Carey, 2000; Dimeff et al., 1999; Martens et al., 2007) delivered with parent-based interventions (Turrisi et al., 2001; 2009, 2013) directed toward members of the MRC group. Thus, the goal of the present study was to examine student characteristics that, together with parental influences, are associated with membership in the MRC group. Each of the student characteristics examined is discussed in turn.

Intrapersonal student characteristics

Alcohol-related risk and protective behaviors. Research indicates there is a unique association between risky drinking behaviors (e.g., drinking games, pregameing) and higher levels of consequences, even after drinking is controlled for (Borsari, 2004; Kenney et al., 2010). In contrast, alcohol-related protective behaviors (e.g., pacing drinks) have been shown to be inversely associated with consequences after drinking is controlled for (Benton et al., 2004; Delva et al., 2004). The current study explored both risk and protective behaviors as profile characteristics related to membership in the MRC group.

Alcohol beliefs. Research findings suggesting that alcohol-related beliefs are uniquely associated with consequences are somewhat inconclusive. For example, studies have demonstrated that both positive and negative reinforcement beliefs were unique predictors of higher levels of consequences, even after heavy drinking was controlled for (Carey and Correia, 1997). Other studies have partially corroborated these findings (Magid et al., 2007; Martens et al., 2003; Read et al., 2003). The present study examined the association between drinking beliefs and membership in the MRC group.

Normative perceptions. Students' perceptions of the frequency and quantity of their peers' alcohol consumption (descriptive norms), along with their perceptions of their peers' approval of their own drinking (injunctive norms), have been consistently and positively associated with consequences

(Larimer et al., 2004; Neighbors et al., 2007; Read et al., 2002). The current study examined the associations between both descriptive and injunctive norms and membership in the MRC group.

Previous history of consequences. Previous research indicates pre-college consequences are uniquely and positively associated with college consequences, even after pre-college and freshman-year drinking are controlled for (Mallett et al., 2011a; Schulenberg and Maggs, 2002). The present study examined the association between a history of pre-college consequences and membership in the MRC group.

Objectives of the present study

The present study had two objectives. The first objective was to longitudinally examine the association between pre-college latent profiles of student psychosocial and behavioral characteristics and membership in the MRC group in the second year of college. LPA empirically identifies profiles of individuals based on a range of indicators. Such an approach offers the benefit of examining multiple constructs interacting with each other within the individual to predict behavioral outcomes, rather than assessing the main effects or lower order interactions of a few selected constructs. We hypothesized that profiles characterized by higher levels of risk behaviors, lower levels of protective behaviors, positive alcohol and normative beliefs, and a pre-college history of consequences would be positively associated with increased risk for membership in the MRC group. In contrast, we hypothesized that profiles with higher levels of protective behaviors, lower risk behaviors, less positive alcohol and normative beliefs, and no pre-college history of consequences would be negatively associated with membership in the MRC group. Based on previous research indicating that the relationship between drinking and consequences is not monotonic (Mallett et al., 2012), we did not expect that the relationship between student profile and MRC group membership would be fully mediated by first-year drinking.

The second objective was to examine the association between student profiles identified through the first objective and parent types identified by Varvil-Weld et al. (2012). In addition to determining the unique main effects of student and parental profiles on MRC group membership, the present study examined whether parental profile moderated the association between student profiles and risk for membership in the MRC group. We expected the association between being in a higher risk student profile (e.g., high-risk behaviors, low protective behaviors) and in the MRC group would be stronger for students whose parents belong to a higher risk parent type (e.g., positive, pro-alcohol). Based on mixed evidence showing that protective parental influences can "buffer" other risk factors (Fairlie et al., 2012; Wood et al., 2004), we hypothesized that the association between belonging to a higher risk student profile and being in the MRC

group would be weaker for students whose parents fit into a more protective parent type (e.g., positive, anti-alcohol). Together, these findings will provide a more complete picture of the risk and protective factors that work together to predict membership in the MRC group and in turn suggest ways that individual- (e.g., brief motivational interventions) and parent-based intervention materials can be refined and combined to benefit these individuals.

Method

Sample

The sample consisted of 370 students from two cohorts at a large, public, mid-Atlantic university in the United States. The sample was identical to the one described in the Varvil-Weld et al. (2012) study. The mean age at recruitment was 17.9 years ($SD = 0.35$), and the sample was 57% female. Racial background was 85.7% White, 4.9% Asian, 3.5% Black or African American, 3.0% other, 1.6% multiracial, 0.5% American Indian or Alaskan Native, and 0.5% Pacific Islander. The demographic characteristics were representative of the campus community from which the sample was drawn.

Recruitment and procedures

A random sample was selected each year in 2008 and 2009 from the registrar's database of incoming first-year students (total incoming class was 7,441 in 2008 and 6,788 in 2009). Potential participants received a mailed invitation in the summer before college matriculation describing the study purpose, procedures, and compensation, along with the survey website and a personal identification number to log in. Emails with the same information were sent to follow up with students who did not respond initially, for a total of up to five reminders. The response rate was 66%, which is consistent with other web-based approaches with college populations (Larimer et al., 2007; McCabe et al., 2005; Thombs et al., 2005). Assessments were collected at three time points: (a) baseline: during the summer before college matriculation, (b) first-year follow-up: during the fall of the first year of college, and (c) second-year follow-up: during the fall of the second year of college. Invitations to complete the follow-up surveys were sent via email. Of the 370 individuals enrolled in the study at baseline, 318 (85.9%) provided data at the first-year follow-up, and 256 (69.2%) provided data at the second-year follow-up.

Participants received \$25 for completing the baseline survey and \$30 for the follow-up surveys. There were no significant differences in the baseline levels of weekly drinking or the frequency of heavy drinking when comparing those who completed the study with those who did not. The local institutional review board approved the study.

Measures

Pre-college student profile indicators (Baseline: Summer before college)

PEAK DRINKING: The Quantity/Frequency/Peak questionnaire (Dimeff et al., 1999; Marlatt et al., 1998) was used to assess pre-college peak drinking. Participants were asked to think of the occasion when they drank the most in the past month and to report the number of drinks they consumed on that occasion.

TYPICAL WEEKLY DRINKING: Pre-college weekly drinking was measured using items from the Daily Drinking Questionnaire (Collins et al., 1985). Participants indicated how many drinks they typically consumed on each day of the week. These responses were summed to create a measure of the number of drinks consumed in a typical week.

ALCOHOL-RELATED RISK BEHAVIORS: Participants were asked to indicate how often they engaged in five alcohol-related risky behaviors (e.g., Kenney et al., 2010; Sher and Rutledge, 2007)—such as pre-gaming and playing drinking games—using a 5-point scale ranging from 0 (*never*) to 4 (*always*). Scores were summed to create a composite variable of risky drinking behaviors ($\alpha = .87$).

ALCOHOL-RELATED PROTECTIVE BEHAVIORS: Participants reported how often they engaged in five alcohol-related protective behaviors while drinking—such as drinking slowly or avoiding trying to keep up with others—using the same 5-point scale as for the risky-drinking-behavior items (Ray et al., 2009). Scores were summed to create a composite variable of protective drinking behaviors ($\alpha = .87$).

PRE-COLLEGE HISTORY OF CONSEQUENCES: Seventeen consequences from the Young Adult Alcohol Problems Screening Test (YAAPST; Hurlbut and Sher, 1992) that are typically prevalent among college students (experienced by greater than 5%) were selected (Mallett et al., 2011b). The YAAPST assesses negative consequences such as experiencing a hangover, blacking out, or getting into a physical fight as a result of drinking. Participants indicated whether they had experienced each of these consequences in the past year, using a 5-point scale ranging from 0 (*never*) to 4 (*3 or more times in the past year*). Items were then summed to create a total consequences score.

ALCOHOL BELIEFS: Pre-college alcohol beliefs were measured using three items taken from previous research (Turrisi et al., 2000) that captured positive beliefs about alcohol. Participants used a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) to indicate the extent to which they endorsed three drinking beliefs, such as “alcohol adds fun and excitement to an otherwise boring life” and “everybody goes through a drinking phase.” Items were summed to create a composite score for alcohol beliefs ($\alpha = .70$).

DESCRIPTIVE NORMS: Descriptive norms were assessed using a modified version of the Daily Drinking Questionnaire as described above (Collins et al., 1985). Participants indicated

how many drinks they believed their closest friends consumed on each day of a typical week, and those responses were summed to create a measure of descriptive norms.

INJUNCTIVE NORMS: Injunctive norms were assessed using three items adapted from Turrissi et al. (2007), asking participants how their closest friends would respond if [they] (a) “drank alcohol every weekend, (b) “drank alcohol daily,” and (c) “drank enough alcohol to pass out.” Response options ranged from 1 (*strong approval*) to 7 (*strong disapproval*). These three items were summed to create a composite score for injunctive norms ($\alpha = .77$).

Pre-college parent type indicators (baseline: summer before college). Pre-college parent type indicators also were assessed during the summer before college entrance. Maternal and paternal influences were assessed separately, and both maternal and paternal indicators were included in the analysis of parent type. Students reported on dimensions of positive communication, negative communication, parental monitoring, perceived parental approval of alcohol use, and parental alcohol use. All items were taken from existing literature and showed good internal consistency. See Varvil-Weld et al. (2012) for a detailed description of the items used to assess these constructs.

First-year drinking (first-year follow-up). First-year drinking was assessed using the same peak drinking item as in the baseline measures (Quantity/Frequency/Peak questionnaire; Dimeff et al., 1999).

MRC group at follow-up (second year of college). The YAAPST was used to code for membership in the MRC group. Using the same 17 items as for the measure of pre-college history of consequences, participants who reported experiencing more than 6 unique consequences and more than 5 repeated consequences were coded with a “1” to indicate they belonged to the MRC group. All other participants were coded as “0.” This is the same coding scheme as used in previous studies identifying the MRC group (Mallett et al., 2011b; Varvil-Weld et al., 2012).

Analysis strategy

Objective 1: Pre-college student profiles and their association with membership in the MRC group. LPA was used to achieve the first aim of identifying distinct profiles of students based on pre-college peak and typical weekly drinking, alcohol-related risk and protective behaviors, pre-college history of consequences, alcohol beliefs, and descriptive and injunctive norms. These eight indicators were included in the LPA, which was conducted according to the suggestions of Lanza and colleagues (2007) using Mplus (Muthén and Muthén, 2011). A restricted one-profile solution was first fit to the data. Additional profiles were added one at a time until the best-fitting solution was identified. Goodness-of-fit determination was based on the Akaike Information Criterion (AIC; Akaike, 1974), the Bayesian

Information Criterion (BIC; Schwarz, 1978), and log likelihood values. For each of these indices, relatively lower values suggested better fit. The Lo–Mendell–Rubin adjusted likelihood ratio test (LMR-LRT; Lo et al., 2001) also was used to select the best-fitting solution; a significant LMR-LRT value indicates that the k -profile solution fits better than the solution with $k - 1$ number of profiles. In addition, entropy values range from 0 to 1, and values closer to 1 suggest good classification quality. Finally, interpretability of the solution was considered when determining the best solution. Mplus uses full-information maximum-likelihood estimates to account for missing data (Schafer and Graham, 2002). There was less than 1% missing data for each of the LPA indicators.

After we determined the best-fitting LPA solution, students were assigned to their most likely profile using posterior probabilities. Bootstrapped binary logistic regression was used to determine whether pre-college student profile membership was associated with membership in the MRC group. Bootstrapping accounted for nonnormal distributions. This “classify and analyze” approach has been used successfully when the entropy value for the LPA solution is greater than .80 (Agrawal et al., 2007).

Finally, two steps tested whether first-year drinking mediated the relation between pre-college student profile and membership in the MRC group. A one-way analysis of variance tested whether student profile was significantly associated with first-year drinking. First-year drinking was added as a control variable to the binary logistic regression model to determine whether the association between pre-college student profile and membership in the MRC group could be explained by first-year drinking. An attenuated association between student profile and MRC group membership would be evidence of partial mediation, whereas disappearance of the association would be evidence of full mediation (Baron and Kenny, 1986).

Objective 2: Interaction between pre-college student profile and parent type. The second aim was to determine how pre-college student profile and parent type jointly contributed to membership in the MRC group. Pre-college parental indicators were used in an LPA following the same procedures as described above. The parent LPA was identical to the analyses conducted by Varvil-Weld et al. (2012). Four parent types were identified as described above (positive, pro-alcohol; positive, anti-alcohol; negative mother; and negative father.) Students were assigned to their most likely parent profile using posterior probabilities.

Next, a chi-square test assessed whether there was a significant association between pre-college student and parental profiles. Then bootstrapped binary logistic regression with both student and parental profiles included as predictors was used to estimate the unique effects of each profile and their product term on the MRC group. The type 3 sum of squares associated with the product term (Student Profile $\times$ Parent

TABLE 1. Akaike's information criterion (AIC), Bayesian information criteria (BIC), log likelihood, and entropy values for the one- through five-profile solutions

Profile(s)	AIC	BIC	Log likelihood	Entropy	LMR-LRT
One profile	18,338.51	18,401.08	9,153.25		
Two profiles	17,256.27	17,354.04	8,603.13	.93	1,079.94
Three profiles	16,697.18	16,830.15	8,314.59	.95	566.44
Four profiles	16,200.48	16,368.64	8,057.24	.96	505.21*
Five profiles	15,972.86	16,176.22	7,934.43	.95	241.09

Notes: LMR-LRT = Lo-Mendell-Rubin adjusted likelihood ratio test.

* $p < .05$.

Profile) was examined, and a p value of less than .05 was used as the criterion for a significant interaction.

Results

Descriptive statistics: MRC group

At follow-up, members of the MRC group comprised 15.5% of the sample ($n = 44$) and were responsible for 45.6% ($n = 694$) of the total consequences (different and repeated; $N = 1,522$). The size of the MRC group is lower than that of Mallett et al. (2011b) because of the inclusion of nondrinkers. The means for peak and weekly drinking for the

MRC group in the fall of sophomore year (9.75 [$SD = 5.39$] and 17.93 [$SD = 12.54$], respectively) were significantly higher ($ps < .01$) than the means for other students who reported drinking (5.32 [$SD = 4.53$] and 7.69 [$SD = 7.69$]; 9.5% of the sample did not report any drinking).

Student profiles and MRC group membership

Model fit indices (AIC, BIC, and log likelihood values) decreased as the second, third, fourth, and fifth profiles were added (Table 1). The LMR-LRT value for the four-profile solution (505.21, $p < .05$) indicated that the four-profile solution fit better than the three-profile solution, whereas the LMR-LRT for the five-profile solution was 241.09 ($p = \text{n.s.}$). In addition, the five-profile solution identified a small profile comprising less than 5% of the sample, making interpretation difficult. The entropy value for the four-profile solution was .96, and the average posterior probabilities for each profile ranged from .97 to .99, suggesting good classification quality. Thus, the four-profile solution was retained.

Figure 1 displays the means for each of the indicators by profile. There were significant differences between profile means for each of the indicators: peak drinking, $F(3, 365) = 226.06$; weekly drinking, $F(3, 365) = 438.67$; risk behaviors, $F(3, 365) = 458.15$; protective behaviors, $F(3,$

FIGURE 1. Means for peak and weekly drinking (number of drinks), risk and protective behaviors (range for each: 0–20), previous history of consequences (range: 0–28), alcohol beliefs (range: 5–25), descriptive norms (weekly drinks), and injunctive norms (range: 3–21) for each of the four student profiles

TABLE 2. Regression coefficients, 95% confidence intervals (CIs), and odds ratios (ORs) from logistic regression analyses using student profile to predict membership in the MRC group

Variable	<i>B</i>	[95% CI]	OR
Model 1			
(ref. = high-risk drinkers)			
Protective drinkers	-1.73	[-2.86, -0.96]	0.18**
Nondrinkers	-20.43	[-20.88, -19.89]	0.00**
Extreme-consequence drinkers	1.38	[0.25, 2.85]	3.96**
Model 2			
(ref. = extreme-consequence drinkers)			
High-risk drinkers	-1.38	[-2.82, -0.17]	0.25**
Protective drinkers	-3.10	[-4.85, -1.91]	0.05**
Nondrinkers	-21.81	[-23.15, -20.73]	0.00**

Notes: MRC = multiple and repeated alcohol-related consequences; ref. = reference.

** $p < .01$.

365) = 775.58; consequence history, $F(3, 365) = 189.71$; alcohol beliefs, $F(3, 365) = 91.96$; descriptive norms, $F(3, 365) = 96.68$; injunctive norms, $F(3, 365) = 26.76$). Tukey's honestly significant difference post hoc test was used to test for significant differences between profile means, which are described below in order of increasing risk.

The least risky profile ($n = 101$, 27.3% of sample; average posterior probability for students assigned to this profile = .99) reported almost no drinking or pre-college consequences ($M_s < .10$) and no use of alcohol-related risk or protective behaviors ($M_s < .50$). They had moderately positive drinking beliefs ($M = 5.37$) and descriptive ($M = 2.97$) and injunctive ($M = 6.10$) norms. This profile was labeled *nondrinkers*.

The next and largest profile ($n = 138$; 37.4% of sample; average posterior probability for students assigned to this profile = .97) had significantly higher levels of protective behaviors than all other profiles ($M = 16.16$), had similar levels of weekly drinking ($M = .40$), and reported significantly higher levels of peak drinking than nondrinkers ($M = 1.83$). This profile reported significantly more alcohol-related risk behaviors ($M = 3.36$) and pre-college consequences ($M = 2.96$) than nondrinkers but less than the other profiles. This group had significantly more positive alcohol beliefs ($M = 7.74$) than nondrinkers but similar descriptive ($M = 3.86$) and injunctive ($M = 6.63$) norms. This profile was labeled *protective drinkers*.

The third profile ($n = 104$; 28.2% of sample; average posterior probability for students assigned to this profile = .97) reported significantly higher levels of alcohol-related risk behaviors ($M = 10.72$), peak drinking ($M = 6.51$), and weekly drinking ($M = 5.31$) than the previous two profiles. This group also had significantly higher levels of pre-college consequences ($M = 12.00$), positive alcohol beliefs ($M = 10.08$), and descriptive ($M = 10.45$) and injunctive norms ($M = 8.94$) relative to the previous two profiles. Their use of alcohol-related protective behaviors ($M = 13.08$) was significantly higher than that of nondrinkers but significantly lower than that of protective drinkers. This profile was labeled *high-risk drinkers*.

The fourth and smallest profile ($n = 34$; 9.1% of sample; average posterior probability for students assigned to this profile = .98) reported significantly higher levels of peak ($M = 12.15$) and weekly drinking ($M = 19.38$), alcohol-related risk behaviors ($M = 12.85$), and descriptive norms ($M = 23.23$) relative to all other profiles. This group's level of pre-college consequences ($M = 27.96$) was significantly higher than that of all other profiles and was more than twice that of the next closest profile. They reported engaging in significantly fewer alcohol-related protective behaviors ($M = 12.31$) than protective drinkers but significantly more than nondrinkers. Their injunctive norms ($M = 10.54$) were significantly higher than those of nondrinkers and protective drinkers but similar to those of high-risk drinkers. This final profile was labeled *extreme-consequence drinkers*.

Student profile was significantly associated with membership in the MRC group, Wald $\chi^2(3) = 27.41$, $p < .01$. Analyses were run twice, first with the high-risk drinkers as the reference group and then with the extreme-consequence drinkers as the reference group. Table 2 shows the regression coefficients, 95% confidence intervals, and odds ratios (ORs). When the high-risk drinkers were used as the reference group, both the protective drinkers and the nondrinkers were significantly less likely to be in the MRC group (ORs < 1), whereas the extreme-consequence drinkers were at increased odds of being in the MRC group (OR = 3.96). When extreme-consequence drinkers were used as the reference group, odds ratios indicated that all three of the other profiles were significantly less likely to be in the MRC group (all ORs < 1).

Additional mediation analyses indicated that there was a significant association between student profile and first-year drinking, $F(3, 313) = 69.63$, $p < .01$. As would be expected, levels of first-year drinking were highest among the riskiest profile and lowest among the lowest risk profile (extreme-consequence drinkers $M = 10.64$ drinks [$SD = 3.97$]; high-risk drinkers $M = 7.36$ drinks [$SD = 3.46$]; protective drinkers $M = 3.98$ drinks [$SD = 3.63$]; nondrinkers $M = 1.30$ drinks [$SD = 2.97$]). The effect of pre-college student pro-

TABLE 3. Distribution of student profiles by parent profile, including observed and expected counts, percentage of parent profile within each student profile, and standardized (std.) residuals

Pre-college student profile	Pre-college parent profile				Total, <i>n</i>
	Positive pro-alcohol, <i>n</i> or %	Positive anti-alcohol, <i>n</i> or %	Negative mother, <i>n</i> or %	Negative father, <i>n</i> or %	
High-risk drinkers	60	18	15	11	104
Expected count	39.2	36.1	20.3	8.5	
% of student profile	57.7%	17.3%	14.4%	10.6%	
Std. residual	3.3	-3.0	-1.2	0.9	
Protective drinkers	45	44	36	13	138
Expected count	52.0	47.9	26.9	11.2	
% of student profile	32.6%	31.9%	26.1%	9.4%	
Std. residual	-1.0	-0.6	1.7	0.5	
Nondrinkers	17	65	13	6	101
Expected count	38.0	35.0	19.7	8.2	
% of student profile	16.8%	64.4%	12.9%	5.9%	
Std. residual	-3.4	5.1	-1.5	-0.8	
Extreme-consequence drinkers	17	1	8	0	26
Expected count	9.8	9.0	5.1	2.1	
% of student profile	65.4%	3.8%	30.8%	0	
Std. residual	2.3	-2.7	1.3	-1.5	

file on membership in the MRC group remained significant even after first-year drinking was controlled for, Wald $\chi^2(3) = 12.74$, $p < .01$, indicating that first-year drinking partially mediated the association between student profile and MRC group membership.

Relationship between student profiles and parent types

There was a significant association between pre-college student profile and parent type, $\chi^2(9) = 83.25$, $p < .01$. Table 3 shows the distribution of student profiles by parent type, including observed and expected counts and standardized residuals. Students whose parents fit the lower risk parent type (i.e., positive, anti-alcohol) were more likely to be in lower risk student profiles. In contrast, students whose parents fit the higher risk parent types (e.g., positive, pro-alcohol) were more likely to be in higher risk student profiles.

When both student and parent profile were included in the bootstrapped logistic regression, the association between student profile and MRC group membership was significant, Wald $\chi^2(3) = 25.88$, $p < .01$, whereas the association between parent profile and MRC group membership was reduced to the trend level, Wald $\chi^2(3) = 6.76$, $p < .10$. There was no significant Student $\times$ Parent Profile interaction predicting membership in the MRC group, Wald $\chi^2(7) = 2.61$, $p = \text{N.S.}$ There was no indication that parent profile “buffered” the effects of student profile on membership in the MRC group.

Discussion

The present study was the first to examine pre-college student profiles that predict membership in a high-risk subgroup of students experiencing excessive alcohol-related conse-

quences (the MRC group). Results identified four distinct profiles of students characterized by differences in drinking, the use of alcohol-related risk and protective behaviors, pre-college history of consequences, drinking beliefs, and descriptive and injunctive norms. Notably, we found a significant association between student profile membership and membership in the MRC group that was not fully explained by first-year drinking. Consistent with our hypotheses, the two pre-college student profiles at increased risk for membership in the MRC group (extreme-consequence drinkers and high-risk drinkers) reported relatively high levels of drinking, alcohol-related risk behaviors, and pre-college consequences and had positive alcohol beliefs and normative perceptions. The extreme-consequence drinkers were at highest risk for being in the MRC group and were differentiated from the next highest-risk profile (high-risk drinkers) by high levels of peak and weekly drinking, high levels of pre-college consequences, and high descriptive norms. Although not as high as the extreme-consequence drinkers, the high-risk drinkers also reported relatively high peak and weekly drinking, pre-college consequences, and descriptive norms and were at increased risk for being in the MRC group relative to the protective drinkers.

There was a significant association between pre-college student profile and parent type, although no interaction between student profile and parent type in predicting membership in the MRC group was observed. Student profile and parent type may not interact because of the strong association between the two. For example, students with positive, pro-alcohol parents were overrepresented in the extreme-consequence drinker profile, indicating that pre-college pro-alcohol parental characteristics coincide with pro-alcohol student characteristics.

On the other end of the continuum, students whose parents fit the positive, anti-alcohol type were much more likely to be nondrinkers than to be in any other profile. Because of the high prevalence of consistent student–parent dyads (e.g., almost 80% of positive, anti-alcohol parents had students who were either nondrinkers or protective drinkers), cell sizes were small for more inconsistent student–parent pairs, and there was little opportunity for protective parent types to offset more negative student profiles.

It is likely that parent and student characteristics reciprocally influence each other before and during the transition to college. Therefore, by the time of college matriculation, students' profiles and type are mostly consistent, as our findings suggest. In addition, although student profile had a unique main effect on MRC group membership even when both student and parent profile were included in the regression model, the effect of parent profile was reduced to the trend level. This finding may suggest that student profile partially mediates the effect of parent profile on MRC group membership, given that parent profile is the more distal influence. Future research using data collected over a longer period could explore this possibility.

Results highlight psychosocial and behavioral constructs that may serve as “markers” for students who are at risk for membership in the MRC group. These markers of profile membership can be addressed in brief motivational interventions. For example, a combination of high levels of drinking, pre-college consequences, and descriptive norms differentiated students in the extreme-consequence profile. Based on these findings, brief intervention programs may benefit from screening for these markers and modifying them to the extent possible (e.g., addressing normative misperceptions, reducing risk behaviors). In contrast, means for alcohol-related protective behaviors were not well separated, suggesting that both high- (e.g., extreme-consequence drinkers) and low- (e.g., protective drinkers) risk individuals engage in similar levels of protective behaviors. Thus, screening for protective behavior use may not provide the same utility in terms of identifying students at risk for membership in the MRC group. In addition, the present findings provide additional support for the combined use of brief motivational interventions and parent-based interventions for high-risk students (Turrisi et al., 2009), given that higher risk students (i.e., extreme-consequence drinkers and high-risk drinkers) were more likely to report having higher risk parents (i.e., positive, pro-alcohol) and may therefore benefit from multiple levels of intervention.

Limitations

Despite offering insight into the intrapersonal risk factors that predict membership in a high-risk subgroup of college students, the present study had several limitations. First, pre-college student and parent profiles were analyzed

separately. Combining student and parent characteristics into the same person-centered analysis might shed additional light on existing subgroups of students that are at increased risk for membership in the MRC group. It is possible that additional student constructs also may be important, such as consequence evaluations and willingness to experience consequences (Mallett et al., 2011c). Future work could explore the role of these and other important constructs. The student-reported data used in the present study represent students' perceptions of their parents' behavior rather than an objective measure of parents' behavior. However, recent research indicates that student-reported data on parenting behavior are reliably correlated with college student drinking outcomes (Varvil-Weld et al., 2013).

Second, a “classify and analyze” approach was used to assign individuals to their most likely profile based on posterior probabilities. Although common, this strategy can be problematic, owing to uncertainty about profile membership. However, the classify and analyze approach has been found to be acceptable when the entropy value for the chosen solution is greater than .80 (Agrawal et al., 2007), as it was in the present study.

Finally, the present sample was relatively homogeneous in terms of demographics and campus environment and may not generalize to other samples or campuses. Future directions include expanding this research to larger and more inclusive samples.

Conclusions

The present study was the first to examine pre-college alcohol-related behaviors and cognitions that predict membership in a high-risk group of college students experiencing high numbers of alcohol-related consequences. Two student profiles emerged (extreme-consequence drinkers and high-risk drinkers)—differentiated by their pre-college drinking, alcohol-related risk behaviors, and consequence history—that were at increased risk of membership in the MRC group. These findings may be useful for screening and intervention efforts designed for students at risk for membership in the MRC group.

As a final note, this study is one of few to examine the MRC group. In our study, this small subgroup of students accounted for approximately the same number of consequences as the remaining 85% of the sample. This group is relatively easily identified, accounts for an inordinate number of problems, is understudied, and has not been the target of current intervention efforts. This underscores the importance of future research efforts with the MRC group.

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