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An Examination of Heavy Drinking, Depressed Mood, Drinking Related Constructs, and Consequences among High-Risk College Students using a Person-Centered Approach

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Abstract

INTRODUCTION—Research has identified college students who experience depressed mood and consume alcohol are at an increased risk for experiencing alcohol problems. The present study identified profiles of differential alcohol use, depression, key psychosocial indicators of drinking (e.g., normative perceptions) and examined the relationship between these profiles and alcohol-related consequences.

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Contributors

Example: Dr. Geisner designed the study and wrote the protocol and edited the manuscript. Dr. Geisner and Dr. Mallett conducted literature searches and provided summaries of previous research studies, outlined and wrote sections of the introduction and discussion. Drs. Varvil-Weld and Trager conducted the statistical analysis and wrote the results section along with consultations from Dr. Turrisi. All authors contributed to and have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

METHOD—Students with a history of risky drinking and elevated depressed mood ($n = 311$; 62.4% female) completed a web-based survey assessing typical and peak drinking, depressive symptoms, descriptive norms, drinking to cope motives, protective behavioral strategies, and alcohol-related consequences.

RESULTS—Latent profile analysis was used to classify participants into distinct profiles focusing on alcohol use patterns and level of depressed mood and drinking related constructs. Profiles were then compared based on their association with reported rates of alcohol-related consequences. Four profiles emerged: 1) *Mild Depression, Heavy Drinkers*, 2) *Mild Depression, Severe Drinkers*, 3) *Moderate Depression, Heavy Drinkers*, and 4) *Moderate Depression, Severe Drinkers*. Findings revealed significant differences between the four profiles on both risky drinking and alcohol-related consequences.

CONCLUSION—These findings suggest the importance of assessing and addressing depressive symptoms among college students in order to reduce rates of risky drinking and alcohol-related consequences.

Keywords

comorbidity; depressed mood; drinking; profile analysis

Introduction

Much has been researched about risky college student drinking, the comorbidity with depressive symptoms, and the increased risk for alcohol-related problems for those struggling with both. National surveys show greater odds ratios of having alcohol use disorders for those struggling with depression (Kessler et al., 1997; Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Likewise, the odds are also greater for those with alcohol use disorders for experiencing depression (Boden & Fergusson, 2011; Kessler et al., 1997; Substance Abuse and Mental Health Services Administration [SAMHSA], 2008). Students who have struggled with both mood and alcohol problems are most likely to develop long-term issues, their depression is less likely to remit, and they may have less motivation to engage in treatment for either condition (Christiansen, Griffiths, & Jorm, 2004; Merrill, Reid, Carey, & Carey, 2014; Perkins, 1999). Finally, this comorbid population is at higher risk for suicide (Cherpitel, Borges, & Wilcox, 2004; Conner, Bagge, Goldston, & Ilgen, 2014; Nock, Hwang, Sampson, & Kessler, 2010). Thus it is important to study this population and understand how to reduce harm.

While previous research examined relationships between depressive symptoms, drinking, and consequences, the simultaneous influence of additional key constructs is not well understood. Specifically, coping motives, protective behavioral strategies and normative influences are significant correlates of risky drinking and related problems; however, the examination of the relationship of these constructs with depressed mood, alcohol consumption and consequences has been limited. Previous work in this area has been primarily variable centered (Paljarvi et al., 2009) and has focused on a limited number of constructs at a time (i.e., 1–2). Alternatively, person-centered approaches such as Latent Profile Analysis allows for the simultaneous examination of the relationship between

multiple indicators in order to identify similar patterns and groups of individuals that may be at a particular risk (Mallett et al., 2015; Scaglione, et al., 2015; Varvil-Weld, Mallett, Turrisi, & Abar, 2012; Varvil-Weld, Mallett, Turrisi, Cleveland, & Abar, 2013). These profiles also offer insight into key variables that influence behaviors of interest (i.e., risky drinking, experiencing harmful consequences, etc.) and may identify high-risk groups and/or constructs as ideal targets for intervention efforts (e.g., Mallett, Marzell, Scaglione, Hultgren, & Turrisi, 2014; Reavy et al., 2016). Previous studies using a LPA framework have not accounted for depressed mood symptoms in their examination of risky drinking and alcohol-related problems, though some (Lau-Barraco, C., Linden-Carmichael, Braitman, & Stamates, 2016) did investigate differences between profile memberships on mental health symptoms finding that people who endorsed a lot of situations for drinking reported significantly more mental health symptoms. Considering that students who report increased depressive symptoms also experience more alcohol-related problems, and that mood disorders and risky drinking are prevalent in the college population, research understanding these patterns of behavior is warranted.

Drinking Motives, Protective Behavioral Strategies, and Normative Perceptions

Motives—College students drink for different reasons, including social, enhancement, and coping (Carey & Correia, 1997; Cooper, Frone, Russell, & Mudar, 1995; Kuntsche, Knibbe, Gmel, & Engels, 2005). Those who are light or moderate social drinkers experience fewer drinking related consequences and report fewer mood issues (Geisner, Mallett, & Kilmer, 2012; Stewart, Loughlin, & Rhyno, 2001). However, those who drink for coping motives are more likely to experience depressive symptoms and alcohol-related problems (Hussong, Galloway, & Feagans, 2005; Hussong, Hicks, Levy, & Curran, 2001; Merrill & Read, 2010).

PBS—Protective behavioral strategies (PBS) consist of a variety of behaviors used to limit the amount of alcohol consumed and/or reduce harm related to drinking (i.e., use of taxi, designated driver, etc.). PBS are a central element of efficacious college student interventions (i.e., BASICS: Dimeff, Baer, Kivlahan, & Marlatt, 1999; Parent-Based Intervention: Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001) and have been studied extensively in relation to risky drinking and related problems (e.g., LaBrie, Lac, Kenney, & Mirza, 2011; Mallett et al., 2015; Martens, Ferrier, & Cimini, 2007; Varvil-Weld et al., 2013). The use of PBS has been found to decrease risky drinking among college students (Prince, Carey, & Maisto, 2013) and directly influence alcohol-related consequences (Benton et al., 2004; Mallett et al., 2015). Few studies to date have examined how use of protective behavioral strategies may be different for students with comorbid depressive symptoms and heavy drinking compared to heavy drinking alone (Martens, Neighbors, Lewis, Lee, Oster-Aaland, & Larimer, 2008a).

Norms—Descriptive drinking norms, or students' perceptions of how much alcohol those around them (typical students, friends) are drinking, have been shown to relate to students' own drinking behaviors (Borsari & Carey, 2001; Neighbors et al., 2007; Perkins, 2002). In addition, normative misperceptions are common for college students and relate to additional alcohol-related consequences (Borsari & Carey, 2003; Lewis & Neighbors, 2004).

Understanding how normative perceptions relate to risk profiles will permit further refinement and targeting of intervention efforts.

While motives, protective behavioral strategies and normative perceptions are central to understanding college student drinking more generally, moving beyond simple relationships will enable for more nuanced and earlier prevention and intervention. Depressed students may be drinking for more coping motives to alleviate/self-medicate their distress. This may lead to increased “helplessness” which may inhibit use of strategies by those who may not use as many protective strategies or try to avoid problems (i.e., not care what happens to them when they drink). In addition, their depressed mood may lead them to misperceiving normative behaviors (Geisner, Kirk, Mittmann, Kilmer, & Larimer 2015). These (less use of PBS and higher normative perceptions) in turn may lead to more drinking and consequences. Thus, the potential overlap of these constructs needs to be better understood as in fact, they may have more of an impact on problematic drinking than when considered individually and may spiral and exacerbate each other, further increasing risk.

Current Study

To gain a better understanding of comorbidity between depressive symptoms and risky drinking, the present study has two aims. The first is to identify distinct comorbidity risk profiles utilizing a person-centered approach that incorporates depressive symptoms, drinking motives, protective behavioral strategies, normative perceptions, and alcohol use (e.g., typical and peak drinking). Research has demonstrated a positive association between coping motives and more alcohol-related problems among students (Merrill & Read, 2010; Merrill, Wardell, & Read, 2014). Therefore, we hypothesized a risky profile to emerge that included individuals who reported heavier drinking patterns, higher proportions of depressive symptoms, higher coping motives to drink, the use of fewer protective behavioral strategies, and higher normative drinking perceptions.

The second aim of the study was to compare comorbidity risk profiles on the amount and type (i.e., physical, legal, academic, sexual) of alcohol-related consequences reported by the sample. First, we hypothesized the riskiest profiles (i.e., highest rates of depressive symptoms and alcohol use, high coping motives, low use of PBS, high normative perceptions) would report the highest rates of consequences consistent with the literature, reporting a positive relationship between comorbidity and increased rates of alcohol-related problems (Christiansen et al., 2004; Perkins, 1999). Further, we examined if certain profiles that emerged were more prone to experience specific types of consequences (physical, legal, academic, sexual) in order to identify specific types of risks.

Methods

Sample Characteristics

The final sample consisted of 311 students (62.4% female; mean age 20.13 [$SD=1.34$]) from a large, public university in the Pacific Northwest of the United States. With respect to race, 59.7% of the sample identified as white or Caucasian, 19.4% identified as Asian or Pacific Islander, 1.2% identified as black or African American, 8.4% identified as multiracial, less

than 1% identified as Native American, and the remaining proportion of the sample were of some other racial background. Distinct from race, 7.8% of the sample reported being of Hispanic/Latino ethnicity.

Procedures

Details on the procedures on the study are detailed elsewhere (Geisner, Varvil-Weld, Mittmann, Mallett, & Turrise, 2015b). Briefly, participants were recruited between fall 2011 and winter of 2013 through email invitations to log on to the study website, view an online consent form and complete a brief 15-minute screening survey about their mood and alcohol use, perceptions of depression among other students, and demographic information. Students ($N = 2675$) participated in the screening. 356 participants (13.3%) meeting criteria for high-risk drinking (consuming 4+/5+ drinks (women/men) and score of 8 or greater on the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, & de la Fuente, 1993)), and elevated depressed mood (score of 14 or greater on the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996)) were directed to the longer baseline survey which assessed further constructs (motives, protective behavioral strategies, etc.). According to Beck et al. (1996), scores 0–13 indicate minimal depression; 14–19 mild depression; 20–28 moderate depression; 29–66 indicate severe depression. The baseline survey was completed by 311 students (89% of those eligible) within 1–2 weeks of the screening.

Baseline Measures

Coping motives—Five items were used to assess students *coping drinking motives* (Cooper, 1994). Sample items from this measure are “Do you drink to cheer you up when you are in a bad mood” and “Do you drink to forget your worries.” Response options ranged from 0 ‘*Never/Almost never*’ to 4 ‘*Almost always/Always*’. Items were summed to produce a composite variable ($\alpha = .85$).

Protective behaviors—The 17-item version of the Protective Behavioral Strategies Scale was used to assess strategies participants used to drink more safely and responsibly (Lewis, Rees, Logan, Kaysen, & Kilmer, 2010; Martens et al., 2005). Items included statements such as, “When drinking alcohol, you knew where your drink had been at all times” and “You stopped drinking at a pre-determined time”. Response options ranged from 0 ‘*Never*’ to 4 ‘*Always*’. Items were summed to create a composite score ($\alpha = .79$), which is consistent with others who have used the measure in this way (Murphy, Dennhardt, Skidmore, Borsari, Barnett, Colby, & Martens, 2012; Neilson, Gilmore, Pinsky, Shepard, Lewis, & George, 2015; Neighbors, Lee, Lewis, Fossos, & Walter, 2009).

Depression symptoms—The Patient Health Questionnaire-9 (PHQ-9; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999) is a nine-item measure used for depression screening, and recent efforts to utilize the measure in a college setting for screening, severity monitoring, and detecting change have been documented (Klein & Chung, 2008). Cut off for the PHQ-9 scores can be interpreted as follows: minimal depression 0–4, mild depression 5–9, moderate depression 10–14, moderately severe depression 15–19, severe depression 20–27. Cronbach’s α was .83. The

PHQ was administered during the baseline assessment so was thus included in the LPA instead of the BDI used at screening.

Typical weekly drinking—The Daily Drinking Questionnaire was used to assess the number of standard drinks participants consumed in a typical week (DDQ; for reliability and validity see Collins, Parks, & Marlatt, 1985; Dimeff et al., 1999). Participants were asked to provide responses for each of the 7 days. A drink was defined at the beginning of the questionnaire as four ounces of wine, 10 ounces of wine cooler, 12 ounces of beer (eight ounces of Canadian, Malt Liquor, or Ice beer, or 10 ounces of microbrew), or one cocktail with one ounce of 100 proof liquor or one and a quarter ounces of 80 proof liquor.

Drinking norms—Parallel items to the DDQ ask students their perceptions of the drinking habits of a typical student on their campus (Drinking Norms Rating Form; for reliability and validity see Baer, Stacy, & Larimer, 1991). Students were asked to “Consider a typical week during the last month. How much alcohol, on average (measured in number of drinks), do you think a typical student drinks on each day of a typical week?” Again, the definition of a standard drink was provided prior to the questions.

Peak drinking—Participants were asked to report the number of drinks consumed on a peak occasion in the past month (Dimeff et al., 1999). Information about standard drink equivalents was provided.

Alcohol-related consequences—The Rutgers Alcohol Problem Inventory (RAPI; White & Labouvie, 1989) was used to assess alcohol-related consequences. Participants indicated how often they experienced a range of alcohol-related problems in the past year, on a scale from 0 ‘None’ to 3 ‘More than 5 times.’ A total of 22 items from the RAPI were broken into five subscales. Items and alphas for each subscale are listed in Table 1.

Data Cleaning

Missing data (less than 5% for all variables) were missing at random (MAR; Rubin, 1976) and were imputed using EM methods (Schafer & Graham, 2002). Outliers (i.e., values more than 3.29 standard deviations from the mean) were recoded to 3.29 standard deviations of the mean (Tabachnick & Fidell, 2012). All but one variable met the aforementioned criteria for outlier adjustment (protective behavioral strategies), and outliers accounted for less than 5% of responses on all variables. Both EM and outlier adjustments were completed prior to any subsequent analyses.

Analysis Strategy

Latent profile analysis (LPA) was used to achieve the first aim of the study. LPA is a data-driven approach, and the goal is to identify subgroups of individuals who are similar to each other but distinct from other subgroups. LPA analyses were conducted in *MPlus* (version 8; Muthén & Muthén, 1998–2017). Based on the recommendations of Lanza, Collins, Lemmon, and Schafer (2007), a one-profile solution was first fit to the data, as if all individuals belonged to the same profile. Additional profiles were added to the model one at a time, and fit indices were examined after each addition to determine which number of

profiles fit the data best. Indices included the Akaike Information Criteria (AIC; Akaike, 1974), the Bayesian Information Criteria (BIC; Schwartz, 1978), and log-likelihood values. Smaller numbers indicate better fit for each index. The parametric bootstrapped likelihood ratio test (bLRT) was used to compare solutions with k and $k-1$ profiles. A significant bLRT indicates the k -profile solution offered an improvement in fit. Finally, an entropy value of $>.80$ suggests good classification quality. After the best-fitting solution was identified, individuals were assigned to their most likely profile based on posterior probabilities. This approach has been used successfully in previous research with LPA, as long as classification quality is acceptable (e.g., Agrawal, Lynskey, Madden, Bucholz, & Heath, 2007; Varvil-Weld et al., 2013). Additional covariate analyses were conducted to examine whether race and gender were associated with profile membership.

The second aim of the study was to assess whether the profiles identified in the first aim were associated with different levels of alcohol-related consequences. The automatic BCH approach in *Mplus* was used to examine the mean differences in consequences across the profiles (Asparouhov & Muthén, 2014; Bakk & Vermunt, 2014). The BCH approach is preferred over alternative classify and analyze approaches (e.g., ANOVA) because it calculates the profiles and conducts the mean differences in the same analytic model, uses weights, robust standard errors, and a maximum likelihood approach (see Bakk & Vermunt, 2014). Class specific means are then estimated, and the differences between the means are evaluated using Wald tests (Bakk & Vermunt, 2016).

Results

Aim 1: LPA

Model fit indices are shown in Table 2. The decreases in AIC, BIC, and log-likelihood values leveled off at the addition of the fifth profile to the model. Further, the five-profile solution included profiles of less than 10 individuals, making interpretation and additional analyses difficult. Thus the four-profile solution was retained. These four profiles are described in more detail below, in order from most common and lowest risk to least common and highest risk. Figure 1 and Table 3 show the means for each of the 6 indicators by student profile.

Profile 1 – Mild Depression, Heavy Drinkers—The most common profile in the sample ($n=169$; 54%) reported moderate levels of drinking and relatively low levels of depressive symptoms. Students in this profile reported drinking 7.6 drinks on average during their peak drinking occasion in the past month, and 11.5 drinks during a typical week. They endorsed the lowest levels of coping motives and highest levels of protective behavioral strategies of any profile in the sample. Their drinking norms were also relatively low.

Profile 2 – Mild Depression, Severe Drinkers—The second profile consisted of 21% of the sample ($n=65$), and depressive symptoms in this profile were similar to the *Mild Depression, Heavy Drinkers*. However they had higher levels of peak and weekly drinking (13.0 and 23.9 drinks, respectively). They were higher risk in terms of other drinking behaviors, and had higher coping motives, engaged in fewer protective behavioral strategies, and had higher drinking norms.

Profile 3 – Moderate Depression, Heavy Drinkers—The third profile was 20% of the sample ($n=61$). This profile reported more moderate drinking (9.1 peak drinks and 18.2 weekly drinks), however students in this profile reported much higher levels of depressive symptoms than students in the first two profiles. Profile 3 students reported moderate levels of protective behavioral strategies and drinking norms. Interestingly, this profile endorsed the highest level of coping motives of any profile in the sample.

Profile 4 – Moderate Depression, Severe Drinkers—The fourth and final profile was the smallest ($n=16$; 5%) and highest risk. Students in this profile reported the highest levels of peak and weekly drinking (19.6 and 43.2 drinks, respectively). They also reported the highest levels of depressive symptoms of any profile in the sample. They endorsed high levels of coping motives, engaged in the fewest protective behavioral strategies, and had high drinking norms.

Follow-up covariate analyses indicated there were significant associations between gender and profile membership. Males were at increased odds of belonging to the *Moderate Depression, Severe Drinkers* profile and to the *Mild Depression, Severe Drinkers* profile relative to the *Mild Depression, Heavy Drinkers* profile ($B=1.50$, $p<.05$). Conversely, males were at decreased odds of belonging to the *Moderate Depression, Heavy Drinkers* profile relative to the *Mild Depression, Severe Drinkers* profile ($B=-1.49$, $p<.05$). There were no significant associations between race and profile membership.

Aim 2: Profile Differences in Alcohol-Related Consequences

Table 4 and Figure 2 show the means for each of the consequence subscales by profile. There were significant differences by profile for total consequences and all five of the consequence subscales. For the overall RAPI score, loss of control, withdrawal, and social consequences, all profiles were significantly different from each other. For these outcomes, the *Moderate Depression, Severe Drinkers* profile experienced the highest level of total consequences, followed by the *Moderate Depression, Heavy Drinkers*, then *Mild Depression, Severe Drinkers*, and finally *Mild Depression, Heavy Drinkers*. This pattern of results varied for academic and driving consequences. In both cases, the *Mild Depression, Heavy Drinkers* group had the lowest consequences relative to the other groups.

Discussion

The current study identified four unique college student profiles of co-occurring depression and alcohol use, drinking related constructs, and their association with experiencing alcohol-related consequences. Consistent with our initial hypothesis, groups with varying risk emerged. Individuals in the *Mild Depression, Heavy Drinkers* profile exhibited the least amount of risk behavior by endorsing the lowest coping motives, normative perceptions, drinking rates, and the highest use of protective behavioral strategies. On the other hand, the *Moderate Depression, Severe Drinkers* exhibited the highest risk reporting high coping motives and normative drinking perceptions, and low use of protective behavioral strategies. Compared to the *Mild Depression, Heavy Drinkers*, students in this highest-risk profile consumed 2.5 times as many drinks on peak occasions (19.6 vs. 7.6) and nearly 4 times as many drinks during a typical week (43.2 vs. 11.5). Further, findings suggested that

normative perceptions were consistently higher in the heavier drinking profiles, but drinking motives and to a lesser degree protective behaviors were higher among moderately depressed profiles. Taken together, these findings highlight the risk associated increased drinking and depression and the need for screening to identify these individuals for early intervention/treatment as well as variables that may be useful to target.

Further, significant relationships between student profiles and alcohol-related consequences were observed. As expected, individuals in the *Moderate Depression, Severe Drinkers* profile consistently reported the highest rates of consequences across all the subscales. However, one particularly interesting finding that emerged was that individuals in the *Moderate Depression, Heavy Drinkers* profile endorsed significantly more alcohol problems than *Mild Depression, Severe Drinkers* across total consequences and 3 of the 5 subscales (loss of control, withdrawal, and social). Individuals in the *Mild Depression, Severe Drinkers* group drank noticeably more than those in the *Moderate Depression, Heavy Drinkers* profile (13.0 vs. 9.1 drinks during peak occasions and 23.9 vs. 18.2 drinks per week, respectively); however, alcohol-related problems did not coincide with the higher rates of alcohol consumption. These findings indicate the significant association between depressive symptoms and higher reports of alcohol-related problems, and the need to address both issues when intervening with these individuals. Simply providing a brief alcohol intervention alone may not successfully reduce related problems among individuals experiencing depressive symptoms. Additional screening may allow individuals in need of additional treatment to be identified and appropriately referred for further care.

Notable findings were also observed among the patterns of specific consequence subscales. First, *Mild Depression* profiles reported fewer consequences than *Moderate Depression* profiles with the exception of driving related consequences. This suggests driving after drinking is more strongly associated with drinking behaviors alone. In terms of social consequences, *Mild Depression* profiles were not significantly different from each other and both were associated with the lowest rates of interpersonal problems. Conversely, individuals in the *Moderate Depression* profiles reported higher rates of social problems suggesting that increased depressive symptoms combined with alcohol may increase the risk of these specific consequences.

Implications

Clinical implications for prevention efforts may be informed by these findings. Past research has shown that a previous history of alcohol problems increases risk for future depression and vice versa (Hasin & Grant, 2002; Sihvola et al., 2008). Further, depression plays a role in experiencing alcohol-related consequences, above and beyond drinking (Martens et al., 2008b). Regardless of the primary problem, drinking, mood symptoms, and related problems clearly form a vicious cycle (deGraaf, Bijl, Spijker, Beekman, & Vollebergh, 2003). In the present study, students in the highest-risk profile (*Moderate Depression, Severe Drinkers*) had the most depressive symptoms and lowest use of protective behavioral strategies, and those who were moderately depressed scored twice as high on coping motives for drinking despite level of drinking. This finding is quite alarming and associated with both acute and chronic risks. Specifically, these finding suggests that individuals are engaging in self-

medication coping strategies and are not utilizing as many protective behaviors, and they may experience immediate harmful consequences as well as problematic and chronic drinking patterns over time. Identifying these high-risk students since they are susceptible to serious and potentially lethal consequences should be done as early as possible. Screening and Brief Intervention with Referral to Treatment (SBIRT) programs would benefit from using profiles such as developed here to identify and help those who are at highest risk.

Thus, the profiles offer targets for intervention efforts. For individuals who were experiencing depression and engaging in risky drinking, targeting coping motives (e.g., correcting perceptions that alcohol improves mood when it actually exacerbates depression), trying to enhance the use of protective behavioral strategies, and correcting normative misperceptions could reduce risky behaviors and drinking consequences. While the entire sample used in this study were at least mildly depressed and heavy drinkers, those who were in the most severe profile, utilized nearly two times less PBS than those in the least severe profile. It is possible that students' motivation for engaging with strategies, their hopelessness, their decreased care about their own well-being and safety (i.e. aspects of depression) may be inhibiting their use of PBS. Focusing more on components of protective behavioral strategies may be necessary for this group of student, especially for strategies which may be less salient the highest risk group due to their depression (e.g., obtaining social support from others in non-drinking activities). Finally, correcting normative misperceptions not only around drinking, but also about depressed mood (see Geisner, Kirk, Mittman, Kilmer, & Larimer, 2015a) may help high-risk students reduce their problematic behaviors. It is important to note that normative perceptions appeared to be higher for those who endorsed heavier drinking patterns and may be less associated with depressive symptoms. While many programs already exist, developing a stepped-care model utilizing multi variable selection criteria and tailoring the content according to profile variables could help reduce consequences and suffering as well as prevent escalation to more severe disorders.

Limitations & Future Directions

The findings should be considered in light of some limitations when drawing conclusions. The data were collected on one campus and with a moderate sample size which limited generalizability. It should be noted the sample included higher risk students that reported a recent history of depressive symptoms and risky drinking. While this may limit generalizability, we specifically focused our research questions in the hopes of targeting and understanding those with comorbidities so as to minimize harms which are often more severe and potentially fatal. While this was the population of interest, these findings may not generalize to general college populations. Next, the data are cross-sectional and not longitudinal. Future studies that examine transitions into and out of profiles would be helpful to identify students who naturally move into lower risk profiles compared to those who worsen or remain in high-risk profiles across time. This may have implications for the development of chronic patterns of both alcohol consumption and depression. In addition, future studies can utilize the revised version of the PBSS (the PBSS-20) which has increased content validity for the serious harm reduction subscale (Treloar, Martens, McCarthy, 2015) as well as using of the same measure (i.e., PHQ for both rather than BDI for screening and

PHQ for baseline) for screening and baseline to avoid measurement issues. Finally, studies are needed that include a large number of schools as well as examining non-college students to replicate and generalize findings.

Conclusion

The current study examined relationships between drinking, depression, and consequences in a sample of college students using a person-centered approach. Four profiles of students were identified with varying levels of depressive symptoms and alcohol consumption, drinking motives, normative perceptions, and use of protective behavioral strategies. Findings revealed significant differences between profiles and rates of consequences indicating individuals in the *Moderate Depression* profiles reported experiencing more consequences than *Mild Depression* profiles, despite having similar drinking patterns. Further, the study identified differences between the four profiles on key variables that can be targeted by interventions to reduce risky drinking related behaviors (i.e., drinking motives, normative perceptions, and protective behavioral strategies). These findings suggest the importance of assessing and addressing depressive symptoms among college students in order to reduce rates of risky drinking and alcohol-related consequences.

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References

- Agrawal A, Lynskey MT, Madden PAF, Bucholz KK, Heath AC. A latent class analysis of illicit drug abuse/dependence: results from the National Epidemiological Survey on Alcohol and Related Conditions. *Addiction*. 2007; 102(1):94–104. [PubMed: 17207127]
- Akaike H. A new look at the statistical model identification. *IEEE Trans Autom Control*. 1974; 19(6): 716–723.
- Asparouhov T, Muthén B. Auxiliary variables in mixture modeling: Using the BCH method in Mplus to estimate distal outcome model and an arbitrary secondary model. *Mplus Web Notes*. 2014; 21:1–22.
- Baer JS, Stacey A, Larimer ME. Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol*. 1991; 52(6):580–586. [PubMed: 1758185]
- Bakk Z, Oberski D, Vermunt J. Relating latent class assignments to external variables: Standard errors for correct inference. *Political Analysis*. 2014; 22:520–540.
- Bakk Z, Vermunt JK. Robustness of stepwise latent class modeling with continuous distal outcomes. *Structural Equation Modeling: A Multidisciplinary Journal*. 2016; 23:20–31.
- Beck, AT., Steer, RA., Brown, GK. *Manual for the Beck Depression Inventory–II*. San Antonio, TX: Psychological Corp; 1996.
- Benton SL, Schmidt JL, Newton FB, Shin K, Benton SA, Newton DW. College student protective strategies and drinking consequences. *Journal of Studies on Alcohol*. 2004; 65(1):115–121. [PubMed: 15000510]

- Boden JM, Fergusson DM. Alcohol and depression. *Addiction*. 2011; 106(5):906–14. [PubMed: 21382111]
- Borsari B, Carey KB. Peer influences on college drinking: A review of the research. *Journal of Substance Abuse*. 2001; 13(4):391–424. [PubMed: 11775073]
- Borsari B, Carey KB. Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol*. 2003; 64(3):331–341. [PubMed: 12817821]
- Carey KB, Correia CJ. Drinking motives predict alcohol-related problems in college students. *Journal of Studies on Alcohol*. 1997; 58(1):100–105. [PubMed: 8979218]
- Cherpitel CJ, Borges GL, Wilcox HC. Acute alcohol use and suicidal behavior: a review of the literature. *Alcoholism: Clinical and Experimental Research*. 2004; 28(s1):18S–28S.
- Christiansen H, Griffiths KM, Jorm AF. Delivering interventions for depression by using the internet: Randomised controlled trial. *BMJ*. 2004; 328(7434):265. [PubMed: 14742346]
- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology*. 1985; 53(2):189–200. [PubMed: 3998247]
- Conner KR, Bagge CL, Goldston DB, Ilgen MA. Alcohol and suicidal behavior: what is known and what can be done. *American Journal of Preventive Medicine*. 2014; 47(3):S204–S208. [PubMed: 25145740]
- Cooper M. Motivations for alcohol use among adolescents: Development and validation of a four factor model. *Psychological Assessment*. 1994; 6(2):117–128.
- Cooper M, Frone MR, Russell M, Mudar P. Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality & Social Psychology*. 1995; 69(5):990–1005. [PubMed: 7473043]
- de Graaf R, Bijl RV, Spijker J, Beekman AT, Vollebergh WA. Temporal sequencing of lifetime mood disorders in relation to comorbid anxiety and substance use disorders—findings from the Netherlands Mental Health Survey and Incidence Study. *Social Psychiatry and Psychiatric Epidemiology*. 2003; 38(1):1–11. [PubMed: 12563553]
- Dimeff, LA., Baer, JS., Kivlahan, DR., Marlatt, G. Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach. New York, NY US: Guilford Press; 1999.
- Geisner IM, Kirk JL, Mittmann A, Kilmer JR, Larimer ME. College students' perceptions of depressed mood: Exploring accuracy and associations. *Professional Psychology: Research and Practice*. 2015a; 46(5):375–383.
- Geisner IM, Mallett K, Kilmer JR. An examination of depressive symptoms and drinking patterns in first year college students. *Issues in Mental Health Nursing*. 2012; 33(5):280–287. [PubMed: 22545634]
- Geisner IM, Kirk JL, Mittmann A, Kilmer JR, Larimer ME. College students' perceptions of depressed mood: Exploring accuracy and associations. *Professional Psychology: Research and Practice*. 2015a; 46:375–383. DOI: 10.1037/pro0000039
- Geisner IM, Varvil-Weld L, Mittmann A, Mallett K, Turrissi R. Brief web-based intervention for college students with comorbid risky alcohol use and depressed mood: Does it work and for whom? *Addictive Behaviors*. 2015b; 42:36–43. [PubMed: 25462652]
- Hasin DS, Grant BF. Major depression in 6050 former drinkers: Association with past alcohol dependence. *Archives of General Psychiatry*. 2002; 59(9):794–800. [PubMed: 12215078]
- Hussong AM, Galloway CA, Feagans LA. Coping motives as a moderator of daily mood drinking covariation. *Journal of Studies on Alcohol*. 2005; 66(3):344–353. [PubMed: 16047523]
- Hussong AM, Hicks RE, Levy SA, Curran PJ. Specifying the relations between affect and heavy alcohol use among young adults. *Journal of Abnormal Psychology*. 2001; 110(3):449–461. [PubMed: 11502088]
- Kessler RC, Crum RM, Warner LA, Nelson CB, Schulenberg J, Anthony JC. Lifetime co-occurrence of DSM-III-R alcohol abuse and dependence with other psychiatric disorders in the National Comorbidity Survey. *Archives of General Psychiatry*. 1997; 54(4):313–321. [PubMed: 9107147]
- Klein MC, Chung H. The College Breakthrough Series—Depression (CBS-D) project: Transforming depression care on college campuses—Part II. *Action Newsletter*. 2008; 47(3&4):1–10.

- Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. *Clinical Psychology Review*. 2005; 25(7):841–861. [PubMed: 16095785]
- LaBrie JW, Lac A, Kenney SR, Mirza T. Protective behavioral strategies mediate the effect of drinking motives on alcohol use among heavy drinking college students: Gender and race differences. *Addictive Behaviors*. 2011; 36(4):354–361. [PubMed: 21215529]
- Lanza ST, Collins LM, Lemmon DR, Schafer JL. PROC LCA: A SAS procedure for latent class analysis. *Structural Equation Modeling: A Multidisciplinary Journal*. 2007; 14(4):671–694. [PubMed: 19953201]
- Lau-Barraco C, Linden-Carmichael AN, Braitman AL, Stamates AL. Identifying patterns of situational antecedents to heavy drinking among college students. *Addiction Research & Theory*. 2016; 24:431–440. <http://doi.org/10.3109/16066359.2016.1153077>. [PubMed: 28163666]
- Lewis MA, Neighbors C. Gender-specific misperceptions of college-student drinking norms. *Psychology of Addictive Behaviors*. 2004; 18(4):334–339. [PubMed: 15631605]
- Lewis MA, Rees M, Logan DE, Kaysen DL, Kilmer JR. Use of drinking protective behavioral strategies in association to sex-related alcohol negative consequences: The mediating role of alcohol consumption. *Psychology of Addictive Behaviors*. 2011; 24(2):229–238.
- Mallett KA, Marzell M, Scaglione N, Hultgren B, Turrissi R. Are all alcohol and energy drink users the same? Examining individual variation in relation to alcohol mixed with energy drink use, risky drinking and consequences. *Psychology of Addictive Behaviors*. 2014; 28(1):97–104. [PubMed: 23528198]
- Mallett KA, Turrissi R, Cleveland M, Scaglione NM, Reavy R, Sell NM, Varvil-Weld L. A dual process examination of alcohol-related consequences among first-year college students. *Journal of Studies on Alcohol and Drugs*. 2015; 76(6):862–871. [PubMed: 26562594]
- Martens MP, Ferrier AG, Cimini MD. Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol and Drugs*. 2007; 68(1):106–114. [PubMed: 17149524]
- Martens MP, Ferrier AG, Sheehy MJ, Corbett K, Anderson DA, Simmons A. Development of the Protective Behavioral Strategies Survey. *Journal of Studies on Alcohol*. 2005; 66(5):698–705. [PubMed: 16329461]
- Martens MP, Martin JL, Hatchett ES, Fowler RM, Fleming KM, Karakashian MA, Cimini MD. Protective behavioral strategies and the relationship between depressive symptoms and alcohol-related negative consequences among college students. *Journal of Counseling Psychology*. 2008b; 55(4):535–541. [PubMed: 22017560]
- Martens MP, Neighbors C, Lewis MA, Lee CM, Oster-Aaland L, Larimer ME. The roles of negative affect and coping motives in the relationship between alcohol use and alcohol-related problems among college students. *Journal of Studies on Alcohol and Drugs*. 2008a; 69(3):412–419. [PubMed: 18432384]
- Merrill JE, Read JP. Motivational pathways to unique types of alcohol consequences. *Psychology of Addictive Behavior*. 2010; 24(4):705–711.
- Merrill JE, Reid AE, Carey MP, Carey KB. Gender and depression moderate response to brief motivational intervention for alcohol misuse among college students. *Journal of Consulting and Clinical Psychology*. 2014; 82(6):984–992. [PubMed: 24865872]
- Merrill JE, Wardell JD, Read JP. Drinking motives in the prospective prediction of unique alcohol-related consequences in college students. *Journal of Studies on Alcohol and Drugs*. 2014; 75(1): 93–102. [PubMed: 24411801]
- Murphy JG, Dennhardt AA, Skidmore JR, Borsari B, Barnett NP, Colby SM, Martens MP. A randomized controlled trial of a behavioral economic supplement to brief motivational interventions for college drinking. *Journal of Consulting and Clinical Psychology*. 2012; 80(5): 876–886. [PubMed: 22663899]
- Muthén, LK., Muthén, BO. *Mplus User's Guide*. Eighth. Los Angeles, CA: Muthén & Muthén; 1998–2017.
- Neighbors C, Walters S, Lee CM, Vader A, Vehige T, Szigethy T, DeJong W. Event-specific prevention: Addressing college student drinking during known windows of risk. *Addictive Behaviors*. 2007; 32(11):2667–2680. [PubMed: 17616260]

- Neighbors C, Lee CM, Lewis MA, Fossos N, Walter T. Internet-based personalized feedback to reduce 21st-birthday drinking: A randomized controlled trial of an event-specific prevention Intervention. *Journal of Consulting and Clinical Psychology*. 2009; 77:51–63. [PubMed: 19170453]
- Neilson EC, Gilmore AK, Pinsky HT, Shepard ME, Lewis MA, George WH. The use of drinking and sexual assault protective behavioral strategies: Associations with sexual victimization and revictimization among college women. *Journal of Interpersonal Violence*. 2015; Advance online publication. doi: 10.1177/0886260515603977
- Nock MK, Hwang I, Sampson NA, Kessler RC. Mental disorders, comorbidity and suicidal behavior: results from the National Comorbidity Survey Replication. *Molecular Psychiatry*. 2010; 15(8): 868–876. [PubMed: 19337207]
- Paljarvi T, Koskenvuo M, Poikolainen K, Kauhanen J, Sillanmaki L, Makela P. Binge drinking and depressive symptoms: a 5-year population-based cohort study. *Addiction*. 2009; 4(7):1168–78.
- Perkins HW. Stress-motivated drinking in collegiate and postcollegiate young adulthood: Life course and gender patterns. *Journal of Studies on Alcohol*. 1999; 60(2):219–227. [PubMed: 10091960]
- Perkins HW. Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol Suppl*. 2002; 14:164–172.
- Prince MA, Carey KB, Maisto SA. Protective behavioral strategies for reducing alcohol involvement: A review of the methodological issues. *Addictive Behaviors*. 2013; 38(7):2343–2351. [PubMed: 23584196]
- Reavy R, Cleveland MJ, Mallett KA, Scaglione NM, Sell NM, Turrissi R. An examination of the relationship between consequence-specific normative belief patterns and alcohol-related consequences among college students. *Alcoholism: Clinical and Experimental Research*. 2016; 40(12):2631–2638.
- Rubin DB. Inference and missing data. *Biometrika*. 1976; 63(3):581–592.
- Saunders JB, Aasland OG, Babor TF, de la Fuente JR. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: II. *Addiction*. 1993; 88(6):791–804. [PubMed: 8329970]
- Scaglione NM, Hultgren BA, Reavy R, Mallett KA, Turrissi R, Cleveland M, Sell NM. Do students use contextual protective behaviors to reduce alcohol-related sexual risk? Examination of a dual-process decision-making model. *Psychology of Addictive Behaviors*. 2015; 29(3):733–743. [PubMed: 26415062]
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. *Psychological Methods*. 2002; 7(2):147–177. [PubMed: 12090408]
- Schwartz GE. Estimating the dimension of a model. *The Annals of Statistics*. 1978; 6(2):461–464.
- Sihvola E, Rose RJ, Dick DM, Pulkkinen L, Marttunen M, Kaprio J. Early-onset depressive disorders predict the use of addictive substances in adolescence: a prospective study of adolescent Finnish twins. *Addiction*. 2008; 103(12):2045–2053. [PubMed: 18855807]
- Spitzer RL, Kroenke K, Williams JBW, the Patient Health Questionnaire Primary Care Study Group. Validation and utility of a self-report version of PRIME-MD: the PHQ Primary Care Study. *JAMA*. 1999; 282(18):1737–1744. [PubMed: 10568646]
- Stewart SH, Loughlin HL, Rhyno E. Internal drinking motives mediate personality domain-drinking relations in young adults. *Personality and Individual Differences*. 2001; 30(2):271–286.
- Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services. Results from the 2007 National Survey on Drug Use and Health: National Findings. Office of Applied Statistics; Rockville, MD: 2008. (Report No NSDUH Series H-34, DHHS Publication No. SMA 08-4343)
- Tabachnick, BG., Fidell, LS. Using multivariate statistics. 5th. New York, NY: Pearson; 2012.
- Treloar H, Martens MP, McCarthy DM. The Protective Behavioral Strategies Scale-20: improved content validity of the Serious Harm Reduction subscale. *Psychological Assessment*. 2015; 27(1): 340–6. DOI: 10.1037/pas0000071 [PubMed: 25558969]
- Turrissi R, Jaccard J, Taki R, Dunnam H, Grimes J. Examination of the short-term efficacy of a parent intervention to reduce college student drinking tendencies. *Psychology of Addictive Behaviors*. 2001; 15(4):366–372. [PubMed: 11767270]

- Varvil-Weld L, Mallett KA, Turrise R, Abar CC. Using parental profiles to predict membership in a subset of college students experiencing excessive alcohol consequences: Findings from a longitudinal study. *Journal of Studies on Alcohol and Drugs*. 2012; 73(3):434–443. [PubMed: 22456248]
- Varvil-Weld L, Mallett KA, Turrise R, Cleveland MJ, Abar CC. Are certain college students prone to experiencing excessive alcohol-related consequences? Predicting membership in a high-risk subgroup using pre-college profiles. *Journal of Studies on Alcohol and Drugs*. 2013; 74(4):542–551. [PubMed: 23739017]
- White HR, Labouvie EW. Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol*. 1989; 50(1):30–37. [PubMed: 2927120]

Highlights

- Latent profile analysis was used to classify participants into distinct profiles
- Four distinct patterns of alcohol use and level of depressed mood emerge
- Significant differences between profiles and rates of consequences were found

Figure 1.

Total for coping motives, protective behavioral strategies, depressive symptoms, weekly drinking, descriptive drinking norms and peak drinking for each student profile

Figure 2.
Mean for each of the RAPI subscales for each student profile

Table 1**RAPI Consequence Subscales**

Subscale	Items	Alpha
Academic		$\alpha=.79$
	Not able to do your homework or study for a test?	
	Went to work or school high or drunk?	
	Neglected your responsibilities?	
Driving		$\alpha=.87$
	Missed a day (or part of a day) of school or work?	
	Drove shortly after having more than two drinks?	
	Drove shortly after having more than four drinks?	
Loss of Control		$\alpha=.82$
	Felt that you needed more alcohol than you used to use in order to get the same effect?	
	Noticed a change in your personality?	
	Felt that you had a problem with alcohol?	
	Tried to cut down or quit drinking?	
	Kept drinking when you promised yourself not to?	
Withdrawal		$\alpha=.74$
	Had withdrawal symptoms, that is, felt sick because you stopped or cut down on drinking?	
	Passed out or fainted suddenly?	
	Felt physically or psychologically dependent?	
Social		$\alpha=.85$
	Got into fights, acted bad, or did mean things?	
	Caused shame or embarrassment to someone?	
	Relative avoided you?	
	Had a fight, argument or bad feelings with a friend?	
	Had a fight, argument or bad feelings with a family member?	
	Was told by a friend or neighbor to stop or cut down drinking?	

Table 2

LPA model fit indices

Number of Profiles	AIC	BIC	bLRT	Entropy Value	Entropy Value
1	12407.87	12452.75	–	–6191.94	–
2	12195.55	12266.60	226.33 *	–6078.77	0.93
3	12097.05	12194.28	112.50 *	–6022.52	0.82
4	12040.01	12163.43	71.03 *	–5987.01	0.79
5	12025.04	12174.64	28.97 *	–5972.52	0.84

Note: AIC = Akaike's Information Criterion; BIC = Bayesian Information Criterion; bLRT = bootstrapped likelihood ratio test

Note 2:

* $p < .05$

Table 3

Means (SE) for depression and alcohol use indicators for the 4-group solution

Indicators	Latent Depression and Drinking Profiles			
	MiDHD (n = 169)	MiDSD (n = 65)	MoDHD (n = 61)	MoDSD (n = 16)
Depression				
Coping Motives	6.75 (0.45)	8.31 (0.79)	14.80 (0.81)	13.28 (1.30)
Depression	9.98 (0.40)	9.77 (0.59)	15.76 (1.48)	18.20 (1.66)
Alcohol Use				
Weekly Drinking	11.49 (0.58)	23.92 (1.62)	18.20 (1.54)	43.21 (2.97)
Peak Drinking	7.58 (0.24)	12.98 (0.77)	9.10 (0.49)	19.58 (1.01)
Protective Behaviors	30.54 (0.86)	25.42 (1.20)	23.74 (2.24)	18.23 (1.29)
Norms	16.91 (0.82)	22.56 (1.48)	16.20 (1.42)	23.28 (2.95)

Note. *SE* = Standard error. MiDHD = Mild Depression, Heavy Drinkers; MiDSD = Mild Depression, Severe Drinkers; MoDHD = Moderate Depression, Heavy Drinkers; MoDSD = Moderate Depression, Severe Drinkers.

Table 4

Means (standard error) for each of the consequence subscales by profile

Latent Depression & Drinking Profiles					χ^2
MiDHD (n=169) 54.3%	MiDSD (n=65) 20.9%	MoDHD (n=61) 19.6%	MoDSD (n=16) 5.1%		
Alcohol-Related Consequences					
RAPI Total	11.55 ^{b,c,d} (.73)	21.45 ^{a,c,d} (1.48)	32.78 ^{a,b,d} (2.65)	49.55 ^{a,b,c} (4.68)	137.30 ^{**}
Academic	2.82 ^{b,c,d} (.20)	5.35 ^{a,d} (.45)	6.49 ^{a,d} (.61)	9.93 ^{a,b,c} (1.03)	88.43 ^{**}
Driving	3.4 ^{b,c,d} (.07)	9.9 ^a (.20)	9.0 ^a (.23)	1.80 ^a (.51)	20.19 ^{**}
Loss of Control	2.62 ^{b,c,d} (.21)	5.68 ^{a,c,d} (.50)	8.62 ^{a,b,d} (.78)	11.81 ^{a,b,c} (1.32)	116.90 ^{**}
Withdrawal	5.3 ^{b,c,d} (.10)	1.26 ^{a,c,d} (.22)	2.76 ^{a,b,c} (.39)	5.02 ^{a,b,c} (.80)	62.11 ^{**}
Social	2.32 ^{b,c,d} (.21)	3.40 ^{a,c,d} (.40)	6.49 ^{a,b,d} (.74)	10.39 ^{a,b,c} (1.46)	56.91 ^{**}

Note 1. MiDHD = Mild Depression, Heavy Drinkers; MiDSD = Mild Depression, Severe Drinkers; MoDHD = Moderate Depression, Heavy Drinkers; MoDSD = Moderate Depression, Severe Drinkers.

Note 2. The χ^2 represent the overall test results (Wald tests), which were produced using the BCH approach;

^{**} $p < .001$.

Note 3.

^a = Mean difference as compared to the MiDHD profile;

^b = Mean difference as compared to the MiDSD profile;

^c = Mean difference as compared to the MoDHD profile;

^d = Mean difference as compared to the MoDSD profile $p < 0.05$.