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Development and Initial Validation of a Measure of Motives for Pregaming in College Students

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Abstract

Objective—Pregaming (i.e., drinking alcohol prior to going out) is a common and risky drinking practice on college campuses. Yet, little is known about what motivates students to pregame as no motives measure exists specifically targeting pregame. The current study describes the development and initial validation of a measure to assess motives for pregame and to evaluate associations between these motives and pregame behavior.

Method—In a multi-stage process using three different college samples, both qualitative (i.e., focus groups) and quantitative methods were used to derive the Pregaming Motives Measure (PGMM). After initial item generation (Stage I: N=43, 74% male) and refinement with exploratory factor analysis (Stage II: N=206, 61% male), a confirmatory factor analysis was performed to establish the structure of the PGMM (Stage III: N=321, 34% male). The pattern of associations of the derived factors, pregame behavior, and general drinking motives were explored to provide evidence for initial construct validity. Last, the indirect effect of pregame motives on alcohol problems via pregame behavior was assessed.

Results—Findings indicated that the PGMM differed both in content from general drinking motives and that the PGMM items generated load on factors labeled Inebriation/Fun, Instrumentality, and Social Ease. Moreover, the Inebriation/Fun and Instrumentality motives were

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Contributors

Authors Read and Bytschkow designed and implemented Studies 1 and 2 while authors Read, Bachrach and Merrill designed Study 3. Author Bachrach wrote the manuscript and authors Bachrach, Merrill, and Bytschkow undertook the statistical analyses. Author Read made meaningful contributions to the outlining and editing of the manuscript and all authors have approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest relevant to this study or the publication of these findings.

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significantly associated with pregaming behavior. PGMM motives also both directly and indirectly predicted alcohol-related consequences.

Conclusions—Findings corroborate other data on pregaming, suggesting that this behavior may be driven by desires for quick inebriation and conviviality and related to problems only via increased drinking. The PGMM offers targeted assessment of pregaming and other social drinking behavior that can lead to deleterious outcomes.

Keywords

Pregaming; drinking motives; alcohol consequences; college students

1. Introduction

Heavy drinking in college students is common (Johnston, O'Malley, Bachman, & Schulenberg, 2009; Wechsler & Nelson, 2008), and has been depicted by *Healthy People 2020* as a major national health problem (U.S. Department of Health and Human Services, 2010). Approximately 85% of college students report drinking each year and almost half (48%) report that drinking to get drunk is an important reason for drinking (O'Malley & Johnston, 2002; Wechsler et al., 2002).

Recently, researchers have begun to investigate specific drinking practices that might be linked to harmful alcohol use in college. Among these is “pregaming” (or “pre-partying”; DeJong & DeRicco, 2007; Pedersen & LaBrie, 2007; Read, Merrill, & Bytschkow, 2010). Pregaming is defined as consuming alcohol in a short period of time prior to going out (e.g., Borsari et al., 2007). Data from several recent studies show clearly that pregaming is a common practice on U.S. campuses, with about 2/3 of college drinkers engaging in this behavior (Borsari et al., 2007; Pedersen & LaBrie, 2007; Read et al., 2010). Moreover, drinking occasions involving pregaming have been linked to greater consumption of alcohol (Pedersen & LaBrie, 2007; Read et al., 2010); higher blood alcohol content (BAC; Borsari et al., 2007; Read et al., 2010); as well as more alcohol-related problems (Zamboanga, Schwartz, Ham, Borsari, & Van Tyne, 2010). In short, pregaming practices increase college students' susceptibility to potentially harmful drinking consequences.

Due to the ubiquity of pregaming, and the risk of deleterious effects associated with this behavior, there is a need to understand factors that motivate students to pregame. Various theories assert that reasons (motives) for drinking are important in the initiation and perpetuation of drinking (Cooper, 1994; Cox & Klinger, 1988). According to Cooper, “people drink in order to attain certain valued outcomes” and drinking that is “motivated by different needs or serving different functions is characterized by unique patterns of antecedents and consequences” (p. 117). For example, research has linked coping motives (drinking to relieve negative affect) to heavy alcohol use and consequences (Cooper, Frone, Russell, & Mudar, 1995; Hussong, Hicks, Levy, & Curran, 2001; Merrill & Read, 2010). In contrast, research has yielded mixed results (either indirect or no effects) when assessing the influence of social and enhancement motives on alcohol-related problems (Merrill & Read, 2010; Read, Wood, Kahler, Maddock, & Palfai, 2003). As such, different motivations will lead to different outcomes and thus will represent different clinical implications. Interventions designed to reduce drinking in college students (e.g., BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999) may benefit from an understanding of the motivations behind specific types of risky college alcohol use. Brief validated assessments of pregaming behavior and its motivations would facilitate the delivery of such feedback. As such, the development of such an assessment was the purpose of the present study.

1.1. Structure of Drinking Motives

Cox and Klinger (1988) proposed that drinking motives could be represented along two dimensions: valence (positive versus negative) and source (internal versus external). These two dimensions translate into four different motivational outcomes. That is, one could be motivated to: (1) drink to enhance one's mood/well-being (Positive, Internal); (2) to obtain positive social gains (Positive, External); (3) to reduce negative affect (Negative, Internal); or (4) to avoid social rejection (Negative, External). These four motivational factors were what Cooper (1994) used as the basis for the development of the Drinking Motives Questionnaire (DMQ; four factors: Enhancement, Social, Coping, and Conformity). As the theory proposed, Cooper (1994) found that each factor was associated with different types of alcohol outcomes. For instance, social motives were associated with drinking at parties and celebrations while coping motives were associated with drinking alone and drinking problems. Moreover, research has differentially linked these motives to alcohol problems both directly and indirectly (e.g., Cooper et al., 1995; Merrill & Read, 2010). Thus, it is clear that motivations for drinking are an important link in understanding the initiation and maintenance of alcohol use and problems.

What is less clear is the extent to which general drinking motives may adequately predict the initiation and maintenance of unique types of alcohol use. In the present study, we were particularly interested in factors which motivate pregaming behavior. To our knowledge, only two studies have examined motivations for pregaming in college students. In the first of these, Read et al. (2010) administered the DMQ to 159 college student drinkers, two-thirds of whom endorsed pregaming. The authors found that though DMQ motives predicted general drinking quantity and frequency, none of these motives were significantly associated with quantity of alcohol consumed during pregaming or BAC on pregaming days. Only enhancement motives were associated (marginally) with pregaming frequency. The Read et al. findings were generally convergent with earlier findings from Pedersen and LaBrie (2007) who found that only social motives predicted pregaming frequency, while none of the general drinking motives were associated with pregaming *quantity*. Moreover, in a sample of high school students, Zamboanga et al. (2011) did not find a relationship between the DMQ and pregaming behavior. Thus, two conclusions can be made from these studies. First, it appears that the broad domain of drinking motives as conceptualized by Cox and Klinger (1988) may not fully predict the motivation to engage in pregaming. Second, of the motives that are related to pregaming behavior in college, both are positive in affective valence. This is important, as it suggests that pregaming might be only motivated by positive (rather than negative) reinforcement.

There has been some preliminary work seeking to identify reasons for pregaming in college students. In two independently conducted studies, Read et al. (2010) and Pedersen, LaBrie, and Kilmer (2009) found that pregamers identified practicality (e.g., to save money, to obtain alcohol easier) and conviviality/enhancement reasons (e.g., makes one more sociable, to have fun) as the most commonly endorsed explanations for engaging in pregaming. This, again, is in contrast to general drinking motives that posit that individuals drink not only for enhancement, but for coping and conformity purposes. Moreover, because situational factors seem to be a motivator, pregaming may be an activity that is context-dependent. For example, students under the age of 21 might be motivated to pregame in order to drink alcohol before going to a party where they cannot be served. On the other hand, students might be motivated to pregame in order to make the final destination more fun (e.g., sporting events or events that will not be serving alcohol), or in order to relax and "loosen up" before arriving at the final event. Such scenarios would not be well-predicted by coping or conformity motives. Therefore, the distinction between general drinking motives and pregaming motives is important as it can provide insight into the differential reasons

students are motivated to drink in specific drinking contexts – especially those associated with heavy drinking behavior.

As discussed above, the identification of motivations that are specific to risky drinking practices will be highly relevant to prevention efforts designed to better understand and reduce harmful drinking on college campuses. In the present study, we sought to develop and provide initial validation for a pregaming motives measure. We also sought to understand how these pregaming motives may differ from more general drinking motives in the prediction of pregaming behavior.

1.2. The Current Study

The present study followed a multi-stage procedure for deriving the Pregaming Motives Measure (PGMM). First the aim of Stage I was to develop an initial item pool that reflected a range of motivations for pregaming behavior. In focus groups, a list of common reasons for pregaming was generated by college student pregamers, and an initial item pool was generated based on frequency of endorsement and prior literature. The objectives of Stage II were to refine (Aim 1) and reduce (Aim 2) the item bank based on exploratory factor analysis (EFA) in a subsequent sample of self-identified pregamers. EFA factor solutions were evaluated in order to arrive at the most parsimonious and interpretable model. Last, in Stage III, the goals were to provide additional item refinement and to confirm the identified structure of the motives measure based on confirmatory factor analysis (CFA) in a third independent sample of pregamers (Aim 1). We also sought to provide evidence for construct validation regarding the pregaming motives' relationship to pregaming behavior, general drinking motives, and alcohol-related problems (Aim 2). The indirect effects of pregaming motives on alcohol problems via pregaming behavior was tested in order to assess whether pregaming motives directly or indirectly predicted alcohol consequences. A priori hypotheses are described below when applicable. All study procedures were approved by the ethics review board and each participant signed informed consent detailing the objectives of each study. 2.

2. Method

2.1. Stage I: Item Development and Generation: Focus Groups

2.1.1. Stage I Aims—Stage I consisted of qualitative methods for item development of the pregaming motives measure.

2.1.2. Participants—Forty-three students (74% male; 79% White; $M_{age} = 19$) recruited from introductory psychology classes were asked to participate in a focus group on pregaming behavior. To be eligible, students had to report pregaming at least 3-4 times in the previous year and drink at least once in the past month. Students received course credit for participation.

2.1.3. Procedure—Five focus group sessions were conducted with approximately eight individuals and 1-2 facilitators per group. Students were prompted with open-ended questions about pregaming behavior (e.g., “What are your reasons for pregaming?”, “What are the benefits to pregaming?”, “When you pregame, how drunk (if at all) do you intend to get?”) and encouraged to discuss for approximately 45 minutes. The sessions were videotaped and research assistants coded the tapes for items reflecting motivation to pregame. If a reason for pregaming was mentioned, it was coded as a frequency of 1. If that reason generated head nods or other non-verbal agreement by more than half of the focus group, it was coded as having received a second endorsement (i.e., frequency of 2). A comprehensive list of items was compiled and then, based on frequency of endorsement and

prior literature, an initial 31-item Pregaming Motives Measure (PGMM; Bytschkow, 2009) was generated.

2.1.4. Results and Discussion—As can be seen in Table 1, students reported pregameing motives that differed from regular drinking motives, such as financial, alcohol accessibility (practicality), and boredom. Students also frequently provided enhancement-type reasons as motivations to pregame. Consistent with Read et al. (2010) and Pedersen et al. (2009), discussion of pregameing behavior revolved around the instrumental and fun-seeking motivations to drink before going out for the evening. From these discussions, it was apparent that pregameing is a behavior motivated by positive reinforcement. Although some items reflected coping (“to relax”) or conformity (“because of peer pressure”), these were not as commonly endorsed as items reflecting the sociable and fun nature of pregameing.

2.2. Stage II: Preliminary Item Selection, Factor Structure, and Refinement of the PGMM

2.2.1. Stage II Aims—The aims of Stage II were to (1) explore the underlying factor structure of the PGMM and (2) arrive at a final reduced set of items that would comprise the initial PGMM. No a priori predictions were made regarding possible number of factors.

2.2.2. Participants—Students (N=206) in introductory psychology classes who identified themselves as “pregamers” (pregamed at least once in the past year) in a mass testing session were invited to take part in Stage II. Forty-eight percent of the sample were freshmen, 27% sophomores, 20% juniors, and 5% seniors. The average age was 19 ($SD = 1.2$). Sixty-one percent were male and 80% were White. Students received course credit for participation.

2.2.3. Measures

2.2.3.1 Pregaming Behavior: Pregaming frequency during the mass testing session was assessed with a single-item. Students were given the following definition of pregameing: “Drinking prior to going out for the night, or before a function starts” and asked, based on that definition, how often they had pregameed in the past year. Response options were 1 (*never in the past year*), 2 (*at least once in the past year, but less than every month*), 3 (*at least once per month, but less than every week*), 4 (*once per week*), and 5 (*more than once per week, 2 or more occasions weekly*).

2.2.3.2 Pregaming Motives: The 26 items generated from Stage I formed the first iteration of a 31-item PGMM. Some motives were broken up into separate items (e.g., to loosen up or become more social/outgoing/less anxious) to ensure each item was measuring a different facet of pregameing motivations. As noted above, the item content was diverse, and included financial, practical, social, enhancement, coping, and conformity motives. Participants were asked: “When you pregame, how often would you say that you pregameed for each of the following reasons?” Response options were as follows: 1 (*almost never/never*), 2 (*some of the time*), 3 (*half of the time*), 4 (*most of the time*) and 5 (*all of the time*). Internal consistency was good ($\alpha = .89$).

2.2.4. Procedure—Participants were invited into the lab and completed the PGMM in cohorts of approximately 10 students. An operational definition of pregameing (see above) was provided.

2.2.5. Data Analysis—We conducted a series of EFAs in Mplus 6.11 (Muthén & Muthén, 2010) with factor solutions ranging from one and five factors to assess the factor structure of the initial PGMM item pool. Because items on the PGMM are categorical (i.e., on an ordinal

scale), their distributions are inherently non-normal. To handle this non-normality, we employed Mplus' mean and variance adjusted weighted least-squares (WLSMV) estimation method which is appropriate for ordinal items. As we anticipated that factors would be intercorrelated due to similarity in content, we specified an oblique Geomin rotation in Mplus. Geomin rotation was chosen as it offers a desirable compromise between factor complexity and interpretability (Sass & Schmitt, 2010).

2.2.6. Results and Discussion

2.2.6.1. Pregaming and PGMM Descriptives: All 206 participants endorsed pregameing at least once in the past year, and all but one endorsed pregameing at least once per month. There was substantial variability in the frequency of endorsement of the PGMM items. The average rating for any given pregameing motive was 2.7, meaning that on average, participants endorsed a given reason either "some of the time" and/or "half of the time."

2.2.6.2. Factor structure of the PGMM: Conducting an EFA using WLSMV estimation allows for the use of standard model fit statistics in model selection. Multiple complementary fit indices were used to evaluate individual model fit (Hu & Bentler, 1999). Specifically we focused on the root mean square error of approximation (RMSEA) and its 90% confidence interval (CI), comparative fit index (CFI), and the Tucker-Lewis index (TLI). These indices augment each other in providing information about model fit (i.e., absolute fit, fit relative to a null model, fit adjusting for model parsimony); used together, these indices provide a more conservative and reliable test of the solution (Brown, 2006). Values of $> .95$ for the CFI and TLI, and $< .05$ for the RMSEA were considered evidence of good model fit, whereas values of $> .90$ and $< .08$ for the RMSEA were considered evidence of acceptable model fit (Bentler, 1990; Hu & Bentler, 1999). Selection among good fitting models was based on interpretability.

The EFA suggested that both a 3- and a 4-factor solution fit the data well. For the 3-factor solution, the RMSEA (.07; CI = .06-.08), CFI (.92) and TLI (.90) all suggested acceptable model fit. A similar picture emerged for the 4-factor solution with all fit indexes in the acceptable range (RMSEA = .06; CI = .06-.07; CFI = .94; TLI = .92). Upon examination of the factor loadings, however, only 4 items loaded on the 4th factor, all of these items had prominent cross-loadings (i.e., factor loadings of .40 or higher on two factors), and only one had its primary loading on the 4th factor. Therefore, a 3-factor solution was determined to provide the most parsimonious and interpretable model. Examination of items loading on each factor indicated that the factors could best be described as: Inebriation/Fun; Instrumental; and Social Ease. In order to reduce measure length (being mindful of the importance of brevity in intervention settings), fifteen items were retained: five items from each of the three factors that loaded both highly on their respective factor and represented breadth of content. Internal consistency was good for both the overall scale ($\alpha = .83$) as well as for each of the proposed factors: Inebriation/Fun ($\alpha = .77$), Instrumental ($\alpha = .70$) and Social Ease ($\alpha = .82$).

In sum, consistent with previous work (e.g., Read et al., 2010), a large proportion of participants endorsed social relaxation (i.e., to loosen up; Social Ease) and inebriation (i.e., to get drunk; Inebriation/Fun) reasons for pregameing. This is congruent with past research that consistently has found that college drinking and pregameing are social in nature (Cooper, Russell, Skinner, & Windle, 1992; Read et al., 2003). However, the PGMM assesses other potentially important pragmatic and functional reasons for pregameing (i.e., alcohol availability; Instrumental) of which the DMQ does not measure. The results of Stage II gave confidence that the current PGMM aided in understanding why college students engage in pregameing and the content structure of these reasons. This new shortened measure was then

ready for administration to a larger sample of college student pregamers (Stage III) to both confirm the underlying factor structure and validate its content with relevant measures of alcohol behavior.

2.3. Stage III: Confirmatory Factor Structure, Item Modification, and Validation

2.3.1. Stage III Aims and Hypotheses—The aims of Stage III were: (1) to confirm the factor structure of the refined 15-item PGMM in an independent sample and (2) to establish initial validity of the measure. It was hypothesized that the pregaming motives would be associated with pregaming behavior. Following prior work (Read et al., 2010; Pedersen & LaBrie, 2007), it was expected that the Social and/or Enhancement factors from the DMQ would be associated with pregaming behavior, as this type of drinking is thought to be more social in nature (DeJong & DeRicco, 2007). However, it was also expected that all three pregaming motive factors would predict pregaming behavior above and beyond general drinking motives. It was further hypothesized that pregaming motives would predict alcohol-related consequences, but that this relationship would be mediated by pregaming behavior. That is, because pregaming motives seem to be more positive in affective valence, research would suggest that they might lead to problem drinking outcomes only through increased drinking (in this case, pregaming; e.g., Merrill & Read, 2010).

2.3.2. Participants—College students ($N = 725$) who were part of an ongoing longitudinal web-based study assessing factors which contribute to substance use in college (see Read et al., 2011) were administered the PGMM along with the DMQ and other indices of pregaming and general alcohol behavior. Of these 725, 44% ($N = 321$) had pregamed in the past month (66% female; 84% White; $M_{age} = 21$ [$SD = .22$]). Participants were compensated with gift cards to local retailers (e.g., Target, Starbucks) for their participation. All subsequent analyses were run on the 321 pregaming students.

2.3.3. Measures

2.3.3.1. Pregaming Frequency and Quantity (PGQF): The term “pregaming” was defined (see Stage II). Students were then asked about past-month frequency and quantity consumed while pregaming. The frequency question read: “In the past 30 days, on the times that you went out drinking, how often would you say that you pregamed?” Response options ranged from “*Never in the Past Month*” (0) to “*Every day*” (6). The quantity question asked: “In the past 30 days, how many drinks did you have, on average, on a typical occasion when you pregamed?” Response options ranged from “*Less than one drink*” (0) to “*Nine or more*” (8). Participants reported, on average, pregaming between 2-3 times in the past month and once or twice per week. Participants reported consuming an average of 3-4 drinks during a pregaming episode. Consistent with Wood, Read, Palfai, and Stevenson (2001), the frequency and quantity items were multiplied together to form an index of typical pregaming behavior in the past month. Students endorsing pregaming “at least once in the past month” or more were then administered the PGMM.

2.3.3.2. Pregaming Motives Measure (PGMM): Participants completed the new 15-item PGMM described in Stage II. In addition, because the Instrumental factor was deemed to lack breadth of content (as most items revolved around alcohol’s unavailability) one item was added based on literature confirming the interpersonal and social nature of pregaming (Pedersen et al., 2009). The new item reflected sexual motives (“It helps me ‘hook up’ [i.e., get together sexually with someone else]”). In addition, one existing item (“Alcohol is not available at the event”) was perceived to be highly redundant with the retained items (see Table 3 for a list of the retained items) and thus was dropped.

2.3.3.3. Alcohol Frequency and Quantity: Again, consistent with Wood et al. (2001), general alcohol use was measured with items regarding typical quantity and frequency of alcohol consumption per week in a past one month interval. The frequency question asked: “Think of all the times in the past month when you had something to drink. How often have you had some kind of beverage containing alcohol?” Response options ranged from “*Never in the past month*” (0) to “*Every day*” (6). The quantity question read: “In the past month, when you were drinking alcohol, how many drinks did you *usually* have on any ONE occasion?” Response options ranged from “*Didn’t drink in the past month*” (0) to “*Nine or more total drinks*” (10). On average, participants drank 1-2 times per week, consuming approximately 5-6 drinks per occasion. A quantity by frequency index was computed to reflect typical past-month drinking.

2.3.3.4. Drinking motives: The Drinking Motive Questionnaire (DMQ; Cooper, 1994) is a 20-item measure used to assess motives for general alcohol use. As noted above, the items factor into four subscales: Social, Coping, Enhancement, and Conformity. Response options ranged from 1 (*Almost never/never*) to 5 (*All of the time*). Items were summed to form the four DMQ subscales.

2.3.3.5. Alcohol Consequences: The 48-item Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006) was used to assess past-month alcohol consequences. Eight subscales that assess a range of outcomes load on a single, higher-order factor. The eight subscales include: Social/Interpersonal; Academic/Occupational; Risky Behavior; Impaired Control; Poor Self-Care; Diminished Self-Perception; Blackout Drinking; and Physiological Dependence. Response options are dichotomous (yes/no). Subscale items were summed for a total number representing past-month consequences. Participants reported experiencing an average of 7.45 unique consequences in the past month ($SD = 8.29$).

2.3.4. Data Analysis—We conducted a series of confirmatory factor analyses (CFAs) to determine whether our exploratory results from Stage II could be validated in this independent sample. Although our primary aim was to test the hypothesized three factor structure, we additionally specified a 1- and 2-factor structure as comparison models. CFA models were conducted in Mplus using the WLSMV estimator given the ordinal nature of the items. We specified the hypothesized 3-factor oblique modes by assigning items to the factors based on their largest loadings from Stage II as well as the a priori placements of the new item to the Instrumental factor. For the comparison models, the 1-factor solution allowed all items to freely load on a single factor, whereas the 2-factor solution was based on an alternative structure associated with social motives versus inebriation motives. Finally, we evaluated an additional 3-factor model with 2 cross-loadings based on the modification indexes. As with our EFA analyses, we used multiple fit indices to evaluate our model (i.e., RMSEA, CFI, TLI).

Following the CFA modeling, bivariate correlations were run in order to assess whether the PGMM and its factors were related to pregaming behavior (frequency and quantity of pregaming), typical alcohol use, motives for general drinking, and alcohol-related consequences. Hierarchical regressions were also run to assess whether the PGMM and its factors predicted pregaming behavior over and above the DMQ. Last, multivariate mediation analyses were performed using bias corrected 95% bootstrap confidence intervals (Preacher & Hayes, 2008) in Mplus to assess whether pregaming behavior mediated the PGMM and alcohol-related consequences.

2.3.5. Results and Discussion

2.3.5.1. CFA Results: Model fit results from the CFAs are presented in Table 2. As can be seen in the table, both 3-factor models provided generally acceptable to good fit as was hypothesized. The 1- and 2-factor comparison models did not fare well in terms of fit. The 3-factor model allowing two items to cross-load (“To get drunk at a more accelerated pace” and “To start the night earlier”) evidenced a noticeable increase in fit, and highlights that the two items are related to both Inebriation/Fun and Instrumental motives. Standardized factor loadings and the final list of items from this CFA can be seen in Table 3. Notably, the newly added item (“It helps me “hook up” [i.e., get together sexually with someone else]”) loaded well on the Instrumental factor, and thus was retained in the final measure. Given the anticipated preference for parsimony when using measures in practice, and based on the model fit, we chose to conduct further analyses using scales calculated based on the simple 3-factor structure (i.e., without cross-loadings).

2.3.5.2. Convergent and Discriminant Validity: Bivariate Analyses: PGMM inter-scale correlations revealed that associations among the factors were strong but not overlapping, suggesting that each taps a different facet of pregameing motivation and evidences good discriminant validity (see Table 4 for correlations, means and alphas for each scale). Bivariate correlations also revealed evidence for convergent validity: all PGMM subscales were significantly related to past 30-day pregameing behavior (PGQF), past 30-day typical alcohol quantity by frequency (alcohol QF), alcohol-related problems (YAACQ), and all four DMQ subscales. As predicted, correlations showed that the relationship between the PGMM subscales and PGQF was slightly stronger than the relationship between the DMQ subscales and PGQF (particularly the Inebriation/Fun scale) providing further evidence for discriminant validity. Interestingly, Inebriation/Fun was most strongly related to both PGQF and typical alcohol QF, while Social Ease was slightly more related to alcohol consequences. Again, this is consistent with other literature that has found that college students motivated to drink based on reducing stress or anxiety are more likely to report alcohol problems (Geisner, Larimer, & Neighbors, 2004). Relatedly, of all motives assessed, the DMQ Coping subscale showed the strongest relationship with alcohol-related problems.

2.3.5.3. Convergent and Discriminant Validity: Multivariate Analyses: To assess whether PGMM factors uniquely predicted PGQF, a regression was conducted by entering the individual Inebriation/Fun, Instrumental, and Social Ease scales in the same step.¹ Moreover, due to the overrepresentation of females in the sample (and because men often report consuming more alcohol than women) gender was controlled for in all subsequent models. The results revealed that both the Inebriation/Fun and Instrumental subscales significantly predicted PGQF ($\beta = .38, p < .01$; $\beta = .15, p = .01$) while Social Ease did not ($\beta = -.09, p = .16$; Model $R^2 = .22$). Thus, Social Ease motives do not uniquely predict *how much/how often* one might pregame when controlling for other pregameing motives. Gender was also a significant predictor ($\beta = .20, p < .01$) of pregameing behavior, indicating that men reported pregameing more often/more frequently than women.

In order to test whether pregameing motives predicted PGQF above and beyond general drinking motives, hierarchical regression was conducted by entering all four DMQ subscales in the first step and all three PGMM subscales and gender in the second step. This revealed that Enhancement was the only DMQ scale to significantly predict PGQF ($\beta = .22, p = .01$; Model $R^2 = .09$); however, when gender and PGMM subscales were entered in step two, this effect became non-significant and Inebriation/Fun and Instrumental were the only subscales

¹Multicollinearity was tested in all regression models, as some study variables correlated quite highly with each other. Collinearity statistics revealed that the Variance Inflation Factor (VIF) was always in the acceptable range (never above 6.00).

to predict PGQF ($\beta = .35, p < .01$; $\beta = .16, p = .01$, respectively; Model $R^2 = .22$). Gender was also still a significant predictor of PGQF ($\beta = .20, p < .01$). Thus, though both Enhancement and Inebriation/Fun assess positive reinforcement reasons for drinking, the PGMM Inebriation/Fun subscale is a better predictor of pregaming behavior. Moreover, it appears that the Instrumental factor, arguably the scale most divergent from the DMQ, uniquely predicts PGQF above and beyond general drinking motives.

2.3.5.4. Convergent and Discriminant Validity: Mediation Analysis: Last, we tested whether PGQF mediated the relationship between pregaming motives and alcohol-related consequences controlling for gender. We employed a path model calculating both the direct and indirect effects of all three pregaming motive factors through PGQF and total consequences. Indirect effects were tested for significance using bias corrected bootstrapping in Mplus. Several advantages of using this approach to test mediation have been noted elsewhere (no assumption of multivariate normality, greater power in detecting effects; e.g., Preacher & Hayes, 2008). Results of this model, including standardized path coefficients, can be found in Figure 1. The model revealed that both Instrumental and Inebriation/Fun motives significantly predicted PGQF and in turn, PGQF significantly predicted alcohol consequences. The indirect effect for Instrumental motives was significant ($\beta = .06, p = .03$, 95% Confidence Intervals [C.I.] = .01-.11) as was the indirect effect for Inebriation/Fun ($\beta = .15, p < .001$, 95% C.I. = .09-.21). Moreover, the direct effects from Instrumental and Inebriation/Fun on consequences were nonsignificant. Thus, pregaming behavior significantly mediated the relationship between Instrumental and Inebriation/Fun motives. Social Ease motives did not significantly predict PGQF but did significantly predict consequences (indirect effect on consequences was $\beta = -.04, p = .22$, 95% C. I. = -.10-.02). These results reveal that pregaming behavior accounts for the relationship between certain pregaming motives and alcohol-related consequences; more specifically, it appears that if one is motivated to pregame in order to get intoxicated quickly and/or to ensure that alcohol is drunk before going out, more alcohol will be consumed and this will lead to alcohol-related problems. On the other hand, students motivated to pregame in order to reduce social awkwardness/anxiety will not necessarily drink more during the pregaming episode but will report experiencing more alcohol-related consequences. Thus, the type of drinking these students are engaging in (i.e., to relieve emotional stress and not necessarily the *amount*) might be what accounts for this relationship.

3. General Discussion

We took a three step approach to construct, refine, and validate a motives measure for pregaming behavior in college student drinkers. First, focus groups were conducted to generate a list of reasons for pregaming. Second, a larger sample was recruited to assess the underlying factor structure of the pregaming motives measure. Third, the factor structure was confirmed and the motives' relationship to relevant constructs of interest were assessed. Results revealed that pregaming motives differed from general drinking motives, that the motives generated load on factors best captured by the labels Inebriation/Fun, Instrumentality, and Social Ease; and that some of these motives are significantly associated with pregaming behavior and either directly or indirectly predict alcohol-related problems.

As was predicted, the items generated in the focus groups and from prior literature suggested that pregaming motives differed from general drinking motives. First, reasons for pregaming were heavily based on positive affect (Inebriation/Fun) and practicality (Instrumental). Although the DMQ similarly has items based on positive affect, these comprise only half of this measure. The other items represent coping and conformity motives – both of which are negative in emotional valence. This is consistent with Cox and Klinger's (1988) 4-dimensional drinking motives model; however, this 4-dimensional model does not seem to

best capture motivations to pregame. Pregaming appears to be geared toward quick inebriation and enhancement of social occasions. Therefore, a measure that assesses these aspects of drinking will best predict pregame behavior. This was apparent when Inebriation/Fun and Instrumentality predicted pregame behavior above and beyond general drinking motives, importantly the Enhancement factor from the DMQ.

Thus, there is clearly something unique about the motivations behind pregame behavior. As noted, the conviviality of pregame is an important reason for this behavior. This might also be why the Social Ease factor predicted pregame behavior bivariately but not in a multivariate context. Social Ease reasons for pregame may explain *why* one would engage in this behavior but do not necessarily predict *how much* or *how often*. Future research is needed to evaluate whether there are aspects of pregame behavior (e.g., under which circumstances) that are uniquely associated with Social Ease motivations.

Finally, our mediation model examined whether pregame behavior explained the association between pregame motives and alcohol consequences. We found support for a significant indirect effect with both Inebriation/Fun and Instrumental motives, suggesting that pregame behavior explains the association between these motives and alcohol-related problems. Social Ease directly predicted problems, indicating that students who pregame to regulate stress might not pregame more frequently or in large quantities but are still experiencing the detriments of this type of drinking. Both of these effects (indirect and direct) highlight a potential pathway to problem drinking that could be targeted in intervention.

Limitations of the present study should be noted. First, although different samples across the three stages of measurement development were assessed, all samples came from the same mid-size public northeastern university. Though rates of drinking in the CFA sample (Stage III) map onto other studies assessing heavy college drinkers (e.g., Wechsler & Nelson, 2008), providing some evidence of generalizability, further validation of the PGMM will need to be conducted in other campus environments. For example, pregame motives might differ between ethnic groups, which we were unable to test here. Moreover, testing the moderating role of gender using a multi-group SEM approach would be an interesting next step. However, tests for gender invariance were not necessarily appropriate for the present study as the sample size for males in Stage III were small compared to females (leading to possibly unstable parameter estimates). Second, our studies were cross-sectional. Thus, the predictive validity of the PGMM cannot be determined. Future studies assessing longitudinal patterns of college drinking behavior might consider assessing pregame motives' ability to predict both future pregame and harmful drinking behavior. Our mediation analyses should be assessed with this in mind. Third, validity data were based on self-report. Issues of social desirability or worries about confidentiality are always a concern with this modality. Last, gender distribution was uneven in each stage, with more men in Stages I and II and more women in Stage III. Ideally, representation of each gender would have been equal throughout each study. However, the fact that the CFA confirmed our expected factor structure despite these gender differences only serves to strengthen the robustness of the structure.

The current findings suggest that pregame is a distinct drinking behavior that is motivated by unique reasons not previously considered in the literature. Future research can further validate the PGMM using different college-aged samples (e.g., freshmen versus seniors), student subtypes (e.g., Greek versus non-Greek members), and college environments (e.g., private versus public institutions). The most beneficial research will likely further address whether pregame motives and pregame behavior confer risk (such as health, legal, and academic problems) and whether these motives and risks are similar across various

institutions (e.g., schools with alcohol-friendly tailgating policies versus schools with bans on alcohol tailgating events). Moreover, early interventions for reductions in harmful college student drinking might benefit from assessing and addressing pregameing and its motivations to help reduce the likelihood that students will experience deleterious outcomes associated with this behavior. It is possible that interventions could incorporate discussion of pregameing behaviors and motivations, while offering tips on protective behavioral strategies in order to curb the amount of alcohol consumed during this portion of the evening.

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Highlights

>We develop and validate a pregaming motives measure in 3 college student samples.
>We examine this measure's relationship with relevant alcohol indices. >Three factors underlie pregaming motives: Inebriation/Fun, Instrumental, Social Ease. >Factors predict pregaming behavior above and beyond general drinking motives. >Factors both directly and indirectly predict alcohol-related consequences.

Figure 1. Direct and Indirect Effects Model with Standardized Path Coefficients

Note. INSTRU = Instrumental motives factor; SOC EASE = Social Ease motives factor; INEB = Inebriation/Fun motives factor; PGQF = Pregaming quantity X frequency; CONS = Past 30-day alcohol-related consequences. Although not drawn in the figure, all exogenous variables were correlated. *** $p < .000$, ** $p < .01$, * $p < .05$

Table 1**Frequently Endorsed Focus Group-Generated Reasons for Pregaming: Stage I**

1	To save money
2	To loosen up or become more social/outgoing/less anxious
3	To get a buzz or to get drunk before going out
4	To have fun
5	To waste/pass time before going to the event
6	To socialize or hang out with friends/to bond before event
7	Because it warms you up before walking to the event in cold weather
8	Because you are underage and cannot otherwise obtain alcohol at the event
9	To celebrate a special occasion (e.g., birthday, accomplishment, end of semester, etc.)
10	Because there will not be alcohol at the event
11	To get drunk at a more accelerated pace
12	Because everyone else is pregameing
13	To become excited about going out
14	To relax
15	To drink before a sporting event
16	Fraternities do not supply enough alcohol at parties
17	Because you don't like the alcohol provided at the event
18	Because you have no reason not to
19	To make a boring/unfavorable event seem fun
20	So you do not have to drive to the event
21	To start the night earlier
22	To put you in a good mood before the event
23	To make an awkward situation at the event easier to deal with
24	Because of peer pressure
25	Because it often involves playing drinking games
26	To establish a group of people to watch out for each other at the event

Note. Reasons are listed from most to least frequently endorsed.

Table 2

Summary of Confirmatory Factor Analysis Model Fit: Stage III

	<i>df</i>	χ^2	$\chi^2 p$	CFI	TLI	RMSEA
Model 1	90	897.95	< .001	0.82	0.78	0.167
Model 2	89	789.57	< .001	0.84	0.81	0.157
Model 3	87	354.36	< .001	0.94	0.93	0.098
Model 4	85	254.55	< .001	0.96	0.95	0.079

Note. N = 321. *df* = degrees-of-freedom; χ^2 = WLSMV Chi-Square; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.
Model 1 = 1-factor model.
Model 2 = 2-factor model.
Model 3 = 3-factor model.
Model 4 = 3-factor model allowing items 6 and 9 to cross-load.

Table 3
Standardized Factor Loadings and Inter-Factor Correlations from the 3-Factor Solution of the 15-item PGMM

PGMM Item	PGMM Factors		
	Inebriation/Fun	Social Ease	Instrumental
14. To have fun	0.84		
6. To start the night earlier	0.78		
9. To get drunk at a more accelerated pace	0.75		
11. To socialize with friends	0.74		
3. To get buzzed before going to the event	0.65		
4. To become more social before going to the event		0.94	
15. To loosen up before going to the event		0.86	
7. To feel less anxious at the event		0.78	
1. To make an awkward situation at the event easier to deal with		0.74	
10. Because you are stressed		0.64	
13. Because there will not be enough alcohol at the event			0.82
12. Fraternities do not supply enough alcohol at parties			0.80
8. It helps me "hook up" (i.e., get together sexually with someone else)			0.76
2. Because you are underage and cannot otherwise obtain alcohol at the event			0.72
5. Because you don't like the alcohol provided at the event			0.71
PGMM Inter-Factor Correlations			
Inebriation/Fun	1.00		
Social Ease	.67	1.00	
Instrumental	.53	.60	1.00

Note. Items are numbered based on order of the 15-item PGMM. Factor loadings presented are from the CFA model where items were not allowed to cross-load.

Table 4

Means, Scale Internal Consistencies, and Bivariate Correlations from Stage III

Scales	1	2	3	4	5	6	7	8	9	10	Mean	SD	α
1. Inebriation/Fun	--										3.06	.92	.82
2. Instrumental	.38**	--									1.53	.67	.78
3. Social Ease	.55**	.49**	--								2.20	.91	.85
4. PGQF	.40**	.27**	.20**	--							7.79	6.76	--
5. Alcohol QF	.36**	.15**	.19**	.70**	--						17.75	9.61	--
6. YAACQ	.28**	.16**	.30**	.43**	.52**	--					7.45	8.29	.94
7. Social	.71**	.17**	.49**	.26**	.28**	.27**	--				16.68	4.90	.90
8. Coping	.34**	.35**	.60**	.12*	.13*	.38**	.41**	--			9.44	4.32	.88
9. Enhancement	.64**	.21**	.43**	.29**	.35**	.31**	.73**	.43**	--		13.74	4.81	.84
10. Conformity	.26**	.44**	.42**	.12*	.08	.29**	.32**	.41**	.25**	--	8.17	3.47	.82

Note. Inebriation/Fun = Pregaming inebriation subscale; Instrumental = Pregaming instrumental subscale; Social Ease = Pregaming social ease subscale; PGQF = Pregaming quantity by frequency over the past 30 days; Alcohol QF = Typical past 30-day alcohol quantity by frequency; YAACQ = Young Adult Alcohol Consequences Questionnaire (average number of consequences experienced over the past 30 days); Social = Drinking Motives Questionnaire (DMQ) Social subscale; Coping = DMQ Coping subscale; Enhancement = DMQ Enhancement subscale; Conformity = DMQ Conformity subscale.

* $p < .05$,

** $p < .01$.