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Validation of a Seven-Factor Structure for the Motives for Playing Drinking Games Measure

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Abstract

Playing drinking games can be characterized as a high-risk drinking activity because games are typically designed to promote heavy alcohol consumption. While research suggests that young adults are motivated to play drinking games for a variety of reasons (e.g., for thrills/fun, for the competition), the Motives for Playing Drinking Games measure has received limited empirical attention. We examined the psychometric properties of this measure with a confirmation sample of young adults recruited from Amazon's MTurk (N = 1,809, ages 18-25 years, 47% men; 41% not currently enrolled in college) and a validation sample of college students (N = 671; ages 18-23 years; 26% men). Contrary to the 8-factor model obtained by Johnson and Sheets in a study published in 2004, examination of the factor structure with our confirmation sample yielded a revised 7-factor model that was invariant across race/ethnicity and college student status. This model was also validated with the college student sample. In the confirmation sample, enhancement/thrills and sexual pursuit motives for playing drinking games were positively associated with gaming frequency/consumption and negative gaming consequences. Furthermore, conformity motives for playing drinking games were positively associated with negative gaming consequences, while competition motives were positively associated with gaming frequency. These findings have significant implications for research and prevention/intervention efforts.

Keywords

drinking games, drinking motives, alcohol use, MTurk

A drinking game is a social activity that consists of performing some type of cognitive and/or motor task according to rules that are designed to encourage intoxication (Zamboanga et al., 2013). The prevalence of drinking games participation among college-attending young adults is relatively high (for review, see Zamboanga et al., 2014). For instance, almost half of the college students participating in a large multisite study reported having played a drinking game at least once during the past year (Grossbard, Geisner, Neighbors, Kilmer, & Larimer, 2007). Given that drinking games lend themselves to rapid alcohol consumption and increased intoxication, it is not surprising that participation in this activity has been linked to negative alcohol-related consequences as measured by general indices of negative drinking consequences (e.g., Grossbard et al., 2007; Zamboanga et al., 2010). The ubiquity of drinking games behavior on college campuses and its associated health risks warrants a better understanding of young adults' motives for engaging in this high-risk behavior.

Motivational Conceptualizations of Drinking

Motivational conceptualizations of drinking posit that an individual's reasons for drinking are the most proximal predictor of alcohol use, and thus serve as the "final common pathway" through which other secondary influences, like alcohol expectancies (i.e., anticipated effects of alcohol consumption) and sociocultural/environmental factors (e.g., social norms around drinking), are mediated (Kuntsche, Knibbe, Gmel, & Engels, 2005, p. 842). In support of motivational theory, drinking motives have been widely associated with actual alcohol use among adolescents and young adults (Cooper, Kuntsche, Levitt, Barber, & Wolf, 2016; Kuntsche et al., 2005; Kuntsche et al., 2014). Theory and research also suggest that different types of drinking motives are associated with distinct drinking behaviors (Cooper, 1994). In their review of the drinking

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motives literature, Kuntsche et al. (2005) reported that social motives were linked to moderate levels of alcohol use, whereas enhancement motives were associated with heavy alcohol use and, to some extent, negative drinking consequences. In addition, coping motives were associated with heavy alcohol use and negative drinking consequences. Cooper et al. (2016) reported similar findings in their recent review, also noting inconsistent and modest associations between conformity motives and alcohol use and negative drinking consequences.

Far fewer studies have investigated the association between general drinking motives (e.g., measured with the Drinking Motives Questionnaire [DMQ]; Cooper, 1994) and specific high-risk drinking behaviors such as drinking games. Research with high school (Tomaso et al., 2015; Van Tyne, Zamboanga, Ham, Olthuis, & Pole, 2012) and college students (Sheehan, Lau-Barraco, & Linden, 2013) has found links between general drinking motives (particularly social and enhancement drinking motives) and drinking games behavior. Nagoshi, Wood, Cote, and Abbit (1994) found that celebratory and pathological reasons for drinking were positively related to drinking game frequency and consumption, and Boekeloo, Novik, and Bush (2011) found a positive association between endorsing the motive "drinking to get drunk" and alcohol use in the context of a drinking game among incoming college students. While these findings shed light on the association between general drinking motives and drinking games behavior, they are limited in that they do not focus on motives that are specific to playing drinking games. The field of alcohol research has moved increasingly toward assessing motives that are unique to a specific drinking context (e.g., pregaming/prepartying: Bachrach, Merrill, Bytschkow, & Read, 2012; LaBrie, Hummer, Pedersen, Lac, & Chithambo, 2012) or population (e.g., student athletes: Martens, Watson, Royland, & Beck, 2005) rather than relying solely on general drinking motives. Close examination of specific motives that are unique to drinking games could shed light on additional motivational factors that increase drinking gamers' risk for participation in this activity. This knowledge, in turn, may greatly enhance current intervention and prevention efforts addressing drinking games.

Johnson and colleagues developed (Johnson, Hamilton, & Sheets, 1999) and revised (Johnson & Sheets, 2004) the only existing measure that assesses motives for playing drinking games, which we will refer to as the Motives for Playing Drinking Games (MPDG) measure. The MPDG was originally validated with a sample of 287 college students (42% male; 89% White). Using exploratory (principal components) analysis, Johnson and Sheets (2004) extracted eight factors. These factors include conformity (e.g., "Because other people are playing them"), competition/thrills (e.g., "Because I want to win" or "To take a risk"), social lubrication (e.g., "To make it easier to talk to someone"), fun/celebration (e.g., "To liven up a boring party"), coping (e.g., "To forget about problems"), boredom (e.g., "To kill time"), novelty (e.g., "To try something different"), and sexual manipulation (e.g., "To work up the courage to put the moves on someone"). Multivariate regression analyses indicated that certain motives for playing drinking games were uniquely associated with the amount of alcohol consumed while playing drinking games and negative gaming consequences. For instance, competition/thrills and sexual manipulation motives were positively associated with negative gaming consequences (e.g., experiencing a blackout, getting into a fight, and/or being too drunk to give consent for sexual contact), whereas the inverse pattern was found for conformity and novelty motives.

Other studies using the MPDG or other researcher-generated self-report items have also examined drinking game motives and their associations with gaming behaviors. For instance, Johnson and Stahl (2004) found a positive correlation between MPDG sexual manipulation motives and instances of sexual perpetration or victimization from gaming among college students. Research with female college students found that fun/celebration gaming motives (as measured by the MPDG) were positively correlated with levels of intoxication when participating in verbal, ping-pong, card, speed, or coin games (Zamboanga, Calvert, O'Riordan, & McCollum, 2007). In another study, Nagoshi et al. (1994) found that social and intoxication reasons for playing drinking games were positively correlated with frequency of drinking games participation. A recent study by Hone, Carter, and McCullough (2013) found that students who play drinking games to show that they can hold their liquor are at risk for elevated alcohol consumption while playing. Taken together, these findings suggest that endorsing certain motives for playing drinking games are predictive of increased risk for participation, intoxication, and negative gaming consequences.

Young adults play drinking games for a variety of reasons, and as such, a psychometrically sound measure of their motives for doing so would inform future prevention and intervention efforts. Despite the valuable contributions of the aforementioned studies, the literature on drinking motives for drinking games is limited in several ways. First, there has been no attempt to examine the psychometric properties of Johnson and Sheets's (2004) MPDG measure. This is an important next step, as the MPDG was validated with college students who were predominately White and, thus, the measure may not be applicable to non–college students or ethnically diverse populations. Moreover, Johnson and Sheets's (2004) analyses were published over a decade ago and are limited by their exploratory nature and relatively small sample size. A larger, contemporary sample is needed to test the stability of the factor items and to confirm the original factor structure. Second, many studies do not control for participants' typical alcohol use in general or on

other drinking occasions (i.e., when they are *not* playing drinking games) in their analyses. Elevated alcohol consumption is an inherent component of drinking games participation, and thus, involvement in this activity may be characterized as a proxy for heavy alcohol use. Thus, researchers should control for typical alcohol use in order to ascertain the extent to which a given set of independent variables is associated with gaming behaviors, regardless of typical alcohol use. Finally, to our knowledge, very few studies have specifically examined the association between specific motives for playing drinking games and negative gaming consequences (Johnson et al., 1999; Johnson & Sheets, 2004; Johnson & Stahl, 2004), highlighting a problematic gap in the research literature.

Study Aims and Hypotheses

Given the limitations of research examining drinking motives specific to drinking games, the present study had two aims. The primary aim was to examine the psychometric properties of the MPDG (Johnson & Sheets, 2004) by confirming the factor structures of this measure with a large, multiethnic, U.S. sample of college-attending and non-college-attending young adults aged 18 to 25 years, and then validating the original and any new emerging factor structures with a U.S. sample of college students. We used exploratory structural equation modeling (ESEM), a novel methodological–substantive approach, to test the factor structure of the MPDG. This approach considers the specified multifactor structure of the measure by allowing us to test a priori factors while accounting for small cross-loadings that are often present in applied research. We expected to find factor structures and item loadings similar to those reported by Johnson and Sheets (2004). To further examine the psychometric utility of the MPDG for use with other populations of interest, we also conducted factorial invariance tests across gender, race/ethnicity, and college student status.

A secondary aim was to investigate the associations of different types of motives on the MPDG with self-reported drinking game–related behaviors (frequency of drinking games participation, number of drinks consumed while playing drinking games, negative gaming consequences). We examined four hypotheses. First, based on the general drinking motives and drinking game motives literature, we hypothesized that there would be a significant, positive association between the drinking game motives of fun/celebration, competition/thrills, and sexual manipulation with different aspects of gaming behaviors (i.e., frequency, level of consumption, negative consequences). Second, given the social nature of drinking games, we hypothesized that there would be a significant, positive association between social lubrication motives and frequency of drinking games participation. Third, we did not expect social lubrication motives to be associated with the amount of alcohol consumed while gaming or negative gaming consequences because general social drinking motives have been linked with moderate alcohol use (Kuntsche et al., 2005) and Johnson and Sheets (2004) did not find any association between social lubrication motives for playing drinking games and gaming behaviors in their multivariate analyses. Fourth, we did not expect to find any associations between coping motives and gaming behaviors given that drinking to cope is "a relatively solitary activity" (Johnson & Sheets, 2004, p. 98; see also Cooper, 1994), which playing drinking games is not, and that people who drink to cope with negative emotions tend to do so independently and are less likely to put themselves in a social drinking context. Consistent with this postulation, prior research with general drinking motives has shown that (a) coping-motivated drinking is positively associated with drinking at home alone (Cooper, 1994); (b) coping motives are particularly important for predicting nonsocial drinking (O'Hara et al., 2014), and (c) negative social contacts during the day uniquely predict increased drinking at home (vs. away from home) in the evening among coping-motivated drinkers (Mohr et al., 2005). Finally, due to the limited and/or mixed findings in the literature, we did not advance any hypotheses regarding conformity, novelty, and boredom motives and their associations with our outcome variables; instead, we treated these analyses as exploratory.

Method: Confirmation Sample

Participants and Procedure

Participants were recruited from Amazon's Mechanical Turk (MTurk), an online labor market in which individuals are paid to complete online tasks and surveys (Buhrmester, Kwang, & Gosling, 2011). Respondents (N = 1,809, M_{age} = 22.6, SD = 1.86; 47% men; 41% not currently enrolled in college; 76% White, 6.2% Asian American, 7.7 % Hispanic, 7.4% Black, 2.3% Other) completed an online anonymous survey in Qualtrics, which took an average of 10 minutes to complete. In the survey, we defined one drink as equivalent to 12 ounces of beer, one shot of liquor in a mixed drink or straight, or 5 ounces of wine. To be eligible to participate, participants needed to reside in the U.S., be between 18 to 25 years of age, be current drinkers (i.e., drank an alcoholic beverage at least once in the past month), have played a drinking game at least once in the past month, and have a Human Intelligence Task (HIT) approval rate greater than or equal to 95% for all MTurk work. A worker's HIT approval rate indexes the percentage of tasks approved by requesters relative to the number of tasks submitted by the worker. If someone submits unsatisfactory work that is rejected by a requester, her or his HIT rate decreases each time that person's work is rejected.

Once participants accepted the task from the MTurk Website, we directed them to a consent page informing them of their rights as research participants and asked them to check the appropriate boxes indicating that they met all of the eligibility criteria for the study and that they understood the study information. We compensated participants with $0.50 for completing the survey. In order to prevent the same participants from retaking our questionnaire, we assigned each respondent a completion code. Participants whose surveys could not be linked to a unique code entered on MTurk (n = 40), were incomplete (i.e., did not complete 90% or more of the survey; n = 490), or contained discrepant information regarding their age and the year they were born (n = 133); who did not click the consent box or other participant criteria (i.e., must be current drinker and drinker gamer; n = 26); and anyone who reported that they "never" drink alcohol on the survey itself (n = 50) were automatically excluded from the study yielding our data analytic sample of 1,809. The principal investigator's (first author) institutional review board approved the protocols for this study.

Measures

Demographics. Participants reported their age, gender, race/ethnicity, and college student status (i.e., whether or not the participant was currently attending college).

Drinking Games. We used two items from the Hazardous Drinking Game Measure (Borsari et al., 2014) to assess frequency of drinking games participation and the number of drinks consumed while playing drinking games. Participants reported how often they played drinking games in the past 30 days using a 5-point scale (0 = *never*, 1 = *once*, 2 = 2-4 *times a month*, 3 = 2-3 *times a week*, and 4 = *4 or more times a week*) and how many total drinks they typically consumed when playing drinking games using a dropdown response option ranging from 1-15+ drinks.

Negative Gaming Consequences. We modified the items on the Brief Young Adult Alcohol Consequences Questionnaire (Kahler, Strong, & Read, 2005) to measure the extent to which gamers experienced negative alcohol-related consequences that specifically resulted from playing drinking games as opposed to general drinking. For instance, we revised the item "My drinking has gotten me into sexual situations I later regretted" to read "My participation in drinking games has gotten me into sexual situations I later regretted." We dropped one item, "I have felt like I needed a drink after I'd gotten up (i.e., before breakfast)," as it could not be sensically adapted to drinking games. Thus, our revised version of the Brief Young Adult Alcohol Consequences Questionnaire only includes 23 items as opposed to 24. We summed participants' responses to index overall negative gaming consequences (α = .89).

Typical Alcohol Use on Nongaming Occasions. To measure this variable, we revised the three items that comprise the Alcohol Use Disorders Identification Test-Consumption subscale (AUDIT-C; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993) by adding the phrase, "On drinking occasions when you are NOT playing drinking games" to the beginning of each item. For example, we revised the item "How many drinks containing alcohol do you have on a typical DAY when you are drinking?" to "On drinking occasions when you are NOT playing drinking games, how many drinks containing alcohol do you have on a typical DAY when you are drinking?" (adapted AUDIT-C α = .79). To index participants' typical alcohol use when they were not playing drinking games, we summed their responses to these three items.

Motives for Playing Drinking Games. We used the MPDG measure (Johnson & Sheets, 2004) to measure participants' specific motives or reasons for playing drinking games. We presented participants with the following statement: "Please rate how important each of the following questions are when it comes to your personal decision to play drinking games." Respondents then rated the importance of each motive using a 4-point scale (1 = *not at all important*, 2 = *somewhat important*, 3 = *moderately important*, 4 = *very important*). In the original measure, one of the items read as follows: "As a way of expressing interest in the opposite sex." To make this item more neutral with regards to sexuality, we replaced the words "opposite sex" with "someone." Items are listed in the first column of Table 1. Finally, after considering the content of the items, we decided to relabel "sexual manipulation" and named it "sexual pursuit" instead; we believe this new label is more descriptive of the items on this subscale.

Method: Validation Sample

Participants and Procedures

Our validation sample was derived from a larger multisite study on college alcohol use. For the purpose of this study, our data analytic sample consisted of 671 students (ages 18-23 years, M_{age} = 19.46, SD = 1.21; 26.1% men) who were drinkers (as indexed by a score of at least 1 on the AUDIT-C subscale) and who played drinking games, including those who play infrequently (i.e., less than monthly) and those who play regularly (i.e., at least once a month or more). Participants were recruited from eight U.S. colleges/universities, which included three private liberal arts institutions (a women's college and a coeducational college in the Northeast; a coeducational university in the West coast), a public university in the

Table 1. Subscales and Individual Items on the Motives for Playing Drinking Games (MPDG) Measure and Their Relation to the Specified Factors.

	MTurk sample	College sample	College students (N = 287); Original MPDG[1]; PCA	MTurk participants (confirmation sample) (N = 1,809); ESEM		College students (validation sample) (N = 671); ESEM	
Specific item	*M*/*SD*	*M*/*SD*	8 Factor	8 Factor	7 Factor	8 Factor	7 Factor
C1: To blend in with the crowd	1.85/0.91	1.50/0.74	Conformity 1	X	X	X	X
C2: To fit in	1.77/0.91	1.51/0.75	Conformity 2	X	X	X	X
C3: Because I don't want to feel left out	1.83/0.88	1.52/0.75	Conformity 3	X	X	X	X
C4: Because other people are playing them	2.22/0.93	2.10/0.92	Conformity 4	X	X	X	X
C5: Because I am afraid I will look silly if I don't	1.47/0.78	1.17/0.47	Conformity 5	X	X	X	X
CT1: For the competition	2.19/1.03	1.86/1.02	Competition/Thrills 1	X	r-Competition 1	X	r-Competition 1
CT2: To avoid having to talk to somebody one-on-one	1.46/0.76	1.19/0.54	Competition/Thrills 2	Did not load[a]	Dropped	Did not load	Dropped
CT3: To get practice at that game	1.77/0.93	1.76/0.90	Competition/Thrills 3	X	r-Competition 3	X[b]	r-Competition 3
CT4: Because I want to win	1.98/1.03	2.10/1.13	Competition/Thrills 4	X	r-Competition 4	X	r-Competition 4
CT5: To take a risk	1.72/0.90	1.75/0.91	Competition/Thrills 5	Did not load[b]	Dropped	Did not load[b]	Dropped
CT6: To just go wild	2.14/1.05	2.14/1.02	Competition/Thrills 6	Did not load[b,c]	r-Enhancement/Thrills 6	Did not load[b,c]	r-Enhancement/Thrills 6
CT7: To see the reactions of others when their inhibitions are lowered	1.92/0.95	1.74/0.89	Competition/Thrills 7	Did not load[b]	Dropped	Did not load[b]	Dropped
SL1: As a way of getting to know other people	2.35/0.92	2.39/0.96	Social Lubrication 1	X	X	X	X
SL2: To make it easier to talk to someone	1.99/0.94	1.88/0.93	Social Lubrication 2	X[a]	X[d]	X	X[e]
SL3: To meet interesting people	2.10/0.95	2.00/0.95	Social Lubrication 3	X	X	X	X
SL4: To learn things about others	2.06/0.93	2.07/0.94	Social Lubrication 4	X	X	X	X
SL5: As a way of expressing interest in someone[2]	1.84/0.94	1.49/0.76	Social Lubrication 5	X	X[e]	Did not load[f]	Did not load[f]
ET1: To get drunk	2.49/1.04	2.55/1.03	Fun/Celebration 1	X[b]	r-Enhancement/Thrills 1	X	r-Enhancement/Thrills 1
ET2: To get a buzz	2.54/0.94	2.56/0.89	Fun/Celebration 2	X[b]	r-Enhancement/Thrills 2	X	r-Enhancement/Thrills 2
ET3: Because they are fun	3.15/0.90	3.27/0.80	Fun/Celebration 3	X	r-Enhancement/Thrills 3	X	r-Enhancement/Thrills 3
ET4: To liven up a boring party	2.86/0.95	2.73/0.87	Fun/Celebration 4	X	r-Enhancement/Thrills 4	X	r-Enhancement/Thrills 4
ET5: To have a good laugh	3.18/0.84	3.26/0.77	Fun/Celebration 5	X	r-Enhancement/Thrills 5	X	r-Enhancement/Thrills 5
CP1: To relax	2.61/0.95	2.24/0.99	Coping 1	Did not load[g]	Dropped	X[h]	Dropped
CP2: To forget about problems	1.79/0.98	1.50/0.81	Coping 2	X[g]	Dropped	X[h]	Dropped
CP3: To feel better about myself	1.50/0.81	1.25/0.59	Coping 3	X[g]	Dropped	X[h]	Dropped
B1: To kill time	2.08/0.91	1.69/0.82	Boredom 1	X[i]	X	X	X
B2: When there is nothing else to do	2.42/0.94	2.45/0.97	Boredom 2	X[c,i]	X	X	X
B3: Because I don't know what else to do for fun	1.57/0.83	1.42/0.76	Boredom 3	X[c]	X	X	X
N1: Because it is a new experience	2.15/0.96	1.95/0.92	Novelty 1	X	X	X	X
N2: To try something different	2.20/0.90	2.44/0.87	Novelty 2	X	X	X	X
N3: Because it is a more exciting way to drink	2.67/0.98	2.62/0.91	Novelty 3	Did not load[c]	r-Enhancement/Thrills 7	Did not load[c]	r-Enhancement/Thrills 7
SP1: In order to have sex with someone	1.38/0.76	1.10/0.39	Sexual Manipulation 1	r-Sexual Pursuit 1	r-Sexual Pursuit 1[j]	r-Sexual Pursuit 1[j]	r-Sexual Pursuit 1[j,k]
SP2: As a way to get a date	1.44/0.77	1.16/0.45	Sexual Manipulation 2	r-Sexual Pursuit 2	r-Sexual Pursuit 2[j]	r-Sexual Pursuit 2[j]	r-Sexual Pursuit 2[j,k]
SP3: To work up the courage to put the moves on someone	1.48/0.81	1.22/0.51	Sexual Manipulation 3	r-Sexual Pursuit 3	r-Sexual Pursuit 3[j]	r-Sexual Pursuit 3[j]	r-Sexual Pursuit 3[j,k]

Note. [1]Johnson and Sheets (2004); [2]Participants in the validation sample (college students) were given the item that contained the original wording of this question; response items on the MPDG range from 1 to 4; X = item loaded on intended factor; r = renamed; PCA = principal components analysis; ESEM = exploratory structural equation modeling.
[a]Cross-loaded on the Boredom factor. [b]Cross-loaded on the Coping factor. [c]Cross-loaded on the Fun and Celebration factor. [d]Cross-loaded on the Conformity factor. [e]Cross-loaded on the Sexual Pursuit factor. [f]Loaded on Sexual Pursuit factor. [g]Three items from the Competition and Thrills (CT5, CT6, and CT7) factor and two items from the Fun and Celebration (FC1 and FC2) factor cross-loaded on this factor. [h]Four items from the Competition and Thrills (CT3, CT5, CT6, and CT7) factor and one item from the Fun and Celebration factor (FC2) cross-loaded on this factor. [i]One item from the Competition and Thrills (CT2) factor and one item from the Social Lubrication (SL2) factor loaded on this factor. [j]One item from the Social Lubrication (SL5) factor cross-loaded on this factor. [k]One item from the Social Lubrication (SL2) factor cross-loaded on this factor.

Southeast, and four private religious-affiliated liberal arts institutions (one women's college and one men's university in the Midwest; one coeducational university and college in the Northwest and the South, respectively). The sample consisted of White (69%), Asian American (8%), Hispanic (3%), Black (2%), and Other (18%), which includes students of mixed ethnic/racial backgrounds.

The methods for data collection at the various sites were similar in that participants were recruited from psychology classes and were asked to complete a college alcohol use survey[1] that included the MPDG, standard AUDIT-C, and two questions regarding drinking game behaviors (Zamboanga et al., 2010): frequency of participation (0 = *I Don't Play Drinking Games*, 1 = *less than once a month*, 2 = *once a month*, 3 = *two to three times a month*, 4 = *once a week*, 5 = *two to three times a week*, 6 = *four to five times a week*, 7 = *daily or nearly daily*) and number of drinks consumed during a typical drinking game (1 = *one drink*, 2 = *two drinks*, 3 = *three to four drinks*, 4 = *five to six drinks*, 5 = *seven or more drinks*).

Following provision of informed consent, participants completed the survey in one of two ways. In the first method, students signed up to fill out the questionnaire in a research lab under the supervision of a trained research assistant. In the second method, questionnaires were distributed to students by a research assistant at the start of an on-campus psychology course with the permission of the professor. Students returned completed questionnaires to the next class meeting. Given the sensitive nature of some of the items, we informed participants that their responses would be kept confidential and that no identifying information would be found on their surveys. Students were compensated for participation by receiving course credit or extra credit at the discretion of the instructor. Each study site's institutional review board approved the study protocols, and the principal investigator's (first author) institution approved survey testing at the other sites.

Data Analytic Plan

We conducted data analyses in four stages: ESEM and confirmatory factor analysis (CFA) of the MPDG using the confirmation sample (Stage 1); replication of the factor structure using the validation sample (Stage 2); testing measurement invariance (MI) across gender, college status, and race/ethnicity using the confirmation sample (Stage 3); and testing a primary ESEM of the associations between drinking game motives and drinking game behaviors/consequences using the confirmation and the validation sample (Stage 4). Stages 1, 2, and 3 correspond with the primary study aim (i.e., to examine and confirm the psychometric properties of the MPDG), and Stage 4 corresponds with our secondary aim (i.e., to investigate how specific motives for playing drinking games are associated with drinking games behavior and negative gaming consequences).

Stage 1

To examine and confirm the factor structure of Johnson and Sheets's (2004) MPDG, we took a methodological–substantive approach that integrated confirmatory and exploratory factor analysis (EFA) into an ESEM (Asparouhov & Muthén, 2009). This ESEM theory-driven approach allows us to test a priori hypotheses about the factor structure of a measure, such as confirming the factor structure of Johnson and Sheets's (2004) MPDG, while allowing for small cross-loadings (Marsh et al., 2009; Marsh et al., 2010; Marsh, Morin, Parker, & Kaur, 2014). Within this framework, all psychometric tests typically used in a CFA model evaluation are available, but item cross-loadings are not fixed to zero, because this is too restrictive for multidimensional constructs (McCrae, Zonderman, Costa, Bond, & Paunonen, 1996) and can improperly inflate true population latent factor correlations (Asparouhov & Muthén, 2009).

We examined the confirmation sample factor structure with both the CFA and ESEM frameworks to confirm the appropriateness of our modeling approach (Marsh et al., 2009; Morin & Maïano, 2011). Marsh, Nagengast, Morin, and Von Davier (2013) suggest using an ESEM approach if an ESEM model fits the data better than a CFA model, as the CFA model can distort the number of factors or the associations among factors. Given these considerations, we first tested the CFA a priori factor structure by specifying an 8-factor structure based on Johnson and Sheets's (2004) findings (see Table 1 for the subscales and items associated with each factor). Then, we estimated the a priori ESEM model following Marsh et al.'s (2009; Marsh, Nagengast, et al., 2011; Marsh, Liem, Martin, Morin, & Nagengast, 2011) recommendation to use an oblique geomin rotation and an epsilon value of .5, with the factor specification set to eight. After the two models were compared, the model fit, factor correlations, and individual items were closely examined and the factor structure of the MPDG was reevaluated through a series of EFA (1- to 8-factor factor structures) using oblique geomin rotation (see online supplementary tables for item loadings, available online at http://journals.sagepub.com/doi/suppl/10.1177/1073191117701191). Once a revised factor structure was obtained, CFA and ESEM were conducted again with the confirmation sample to assess the new factor structure.[2]

Stage 2

In the case that our Stage-1 analyses identified discrepancies between our identified factor structure and Johnson and Sheets's (2004) 8-factor solution, we thought it would be important to validate our findings. In particular, as any proposed changes to the factor structure would be based on a diverse sample that included both college attending and non–college attending young adults, we sought to validate

our findings with a sample that was comparable with that of Johnson and Sheets's (2004) original college sample. Following the same procedures outlined for Stage 1, we planned to conduct an 8-factor CFA and ESEM analysis and subsequent CFA and ESEM with any other relevant factor structures using our validation college sample (see Supplementary Table S4 for EFA–SEM analyses).

Stage 3

After we validated the factor structure for the measure, we tested for MI across gender, college status, and race/ethnicity with our confirmation sample following the sequence outlined by Marsh et al.'s (2009) 13-model taxonomy for MI for ESEM models.

Stage 4

We ran two separate ESEMs. For the confirmation sample, we tested a model that examines the drinking game motives factors and their associations with frequency of drinking games participation, drinking games consumption, and negative gaming consequences while controlling for typical alcohol use on nondrinking gaming occasions (in order to isolate the unique effects of drinking game motives on gaming behaviors and related consequences) and age. For the validation sample, we tested a model that examines the drinking game motives factors and their relations with frequency of drinking games participation and consumption while controlling for alcohol use in general and age. We controlled for age in both samples because prior research with college students suggests that younger students participate in drinking games more often than older students (Zamboanga et al., 2014).

We ran all models with Mplus 7.13 (Muthén & Muthén, 1998-2012) with maximum likelihood with robust standard errors (MLR) as the estimation method, as it is robust to violations of nonnormality. We used the full-information MLR estimator to correct for small amounts of missing data present at the item level (0.1% to 0.9%; $M_{missing}$ = 0.45%; $SD_{missing}$ = 0.23%; Enders, 2010). Assessments of model fit were chosen because of their robust nature to sample size and model parsimony: comparative fit index (CFI; Bentler, 1990), the Tucker–Lewis index (TLI; Tucker & Lewis, 1973), root mean square error of approximation (RMSEA; Steiger, 1990), the 90% confidence interval of the RMSEA, and standardized root mean square residual (SRMR; Berndt, 1998). Adequate model fit occurs when CFI and TLI are over .90 in combination with RMSEA at approximately .06 and SRMR at less than .08 (Marsh, Hau, & Wen, 2004), although CFI and TLI values of over .95 are preferable (Byrne, 2005; Hu & Bentler, 1999). The 90% confidence interval of the RMSEA includes values less than .05 for the lower bound and less than .08 for the upper bound, or containing 0 for the lower bound and less than .05 for the upper bound (MacCallum, Browne, & Sugawara, 1996). Although chi-square tests of model fit are common when evaluating CFA models, because they are overly sensitive to sample size and to minor deviations from multivariate normality, it is typical for the applied CFA modeling used in the present study to focus on sample size independent indices, like the CFI, TLI, and RMSEA (Marsh, Hau, & Grayson, 2005). In addition, because ESEM estimates a large number of parameters, it is important to also include indices that correct for model parsimony, like the TLI and RMSEA (Marsh et al., 2009; Marsh et al., 2010). Fit indices used for CFA are appropriate for assessing ESEM models, although we should note that it is highly problematic to rigidly interpret cutoff values within this framework (Perry, Nicholls, Clough, & Crust, 2015).

We evaluated MI tests with changes in CFIs, TLIs, and RMSEA, with a change of less than .01 CFI and a change of less than .015 RMSEA between a more restricted model and a preceding one suggesting MI (Chen, 2007; Marsh et al., 2005). In addition, because our sample sizes were large, we evaluated all parameter estimates with stringent alpha levels ($p < .001$) to reduce the risk of Type I error.

Results

Descriptive Statistics and Bivariate Analyses (Confirmation Sample)

We first examined the distributions and intercorrelations of the study variables. Although the confirmation sample is diverse and includes both college attending and non–college attending young adult drinking gamers, the mean frequency of drinking games participation of 1.87 (where 1 = *once a month* and 2 = *two to four times a month*) is highly comparable with our validation sample of college drinking gamers (M = 2.50 where 2 = *once a month* and 3 = *two or three times a month*). Frequency of gaming (M = 1.87, SD = 0.63, range = 1-4), number of drinks consumed while gaming (M = 6.20, SD = 2.87, range = 1-15), negative gaming consequences (M = 7.38, SD = 5.28, range = 0-23), and typical alcohol use on nondrinking gaming occasions (M = 4.10, SD = 2.30, range = 0-12) were positively correlated with each other (Mean r = .31; rs range from .23 to .37, ps < .001). Age was negatively correlated with frequency of gaming ($r = -.11$, $p < .001$) but was positively associated with number of drinks consumed while gaming (r = .07, p = .008). No significant associations, including college student status, were found among the other variables.

Stage 1: CFA and ESEM (Confirmation Sample)

CFA of the A Priori 8-Factor Model. The goodness-of-fit statistics and factor loading uniqueness of the CFA 8-factor measurement model are displayed in Tables 2 and 3. The

Table 2. Goodness-of-Fit Statistics of the Confirmatory Factor Analytic and Exploratory Structural Equation Models.

Model	Description	CFI	TLI	RMSEA	90% CI	SRMR	CM	ΔCFI	ΔTLI	ΔRMSEA
MTurk participants (confirmation sample)										
A priori CFA	CFA 8-factor Model	.789	.763	.069	[.067, .071]	.076	—	—	—	—
A priori ESEM	ESEM 8-factor model	.956	.922	.040	[.037, .042]	.019	—	—	—	—
Post hoc CFA	CFA 7-factor model	.868	.848	.061	[.059, .064]	.070	—	—	—	—
Post hoc ESEM	ESEM 7-factor model	.963	.932	.041	[.038, .044]	.018	—	—	—	—
ESEM structural model	ESEM	.956	.926	.040	[.037, .042]	.020	—	—	—	—
College student participants (validation sample)										
A priori CFA	CFA 8-factor Model	.764	.735	.067	[.064, .070]	.072	—	—	—	—
A priori ESEM	ESEM 8-factor model	.951	.914	.038	[.034, .043]	.023				
Post hoc CFA	CFA 7-factor model	.856	.834	.058	[.054, .062]	.067	—	—	—	—
Post hoc ESEM	ESEM 7-factor model	.959	.924	.039	[.034, .045]	.022	—	—	—	—
ESEM structural model	ESEM	.960	.920	.040	[.035, .044]	.024				
1. Invariance across gender[b]										
	1 Configural invariance	.963	.934	.047	[.044, .050]	.021	—	—	—	—
	2 Weak invariance	.957	.941	.044	[.041, .047]	.031	1-1	−.006	.007	−.003
	5 Strong invariance	.955	.942	.044	[.041, .047]	.031	1-2	−.002	.001	.000
	7 Strict Invariance	.936	.921	.051	[.049, .054]	.043	1-5	−.019[a]	−.021[a]	.007
	4 Covariance invariance	.952	.938	.046	[.043, .048]	.053	1-2	−.005	−.003	.002
	10 Latent means invariance	.944	.929	.049	[.046, .051]	.055	1-5	−.011[a]	−.013[a]	.005
2. Invariance across ethnicity[b]										
	1 Configural invariance	.950	.933	.049	[.046, .052]	.034	—	—	—	—
	2 Weak invariance	.955	.944	.044	[.041, .048]	.035	2-1	.005	.001	−.005
	5 Strong invariance	.954	.946	.044	[.041, .047]	.036	2-2	−.001	.002	.000
	7 Strict Invariance	.950	.946	.044	[.041, .047]	.038	2-5	−.004	.000	.000
	4 Covariance invariance	.954	.946	.044	[.041, .047]	.040	2-2	−.001	.002	.000
	10 Latent means invariance	.954	.946	.044	[.041, .047]	.036	2-5	.000	.000	.000
3. Invariance across college status[b]										
	1 Configural invariance	.963	.933	.048	[.045, .051]	.021	—	—	—	—
	2 Weak invariance	.960	.946	.043	[.040, .046]	.028	3-1	−.003	.013	.005
	5 Strong invariance	.959	.947	.043	[.040, .045]	.029	3-2	−.001	.001	.000
	7 Strict Invariance	.956	.946	.043	[.040, .046]	.031	3-5	−.003	−.001	.000
	4 Covariance invariance	.960	.948	.042	[.039, .045]	.037	3-2	.000	.002	.001
	10 Latent means invariance	.958	.946	.043	[.040, .046]	.033	3-5	−.001	.000	.000

Note. CFA = confirmatory factor analytic model; ESEM = exploratory structural equation model; CFI = comparative fit index; TLI = Tucker–Lewis Index; RMSEA = root mean square error of approximation; 90% CI = 90% confidence interval of the RMSEA; SRMR = standardized root mean square error of approximation; CM = comparison model; Δ = change.
[a]Indicates that the ΔCFI, ΔTLI, or ΔRMSEA criteria for measurement invariance are not met. Number (1, 2, 4, 5, 7, and 10) for description on invariance models indicates parameters constrained in the model as outlined by Marsh et al. (2009), 1: no constraints; 2: factor loadings; 4: factor loadings, factor variance–covariance; 5: factor loadings, item intercepts; 7: factor loadings, item intercepts, item uniqueness; 10: factor loadings, item intercepts, factor means. [b]Indicates MTurk confirmation sample.

Table 3. Confirmation Sample: Standardized Parameter Estimates from the 8-Factor Confirmatory Factor Analytic and Exploratory Structural Equation Models of the Motives for Playing Drinking Games Measure.

	Confirmatory factor analysis									Exploratory structural equation modeling								
Standardized factor loadings and uniquenesses																		
Item	CT (λ)	C (λ)	FC (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	CP (λ)	δ	CT (λ)	C (λ)	FC (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	CP (λ)	δ
Competition and Thrills																		
CT1: For the competition	**.50**								.76	**.88**	−.02	.04	.00	−.01	.00	.02	−.08	.24
CT2: To avoid having to talk to somebody one-on-one	**.34**								.88	.04	.20	−.08	.01	−.05	.01	**.50**	.00	.59
CT3: To get practice at that game	**.53**								.31	**.33**	−.04	−.01	.16	.14	.08	.11	.06	.68
CT4: Because I want to win	**.53**								.72	**.77**	.07	.01	−.01	−.01	−.01	−.03	.05	.37
CT5: To take a risk	**.64**								.57	.09	.05	−.04	.11	.20	.01	−.02	**.48**	.53
CT6: To just go wild	**.67**								.56	.08	.05	**.36**	.02	.02	.04	−.10	**.50**	.47
CT7: See reactions when inhibitions are lowered[a]	**.55**								.69	−.03	.02	.03	.22	.07	.07	.01	**.38**	.66
Conformity																		
C1: To blend in with the crowd		**.80**							.37	−.02	**.72**	.03	−.03	.06	.06	.07	.01	.36
C2: To fit in		**.84**							.30	.02	**.84**	.00	−.01	−.04	.03	−.01	.02	.28
C3: Because I don't want to feel left out		**.66**							.57	−.05	**.65**	−.02	.05	−.02	−.08	.14	.00	.52
C4: Because other people are playing them		**.62**							.62	.06	**.62**	.13	.06	.02	−.06	−.05	.02	.56
C5: Because I am afraid I will look silly if I don't		**.69**							.53	.03	**.51**	−.21	−.03	.06	.05	.11	.21	.47
Fun and Celebration																		
FC1: To get drunk			**.68**						.54	−.03	−.07	**.61**	−.08	−.12	.01	.03	**.50**	.45
FC2: To get a buzz			**.69**						.53	.00	−.01	**.56**	.06	−.16	−.06	.01	**.47**	.47
FC3: Because they are fun			**.61**						.63	.02	.01	**.69**	.01	.02	.01	−.16	−.01	.49
FC4: To liven up a boring party			**.62**						.62	.08	.03	**.54**	.08	.06	.02	.14	−.04	.56
FC5: To have good laugh			**.54**						.70	−.04	−.01	**.56**	.10	.10	−.07	.03	−.08	.62
Social Lubrication																		
SL1: As a way of getting to know other people				**.73**					.47	.00	.14	.20	**.62**	.03	.06	−.03	−.07	.41
SL2: To make it easier to talk to someone				**.52**					.73	−.05	.22	.10	**.33**	−.09	.02	**.42**	−.03	.52
SL3: To meet interesting people				**.77**					.42	.00	.07	.02	**.59**	.13	.09	−.10	.12	.40
SL4: To learn things about others				**.64**					.58	.04	−.09	−.03	**.74**	.02	−.07	.06	.12	.47
SL5: As a way of expressing interest in someone				**.71**					.50	.07	−.02	−.01	**.49**	−.01	.28	.15	.04	.45
Novelty																		
N1: Because it is a new experience					**.67**				.55	.01	−.03	.00	.13	**.69**	−.03	.04	.00	.43
N2: To try something different					**.69**				.52	−.02	−.04	.08	.11	**.64**	.01	−.06	.00	.46
N3: Because it is a more exciting way to drink					**.59**				.65	.09	.04	**.58**	−.03	.13	.06	−.02	.08	.51
Sexual Pursuit																		
SP1: In order to have sex with someone						**.76**			.42	.04	.01	.01	−.04	−.02	**.72**	.01	.08	.41
SP2: As a way to get a date						**.85**			.28	.00	.01	.01	.07	.01	**.88**	−.03	−.06	.24
SP3: To work up the courage to put the moves on someone						**.80**			.35	−.02	.02	−.02	.07	.00	**.67**	.16	.05	.36
Boredom																		
B1: To kill time							**.64**		.59	.05	.00	.25	−.08	.22	.07	**.31**	.12	.65
B2: When there is nothing else to do							**.59**		.65	.05	.03	**.35**	−.01	.25	−.05	**.30**	.00	.61
B3: Because I don't know what else to do for fun							**.65**		.57	.00	.12	.00	−.07	.16	.14	**.35**	.23	.53
Coping																		
CP1: To relax								.29	.92	−.02	−.10	.25	.12	.13	.02	.08	.10	.82
CP2: To forget about problems								**.64**	.59	−.04	.07	.06	.01	.06	.01	.26	**.41**	.61
CP3: To feel better about myself								**.75**	.44	.02	.21	−.13	.10	.03	.14	.17	**.31**	.52

Note. λ = standardized factor loading; δ = standardized uniqueness; CT = Competition and Thrills; C = Conformity; FC = Fun and Celebration; SL = Social Lubrication; N = Novelty; SP = Sexual Pursuit; B = Boredom; CP = Coping. Bolded numbers indicate factor loadings of at least .30.

[a]This item was paraphrased for brevity in this table (see Table 1 for the exact wording of this item). Factor correlations: CT with C = .56; CT with FC = .65; CT with SL = .72; CT with N = 72; CT with SP = .66; CT with B = .74; CT with CP = .75; C with FC = .22; C with SL = .50; C with N = .38; C with SP = .53; C with B = .61; C with CP = .70; FC with SL = .50; FC with N = .66; FC with SP = .21; FC with B = .58; FC with CP = .34; SL with N = .70; SL with SP = .62; SL with B = .60; SL with CP = .62; N with SP = .35; N with B = .64; N with CP = .46; SP with B = .56; SP with CP = .71; B with CP = .74.

results show that the CFA solution provided an unacceptable fit to the data across all fit indices. Although most of the standardized parameter estimates suggest that the factor loadings were substantial (with the exception of CP1: "to relax"), the latent variable correlations were moderate to strong (r = .21-.75; M = 0.57; SD = 0.15).

ESEM of the A Priori 8-Factor Model. In contrast with the results from the CFA measurement model, the a priori 8-factor ESEM model (Tables 2 and 3) provided an adequate fit to the data. In general, the factor loadings for five of the eight factors (conformity, fun and celebration, social lubrication, sexual pursuit, and novelty) aligned with Johnson and Sheet's (2004) original factor structure with substantial factor loadings greater than or equal to .30 (with the exception of N3: "Because it is a more exciting way to drink"). Across all factors, the cross-loadings were small (M = 0.05; SD = 0.13), with 10 cross-loadings larger than .30. The latent variable correlations were weak to moderate (r = .00-.58; M = 0.29; SD = 0.13), much lower than the factor correlations measured in the CFA, suggesting that the CFA model restrictions may have inappropriately inflated the CFA factor correlations.

Although the ESEM model fit indices were adequate, the items did not always load on the factors as expected. Three factors did not perfectly align with Johnson and Sheets's (2004) proposed factor structure: competition/thrills, boredom, and coping. For competition/thrills, only three items substantially loaded as expected (CT1: "For the competition"; CT3: "To get practice at that game"; and CT4: "Because I want to win"), suggesting that competition may be a separate factor from thrills, since the remaining items (CT2: "To avoid having to talk to somebody one-on-one"; CT5: "To take a risk"; CT6: "To just go wild"; and CT7: "To see the reactions of others when their inhibitions are lowered"), many of which refer to thrills, were not substantive (<.30) and cross-loaded heavily onto other factors (CT2 loaded on boredom; CT5, CT6, and CT7 all loaded on coping; CT6 also cross-loaded on fun and celebration). There was some support for the boredom factor in that all item loadings were at or just slightly above .30, with two cross-loaded items that focused on not talking or talking with others (CT2 and SL2: "To make it easier to talk to someone") heavily contributing to that factor at .50 and .42, respectively. In addition, one of the boredom items, B2 ("When there is nothing else to do"), cross-loaded on fun and celebration, and while avoiding boredom or seeking thrills are conceptually distinct, it is possible that this distinction may not be as clear to everyone who plays drinking games. For the coping factor, we found that CP1 ("To relax") loaded at .10, and five other items, including items focusing on thrills (CT5, CT6, and CT7) and intoxication (FC1: "To get drunk" and FC2: "To get a buzz") cross-loaded at .38 or above, heavily contributing to that factor. Thus, we did not find support for coping as a possible motive for playing drinking games. In consideration of all of the discrepancies we found between the expected and observed factor loadings, we elected to examine and modify the factor structure in the following ways. First, we conducted a series of EFA-SEMs (factor analyses with oblique rotation) to determine the underlying number of factors in the MPDG. Once we empirically determined the numerical factor structure, we utilized a theoretically based empirical approach to determine which factors comprised the 7-factor structure. Finally, we refined the factor structure at the item level using the following guidelines: (a) items whose loadings were less than .30 were dropped from the factor; (b) items that cross-loaded at .30 or above in another factor, *and* did not substantially load on the intended factor, *and* were conceptually meaningful were included in another factor; and (c) factors with substantive item cross-loadings were dropped if they did not make theoretical sense.

Table 4. One- to 8-Factor Geomin-Rotated Solution Structure Coefficients for Motive for Playing Drinking Games Exploratory Factor Analysis.

Factor	RMSEA	CFI	Eigenvalue
1	.096	.58	9.68
2	.078	.73	3.41
3	.068	.81	1.81
4	.060	.86	1.64
5	.052	.91	1.40
6	.048	.93	1.14
7	.047	.93	1.07
8	.040	.96	0.93

Note. RMSEA = root mean square error of approximation; CFI = comparative fit index.

Revised 7-Factor EFA Model. Since we were not able to confirm the 8-factor structure from the original measure, we used statistical (Costello & Osborne, 2005; Tabachnick & Fidell, 2001) and theoretical (i.e., Cooper, 1994, motives for drinking) approaches to revise the factors and their items.[3] We conducted a series of EFA-SEMs, with factor results for one to eight factors, to examine the underlying structure of the MPDG (see Table 4; see online supplementary tables for item loadings). We compared the factor solutions by using Kaiser's criterion (retaining factors with eigenvalues greater than one) and RMSEA (values less than .05; Browne & Cudeck, 1993), as well as the a priori hypothesis that the factor structure should reflect Johnson and Sheets's (2004) original 8 factors. The 7-factor structure was identified as the most appropriate factor structure (see Table 4). However, there was mixed support for both the coping factor and the boredom factor. To determine which factor to retain, we took a streamlined theoretical approach. First, we decided to examine the 7-factor

structure without three thrill-based items (CT2: "To avoid having to talk to somebody one-on-one"; CT5: "To take a risk"; and CT7: "See reactions when inhibitions are lowered") that were not conceptually related to other factors to reconfirm the 7-factor structure. We chose this approach as we had previously determined that competition was a conceptually and empirically separate factor from the thrill items, and we were concerned that keeping these conceptually problematic items would create a less refined solution. Once we reconfirmed that the 7-factor structure was conceptually and theoretically meaningful (see Supplemental Table S2), we conducted two EFA-SEMs (see Supplemental Table S3), one with the items for boredom present (but not coping) and another with the items for coping present (but not boredom). Although both models had similar fit (7-factor boredom RMSEA = .041; 7-factor coping RMSEA = .038), the boredom items loaded clearly and succinctly on the boredom factor, while the coping items did not form a unique coping factor. In the boredom factor, all items loaded above .40 (B1: "To kill time" loaded at .60, B2: "When there is nothing else to do" loaded at .62, and B3: "Because I don't know what else to do for fun" loaded at .46) with no substantial cross-loadings from the other items. However, in the coping factor, only one intended item loaded (CP2: "To forget about problems" loaded at .36). In addition, several items from fun and celebration (FC1: "To get drunk" and FC2: "To get a buzz" loaded at .72 and .68, respectively) and competition and thrills (CT6: "To just go wild" loaded at .44) cross-loaded substantially on the coping factor; thus, we dropped the coping factor.

In addition to dropping the three items from thrills and the coping factor, we made two additional changes based on our previous guidelines. First, we expanded the fun and celebration factor and renamed it enhancement and thrills. This was done because (a) the original items from this factor seem to reflect enhancement motives as conceptualized by Cooper (1994) with respect to general drinking motives (e.g., FC2: "To get a buzz") and (b) two items that seem to reflect thrill-seeking motives (N3: "Because it is a more exciting way to drink" and CT6: "To just go wild") loaded substantially on the fun and celebration factor in the 8-factor ESEM (see Table 3) and in the series of 8- and 7-factor EFA-SEMs (see Supplemental Tables S1-S3). Second, the novelty factor, although now only containing two items (N1: "Because it is a new experience" and N2: "To try something different"), was retained, and the other novelty item (N3: "Because it is a more exciting way to drink") was moved to enhancement and thrills (see Table 3; and Supplemental Tables S1-S3). In sum, a total of 6 of the 34 original items were dropped from further analysis (see Table 1).

CFA and ESEM of the Revised 7-Factor Model. We conducted CFA and ESEM again to confirm the revised 7-factor structure[3]: competition, conformity, enhancement/thrills, social lubrication, novelty, sexual pursuit, and boredom. The goodness-of-fit statistics, factor loadings, and uniquenesses of the 7-factor CFA and ESEM are displayed in Tables 2 and 5. The results show that the CFA solution, although improved, still provided an unacceptable fit to the data across most goodness-of-fit statistics. All standardized parameter estimates suggested that the factor loadings were substantial (>.30), and the latent variable correlations were still moderate to strong (r = .28-.65; M = 0.44; SD = 0.12).

In contrast with the results from the CFA measurement model, the 7-factor ESEM model (Table 5) again provided an adequate fit to the data. All of the factor loadings for the seven factors were substantial and only three items had cross-loadings slightly above .30 (SL2: "To make it easier to talk to someone" cross-loaded on conformity, while SL5: "As a way of expressing interest in someone" and B3: "Because I don't know what else to do for fun" cross-loaded on sexual pursuit). On average, the cross-loadings were exceedingly small (M = 0.03; SD = 0.09), and the factor correlations were weak to moderate (r = .03-.50; M = 0.22; SD = 0.10). The deflated factor correlations in the ESEM provide support for the discriminant validity of these seven extracted factors.

Stage 2: Validation of Revised 7-Factor MDGP Using a College Student Sample

CFA and ESEM of the A Priori 8-Factor Model. The goodness-of-fit statistics and factor loading uniqueness of the CFA 8-factor measurement model using the validation sample are displayed in Tables 2 and 6. Results indicate the CFA solution provided an unacceptable fit to the data across all fit indices (as in the confirmation sample). Although most of the standardized parameter estimates suggest that the factor loadings were substantial (with the exception of CT2: "To avoid having to talk to somebody one-on-one" and, to some extent, SP1: "In order to have sex with someone"), the latent variable correlations were moderate to strong (r = .30-.81; M = 0.55; SD = 0.17). Similar to the confirmation sample, the a priori 8-factor ESEM model (Tables 2 and 6) provided an adequate fit to the data. The factor loadings for five of the original eight factors (conformity, social lubrication, novelty, boredom, and sexual pursuit) were substantially greater than or slightly above .30 (with the exception of N3: "Because it is a more exciting way to drink" and SL5: "As a way of expressing interest in someone"), and the cross-loadings were small (M = 0.05; SD = 0.13) with few substantial cross-loadings. Across all factors, there were seven cross-loadings larger than .30 (six of which replicated the cross-loadings of the confirmation sample) and the latent variable correlations were weak to moderate (r = .04-.42; M = 0.24; SD = 0.09), much lower than the factor correlations measured in the CFA.

Table 5. Confirmation Sample: Standardized Parameter Estimates from the 7-Factor Confirmatory Factor Analytic and Exploratory Structural Equation Models of Motives for Playing Drinking Games Measure.

	Confirmatory factor analysis								Exploratory structural equation modeling							
Standardized factor loadings and uniquenesses																
Item	CT (λ)	C (λ)	ET (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	δ	CT (λ)	C (λ)	FC (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	δ
Competition																
CT1: For the competition	**.82**							.33	**.87**	−.02	.01	.02	−.03	−.02	.03	.26
CT3: To get practice at that game	**.50**							.75	**.31**	−.02	−.02	.17	.07	.15	.15	.68
CT4: Because I want to win	**.82**							.33	**.77**	.07	.03	−.04	.01	.04	−.02	.36
Conformity																
C1: To blend in with the crowd		**.80**						.35	−.01	**.75**	.00	−.01	.06	.05	.03	.36
C2: To fit in		**.84**						.29	.04	**.86**	.01	.00	.00	.02	−.08	.28
C3: Because I don't want to feel left out		**.66**						.57	−.05	**.70**	−.03	.05	−.04	−.06	.03	.53
C4: Because other people are playing them		**.62**						.62	.07	**.60**	.13	.06	.04	−.09	−.02	.57
C5: Because I am afraid I will look silly if I don't		**.68**						.54	.02	**.57**	−.14	−.03	.02	.20	.09	.49
Enhancement and Thrills																
ET1: To get drunk			**.67**					.55	.08	.08	**.51**	−.01	.08	.27	−.01	.45
ET2: To get a buzz			**.68**					.54	−.06	−.03	**.75**	−.13	−.03	.26	.05	.49
ET3: Because they are fun			**.60**					.64	−.02	.02	**.70**	.01	−.06	.17	.02	.54
ET4: To liven up a boring party			**.63**					.61	.05	−.07	**.63**	.07	.03	−.14	−.04	.59
ET5: To have good laugh			**.52**					.73	.08	.02	**.43**	.17	−.03	−.06	.18	.66
ET6: To just go wild			**.64**					.60	−.03	−.02	**.48**	.13	.10	−.18	.00	.54
ET7: Because it is a more exciting way to drink			**.70**					.51	.12	.01	**.55**	.01	.14	.01	.05	.52
Social Lubrication																
SL1: As a way of getting to know other people				**.73**				.47	.00	.10	.13	**.66**	.06	−.02	−.03	.41
SL2: To make it easier to talk to someone				**.52**				.73	−.08	**.33**	.06	**.33**	−.08	.10	.09	.64
SL3: To meet interesting people				**.77**				.42	.00	.05	.05	**.57**	.19	.14	−.04	.45
SL4: To learn things about others				**.65**				.58	.01	−.08	−.04	**.73**	.01	.01	.05	.49
SL5: As a way of expressing interest in someone				**.71**				.50	.05	.01	−.02	**.53**	−.01	**.34**	.06	.46
Novelty																
N1: Because it is a new experience					**.76**			.43	.02	−.02	−.03	.10	**.60**	−.01	.16	.49
N2: To try something different					**.77**			.42	−.02	.03	.05	−.01	**.81**	.01	.01	.31
Sexual Pursuit																
SP1: In order to have sex with someone						**.76**		.43	.06	.00	.05	.05	.00	**.74**	−.03	.41
SP2: As a way to get a date						**.86**		.27	.03	−.01	−.01	.21	.04	**.75**	−.05	.30
SP3: To work up the courage to put the moves on someone						**.80**		.36	−.02	.05	−.01	.16	−.01	**.71**	.04	.35
Boredom																
B1: To kill time							**.66**	.56	.03	.01	.14	−.02	.03	.15	**.54**	.55
B2: When there is nothing else to do							**.63**	.61	.02	.03	.18	.08	.03	−.07	**.56**	.51
B3: Because I don't know what else to do for fun							**.62**	.62	−.02	.21	.01	−.02	.02	**.32**	**.38**	.54

Note. λ = standardized factor loading; δ = standardized uniqueness; CT = Competition; C = Conformity; ET = Enhancement and Thrills; SL = Social Lubrication; N = Novelty; SP = Sexual Pursuit; B = Boredom. Bolded numbers indicate factor loadings of at least .30.

[a]This item was paraphrased for brevity in this table (please see Table 1 for the exact wording of this item). CFA factor correlations: CT with C = .30; CT with ET = .47; CT with SL = .41; CT with N = .37; CT with SP = .37; CT with B = .45; C with ET = .27; C with SL = .50; C with N = .35; C with SP = .53; C with B = .60; ET with SL = .54; ET with N = .50; ET with SP = .27; ET with B = .63; SL with N = .65; SL with SP = .62; SL with B = .60; SL with B = .60; N with SP = .33; N with B = .55 SP with B = .56.

Table 6. Validation Sample: Standardized Parameter Estimates from the 8-Factor Confirmatory Factor Analytic and Exploratory Structural Equation Models of the MPDG Measure.

	Confirmatory factor analysis									Exploratory structural equation modeling								
Standardized factor loadings and uniquenesses																		
Item	CT (λ)	C (λ)	FC (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	CP (λ)	δ	CT (λ)	C (λ)	FC (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	CP (λ)	δ
Competition and Thrills																		
CT1: For the competition	**.52**								.73	**.98**	−.01	−.08	.00	−.03	.01	−.02	.06	.08
CT2: To avoid having to talk to somebody one-on-one	**.30**								.91	.00	.22	−.16	.12	−.07	.13	.13	.20	.75
CT3: To get practice at that game	**.53**								.72	**.32**	.02	.13	.08	.02	.19	.16	−.03	.67
CT4: Because I want to win	**.52**								.73	**.69**	.00	.19	−.02	.02	−.01	.04	−.04	.40
CT5: To take a risk	**.64**								.66	.14	.06	.09	−.02	.25	.01	.09	**.32**	.65
CT6: To just go wild	**.59**								.60	.02	.00	**.38**	−.07	.02	.05	−.02	**.50**	.51
CT7: See reactions when inhibitions are lowered[a]	**.43**								.82	−.02	.02	.01	.06	.05	.06	.13	**.37**	.75
Conformity																		
C1: To blend in with the crowd		**.78**							.39	.04	**.67**	.02	.00	.16	.08	−.02	.02	.39
C2: To fit in		**.84**							.30	−.01	**.88**	−.01	.04	−.00	−.09	−.06	.02	.25
C3: Because I don't want to feel left out		**.77**							.42	−.02	**.81**	.01	.00	−.07	−.05	.00	.00	.40
C4: Because other people are playing them		**.57**							.68.	.12	**.54**	.23	.01	.03	.02	−.09	−.15	.58
C5: Because I am afraid I will look silly if I don't		**.59**							.65	−.07	**.55**	−.10	−.07	.04	.11	.11	.03	.61
Fun and Celebration																		
FC1: To get drunk			**.63**						.61	.00	−.03	**.60**	−.15	−.10	.12	.10	.24	.50
FC2: To get a buzz			**.68**						.54	−.01	.00	**.46**	.00	.00	−.08	.06	**.46**	.48
FC3: Because they are fun			**.61**						.63	.08	−.02	**.69**	.16	.00	.00	−.08	−.09	.46
FC4: To liven up a boring party			**.57**						.68	−.03	.11	**.36**	.21	−.04	.05	.28	−.03	.58
FC5: To have good laugh			**.60**						.64	−.04	−.02	**.55**	.14	.13	−.02	−.12	−.15	.57
Social Lubrication																		
SL1: As a way of getting to know other people				**.69**					.53	.01	.05	.03	**.79**	−.01	−.02	−04	−.07	.34
SL2: To make it easier to talk to someone				**.76**					.42	−.02	.10	−.03	**.46**	.00	.11	.00	−.03	.39
SL3: To meet interesting people				**.72**					.48	.05	−.02	.07	**.60**	.06	.03	−.10	.12	.45
SL4: To learn things about others				**.61**					.63	.00	−.06	−.05	**.63**	.01	.08	.12	.12	.54
SL5: As a way of expressing interest in someone				**.58**					.66	.18	.10	.06	.10	.04	**.50**	.03	.04	.51
Novelty																		
N1: Because it is a new experience					**.51**				.74	.01	.01	−.03	.00	**.91**	.14	.00	−.01	.13
N2: To try something different					**.59**				.65	−.05	−.04	.21	.13	**.44**	−.03	.15	.02	.58
N3: Because it is a more exciting way to drink					**.67**				.55	.11	**.18**	**.51**	.01	.05	−.02	−.04	.12	.55
Sexual Pursuit																		
SP1: In order to have sex with someone						**.34**			.87	.01	−.10	.03	−.03	−.06	**.38**	.08	.10	.83
SP2: As a way to get a date						**.70**			.51	−.01	−.01	−.04	.05	.06	**.75**	−.02	−.06	.44
SP3: To work up the courage to put the moves on someone						**.80**			.36	.02	.03	.02	−.01	−.02	**.71**	−.03	.08	.44
Boredom																		
B1: To kill time							**.65**		.58	.07	−.08	−.03	.00	.16	−.05	**.50**	.24	.58
B2: When there is nothing else to do							**.66**		.56	.06	.03	.09	.15	.00	−.03	**.62**	.00	.47
B3: Because I don't know what else to do for fun							**.49**		.76	−.05	.21	.03	−.06	.00	.07	**.32**	.14	.73
Coping																		
CP1: To relax								**.70**	.51	−.05	−.02	.15	.23	.10	−.03	−.03	**.52**	.51
CP2: To forget about problems								**.58**	.66	−.02	.09	.00	.05	−.09	.02	−.01	**.62**	.58
CP3: To feel better about myself								**.59**	.65	.03	.21	−.05	.07	.00	.09	−.04	**.44**	.62

Note. λ = standardized factor loading; δ = standardized uniqueness; CT = Competition and Thrills; C = Conformity; FC = Fun and Celebration; SL = Social Lubrication; N = Novelty; SP = Sexual Pursuit; B = Boredom; CP = Coping. Bolded numbers indicate factor loadings of at least .30.

[a]This item was paraphrased for brevity in this table (see Table 1 for the exact wording of this item). CFA Factor correlations: CT with C = .40; CT with FC = .78; CT with SL = .68; CT with N = .81; CT with SP = .50; CT with B = .70; CT with CP = .75; C with FC = .22; C with SL = .53; C with N = .50; C with SP = .37; C with B = .41; C with CP = .51; FC with SL = .58; FC with N = .84; FC with SP = .23; FC with B = .65; FC with CP = .63; SL with N = .66; SL with SP = .58; SL with B = .54; SL with B = .54; SL with CP = .78; N with SP = .33; N with B = .68; N with CP = .62; SP with B = .29; SP with CP = .54; B with CP = .63.

CFA and ESEM of the Revised 7-Factor Model. We conducted CFA and ESEM with the validation sample to confirm the revised 7-factor structure that we derived from our confirmation sample: competition, conformity, enhancement/thrills, social lubrication, novelty, sexual pursuit and boredom. The goodness-of-fit statistics, factor loadings, and uniquenesses of the 7-factor CFA and ESEM are displayed in Tables 2 and 7. The results show that the CFA solution, although improved, still provided an unacceptable fit to the data across most goodness-of-fit statistics. All standardized parameter estimates suggested that the factor loadings were substantial (>.30), and the latent variable correlations were small to strong (r = .16-.59; M = 0.38; SD = 0.13).

In contrast with the results from the CFA measurement model, the 7-factor ESEM model, again, provided an adequate fit to the data. All the factor loadings for the seven factors were substantial (with the exception of SL5: "As a way of expressing interest in someone") and only two items had cross-loadings above .30 (SL5 and SL2: "To make it easier to talk to someone" both cross-loaded on sexual pursuit). On average, the cross-loadings were exceedingly small (M = 0.03; SD = 0.07), and the factor correlations were weak to moderate (r = .10-.51; M = 0.28; SD = 0.09).

Stage 3: Measurement Invariance of the 7-Factor Model (Confirmation Sample)

Measurement invariance (MI) is present when an observed score does not rely on group measurement, but rather, depends on the true score (Meredith, 1993; Meredith & Millsap, 1992). In the case of latent variables, the latent variable is the proxy for a person's true score, and the items are the observed random variables, which require that the measurement model that links the individual items to the latent variable be the same across subgroups (Wu, Li, & Zumbo, 2007).

We assessed MI on the revised 7-factor structure to ensure that between-group comparisons can be made using this revised measure. Following Marsh et al.'s (2009) 13-model taxonomy of ESEM MI, a series of 13 ESEM models was conducted across gender, race/ethnicity, and college status. Only the results from models 1, 2, 4, 5, 7, and 10 are reported to test the hierarchy of factor invariance: configural invariance (Model 1), weak factorial invariance (Models 1, 2), strong factorial invariance (Models 2, 5), and the more rigorous testing of strict factorial invariance (Models 5, 7), factor variance–covariance invariance (Models 2, 4), and invariance of factor means (Models 5, 10).[4] Research suggests that configural invariance, weak factorial invariance, and strong factorial invariance, which make up MI and assess invariance of construct, factor loading, and item intercepts, must be met for MI to exist (Marsh, 1994; Vandenberg & Lance, 2000). There is disagreement on whether meeting strict invariance, which is composed of strict factorial invariance, factor variance–covariance, and invariance of factor means and examines the invariance of covariances, covariance, and means of latent variables, is a necessary condition for MI (Deshon, 2004; Little, 1999), although Lubke and Dolan (2003) affirm that it should be tested and be considered as a necessary part of testing for MI. However, invariance across factor variance–covariance and latent means invariance does not have to be met as a necessary condition for MI (Meredith & Millsap, 1992; Millsap, 1998).

Gender. The results from the MI tests (Table 2) for gender indicated MI across configural, weak, strong, and factor variance–covariance invariance. However, for strict invariance and latent means invariance, there were inconsistencies among fit indices. For both tests, the ΔCFI and ΔTLI were greater than .01, and the model fit was low (although still adequate); however, the ΔRMSEA was not greater than .015 for either test, indicating possible MI. We pursued alternative tests of partial invariance due to the inconsistencies of the fit indices for strict invariance, as some researchers suggest that strict invariance is a requirement for MI (e.g., Little, 1999). Based on (ex post facto) modifications in which we freed parameters one at a time, we identified two intercepts that contributed to most of the lack of fit in Model 1-7*p* (*p* indicating partial invariance): items SP1 ("In order to have sex with someone") and SP2 ("As a way to get a date"). The results supported partial invariance of the item intercepts, as the fit indices for 1-7*p* (CFI = .952; TLI = .94; RMSEA = .045) were nearly identical to 1-5, and the differences in CFI and TLI were less than the .01 value that would have led to the rejection of the constraints.

Race/Ethnicity. The results from the MI tests (Table 2) for race/ethnicity (White, Hispanic, and Black) indicated complete MI across all six tests, including the stringent invariance testing for strict invariance, the factor variance–covariance invariance, and the invariance of factor means. Thus, in terms of race/ethnicity, there was complete MI for Whites, Blacks, and Hispanics. However, it should be noted that tests for MI according to Asian American ethnicity could not be completed, as the residual covariance matrix was negative. It is possible that the model specification for this ethnic subgroup may not be appropriate (there were negative residuals for two of the individual items, CT1: "For the competition" and N1: "Because it is a new experience") or that the data analytic sample size of the Asian American group (n = 113), which is smaller than the other three ethnicities tested here (ns for White = 1,381, Hispanic = 139, Black = 133), was too small, and therefore its residual was negative while its larger representative population was positive.

Table 7. Validation Sample: Standardized Parameter Estimates from the 7-Factor Confirmatory Factor Analytic and Exploratory Structural Equation Models of Motives for Playing Drinking Games Measure.

	Confirmatory factor analysis								Exploratory structural equation modeling							
Standardized factor loadings and uniquenesses																
Item	CT (λ)	C (λ)	ET (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	δ	CT (λ)	C (λ)	ET (λ)	SL (λ)	N (λ)	SP (λ)	B (λ)	δ
Competition																
CT1: For the competition	**.84**							.30	**.87**	.00	−.10	−.01	−.02	.11	.01	.30
CT3: To get practice at that game	**.51**							.74	**.35**	.01	.07	.10	.00	.18	.12	.74
CT4: Because I want to win	**.83**							.32	**.82**	.00	.06	−.04	.02	−.03	.03	.32
Conformity																
C1: To blend in with the crowd		**.78**						.40	.05	**.66**	.01	−.01	.16	.12	.00	.40
C2: To fit in		**.84**						.30	.00	**.87**	−.02	.05	−.01	−.03	−.04	.30
C3: Because I don't want to feel left out		**.76**						.43	−.01	**.81**	.01	.01	−.09	.00	−.02	.42
C4: Because other people are playing them		**.57**						.68	.19	**.50**	.12	.03	.03	−.04	.05	.68
C5: Because I am afraid I will look silly if I don't		**.59**						.65	−.07	**.53**	−.10	−.05	.04	.13	.13	.65
Enhancement and Thrills																
ET1: To get drunk			**.63**					.60	−.02	.04	**.57**	−.06	−.01	.23	.05	.60
ET2: To get a buzz			**.68**					.54	.02	−.03	**.69**	−.12	.12	.16	.09	.54
ET3: Because they are fun			**.60**					.65	−.05	.03	**.64**	.00	.01	.09	.11	.65
ET4: To liven up a boring party			**.58**					.66	.18	−.07	**.57**	.17	.02	−.10	−.14	.66
ET5: To have good laugh			**.69**					.66	.00	.08	**.33**	.26	−.04	.00	.20	.66
ET6: To just go wild			**.63**					.61	.00	−.03	**.56**	.12	.16	.00	−.13	.61
ET7: Because it is a more exciting way to drink			**.67**					.55	.13	.17	**.54**	.03	.05	−.02	−.01	.55
Social Lubrication																
SL1: As a way of getting to know other people				**.71**				.50	.02	.05	−.02	**.82**	−.01	.00	−.02	.50
SL2: To make it easier to talk to someone				**.73**				.46	−.03	.16	.09	**.42**	.00	**.31**	.05	.47
SL3: To meet interesting people				**.73**				.46	.03	.00	.11	**.59**	.07	.14	.00	.46
SL4: To learn things about others				**.63**				.61	−.02	−.05	−.06	**.66**	.01	.12	.08	.61
SL5: As a way of expressing interest in someone				**.58**				.66	.21	.10	.02	.11	.04	**.54**	−.03	.66
Novelty																
N1: Because it is a new experience					**.68**			.54	.02	.02	.00	−.04	**.86**	.12	.00	.54
N2: To try something different					**.76**			.43	−.02	.03	.22	.13	**.48**	−.08	.09	.43
Sexual Pursuit																
SP1: In order to have sex with someone						**.36**		.87	.01	−.08	.08	−.01	−.08	**.42**	.04	.87
SP2: As a way to get a date						**.72**		.48	.01	−.03	−.10	.08	.08	**.69**	−.01	.48
SP3: To work up the courage to put the moves on someone						**.78**		.39	.03	.04	.02	.02	−.03	**.73**	−.04	.39
Boredom																
B1: To kill time							**.63**	.60	.05	−.06	.00	.03	.17	.00	**.62**	.60
B2: When there is nothing else to do							**.69**	.53	.08	.02	.05	.21	.00	−.07	**.63**	.53
B3: Because I don't know what else to do for fun							**.48**	.77	−.03	.21	.04	−.02	.02	.10	**.35**	.77

Note. λ = standardized factor loading; δ = standardized uniqueness; CT = Competition and Thrills; C = Conformity; FC = Fun and Celebration; SL = Social Lubrication; N = Novelty; SP = Sexual Pursuit; B = Boredom. Bolded numbers indicate factor loadings of at least .30.

[a]This item was paraphrased for brevity in this table (see Table 1 for the exact wording of this item). CFA factor correlations: CT with C = .16; CT with ET = .49; CT with SL = .40; CT with N = .33; CT with SP = .26; CT with B = .43; C with ET = .28; C with SL = .52; C with N = .42; C with SP = .37; C with B = .41; ET with SL = .59; ET with N = .55; ET with SP = .27; ET with B = .66; SL with N = .57; SL with SP = .57; SL with B = .54; N with SP = .29; N with B = .53; SP with B = .29.

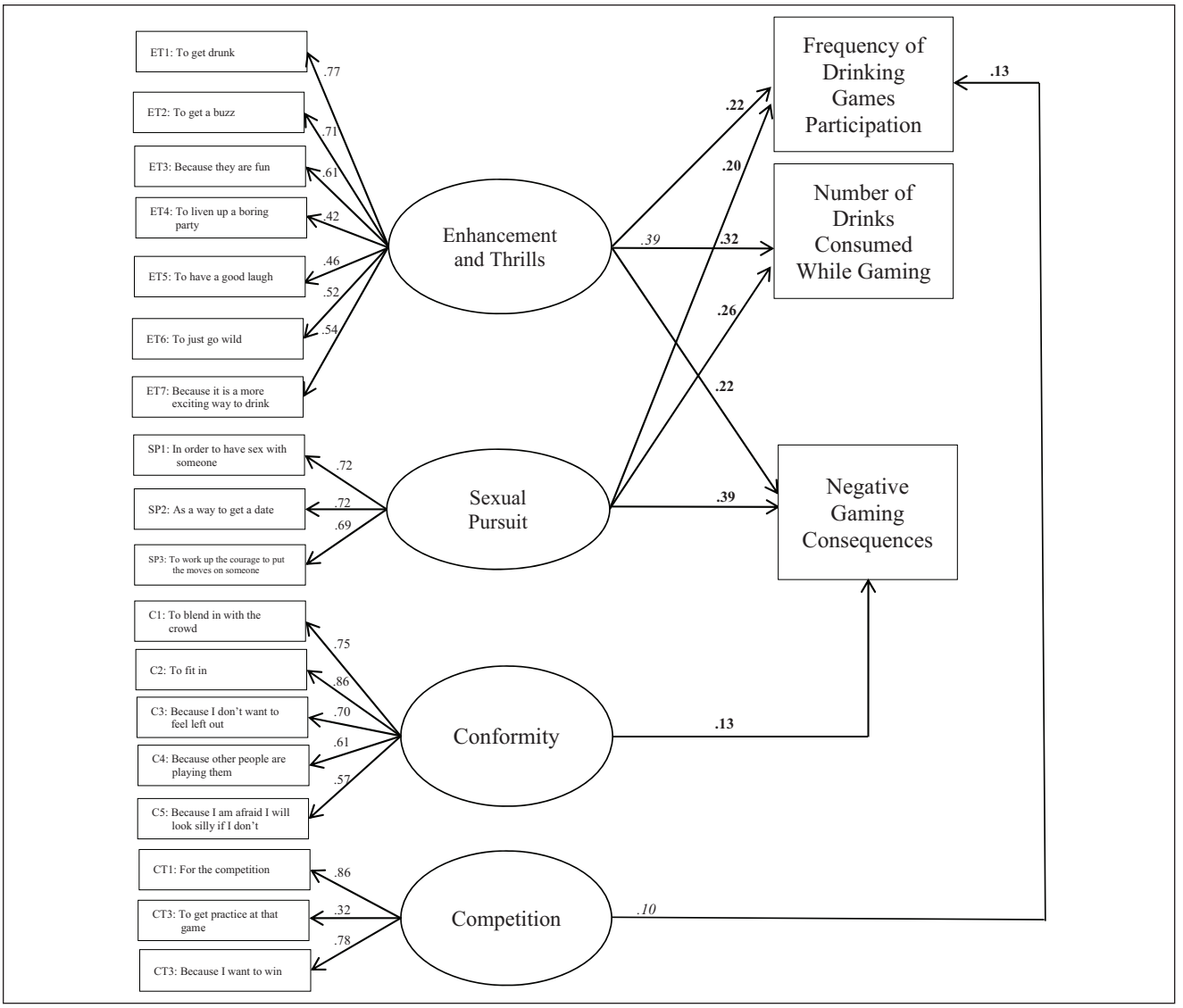

Figure 1. We conducted two separate structural equation models, one for the confirmation sample (MTurk; includes both college attending and non–college attending young adults) and another for the validation sample (college students only). Presented in bold are the standardized parameter estimates from the confirmation sample; the validation sample estimates are in italics. In the validation study, we did not measure negative gaming consequences. To reduce the risk of Type I error and for ease of presentation, only paths that are statistically significant at $p < .001$ are presented.

College Status. The results for the MI tests for college status were similar to the results for race/ethnicity and indicated complete MI across all six tests.

Stage 4: Motives for Playing Drinking Games and Their Associations With Drinking Game Behaviors and Consequences

We ran two ESEMs, one for each sample (validation and confirmation samples), and parameter estimates that were significant at $p < .001$ for both samples are reported in Figure 1. Both models indicated good fit (see Table 2). For the confirmation sample, competition, enhancement/thrills, and sexual pursuit factors were all positively related to drinking games frequency. The enhancement/thrills and sexual pursuit factors were both positively related to the number of drinks consumed while playing drinking games. Conformity, enhancement/thrills, and sexual pursuit were all positively related to gaming specific negative consequences. For the validation sample, enhancement/thrills and competition were both positively associated with number of drinks consumed while playing and drinking games frequency, respectively. Since we did not measure gaming-specific negative consequences

in the validation sample, we were unable to test this outcome variable in the model.

Discussion

Drinking games are prevalent on college campuses; yet we know very little about motives for playing drinking games in general, and how they might be linked to alcohol use and consequences that occur in the context of this risky behavior. We used ESEM, a novel methodological–substantive approach, to test the factor structure of Johnson and Sheets's (2004) MPDG measure. This approach considers the specified multifactor structure of the measure by allowing us to test a priori factors while accounting for small cross-loadings often present in applied research. We expected to find an 8-factor structure that corresponds with that obtained by Johnson and Sheets (2004). Instead, we found support for a revised 7-factor model in our confirmation (i.e., college attending and non-college-attending young adult MTurk participants) and validation (i.e., college students only) samples. In addition, certain motives for playing drinking games were positively associated with drinking game behaviors and negative gaming consequences, even after controlling for typical alcohol consumption and age.

We replicated the original MPDG factors of conformity, boredom, sexual pursuit, and to some extent, novelty and social lubrication in both confirmation and validation samples. However, results from both samples suggested some needed modifications to the competition/thrills and fun/celebration factors. With regard to competition/thrills (relabeled competition), only three items from the original factor (i.e., "For the competition," "To get practice at that game," and "Because I want to win") loaded on this factor. Conceptually, these items encompass motives for playing drinking games relevant to their competitive nature, and thus, we named this factor competition. We eliminated the "thrills" component of this factor as the remaining original items, many of which do not allude to competition (e.g., "To avoid having to talk to somebody one-on-one"), did not significantly load with the other competition items. Instead, they loaded on other factors, suggesting that competition is a separate factor from thrills, so we dropped these items from the competition factor. We reassigned one of the dropped competition/thrills items (i.e., "To just go wild") to Johnson and Sheets's (2004) original fun/celebration factor, as it loaded substantially with the other items comprising this factor. In addition, one item from the novelty factor (i.e., "Because it is a more exciting way to drink") loaded on the fun/celebration factor in both confirmation and validation samples. This led us to reconceptualize the fun/celebration factor as encompassing enhancement/thrills reasons for playing drinking games. Indeed, according to the factor loadings, the new factor consists of motives that capture the desire to seek out the internal enhancing effects of alcohol consumption (i.e., "To get a buzz" and "To get drunk") and to experience external thrills (e.g., "Because they are fun," "To liven up a boring party"). The enhancement/thrills factor is somewhat consistent with Cooper's (1994) original conceptualization of general enhancement drinking motives, which entails drinking in pursuit of the positive internal enhancing effects of alcohol. Perhaps given the nature of drinking games, enhancement motives for drinking games extend beyond the pursuit of internally enhancing aspects of alcohol consumption to the thrilling aspects of the manner in which alcohol is consumed.

With regard to the social lubrication factor, only one item (SL5: "As a way of expressing interest in someone") did not load on this factor in the validation sample. However, in our post hoc 7-factor ESEM analysis with the confirmation sample, this item loaded substantially on social lubrication (.53), but it also loaded on the sexual pursuit factor (.34). Conversely, in both the a priori 8-factor and post hoc 7-factor ESEM analyses with the validation sample, SL5 did not load on social lubrication; instead, it loaded only on the sexual pursuit factor. Although the exact reasons for these findings are unclear, the movement of the SL5 item between the two factors suggests that some young adult drinking gamers could interpret this motive as having a social connotation, whereas others might believe it refers to expressing intimate or sexual interest. Perhaps future research could revise this item so that the wording more clearly specifies one motivation underlying this interest (e.g., "As a way of expressing romantic or sexual interest in someone" vs. "As a way of building new friendships"). Careful attention should therefore be given to this item in future factor analytic work prior to using the social lubrication and sexual pursuit subscales.

Finally, we found no support for the presence of the coping factor as originally identified by Johnson and Sheets (2004). This finding makes intuitive sense given that Johnson and Sheets (2004, p. 98) noted that drinking to cope is "a relatively solitary activity" (Cooper, 1994). Because a drinking game is a social activity in which players are interacting with others, it is conceivable that those who are drinking to cope with their negative emotions will not be particularly inclined to put themselves in a social context. In fact, research shows that much coping-motivated drinking is done in solitary contexts and is not useful in predicting social drinking activities (Cooper, 1994; Mohr et al., 2005; O'Hara et al., 2014). As such, while coping motives are conceptually meaningful reasons for drinking behaviors and consequences in general, they may not contribute to one's decision to play drinking games in particular.

Motives for Playing Drinking Games and Their Associations With Gaming Behaviors and Consequences

As hypothesized, results showed some associations between drinking game motives and gaming behaviors and related

consequences. Enhancement/thrills motives were positively associated with frequency of drinking games participation, drinks consumed while playing, and negative gaming consequences for the confirmation sample, and for the validation sample, these motives were positively related to the number of drinks consumed while playing. These findings are consistent with prior literature showing DMQ-measured enhancement motives to be predictive of heavy alcohol use and, to some degree, negative drinking consequences (Cooper, 1994; Cooper et al., 2016; Kuntsche et al., 2005). The positive association between sexual pursuit motives and negative gaming consequences is also consistent with some of the findings reported by Johnson and Sheets (2004).

We also found that conformity motives for playing drinking games were positively associated with negative gaming consequences but not associated with frequency of drinking games participation or number of drinks consumed while playing. In contrast, Johnson and Sheets (2004) found that conformity motives were negatively associated with gaming consequences and drinking game consumption/frequency while playing in their college student sample. Discrepant findings may have arisen because our sample included young adults not currently in college, and/or because we controlled for both age and typical alcohol use on nondrinking gaming occasions. When interpreting findings with respect to conformity motives for drinking games, one must also consider that it is unclear whether endorsement of conformity motives for gaming pertains to peer pressure *to engage* in drinking games or peer pressure experienced *during* the game itself, whereby players may feel obligated to continue to play even at the cost of experiencing negative outcomes. While future research using experimental study designs (see Zamboanga & Peake, 2017) is needed to better understand when conformity pressures are experienced while playing drinking games, this finding also highlights the need for more studies that examine drinking refusal self-efficacy skills as they apply to drinking games (see Kenney, Napper, & LaBrie, 2014).

Given the competitive nature of many drinking games (Zamboanga et al., 2014), and consistent with our hypothesis, competition motives were positively related to frequency of participation in drinking games in both samples. However, in our structural model, competition motives were not associated with drinking consumption while playing or negative gaming consequences. One possible explanation for this finding is that competitively motivated gamers are more serious about the game and may therefore practice to become more skilled. During competitive drinking games, the player or team that is less skilled is at most risk for heavy consumption, whereas the inverse is likely to be true for more skilled players. Some "competitive" players might also limit their drinking outside the context of the game (i.e., ad lib drinking before, during, or after the game) to avoid "reversal of competence" (i.e., diminished drinking games performance due to increased intoxication; Green & Grider, 1990). We are not suggesting that competition motives are protective against consumption or negative gaming consequences; rather, we are raising the possibility that relative to other motives (e.g., enhancement/thrills; sexual pursuit), competition motives for playing drinking games appear to be potentially less harmful.

Consistent with the multivariate findings reported by Johnson and Sheets (2004), social lubrication motives were not significantly related to gaming behaviors and consequences. Social drinking motives have been found to be associated with moderate (Kuntsche et al., 2005) and relatively benign patterns of alcohol use (Cooper et al., 2016). Conceivably, gamers who play drinking games for social reasons (i.e., to facilitate or reinforce social interactions) may be less inclined to drink excessively while playing since the consequences of excessive consumption (e.g., feeling sick, misbehaving) would likely negate their social goals, such as getting to know others and making it easier to talk to people.

Finally, although we found some similarities in both samples regarding the associations between the MPDG subscales (i.e., enhancement/thrills and competition) and drinking game behaviors, we also found some differences in these relations. For example, sexual pursuit was positively associated with both frequency of participation and gaming consumption for the confirmation sample, but not for the validation sample. Differences in the sample and the variable used to control for typical alcohol use between these samples (i.e., typical alcohol use on nondrinking game occasions in the confirmation sample vs. typical alcohol use in general in the validation sample) precludes us from making any definitive conclusions regarding these different patterns of associations. Thus, future research designed to better understand how and why college students and non–current college students may differ on their motives for playing drinking games and their associations with gaming behaviors and consequences is needed.

Implications for Research and Practice

There are several important study implications worth noting. First, using both CFA and ESEM statistical techniques to examine the psychometric properties of measures of alcohol use, particularly those for which we might expect items to cross-load, could prove useful in future psychometric studies. Second, we found evidence for race/ethnicity (namely for Whites, Hispanics, and Blacks) and college student status (i.e., whether or not the participant was currently attending college) MI for the revised 7-factor structure of the MPDG in our confirmation sample. Researchers and practitioners could therefore use this measure as part of their alcohol risk assessment when working with young adult drinking gamers from diverse populations. Third,

practitioners who work with young adults who participate in risky drinking activities like drinking games could consider paying close attention to those who are motivated to play for enhancement/thrills and sexual pursuit reasons, as both motives are linked with frequent gaming, higher consumption levels, and more negative consequences.

Fourth, an understanding of the motives associated with drinking games participation may help in the development of motivation-matched interventions targeting problematic drinking games participation. In this type of work, specific intervention strategies are matched with particular motives (and/or their associated personality characteristics) to reduce undesirable high-risk behaviors (e.g., Conrod et al., 2000; Conrod, Stewart, Comeau, & Maclean, 2006). These interventions focus on helping individuals find more adaptive strategies to meet their goals and needs than engagement in substance use. For instance, consider the present finding that increased endorsement of competition as a reason for playing drinking games was related to more frequent participation. Practitioners could match young adults who play drinking games for the competition to an early intervention strategy that allows them to consider less risky social activities that do not involve heavy drinking but are still characterized by the competitive features of a drinking game.

Finally, for practitioners to effectively use the MPDG as a clinical tool, further research with the measure is needed. As it stands, practitioners might review individual item responses to identify students endorsing particular risky motives for playing drinking games who might benefit from intervention. However, a more standardized use of the scale would provide added utility in the future. For instance, if researchers could identify normative scores across the factors of the MPDG, this would perhaps help practitioners identify specific "cutoff" scores that could be used to identify risky drinking game motives warranting intervention. Similarly, further work that considers a student's overall pattern of endorsement of different risky and less risky drinking game motives, as opposed to considering the factor scores in isolation of each other, is needed. This will allow us to determine whether and when an individual's endorsement of risky motives is higher, or more significant, than their endorsement of less risky motives. A focus on answering these applied questions will help make the MPDG a more user-friendly and practical tool for practitioners.

Limitations and Future Research Directions

Despite the strength and importance of the present findings, there are a number of study limitations. First, the cross-sectional study design precludes us from making any inferences about the causal associations or the temporal order of effects among our study variables. In other words, we cannot say that particular motives "caused" certain gaming behaviors. Second, due to sample size limitations, we were not able to examine MI across age groups (e.g., underage vs. legal age) and for Asian Americans in our confirmation sample, and across racial/ethnic groups in our validation sample. Thus, future invariance testing with a larger, diverse sample of underage students is needed. In addition, we only found MI for gender up to strict invariance. As such, those who use this measure to test for gender differences or invariance should exercise caution when interpreting their findings. Future research with respect to gender and drinking game motives is warranted. Third, given the primary aim of this study, and in an effort to maintain consistency in the analyses with both our confirmation *and* validation samples, we were not able to examine whether motives for playing drinking games add any predictive validity to drinking gaming outcome variables beyond that of general drinking motives (e.g., as indexed by the DMQ). Despite this limitation, we want to emphasize that understanding the psychometric properties of this measure is an important first step. As a next step, we strongly encourage future researchers to investigate whether drinking game motives predict gaming behaviors and consequences above and beyond general drinking motives (while controlling for typical alcohol use, as we have done in the present study). Future research linking the 7-factor drinking game motives to prospective gaming behaviors and other validated measures that align with these motives is also needed. Fourth, because the novelty factor was only composed of two items, we recommend that future research include additional items to provide more stability for this factor. Fifth, our findings may be somewhat limited due to the nature of our confirmation sample. Research suggests that samples recruited via MTurk may not be perfectly representative of the general population (Paolacci & Chandler, 2014), primarily reflecting differences between internet users and nonusers. Nevertheless, Huff and Tingley (2015) assert that MTurk samples can provide advantages to researchers. In particular, MTurk tends to attract young samples and diverse ethnic groups (Huff & Tingley, 2015). As one of our research aims was to assess the MPDG measure in a multiethnic, young adult sample, we made the decision to use MTurk in order to access more diverse participants. Finally, although a recent study found that self-report MTurk data from alcohol users were of high quality (i.e., good reliability and validity; Kim & Hodgins, 2017), we acknowledge the possibility that participants may have under- or overreported their drinking game attitudes and behaviors.

Conclusions

The broader literature on alcohol use suggests that much can be learned about drinking behaviors and how to

intervene with an improved understanding of motives. Many young adults play drinking games, and the health risks associated with these games highlight the need for a psychometrically sound measure that assesses their motivations for playing. The revised 7-factor MPDG is a promising instrument that deserves continued use and refinement in future research so that we can better understand and address this high-risk activity.

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Notes

1. In contrast to the confirmation sample (MTurk), in the validation study we did not measure negative drinking game consequences. We also assessed typical alcohol use in general in the validation study as opposed to typical alcohol use on nondrinking gaming occasions in the confirmation study.
2. Although ESEM allows for model comparison, we did not examine factor differences in model fit (e.g., directly comparing model fit indices of an 8-factor model compared with a 7-factor model) for two reasons. First, as the MPDG has many items (34 questions), larger factor structures would be automatically favored by model fit indices. Second, we found that the pattern of factor loadings, as opposed to the number of factor loadings, was problematic. Testing a smaller factor model without dropping problematic items would not necessarily provide the insight to help us understand the factor structure and pattern of item loadings.
3. It was not our intention to revise this scale but rather to confirm its structure. Although the ESEM indices approximated good fit, this does not imply that the items replicated the factor structure. It was necessary for us to revise the scale using the item loadings as indicators, as ESEM is an EFA in the context of an SEM framework.
4. Marsh et al.'s (2009) taxonomy of 13 partially nested models starts with the least restrictive model of configural invariance with no invariance constraints (Model 1) and expands to a model of complete invariance that posits strict invariance as well as the invariance of the latent means and of the factor variance–covariance matrix (Model 13). Each model (1-13) represents certain parameters constrained to be invariant and examining models in certain combinations, as outlined by Marsh et al. (2009), corresponds with different types of invariance.

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