Published in final edited form as:
Am J Drug Alcohol Abuse. 2014 September ; 40(5): 353–358. doi:10.3109/00952990.2014.930151.

Drinking game play among first-year college student drinkers: An event-specific analysis of the risk for alcohol use and problems

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Abstract

Background—College students who play drinking games (DGs) more frequently report higher levels of alcohol use and experience more alcohol-related harm. However, the extent to which they are at risk for increased consumption and harm as a result of DG play on a given event after accounting for their typical DG participation, and typical and event drinking, is unclear.

Objectives—We examined whether first-year students consumed more alcohol and were more likely to experience consequences on drinking occasions when they played DGs.

Methods—Participants (N = 336) completed up to six web-based surveys following weekend drinking events in their first semester. Alcohol use, DG play, and consequences were reported for the Friday and Saturday prior to each survey. Typical DG tendencies were controlled in all models. Typical and event alcohol use were controlled in models predicting risk for consequences.

Results—Participants consumed more alcohol on DG versus non-DG events. All students were more likely to experience blackout drinking consequences when they played DGs. Women were more likely to experience social-interpersonal consequences when they played DGs.

Conclusion—DG play is an event-specific risk factor for increased alcohol use among first-year students, regardless of individual DG play tendencies. Further, event DG play signals increased risk for blackout drinking consequences for all students, and social-interpersonal consequences for women, aside from the amount of alcohol consumed on those occasions as well as typical drinking behaviors. Prevention efforts to reduce high-risk drinking may be strengthened by highlighting both event- and person-specific risks of DG play.

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Declaration of Interests

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this manuscript.

Drinking games (DGs) are social drinking events in which alcohol consumption is guided by a specific set of rules related to the performance of a physical or cognitive task, and facilitate intoxication via intake of large amounts of alcohol in a limited window of time (1). Between 57% and 65% of college student drinkers participate in DGs, which is linked to increased quantity and frequency of alcohol use, heavy drinking, and getting drunk (2–6). DGs are also associated with alcohol-related harm (2,4,6–9) and this association may be moderated by gender (2,4) and typical alcohol consumption (7,10). Collectively, past research indicates that DG play signals greater risk for hazardous drinking and related harm.

What is relatively less known is whether DG play increases one's risk for drinking and alcohol-related consequences on occasions he or she drinks, adjusting for their typical patterns of alcohol use and DG play. Previous research in which daily (i.e., event) DG play and alcohol consumption were assessed retrospectively for three months found that individuals, on average, consumed more alcohol on days they played DGs, relative to non-DG drinking days (2). However, because of the inherent association between DG play and alcohol consumption, it is important to separate typical patterns of alcohol use and DG play to precisely characterize the role that DG play has on alcohol consumption on a given drinking event, controlling for individual DG and alcohol use tendencies. Further, there are no studies, to our knowledge, that have examined individuals' risk for alcohol-related harm on occasions they played DGs, controlling for either typical patterns of alcohol use or alcohol consumed on those same occasions.

This is particularly important for first-year college students who are relatively new to drinking and college environments. First-year students tend to play DGs more often relative to older students (4,5), perhaps due to the central role of DGs in parties or other socializing events with alcohol they are likely to attend (5). Also, for some students, DG play during the first semester of college is likely a continuation of risky drinking behavior established prior to college matriculation (11,12). Accordingly, this study utilized an event-specific, repeated-measures framework in order to examine the associations of DG play with alcohol use and related consequences among students in their first semester of college. Our assessments targeted weekend drinking events (i.e., Friday and Saturday drinking occasions), as weekend drinking accounts for the majority of alcohol consumption among first-year students (13).

The first aim was to examine whether first-year students consumed more alcohol on drinking events in which DGs were played, controlling for typical frequency of DG play. The second aim was to examine whether students were more likely to experience alcohol-related consequences on events they played DGs, above and beyond what could be explained by the amount of alcohol consumed (event-level), as well as their typical patterns of alcohol use and DG play (person-level). Gender was included as a covariate in all models as well as a moderator of event-specific relationships, as some research indicates that men drink more than women when playing (2,6,14), but women may experience more consequences (2).

Method

Participants and Procedure

Seven hundred first-year students between the ages of 18–20 were randomly selected from the registrar's database at a large, public university in the Northeast United States. Students were mailed a letter inviting them to complete up to six web-based surveys assessing Friday and Saturday drinking behaviors during the fall of 2010. An email invitation followed to their university email address and included a URL and personal identification number (PIN) to access the consent form and first survey, yielding a 68.0% (n = 476) response rate. Individuals who reported past month alcohol use (n = 358, 75.2%) were subsequently invited to complete five additional surveys throughout the semester. Survey invitation emails were sent on Sundays, with up to three reminders, and survey access was disabled after four days. Surveys 1 and 6 lasted 45–60 minutes and included both event and non-event measures. Surveys 2–5 included only event-specific measures and lasted 10–15 minutes. To help ensure accurate recall, each survey was structured so that questions specific to the previous Friday were asked first, followed by a separate series of questions for Saturday. Participants were compensated $30 each for surveys 1 and 6, and $10 each for surveys 2–5. Response rates ranged from 93.0%–98.3% for surveys 2–6. The university's institutional review board approved all procedures.

Of the 358 students who reported past month alcohol use, 22 did not report any consumption across all 12 measured days (events), and were excluded from further analysis. This yielded a sample of 336 first-year student drinkers (53.0% men) with a mean age of 18.20 years (SD = .44). The majority of the sample identified as White/Caucasian (89.0%), with 5.1% Asian, 2.4% Black/African American, 2.1% Multiracial or Other, and 8.6% identified as Hispanic. Participants resided primarily in on-campus residence halls (97.6%).

Measures

Alcohol Use—Event-specific alcohol use was assessed with an open-ended question asking participants to indicate the number of drinks they consumed on the previous Friday and Saturday. A standard drink definition was provided to help with their estimate. A typical drinking variable was also calculated, based on event-specific alcohol use data, as the average number of drinks consumed across all drinking events.

Drinking Game Play—To assess event-specific DG play, participants were asked to indicate DG participation (0 = *No*, 1 = *Yes*) on each event they reported alcohol use. Typical DG play was calculated as the proportion of events on which DGs were played, relative to an individual's total number of drinking events.

Alcohol-related Consequences—Similar to DG play, event-specific consequences were assessed by asking students to indicate if they experienced consequences (0 = *No*, 1 = *Yes*) on events they consumed alcohol. Items were adapted from the Young Adult Alcohol Consequences Questionnaire (YAACQ) (15) to indicate whether consequences were experienced during or after a specific drinking occasion, as opposed to over an extended period of time. We examined consequence items likely to be related to event-specific

drinking, including social-interpersonal (e.g., "I said or did embarrassing things"; 6 items, α = .91), risk behavior (e.g., "I drove a car when I had too much to drink to drive"; 8 items, α = .91), and blackout drinking (e.g., "I've not been able to remember large stretches of time while drinking"; 7 items, α = .92) consequences. Because items were dichotomous, we obtained tetrachoric inter-item correlation estimates via PRELIS (SSI, Inc., Skokie, IL) and used those values to calculate the coefficient alpha for each subscale. Items within each category were summed and the sum score was dichotomized (0 = *no consequences*, 1 = *one or more*) for each domain.

Analytic Plan

Descriptive statistics were analyzed using IBM SPSS Statistics 20 (IBM Corp., Armonk, NY). Hierarchical linear models (HLMs) were used to address study aims, and were analyzed using HLM 6.08 (SSI, Inc., Skokie, IL). For all models, we only included days in which alcohol use was reported, which consisted of 1,860 drinking events across the 336 participants. Days with missing data on one or more event-level variables of interest (n = 22, 1%) were further excluded, resulting in 1,838 total drinking events for HLM analyses.

To address the first aim, we tested a model with event-specific alcohol use as the outcome. The Level 1 (event-level) covariate was whether an individual played DGs on drinking events, and Level 2 (person-level) covariates were gender and one's typical DG play. In addition, we tested a cross-level interaction between gender and event-level DG play. Across all drinking occasions, number of drinks consumed ranged from 1 to 40 and was fairly normally distributed (M = 6.90, SD = 4.51). Thus, an identity link was utilized for the HLM analysis.

For the second aim, a logistic model was used for each of the dichotomous consequence outcomes using the Bernoulli option in HLM. For these models, we included all covariates used to predict alcohol use and added event-level alcohol use (Level 1), typical alcohol use (Level 2), and the interaction between gender and event-level alcohol use.

All Level 2 predictors (with the exception of dummy coded gender; women coded 1) were grand mean centered so that values represented how individuals differed from the population mean, indicating relative individual differences. Level 1 predictors were person centered so values reflected event-specific variation relative to one's average or typical behavior (i.e., deviation from person means) (16). All models were random-intercept models with fixed slopes for the Level 1 predictors.

Results

Descriptive Statistics

Across the 12 weekend days, participants averaged 5.54 (SD = 2.67) total drinking events and 2.25 (SD = 2.17) DG events. 75.6% (n = 254) of participants reported at least one DG event. Descriptive statistics for typical alcohol use, DG play, and consequence variables averaged across drinking events are presented in Table 1.

Event-specific Alcohol Use

Table 2 shows men consumed higher levels of alcohol on drinking events compared to women, and those who participated in DG more frequently across events consumed more alcohol (Model ALC1). At the event level, DG participation was significantly associated with greater alcohol use such that on occasions when individuals played DGs they consumed an average of 1.12 more drinks compared to drinking events they did not play DGs. Gender was added as a cross-level interaction with event DG play in Model ALC2, and it was not statistically significant.

Event-specific Alcohol-related Consequences

Table 3 shows that those who consumed higher levels of alcohol quantity across events were more likely to report any social-interpersonal (model SOC1), risk behavior (model RSK1) or blackout drinking consequences (model BLK1). Controlling for individual differences in typical drinking, those who played DGs more frequently were more likely to experience any blackout drinking consequences. Women were more likely to experience any social-interpersonal and blackout drinking consequences.

In addition to the between-person variability, event-specific alcohol use was significantly related to the experience of all consequence types. The odds of experiencing any social-interpersonal, risk behavior, or blackout drinking consequences were higher (24%, 16%, and 38%, respectively) on events when individuals consumed one more drink than their typical amount. Further, DG play increased their chances of experiencing any blackout drinking consequences on that same occasion.

Moderated Associations of Event-specific Alcohol Use and DG Play by Gender

In Table 3, models SOC2, RSK2, and BLK2 include cross-level interactions of gender and both event-specific drinking and DG play. There was a significant interaction between gender and DG play for social-interpersonal consequences such that, for women, their chances of experiencing this type of harm on occasions they played DGs were much greater than those of men (odds ratio = 2.59; see Figure 1 for probabilities). There was also a significant interaction between event-specific consumption and gender for blackout drinking consequences. When women, compared to men, drank one more than their usual, their odds of experiencing blackout drinking consequences were increased by a factor of 13% (odds ratio = 1.13; see Figure 2 for probabilities).[1]

Additional Analyses with Blood Alcohol Concentration (BAC)

We also ran a series of alternative models similar to the ones reported above, with the exception that BAC was substituted for number of drinks, first as an outcome variable (similar to Table 2), and then as a both a Level 1 and Level 2 predictor of the consequence

[1]In addition to the three consequence types, we also examined total consequences as an outcome. A total consequence score was calculated for each event by summing all items (M = 3.93, SD = 4.71). Poisson HLM models were utilized because this variable was positively skewed with a considerable amount of zeros (16). Results indicated that women, students who consumed more alcohol, on average, and students who consumed more than their typical amount on a given drinking event (all ps < .01) reported higher total consequence scores. However, neither typical DG tendencies or event-specific DG play was significantly associated with one's overall experience of harm on a given event. In addition, there were no significant cross-level gender interactions for these models.

outcomes (similar to Table 3). Participants reported their weight in the first survey, and the duration of each reported drinking event across all assessments, which allowed us to calculate both event-specific BACs and a typical BAC across all drinking events (17). With BAC as the outcome, DG play remained a significant predictor at both the typical and event-specific level (*p*s < .01); however, gender was not significantly associated with BAC, which is not surprising given that men reported drinking more than women across all occasions, and BAC accounts for gender differences in alcohol metabolism. In addition, the cross-level interaction between gender and event DG play was not significant. Similarly, for the model predicting blackout drinking consequences, gender was no longer a significant predictor at Level 2 (in models with and without the gender interactions), and there was no significant cross-level interaction between gender and event-specific BAC. For models predicting social-interpersonal and risk behavior consequences, results were similar to those shown in Table 3.

Discussion

This study examined the risks associated with DG play among first-year college student drinkers using an event-level, repeated-measures framework. Four primary findings emerged. First, students consumed approximately one additional drink and reported higher BACs on events they played DGs, controlling for typical gaming tendencies. Thus, regardless of how often first-year students play DGs, they are likely to consume more when doing so, which underscores the high-risk nature of DGs for all student drinkers. Although one drink may not seem like a substantial increase, it is concerning in the context of our sample of students who consumed about six drinks when drinking. Further, a one-drink increase from typical drinking behavior was associated with much higher odds of experiencing all consequences types.

Second, men consumed approximately two more drinks than women on all drinking events, regardless of whether they played DGs, resulting in similar BACs for men and women on those occasions. That men drink more than women when playing DGs is consistent with some research on gender differences in typical alcohol consumption related to DG play (2,6,14). Conversely, two recent DG simulation studies, in which students played DGs in a lab environment with water substituted for alcohol use, found that men and women consume similar amounts when playing DGs which would result in higher BACs for women when alcohol is consumed (18,19). Notably, men and women were instructed to drink similar amounts during the simulations, which could also account for differences in results as compared to self-report studies.

Third, both personal DG tendencies and event-specific DG participation were related to blackout drinking consequences. This is consistent with the notion that DGs consist of consuming drinks in a short timespan, resulting in elevated BACs, and in turn, higher odds of getting sick and experiencing blackouts after drinking. Specifically, research suggests that gulping drinks, a behavior consistent with DG play, can lead to a more rapid rise in BAC and an increased likelihood of experiencing a blackout (20). In contrast, typical DG tendencies and event-specific DG play were not significantly associated with risk of experiencing any social-interpersonal or risk behavior consequences, controlling for typical

and event-specific consumption. However, given that students were more likely to experience those consequences on occasions when they drank more than their typical amount, it is plausible that DG play may increase students' risk for harm during or after a drinking event in a more indirect manner via increasing event-specific alcohol use on those occasions. Thus, findings from the present study collectively suggest that DG play places all individuals at increased risk of harm.

Fourth, we found event DG participation was related to an increased risk of experiencing social-interpersonal consequences for women. That DG play was uniquely related to social-interpersonal harm (e.g., saying embarrassing things, becoming obnoxious or insulting) makes sense given the social context of DGs. The competitive nature of DGs coupled with the social setting and increased alcohol use provides an opportunity for individuals to express themselves in unbecoming ways within their peer groups (e.g., taunting other players). Whereas all gamers may make antagonizing comments to fellow players to entice them to drink more, women may retrospectively perceive those actions to be embarrassing or regretful, whereas men may perceive such actions in a neutral or even positive light (i.e., it is just a part of the DG experience). No gender differences were observed in the association between event DG play and risk behavior or blackout drinking consequences. This is contrary to a previous study (2) that found a stronger association between past month DG play and social risk behavior consequences (e.g., unplanned sex, driving while intoxicated) for women. Between-study differences in findings may be due to differences in measurement or that both typical and event-specific alcohol use was controlled for in the current study.

This study has some limitations including a single-campus sample of first-year student drinkers in their first semester. The extent to which results would generalize to comparable students on college campuses with different drinking environments is unclear. Our sample may be considered high-risk based on the average levels of reported alcohol use. However, alcohol use levels in our study are similar to levels of past month use reported in previous DG research with a similarly aged college sample (2). This study relied on self-report data and accurate recall could be affected on nights of elevated alcohol use. Students may have underestimated their alcohol use on DG events, and, in turn, the risks associated with DG play could be underestimated. Future event-specific studies could be designed to distinguish between the number of drinks consumed during and after DGs, to gauge how DG play leads to subsequent rises in alcohol use or BAC. Incorporating measures of event-specific motives and intentions for DG play could offer further understanding as to why DGs influence risk. For example, individuals who intend to get drunk on a given occasion might participate in DGs as a way to achieve that goal.

Prevention efforts targeting incoming students may benefit from components related to both typical and event-specific DG play. In addition to discussing students' past experiences with DGs, it could be useful to help them understand the risks associated with DG play on any occasion, regardless of their typical DG play tendencies. For women, it may be particularly beneficial to emphasize the increased risk of social-interpersonal consequences, especially given that DG play is often motivated by social reasons (14,21). Highlighting the discrepancy between playing DGs to fit in with peers or meet new people, and in turn, being

more likely to insult or offend others, could be particularly relevant for women. Overall, our findings provide evidence that event-specific DG play is a contextual risk factor for all first-year student drinkers, regardless of individual alcohol use and DG play tendencies.

Acknowledgments

This research was supported by Award Numbers F31 AA018899, R01 AA015737, and R01 AA019511 from the National Institute on Alcohol Abuse and Alcoholism (NIAAA).

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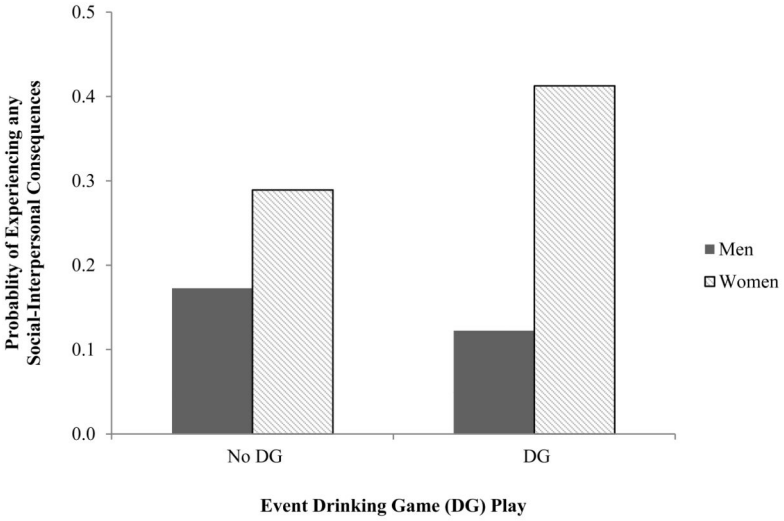

Figure 1.

Event DG play × gender interaction effect on the probability of experiencing any social-interpersonal consequences on drinking occasions. Data points represent likelihoods for participants when values of typical alcohol use and DG play across events are equal to the population average (i.e., zero due to grand-mean centering), and event alcohol use is equal to an individual's average (i.e., zero due to person-mean centering).

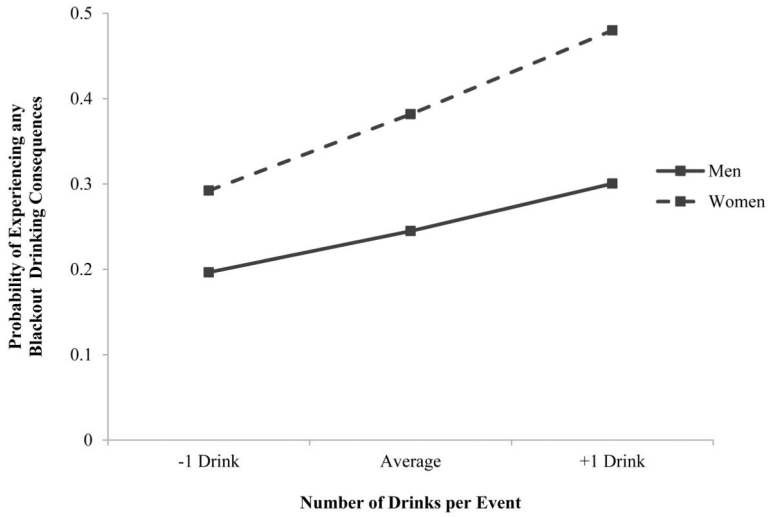

Figure 2.

Event number of drinks × gender interaction effect on the probability of experiencing any blackout drinking consequences on drinking occasions. Data points represent likelihoods for participants on non-DG events and when values of typical alcohol use and DG play across events are equal to the population average (i.e., zero due to grand-mean centering).

Table 1

Descriptive statistics across participants on drinking occasions for drinking game (DG) play, alcohol use, and consequences

Variable	Overall sample (*N* = 336) *M (SD)*	Men (*n* = 178) *M (SD)*	Women (*n* = 158) *M (SD)*
Typical number of drinks per event			
All events	6.24 (3.44)	7.32 (3.68)	5.03 (2.70)**
Non-DG events only	5.69 (3.48)	6.46 (3.70)	4.84 (3.01)**
DG events only	7.45 (3.73)	8.71 (3.88)	6.05 (2.99)**
Proportion of events with any SOC consequences			
All events	0.26 (.27)	0.23 (.28)	0.29 (.27)
Non-DG events only	0.24 (.31)	0.22 (.31)	0.25 (.30)
DG events only	0.30 (.37)	0.24 (.35)	0.36 (.38)**
Proportion of events with any RSK consequences			
All events	0.20 (.25)	0.21 (.27)	0.20 (.22)
Non-DG events only	0.19 (.28)	0.17 (.29)	0.20 (.27)
DG events only	0.22 (.32)	0.23 (.34)	0.19 (.30)
Proportion of events with any BLK consequences			
All events	0.33 (.30)	0.33 (.31)	0.34 (.28)
Non-DG events only	0.28 (.31)	0.26 (.31)	0.30 (.32)
DG events only	0.43 (.40)	0.41 (.40)	0.44 (.40)

Note. SOC = social-interpersonal; RSK = risk behavior; BLK = blackout drinking. Independent samples t-tests were conducted to test for significant gender differences;

* $p < 0.05$,

** $p < 0.01$.

Table 2

Drinking game (DG) play and event-specific alcohol use

	Coefficient *(SE)*	
Fixed effects	**ALC1**	**ALC2**
Intercept	7.39 (0.24)**	7.39 (0.24)**
Women	−2.06 (0.34)**	−2.06 (0.34)**
Person-level DG play	3.77 (0.57)**	3.77 (0.57)**
Event-level DG play	1.12 (0.19)**	1.46 (0.27)**
Event-level DG play × Women		−0.68 (0.38)

Note. Event-level N = 1,838; Person-level N = 336.

* $p < 0.05$,

** $p < 0.01$. ALC1 is the model with no cross-level interaction between event-level DG play and gender, whereas ALC2 is the model in which that interaction was included.

Table 3

Drinking game (DG) play and event-specific consequences

	Social-Interpersonal (SOC) Odds ratio [95% CI]		Risk Behaviors (RSK) Odds ratio [95% CI]		Blackout Drinking (BLK) Odds ratio [95% CI]	
Fixed Effects	**SOC1**	**SOC2**	**RSK1**	**RSK2**	**BLK1**	**BLK2**
Intercept	**0.21 [0.16, 0.27]**	**0.21 [0.16, 0.27]**	**0.18 [0.14, 0.23]**	**0.18 [0.14, 0.24]**	**0.32 [0.25, 0.41]**	**0.32 [0.25, 0.42]**
Women	**2.02 [1.41, 2.89]**	**1.95 [1.35, 2.81]**	1.44 [0.98, 2.11]	1.40 [0.95, 2.06]	**1.96 [1.36, 2.81]**	**1.91 [1.32, 2.74]**
Person-level number of drinks	**1.13 [1.07, 1.20]**	**1.14 [1.07, 1.20]**	**1.11 [1.05, 1.18]**	**1.11 [1.05, 1.18]**	**1.26 [1.19, 1.34]**	**1.26 [1.19, 1.34]**
Person-level DG play	0.82 [0.45, 1.50]	0.81 [0.44, 1.50]	1.39 [0.73, 2.65]	1.39 [0.73, 2.65]	**1.85 [1.02, 3.38]**	**1.83 [1.01, 3.35]**
Event-level number of drinks	**1.24 [1.19, 1.30]**	**1.23 [1.17, 1.30]**	**1.16 [1.12, 1.21]**	**1.14 [1.08, 1.20]**	**1.38 [1.32, 1.45]**	**1.32 [1.25, 1.40]**
Event-level DG	1.15 [0.86, 1.52]	0.67 [0.43, 1.04]	0.98 [0.73, 1.33]	1.07 [0.68, 1.66]	**1.33 [1.00, 1.76]**	1.33 [0.88, 2.00]
Event-level number of drinks × Women		1.04 [0.95, 1.13]		1.06 [0.98, 1.16]		**1.13 [1.02, 1.25]**
Event-level DG play × Women		**2.59 [1.45, 4.62]**		0.85 [0.46, 1.56]		1.00 [0.57, 1.76]

Note. Event-level N = 1,838; Person-level N = 336. Significant effects are indicated when the confidence interval (CI) does not contain the value of one, and are presented in bold. SOC1, RSK1, and BLK1 are models with no cross-level interactions between event-level behaviors and gender, whereas SOC2, RSK2, and BLK2 are models in which those interactions were included.