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Does Drinking to Cope Explain Links Between Emotion-Driven Impulse Control Difficulties and Hazardous Drinking? A Longitudinal Test

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Abstract

Difficulty controlling impulsive behaviors when experiencing negative emotions is a prominent risk factor for hazardous alcohol use, and prior research suggests that drinking to cope may mediate this association. The present study examines this possibility prospectively in a sample of 490 young adult women between the ages of 18 and 25. Participants completed measures of emotion-driven impulse control difficulties, drinking to cope, and hazardous alcohol use at six time points over the course of approximately 20 months (i.e., one assessment every four months). Multilevel structural equation modeling revealed that drinking to cope fully mediated the relationship between emotion-driven impulse control difficulties and hazardous alcohol use when examining these relationships between individuals and partially mediated this relation when examining these relationships within individuals. These findings suggest that drinking to cope is a key mechanism in the relationship between emotion-driven impulse control difficulties and hazardous drinking. Results highlight the importance of targeting both emotion dysregulation and drinking to cope when treating young women for alcohol use problems.

Keywords

alcohol; drinking motives; emotion regulation; longitudinal; impulse control difficulties

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Research has consistently shown positive associations between negative emotions and drinking (Malouff, Thorsteinsson, Rooke, & Schutte, 2007; Mohr, Armeli, Tenne, & Todd, 2010). One factor that may contribute to increased drinking when experiencing negative affect is difficulties in emotion regulation (Messman-Moore & Ward, 2014). Emotion regulation is a multi-faceted construct involving emotional awareness, clarity, and acceptance, the flexible use of situationally-appropriate strategies to modulate the intensity and/or duration of emotions, and the ability to engage in goal-directed behaviors and inhibit impulsive behaviors when experiencing negative emotions (Gratz & Roemer, 2004). One of these facets—the ability to inhibit impulsive behaviors when experiencing negative emotions—may be particularly relevant to hazardous drinking.

Although broad deficits in emotion regulation predict a range of impulsive behaviors (e.g., Buckholdt et al., 2014; Gratz & Roemer, 2004; Weiss, Tull, Viana, Anestis, & Gratz, 2012), evidence indicates that difficulties controlling impulsive behaviors in the context of emotional distress may be uniquely associated with hazardous drinking (Fox, Hong, & Sinha, 2008; Messman-Moore & Ward, 2014). Specifically, a number of studies have found that negative urgency (i.e., a disposition to engage in rash action when experiencing negative affect) is the facet of impulsivity most closely related to drinking problems and alcohol dependence (see Coskunpinar, Dir, & Cyders, 2013 for a meta-analysis). Though borne out of the impulsivity literature, negative urgency is commonly viewed as an aspect of emotion regulation (Cyders & Smith, 2008; Weiss et al., 2012). This conceptualization derives from evidence suggesting that individuals in a state of emotional distress are more likely to allocate resources toward the immediate elimination of that distress (regardless of the longer-term negative consequences of the behavior), thus increasing their use of maladaptive emotion regulating behaviors (Tice, Bratslavsky, & Baumeister, 2001).

Alcohol may be particularly reinforcing for individuals who have difficulty regulating their behaviors when distressed. Self-medication models of drinking emphasize the use of alcohol to escape or avoid unpleasant internal experiences, particularly negative emotions (e.g., Khantzian, 1997; Greeley & Oei, 1999). Negative reinforcement of drinking in this manner may eventually result in the expectancy that drinking can be used to reduce distress (Cooper, 1994; Cox & Klinger, 1988), which may foster unhealthy drinking patterns due to an overreliance on drinking as a strategy for managing distress (Cooper, 1994; Cooper, Frone, Russell, & Mudar 1995). Support for the self-medication model comes from research comparing drinking motivations and patterns of alcohol use in those low and high in emotion-driven impulse control difficulties. Cross-sectional studies demonstrate that greater difficulty controlling impulsive behaviors when distressed is associated with higher drinking to cope (e.g., Adams, Kaiser, Lynam, Chamigo, & Milich, 2012; Jones, Chryssanthakis, & Groom, 2014), which, in turn, is associated with problematic drinking and alcohol dependence (e.g., Adams et al., 2012; Carpenter & Hasin, 1998). Prospective studies support these findings, indicating that adults with high baseline difficulties controlling impulsive behaviors when distressed are more likely to report drinking to cope at follow-up (Settles, Cyders, & Smith, 2010). Higher drinking to cope at baseline is also associated with later increased frequency and quantity of drinking (Crutzen et al., 2013; Settles et al., 2010), as well as greater risk for alcohol abuse and dependence (Beseler, Aharonovich, Keyes &

Hasin, 2008). Beyond these individual relations, several cross-sectional studies have found that drinking to cope mediates relations between increased difficulties controlling impulsive behaviors when distressed and problematic drinking (Adams et al., 2012; Jones et al., 2014; Magid, MacLean, & Colder, 2007; Martens, Pederson, Smith, Stewart, O'Brian, 2011).

In addition to information gleaned from cross-sectional studies, longitudinal studies can provide additional information about relationships between drinking to cope and drinking problems among individual women, which has important implications for interventions. Longitudinal research examining within-person trajectories of drinking to cope and drinking problems also supports the notion that greater drinking to cope is proximally associated with increases in drinking (Cooper et al., 2008; Littlefield et al., 2009, 2010; O'Hara et al., 2014). For example, in a study examining daily drinking to cope motives and alcohol use in college women across 30 days, O'Hara et al. (2014) found that women drank alone more frequently on nights when they reported higher than usual drinking to cope. In support of the larger model, Settles, Cyders, and Smith (2010) found that higher negative urgency at the start of the first semester of college was associated with greater drinking quantity at the end of the second semester of college. Further, this change was mediated by changes in drinking to cope during the course of the first semester. However, Settles et al. (2010) did not assess levels of negative urgency over time, and thus were unable to examine within-person effects of the tendency to act impulsively when experiencing negative emotions on drinking to cope and drinking quantity. Moreover, research examining this model has focused largely on college students; given that this population inhabits a unique social environment in which heavy drinking is normative (Blanco et al., 2008), the generalization of these findings is unclear.

Understanding how drinking to cope may foster drinking problems in young adults is important because alcohol use disorders peak when individuals are in their early 20s (Grant et al., 2006). Moreover, epidemiological studies indicate a narrowing gender gap for heavy drinking and alcohol use disorders, such that women (but not men) in younger birth cohorts have higher prevalence rates of heavy drinking and alcohol use disorders (see Keyes, Li, & Hasin, 2011 for a review). Young adult women are more likely than men to use alcohol to improve mood, reduce tension, or cope with problems (Beck, Thombs, Mahoney, & Fingar, 1995; Borjesson & Dunn, 2001; Norberg, Norton, Olivier, & Zvolensky, 2010), drink more in the context of negative emotional states such as when they are depressed (Beck et al., 1995), and are more likely to initiate heavy episodic drinking to escape or alleviate distress (Liu & Kaplan, 1996). Young women are also at increased risk for several negative drinking-related consequences, including unprotected sex, injury, memory lapses (Dumas, Wells, Tremblay, & Graham, 2013), and sexual assault (Abbey, Zawacki, Buck, Clinton, & McAuslan, 2001). These recent trends suggest that understanding contributors to hazardous alcohol use in young adult women is critical.

Purpose of the Present Study

The present study builds on prior work by examining relations among emotion-driven impulse control difficulties, drinking to cope, and hazardous drinking prospectively in a sample of young adult women who completed assessments at six time points over the course

of approximately 20 months. The present study examines an ethnically diverse sample of young adult community women over relatively short follow-up periods (i.e., four months) to assess relationships among study variables, including both between- and within-person effects. These briefer follow-up assessments allow for the examination of more proximal within-person relationships among study variables.

Our overarching hypothesis was that greater drinking to cope would mediate relations between emotion-driven impulse control difficulties and hazardous alcohol use. More specifically, we hypothesized between-person effects, such that women with greater emotion-driven impulse control difficulties would drink to cope more frequently. We also hypothesized that women who drink to cope more frequently would have higher hazardous alcohol use than other women. We further predicted that the between-person effect of emotion-driven impulse control difficulties on hazardous alcohol use would be significantly reduced after controlling for the between-person effect of drinking to cope; thus, drinking to cope was expected to mediate relations between emotion-driven impulse control difficulties and hazardous alcohol use. Regarding within-person effects, we hypothesized that on occasions that women reported greater emotion-driven impulse control difficulties than usual, they would also report drinking to cope more frequently. On occasions women reported greater drinking to cope, they were also expected to report more hazardous alcohol use. Finally, we predicted a within-person mediational effect such that the impact of emotion-driven impulse control difficulties on hazardous alcohol use would be significantly reduced after controlling for the within-person effect of drinking to cope.

Method

Participants

The current data were drawn from a larger, multi-site prospective study of emotion dysregulation and sexual revictimization among young adult women in the community (see Masked for Review). A total of 490 women aged 18 to 25 were recruited from the community at four different sites (Lincoln, Nebraska [$n = 121$]; Omaha, Nebraska [$n = 96$]; Jackson, Mississippi [$n = 151$]; Oxford, Ohio [$n = 122$]) at baseline. Participants completed six assessments (one every four months) over a 20-month period. At each follow-up assessment, participants were asked to report on behaviors during “the previous four months (i.e., since the last assessment).” The current study uses data from Waves 1 through 6.

At baseline, study participants were an average of 21.74 years old ($SD = 2.23$, range = 18 to 25). In addition, 187 women (38%) were not students, 46 women (9%) were part-time students, and 256 women (52%) were full-time students. Two-hundred one women (41%) reported a household yearly income under \$10,000, 79 women (16%) reported between \$10,000 and \$20,000, 55 women (11%) reported between \$20,000 and \$30,000, 61 women reported between \$30,000 and \$50,000 (13%), and 88 women (18%) reported an income over \$50,000. Regarding ethnicity, 61% of participants identified as European American, 35% as African American, 6% as Latina, 3% as American Indian, 4% as Asian, and 3% as another ethnic background (categories were not mutually exclusive so total exceeds 100%). The majority of women reported completing at least some higher education ($n = 367$; 75%) and being single and never married ($n = 408$; 83%).

Measures

Difficulties in Emotion Regulation Scale - Impulse Control Difficulties subscale (DERS; Gratz & Roemer, 2004)—Emotion-driven impulse control difficulties were assessed with the impulse control difficulties subscale of the DERS. Participants rated each of six items on a 5-point scale ranging from 1 = “almost never” to 5 = “almost always.” Sample items include: “When I’m upset, I lose control over my behaviors” and “When I’m upset, I become out of control.” An overall score reflecting emotion-driven impulse control difficulties was created by taking the mean of all items. The alphas for this subscale in the current sample ranged from .86 to .87 across occasions. Descriptive statistics for this subscale are displayed in Table 2. The DERS and its subscales have been found to demonstrate good test-retest reliability and construct and predictive validity (see Gratz & Roemer, 2004; Gratz & Tull, 2011). Similar to the commonly-used UPPS negative urgency subscale (Lynam, Smith, Whiteside, & Cyders, 2006), the impulse control difficulties subscale of the DERS assesses difficulties controlling impulsive behaviors when experiencing negative emotions. Scores on this subscale are negatively associated with activation of the rostral anterior cingulate cortex (an area of the brain thought to be associated with inhibitory control) among cocaine-dependent patients (Li et al., 2008) and evidence a significant positive correlation with the UPPS negative urgency scale ($r = .64$; Weiss et al., 2013).

Drinking Motives Questionnaire – Revised, Coping subscale (DMQ-R; Cooper, 1994)—Drinking to cope was assessed at each occasion with the coping subscale of the DMQ-R. The five items on this subscale assess how often individuals drink to cope with their emotions or problems on a 6-point scale from 1 = “I never drink alcohol” to 6 = “almost always/always.” Sample items include: “To forget your worries” and “To cheer up when you are in a bad mood.” Higher scores on this scale indicate using drinking to cope more often. A drinking to cope score was created by taking the mean of all items. The alphas for drinking to cope in the current sample ranged from .92 to .94 across occasions. Descriptive statistics for drinking to cope are displayed in Table 2.

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993)—Hazardous alcohol use was assessed at each occasion with the AUDIT, a 10-item measure that assesses three aspects of hazardous drinking, including quantity and frequency of drinking, symptoms of dependence, and problems caused by alcohol use. At follow-up assessments, the original past-year time frame of the AUDIT items was modified to assess the past four months (reflecting the interval between assessments). Higher scores indicate greater hazardous alcohol use. A hazardous alcohol use score was created by taking the mean of all items. To make the variance estimate less prone to numerical instability given the small estimates in analyses, the scale of the AUDIT score was increased by multiplying the mean of items by 10. Alphas for the AUDIT in the current sample ranged from .79 to .88 across occasions. Descriptive statistics for hazardous alcohol use are displayed in Table 2.

Procedure

Study procedures were approved by the Institutional Review Boards of all participating institutions. Participants were recruited through a variety of means. A list of potential participants who met eligibility criteria (i.e., women in the target age range) was provided by Survey Sampling International (SSI), and recruitment letters were sent to a randomly selected sample of women from this list. We also recruited participants through advertisements posted online and throughout the community (including coffee shops, churches, stores, hospitals, colleges, and clinics). In all cases, participants were recruited for a study about “life experiences and adjustment among young adult women.” All participants provided written informed consent. At Waves 1, 3, and 5, participants completed relevant self-report measures as well as activities unrelated to the current study (i.e., a diagnostic interview and laboratory tasks) at the study sites. Waves 2, 4, and 6 included self-report measures only, and could be completed either at home or in the laboratories of the study sites. Participants were compensated \$75 for the Wave 1 assessment, \$25 for the Wave 2, 4, and 6 assessments, and \$50 for the Wave 3 and 5 assessments.

Analytic Strategy

The current study used a longitudinal design to examine the relations among time-varying emotion-driven impulse control difficulties, drinking to cope, and hazardous alcohol use. Across all measures, at least 80% of items had to be answered in order for scale scores to be computed. The current study uses multilevel modeling to examine relations among study variables. Multilevel modeling allows for modeling dependence across observations in longitudinal samples and the inclusion of time-varying and person level predictors, and does not require the same data structure for each person (i.e., it can effectively model when data are unbalanced or missing). An empty means, random intercept model was estimated to decompose the variation in each time-varying variable, using maximum likelihood within SAS PROC MIXED, in which occasions were modeled as nested within persons.

Unconditional univariate models—To help discern the best-fitting unconditional model for each time-varying variable, a saturated means, unstructured variance model was estimated for each variable, in which the outcome mean and variance is estimated separately per occasion. We used the likelihood ratio test, in which the $-2 \log$ likelihood (LL) between models are asymptotically chi-square distributed, to compare nested models.

Multivariate analyses—Once the best-fitting unconditional model was determined for each variable, we then used multilevel structural equation modeling within Mplus v. 7 (Muthén & Muthén, 1998–2012) under robust maximum likelihood to examine study hypotheses. Robust maximum likelihood uses a scaling factor to adjust model fit statistics and model standard errors for continuous data that are more or less kurtotic than would otherwise be common in a normal distribution. Estimation through maximum likelihood, which was used in SAS and Mplus, also handles missing data. Each participant contributes a portion to the function due to their observations. If some data are missing, the log-likelihood function uses a reduced form of the multivariate normal distribution function; through this, the total log-likelihood is maximized and missing data do not contribute. We included several control variables in the analyses. Location (with Ohio as the reference group) was

included to control for the sampling design, and the demographic variables of race (with White coded as 0 and racial minority coded as 1) and age at Wave 1 (centered at 18) were included because they have been shown to be related to hazardous drinking (Hasin, Stinson, Ogburn, & Grant, 2007).

Because a model with model-based variance partitioning of emotion-driven impulse control difficulties would not estimate, two observed variables were used to partition the effect of emotion-driven impulse control difficulties into its contextual (level-2) and within-person (level-1) effects. A contextual effect is the incremental between-person effect, or (in longitudinal models such as the current model) the incremental effect of general person characteristics above and beyond the characteristics of a specific occasion. The level-2 predictor was created as the person mean of emotion-driven impulse control difficulties and the level-1 predictor was time-varying emotion-driven impulse control difficulties. This same type of variance partitioning was model-based for the level-1 outcomes of drinking to cope and hazardous alcohol use, such that random intercept variances were estimated for each at level 2, and residual variances were estimated for each at level 1. The fixed effects for level-1 were within-person effects and the fixed effects for level-2 were contextual effects.

We first evaluated the unique total effect of emotion-driven impulse control difficulties on hazardous alcohol use in a multilevel model. Next, we examined the full model, which included the effect of emotion-driven impulse control difficulties on drinking to cope ($X \rightarrow M$), the effect of drinking to cope on hazardous alcohol use ($M \rightarrow Y$), and the effect of emotion-driven impulse control difficulties on hazardous alcohol use ($X \rightarrow Y$) after accounting for the mediated effect. See Figure 1 for a diagram of the multilevel structural equation model. The MODEL CONSTRAINT command was used to obtain model-implied between-person effects and indirect effects. Thus, we were able to examine the between- and within-person effects of each pathway (i.e., $X \rightarrow M$, $M \rightarrow Y$, and $X \rightarrow Y$). In addition to the MODEL CONSTRAINT test of indirect effects in Mplus (which uses the delta method to find the variance of a function of random variables; MacKinnon, 2008), we used the parametric bootstrap to obtain a 90% confidence interval (CI) around the observed indirect effect. A 90% CI is consistent with prior research (Preacher, Zyphur, & Zhang, 2010) and corresponds to a one-tailed, $\alpha = .05$ hypothesis test. This method is called the Monte Carlo method in the context of single-level mediational models (MacKinnon, Lockwood, & Williams, 2004) and, in the current study, was calculated with Selig and Preacher's (2008) web-based utility.

Results

Descriptive Statistics

Table 1 shows the intercorrelations among study variables at Wave 1, and Table 2 displays descriptive data for study variables and the number of participants at each occasion. Participants who completed the final assessment in the current study did not differ from those who did not complete this assessment on the following variables at baseline: age, $t(488) = 1.29, p = .20$; hazardous alcohol use, $t(484) = 1.43, p = .15$; drinking to cope, $t(486) = 1.60, p = .11$; ethnicity, $\chi^2(1) = .39, p = .53$; or study location $\chi^2(3) = 2.58, p = .46$.

However, participants who did not complete the final assessment reported greater emotion-driven impulse control difficulties at baseline (mean = 11.65) than those who completed the final assessment (mean = 10.66), $t(488) = 2.05, p = .04$. As for site differences, participants recruited from Jackson, MS were more likely than those recruited from any other site to identify as an ethnic minority, $\chi^2(3) = 96.39, p < .001$. Results also revealed differences in participant age across sites, $F(3, 486) = 6.18, p < .001$. Post hoc comparisons using Fisher's least significant difference (LSD) test revealed that participants recruited from Omaha, NE ($M = 22.50, SD = 2.13$) were older than participants recruited at Ohio ($M = 21.22, SD = 2.41$), Jackson, MS ($M = 21.75, SD = 2.02$), and Lincoln, NE ($M = 21.66, SD = 2.21$), and that participants recruited from Jackson were older than those recruited from Ohio.

With regard to levels of hazardous drinking within this sample, the mean AUDIT scores of participants in this sample (3.54 – 4.85) are comparable to those of other community samples and samples of young adult women (see Clements, 1998; Selin, 2003). Of the 490 participants, 36 women (7%) reported that they did not drink any alcohol over the course of the study. At each occasion, the percentage of women who reported not drinking in the previous 4 months ranged from 19% to 22%. From one assessment period (i.e., wave) to the next, participants could either report the same level of hazardous drinking, increased hazardous drinking, or decreased hazardous drinking (e.g., Wave 1 to Wave 2, Wave 2 to Wave 3, etc.). From one wave to the next, 30% to 40% of women drank the same amount at the next wave, 28% to 35% of women increased their drinking at the next wave, and 28% to 41% of women decreased their drinking at the next wave. In addition, from the first wave to the last wave, 24% of women did not change their drinking, 31% of women increased their drinking, and 45% of women decreased their drinking.

Unconditional Univariate Models

The intraclass correlation for emotion-driven impulse control difficulties indicated that 61% of the variation was between persons. This correlation was significantly greater than 0, $-2 LL(df=1) = 1158.73, p < .001$. The saturated means, unstructured variance model showed that emotion-driven impulse control difficulties fluctuated over time, meaning no effects of time were needed.

For drinking to cope, the intraclass correlation indicated that 63% of the variation was between persons. This correlation was significantly greater than 0, $-2 LL(df=1) = 1268.71, p < .0001$. The saturated means, unstructured variance model demonstrated mean differences across occasions for drinking to cope ($F[5, 393] = 3.43, p < .01$). Drinking to cope at the first occasion was significantly higher than at all other occasions. Thus, the best-fitting unconditional model of time included an initial time effect in which Occasion 1 vs. Occasions 2, 3, 4, 5, 6 was dummy-coded. In addition, there were significant individual differences in the time effect, $-2 LL(df = 2) = 32.7, p < .001$.

The intraclass correlation for hazardous alcohol use indicated that 63% of the variation was between persons. This correlation was significantly greater than 0, $-2 LL(df=1) = 1260.25, p < .0001$. The saturated means, unstructured variance model showed mean differences across occasions for hazardous alcohol use ($F[3, 379] = 6.75, p < .001$). Hazardous alcohol use at the first and second occasions was significantly higher than all other occasions. Thus,

the best-fitting unconditional model of time included a time effect in which Occasions 1, 2 vs. Occasions 3, 4, 5, 6 was dummy-coded. There were significant individual differences in the time effect, $-2 LL (df = 2) = 58.9, p < .001$.

Multivariate Analyses

First, to evaluate the unique total effect of emotion-driven impulse control difficulties on hazardous alcohol use, a multilevel model was estimated with emotion-driven impulse control difficulties as a predictor and hazardous alcohol use as the outcome. This model revealed a significant positive within-person effect (estimate = 0.42, $p < .05$), such that hazardous alcohol use was higher on occasions that emotion-driven impulse control difficulties were higher. The between-person effect was also significant (estimate = 1.53, $p < .001$), such that hazardous alcohol use was higher on average for persons who experienced greater emotion-driven impulse control difficulties on average. This between-person effect was still significant after controlling for time-varying emotion-driven impulse control difficulties at each occasion (contextual effect estimate = 1.11, $p < .01$).

The extent to which drinking to cope mediated the relationship between emotion-driven impulse control difficulties and hazardous alcohol use was examined in a multilevel mediation model. Full results for this model are displayed in Table 3. Based on prior univariate results, a random time effect (for the fixed initial time effect) on drinking to cope and a random time effect (for the fixed effect of Occasions 1, 2 vs. Occasions 3, 4, 5, 6) on hazardous alcohol use were estimated. However, both random effects would not estimate simultaneously. We attempted to estimate a model including random intercepts for alcohol and drinking to cope and a random time effect on both hazardous alcohol use and drinking to cope, but this model would not estimate. Thus, we retained the model that allowed us to include the most random effects, specifically a random intercept for alcohol, a random intercept for drinking to cope, and a random time effect on hazardous alcohol use were estimated.

With respect to the between-person model, women with higher emotion-driven impulse control difficulties also had higher drinking to cope (estimate = 0.83, $p < .001$; $X \rightarrow M$). In addition, women with higher drinking to cope had higher hazardous alcohol use (estimate = 2.93, $p < .001$; $M \rightarrow Y$). The between-person effect of emotion-driven impulse control difficulties on hazardous alcohol use was significantly reduced after controlling for the between-person effect of drinking to cope, as indicated by a significant between-person indirect effect of emotion-driven impulse control difficulties on hazardous alcohol use through drinking to cope (estimate = 2.42, 90% CI [1.98, 2.88]). The between-person effect of emotion-driven impulse control difficulties on hazardous alcohol use did not remain significant (estimate = 0.37, $p = .06$; $X \rightarrow Y$) after accounting for the mediated effect, suggesting that the between-person relation between emotion-driven impulse control difficulties and hazardous alcohol use was fully explained by the mediator drinking to cope.

With respect to the within-person model, on occasions women reported greater emotion-driven impulse control difficulties than usual, they also reported higher drinking to cope (estimate = 0.13, $p < .01$; $X \rightarrow M$). Additionally, on occasions women reported higher drinking to cope, they also reported higher hazardous alcohol use (estimate = 1.60, $p < .001$;

M → Y). The within-person effect of emotion-driven impulse control difficulties on hazardous alcohol use was significantly reduced after controlling for the within-person effect of drinking to cope, as indicated by a significant within-person effect of emotion-driven impulse control difficulties on hazardous alcohol use through drinking to cope (estimate = 0.20, 90% CI [0.08, 0.32]). However, the within-person effect of emotion-driven impulse control difficulties on hazardous alcohol use remained significant (estimate = 0.59, $p < .001$; X → Y) after accounting for the mediated effect. Thus, on occasions women reported greater emotion-driven impulse control difficulties, they also reported higher hazardous alcohol, but this relation cannot be explained solely by the mediator drinking to cope.

Discussion

Using a diverse sample of young adult community women, the current study extends prior research by investigating difficulties controlling impulsive behaviors when distressed, drinking to cope, and hazardous alcohol use over a period of approximately 20 months. Findings suggest that emotion-driven impulse control difficulties, drinking to cope, and hazardous alcohol use fluctuated within women, but did not change in a systematic way, over the course of the study. Moreover, results largely supported our hypotheses, showing significant direct relations among difficulties controlling impulsive behaviors when distressed, drinking to cope, and hazardous alcohol use for both between- and within-person analyses. Findings also revealed full mediation of the relation between emotion-driven impulse control difficulties and hazardous alcohol use by drinking to cope for between-person analyses and partial mediation for within-person analyses. These results have important theoretical and clinical implications, which are discussed below.

Women with greater emotion-driven impulse control difficulties also reported greater hazardous alcohol use and more drinking to cope. These findings are consistent with prior cross-sectional research demonstrating links between negative urgency and both drinking to cope (e.g., Adams et al., 2013; Jones et al., 2014) and greater drinking problems (e.g., Adams et al., 2013). In addition to these direct relations, drinking to cope accounted for the relationship between emotion-driven impulse control difficulties and hazardous alcohol use. Young adult women who have difficulties controlling impulsive behaviors when distressed appear more likely to engage in maladaptive coping behaviors that maximize immediate benefits, such as drinking. This use of alcohol for self-medication purposes (Khantzian, 1997; Greeley & Oei, 1999) likely alleviates distress and, thus, reinforces future drinking to cope behaviors, increasing the risk for a pattern of using alcohol hazardously.

Perhaps more important to informing intervention, it is critical to determine whether there is a relationship between emotion-driven impulse control difficulties and drinking to cope for individual women. In general, our within-person effects mirrored the between-person effects and speak to the question of *when* women are at risk for hazardous alcohol use. On occasions women reported greater emotion-driven impulse control difficulties than usual, they also reported greater drinking to cope and hazardous alcohol use, suggesting a proximal link between these variables. Specifically, results suggest that women may be at greater risk for using alcohol to cope with negative emotions at times when they perceive greater

difficulties controlling impulsive behaviors while feeling distressed. In addition, the within-person effect of emotion-driven impulse control difficulties on hazardous alcohol use was significantly reduced after controlling for the within-person effect of drinking to cope. These findings suggest that drinking to cope is a key proximal mechanism underlying the relation between emotion-driven impulse control difficulties and hazardous drinking. These results are consistent with prior longitudinal findings that changes in drinking to cope mediated the relationship between general impulsivity and changes alcohol problems over time (Littlefield et al., 2010). The current study extends this work by examining emotion-driven impulse control difficulties, rather than general impulsivity, as well as by revealing more precise proximal relations between variables (i.e., assessments occurred every four months over the course of 20 months, rather than every 1 to 6 years over the course of 16 years), and examining these relations among a diverse sample of community women rather than a sample of college students.

The current study has implications for drinking prevention and intervention efforts aimed at young women. First, findings may aid in the identification of women at risk of using alcohol hazardously. In particular, results suggest the potential utility of assessing both emotion-driven impulse control difficulties and the use of alcohol to cope among young women. Second, within-person effects suggest that targeting emotion-driven impulse control difficulties and drinking to cope could reduce women's hazardous alcohol use. For example, given the importance of motives in predicting hazardous drinking, interventions might target coping skills that can be used in place of drinking. In particular, brief motivational interventions could include a component that assists young women in establishing a behavioral plan for coping with emotional distress without drinking. Likewise, interventions to reduce drinking may be more effective for young women if they incorporate techniques to enhance emotion regulation and distress tolerance skills (e.g., dialectical behavior therapy [Linehan, 1993], emotion regulation group therapy [Gratz, Tull, & Levy, 2014], and skills for improving distress intolerance [Bornovalova, Gratz, Daughters, Hunt, & Lejuez, 2012]). These interventions may increase adaptive responses to emotional distress and decrease problematic substance use (e.g., Axelrod, Perepletchikova, Holtzman, & Sinha, 2011; Gratz & Tull, 2011).

Although one strength of this study is its longitudinal design, the self-report measures used here are vulnerable to retrospective recall and social desirability biases. Future work should examine the interrelations among these variables using daily diary or ecological momentary assessment techniques. Such approaches would reduce recall bias and allow researchers to examine temporal associations more precisely. In addition, based on theory and prior research (see Adams et al., 2013; Jones et al., 2014; Magid et al., 2007; Martens et al., 2011; Settles et al., 2010), we examined one direction of relationships between study variables (i.e., emotion driven impulsivity → drinking to cope → hazardous alcohol use). Future research should explore potential reciprocal relationships between these three variables or the possibility that hazardous alcohol use influences emotion-driven impulsivity (e.g., see Riley, 2015). Future research should also examine whether the present findings are generalizable outside a population of diverse young women in the community. For example, researchers should explore these relationships among men, women outside the age range included here, and clinical samples of individuals with alcohol use or emotional disorders.

Finally, our findings of partial mediation for the within-person analyses suggest that other factors may also be relevant in explaining the relation between emotion-driven impulse control difficulties and hazardous drinking, such as attentional bias to alcohol cues (Coskunpinar, Dir, Karyadi, Koo, & Cyders, 2013) or risky decision making (Walsh, DiLillo & Messman-Moore, 2012). In addition, other facets of emotion regulation, such as access to regulatory strategies seem to be relevant to drinking to cope in women (Messman-Moore & Ward, 2014), and may be important to assess in future studies. Future research examining these and other potential mechanisms may help clarify the precise nature of the association between emotion-driven impulse control difficulties and hazardous alcohol use. However, there is also evidence that the impact of heavy drinking on negative alcohol-related outcomes (i.e., hazardous drinking) is heightened in the context of poor emotion regulation (Chandley, Luebbe, Messman-Moore & Ward, 2014), and as such emotion regulation may have a moderating rather than mediating impact on hazardous drinking.

These limitations notwithstanding, the current study adds to the literature examining the interrelations of emotion-driven impulse control difficulties, drinking to cope, and hazardous alcohol use, demonstrating both between- and within-person relationships among these variables. Results highlight the importance of targeting both emotion-driven impulse control difficulties and drinking to cope when treating young women for alcohol use problems. Addressing both these factors in treatment may help to reduce the number of young women using alcohol hazardously, an issue with both clinical and public health significance.

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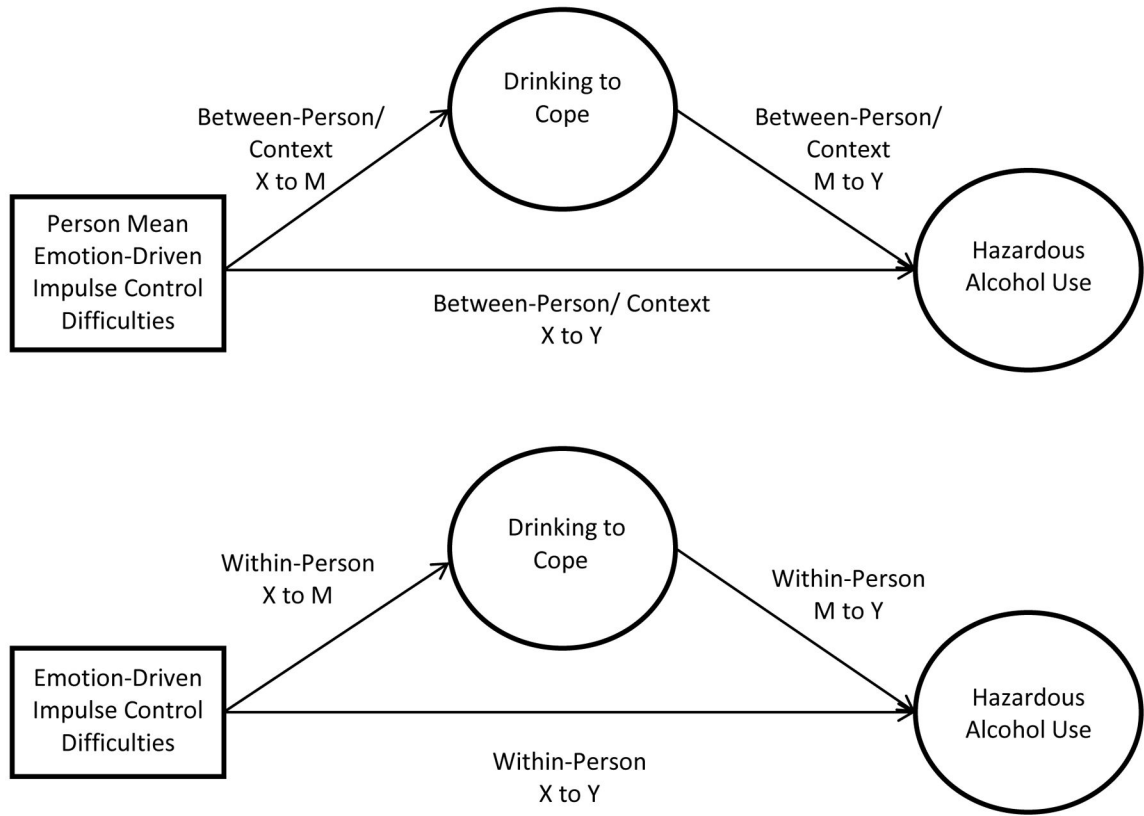


Figure 1.
Depiction of the multilevel structural equation model

Table 1

Correlations among study variables Wave 1.

Study Variables	1	2	3	4
1. Age	--			
2. Race	-.11	--		
3. Emotion-driven impulse control difficulties	-.02	-.05	--	
4. Drinking to cope	.06	-.06	.30**	--
5. Hazardous alcohol use	-.06	-.17**	.19**	.49**

Note.

**
 $p < .01$.

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Table 2

Descriptives statistics for study variables at each wave of assessment.

Model Variable	Wave 1		Wave 2		Wave 3		Wave 4		Wave 5		Wave 6	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Emotion-drive impulse control difficulties	10.94	(4.82)	11.27	(4.79)	10.17	(4.22)	10.65	(4.53)	10.21	(4.22)	10.71	(4.62)
Drinking to cope	11.82	(6.19)	11.21	(6.05)	10.91	(5.72)	10.66	(5.57)	10.60	(5.48)	10.51	(5.41)
Hazardous alcohol use	4.85	(5.13)	4.42	(5.40)	3.83	(4.65)	3.88	(4.44)	3.54	(3.82)	3.66	(4.06)

Note. Wave 1, $n = 490$; Wave 2, $n = 428$; Wave 3, $n = 402$; Wave 4, $n = 376$; Wave 5, $n = 348$; Wave 6, $n = 349$. Scale means and standard deviations are reported instead of the means of items to enable comparison to previous studies.

Table 3

Results for the effects of a multilevel mediation model.

Model Effects	Est	SE	<i>p</i>
<u>Model for the Means</u>			
<i>Predicting drinking to cope</i>			
Intercept for drinking to cope	0.74	0.12	<.001
Occasion 1 vs. Occasion 2, 3, 4, 5, 6	0.17	0.04	<.001
Ohio vs. Mississippi	-0.18	0.16	.24
Ohio vs. Lincoln	-0.11	0.18	.54
Ohio vs. Omaha	-0.14	0.16	.37
Age	0.06	0.03	.03
Ethnicity	-0.03	0.12	.82
<i>Effect of emotion-driven impulse control difficulties (X → M)</i>			
Within person effect	0.13	0.04	<.01
Between person effect	0.83	0.07	<.001
<i>Predicting hazardous alcohol use</i>			
Intercept for hazardous alcohol use	1.09	0.46	.02
Occasion 1, 2 vs. Occasion 3, 4, 5, 6	0.44	0.09	<.001
Ohio vs. Mississippi	-1.17	0.39	<.01
Ohio vs. Lincoln	-0.71	0.40	.08
Ohio vs. Omaha	-0.25	0.43	.56
Age	-0.15	0.06	.03
Ethnicity	-1.12	0.24	<.001
<i>Effect of emotion-driven impulse control difficulties (X → Y)</i>			
Within person effect	0.59	0.17	<.001
Between person effect	0.37	0.19	.06
<i>Effect of drinking to cope (M → Y)</i>			
Within person effect	1.60	0.14	<.001
Between person effect	2.93	0.16	<.001
<u>Model for the Variance</u>			
Drinking to cope random intercept variance	0.67	0.06	<.001
Hazardous alcohol use random intercept variance	3.14	0.36	<.001
Random effect for occasion on hazardous alcohol use	0.80	0.12	<.001
Intercept-Effect of occasion covariance	1.25	0.20	<.001
Drinking to cope residual variance	0.51	0.03	<.001
Hazardous alcohol use residual variance	7.38	0.87	<.001
<u>Indirect effects</u>			
Between Person Indirect Effect	2.42	0.28	<.001
Within Person Indirect Effect	0.20	0.07	<.01