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A preliminary examination of the association between drinking as a typical coping strategy and level of acute alcohol consumption prior to a suicide attempt

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ABSTRACT

Drinking to cope is associated with suicide ideation and attempts. Event-based research shows drinking, particularly when alcohol is consumed in large quantities, increases the intensity of suicidal thoughts and immediate risk for attempt. Such findings suggest those who typically drink to cope may be especially likely to drink heavily in the hours preceding a suicide attempt. In the first examination of the association between regular use of alcohol as a coping strategy and acute alcohol consumption prior to a suicide attempt, participants included 130 patients hospitalized for a recent attempt. The number of drinks consumed in the acute period preceding the attempt, as well as past-year heavy drinking frequency, typical drinking motives, and depressive symptoms were assessed. The unique impacts of coping motives on odds of consuming any alcohol, and of using specific amounts of alcohol in the acute period, were determined through binary and multinomial logistic regressions. Results demonstrated that commonly drinking for coping motives increased the odds of heavy drinking — but not of using alcohol at low levels — during the acute period. Results held after adjusting for relevant covariates. Clinicians should assess drinking motives and prioritize prevention of drinking to cope to reduce risk of alcohol-related suicide attempts.

1. Introduction

Alcohol plays an important role in a number of suicidal behaviors. One-third of suicide decedents have alcohol in their systems, and nearly one-quarter are intoxicated at the time of death (Kaplan et al., 2013). Similarly, an empirical review found that approximately 40% of non-fatal suicide attempts involved alcohol use in the hours immediately prior to the attempt (i.e., acute alcohol use; Cherpitel et al., 2004; Griffin et al., 2017). Controlled studies have demonstrated that acute alcohol use, particularly when it occurs in large quantities (i.e., heavy drinking), increases the odds of attempting suicide (Borges et al., 2017). Past studies have also indicated that suicide attempts preceded by acute alcohol use are associated with use of violent means (Park et al., 2017; Sher et al., 2009). Consistent with these findings, acute intoxication has been found to be a predictor of use of violent means among suicide decedents (Kaplan et al., 2013). While the research support is limited, at least one past study indicates that suicide attempts preceded by heavy drinking are also marked by short proximal planning (e.g., Klimkiewicz et al., 2012). Collectively, these findings demonstrate that a substantial number of potentially lethal suicide attempts are characterized by acute alcohol use and short planning timeframes; this suggests that such attempts may be both particularly deadly and perhaps particularly preventable if acute alcohol use could be addressed. Specifically, among those who drink alcohol, interventions that reduce heavy drinking in the hours of high distress that would otherwise precede a suicide attempt (i.e., the acute period) could greatly reduce risk, and thus have the potential to prevent these alcohol-related suicide attempts and deaths from ever occurring. An initial step toward the development of such interventions is to better understand how patterns of behavior (i.e., those that are most amenable to clinical assessment and intervention), such as drinking motives and drinking patterns, relate to acute alcohol use prior to suicide attempts among those at high-risk.

Drinking motives are defined as the subjective reasons individuals

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indicate that they usually consume alcohol (Cooper et al., 2015; Cox and Klinger, 1988). Of the commonly examined motives, drinking to cope with negative emotions (i.e., coping motives) has been identified as particularly pernicious, with past studies demonstrating associations between this motive and a variety of problematic patterns including heavy drinking, drinking alone, drinking while down, alcohol-related problems, and depressive symptoms (for a review, see Cooper et al., 2015). These patterns have been demonstrated in a variety of populations, including college students (e.g., Kuntsche et al., 2005) and veterans (e.g., McDevitt-Murphy et al., 2017, 2015). In addition, prospective studies have indicated that drinking to cope results in net increases of problematic alcohol use over time (i.e., Holahan et al., 2001; Windle and Windle, 2015), which may be due to individuals' tendencies to continuously rely on this strategy rather than to use long-term and more effective ones (Veilleux et al., 2014).

Most directly relevant to the current study, previous research has also identified drinking to cope as a probable predictor of suicidal behavior. Specifically, Hufford (2001) suggests that consuming large amounts of alcohol while distressed may inadvertently narrow an individual's focus to the negative aspects of their current situation (i.e., *alcohol myopia*; Steele and Josephs, 1990), thereby increasing distress, suicide ideation, and risk for attempt. In line with the aforementioned theory, previous research has demonstrated associations between increased frequency of drinking for coping motives and both suicide ideation (Gonzalez et al., 2009) and attempts (Grazioli et al., 2018). In conjunction with previous literature suggesting suicide attempts can occur abruptly in response to stressful events (Conner, 2004), these findings underscore the importance of better understanding the relationship between typical patterns of alcohol-related thoughts and behaviors that occur in response to distress and acute alcohol use prior to a suicide attempt. Although a single past study (i.e., Bagge et al., 2015) examined motives for alcohol use specifically within the acute period and found that most individuals reported drinking for reasons other than to facilitate the suicide attempt (i.e., non-facilitative reasons), to our knowledge no study has yet examined the associations between typical reasons for drinking and acute alcohol use prior to a suicide attempt.

To address this gap, the current study examined associations between acute alcohol use and typical drinking motives (i.e., coping, social, and enhancement) in a high-risk sample of individuals who were hospitalized for a recent suicide attempt. Based on previous literature that has indicated coping motives are associated with increased suicide risk (Gonzalez et al., 2009; Grazioli et al., 2018), it was hypothesized that greater endorsement of regularly drinking to cope would increase the odds of: 1) *any* alcohol use immediately prior to a suicide attempt, and 2) *heavy drinking* during the same acute period. Hypotheses regarding social and enhancement drinking motives were exploratory. Past year heavy drinking frequency and depressive symptoms were included as covariates given that both have been found to be risk factors for suicide attempts (Glasheen et al., 2015; Kessler et al., 1999) and associated with coping motives for drinking (e.g., Park and Levenson, 2002); sex was also included as a covariate given established associations with alcohol use.

2. Methods

2.1. Participants and procedure

Data were collected as part of a larger project examining traits and behaviors of individuals who recently attempted suicide (Ward-Ciesielski et al., 2016). The current sample included patients who presented to a Level-1 trauma hospital in the Southeastern United States following a recent suicide attempt (i.e., non-fatal self-injurious behavior with intent to die; Silverman et al., 2007). Eligibility was determined by electronic medical record review and consultation between study personnel and the treatment team. After attending physicians deemed patients as psychologically stable, eligible patients (n = 227) were approached for participation. Of those eligible, 190 (83.7%) provided written consent to participate. After limiting the sample to those who endorsed past-year alcohol consumption and who completed the Drinking Motives Questionnaire – Revised (Cooper, 1994; this measure was added to the battery after data collection began), 133 participants were eligible. Of these, three (2.25%) had missing data, and were excluded from all analyses using listwise deletion, resulting in a final sample of 130. Most participants were female (66%), and identified as White/Caucasian (61%) or Black/African American (33%); additionally 95% of the sample identified as non-Hispanic/Latino (95%). The average age was 36.65 (SD = 12.60). Prior to hospital discharge, consenting participants completed a 2.5-hour assessment (i.e., self-reports, interviews) conducted by trained research assistants. Participants received $35 as compensation. All study procedures were approved by the hospital IRB.

2.2. Measures

2.2.1. Past-year heavy drinking frequency

Past-year heavy drinking frequency was assessed with an item asking participants how often they consumed 4 (for females) or 5 (for males) or more standard drinks (Ginley and Bagge, 2017). Response options included: 0 = *none*, 1 = *1–2 times/year*, 2 = *3–11 times/year*, 3 = *1 time/month*, 4 = *2–3 times/month,* 5 = *1 time/week,* 6 = *2 times/week,* 7 = *3–4 times/week*, 8 = *5–6 times/week*, 9 = *daily*.

2.2.2. Drinking motives

Drinking motives were assessed using the four factor Drinking Motives Questionnaire – Revised (DMQ-R; Cooper, 1994). In this study, our hypotheses focused on coping motives (e.g., *I drink to forget about my problems*). For exploratory purposes, social motives (e.g., *I drink to make social gatherings more fun*) and enhancement motives (e.g., *I drink to give me a pleasant feeling)* were examined in supplemental analyses. Previous research has indicated that the fourth factor, conformity motives, is less relevant in adult populations, as drinking habits are already firmly established (e.g., Cooper, 1994; Kuntsche et al., 2005); therefore, items from this subscale were not included in this study. Each of the three drinking motives were measured by a five-item subscale; subscale scores were derived by averaging responses across items. Consistent with prior assessment of drinking motives among individuals who have made a recent suicide attempt (i.e., facilitative and non-facilitative motives; Bagge et al., 2015), the DMQ-R response options were modified such that participants indicated how strongly they agreed (i.e., *1 = disagree strongly; 5 = agree strongly*) that they typically drink for each specified reason. Internal consistencies for each subscale were excellent (α = 0.91 - 0.92).

2.2.3. Depressive symptoms

Depressive symptoms were assessed using total scores across 20 items (i.e., excluding item nine, which measures suicide ideation) from the Beck Depression Inventory-second edition (BDI-II; Beck et al., 1996). For each item, response options range from 0 to 3, with higher scores reflecting greater frequency/severity of the described symptom. The reporting timeframe for BDI-II items in this study was the seven days that preceded the recent suicide attempt (i.e., modified from the standard two-week reporting period) in order to focus on proximal symptoms. Internal consistency for the BDI-II was excellent (α = 0.90).

2.2.4. Acute alcohol use

Acute (i.e., within six hours of the attempt) alcohol use was assessed using the Timeline Followback Interview for Suicide Attempts (TLFB-SA; Bagge et al., 2013a; Bagge et al., 2013b). For each hour within the acute period, number of standard drinks was assessed. We then created a dichotomous variable representing *any acute drinking;* this variable was coded 1 = *any acute drinking* (i.e., consumed alcohol during the

acute period), and 0 = *no acute drinking*. To represent *level of acute drinking*, we created a three-level variable based on the summed total number of drinks consumed in the acute period, which included the following categories: *no acute drinking* (i.e., 0 drinks during the acute period), *low acute drinking* (i.e., < 4 female; < 5 male), and *heavy acute drinking* (i.e., ≥ 4 female, ≥ 5 male).

2.2.5. Descriptive aspects of suicide attempts

In order to characterize the nature of the suicide attempts within our sample, we utilized dichotomous variables to summarize the violence of, and the proximal planning associated with, each attempt. For the violence variable, consistent with Ginley and Bagge (2017) methods were characterized as either violent (e.g., self-inflicted gunshot wound; coded "1″) or non-violent (e.g., overdose; coded "0″). For the proximal planning variable, based on their responses to the TLFB-SA individuals who reported first planning within the three hours immediately prior to their attempt were characterized as having short proximal planning (i.e., coded "1″); those who reported planning prior to this period were coded "0″ (Bagge et al., 2015, 2013b). These variables were included in post-hoc analyses.

2.3. Analyses

Analyses were conducted using SAS version 7.1. Descriptive statistics and correlations were first computed.[1] Next, a binary logistic regression was conducted to examine whether sex, past-year heavy drinking frequency, or coping motives increased the odds of *any acute drinking*. An additional model was then conducted to determine whether effects were robust after controlling for depressive symptoms. Next, to determine whether these same predictors increased the odds of different *levels of acute drinking*, a multinomial logistic regression was conducted to compare *low acute drinking* and *heavy acute drinking*, with *no acute drinking* as the reference group. We also re-defined the reference group as *low acute drinking*, and re-ran the analyses to directly compare associations between *heavy acute drinking* and *low acute drinking*. For all analyses, we conducted supplemental models replacing coping motives with social or enhancement motives to determine whether identified effects generalized across motives (see Table S1). Additionally, post-hoc analyses were conducted to compare the violence and proximal planning of suicide attempts among participants based on acute alcohol consumption level (i.e., heavy acute use vs. not); Fisher's exact two-tailed tests were utilized to test the statistical significance.

3. Results

3.1. Descriptive statistics and zero-order correlations

Table 1 displays descriptive statistics and zero-order correlations. Thirty-two percent (n = 42) of participants consumed alcohol and 22% (n = 29) engaged in heavy drinking, in the acute period (i.e., within six hours) prior to their recent suicide attempt. Inter-correlations between predictor variables were generally strong to moderate (ranging from r = *0*.72, p < .01 [between supplemental predictors of social and enhancement motives, which were not included in the same model] to r = *0*.18, p = .04 [between depressive symptoms and past-year heavy drinking frequency]). The supplemental predictors of social motives (r = .07, p = .43) and enhancement motives (r = .09, p = .29) were not related to depressive symptoms. Sex was only significantly related to past-year heavy drinking frequency (r = −0.22, p = .01), and use of a violent method (r = −0.21, p = .02). Short proximal planning was not associated with any other variable. Regarding outcomes, the binary *any acute drinking* variable was positively associated with past-year heavy drinking frequency (r = .31, p < .01), coping motives (r = .27, p < .01), and enhancement motives (r = .24, p = .01). These associations indicate that those who drank any amount of alcohol during the acute period were more likely to engage in frequent heavy drinking episodes in the past year, and were also more likely to drink to cope with negative emotions and to enhance positive emotions. Differential relations among predictors and the various *levels of acute drinking* also emerged. Specifically, *low acute drinking (ref = no acute drinking)* was unrelated to predictors (*r*s range from −.01, p = .95 to .09, p = .35); however, both *heavy acute drinking (ref = no acute drinking)* and *heavy acute drinking (ref = low acute drinking)* were each positively associated with past-year heavy drinking frequency (r = .40, p < .01; r = .33, p = .03, respectively) and coping motives (r = .33, p < .01; r = .36, p = .02, respectively). *Heavy acute drinking (ref = no acute drinking)* was also positively related to enhancement motives (r = .28, p < .01) and to depressive symptoms (r = .19, p = .05), whereas *heavy acute drinking (ref = low acute drinking)* was not (r = .22, p = .16; r = .27, p = .09, respectively). In other words, compared to both those who engaged in low acute drinking and those who did not engage in any acute drinking, those who drank heavily in the acute period reported a greater number of past-year heavy drinking episodes and greater coping motives. Additionally, compared to only those who did not engage in any acute drinking, those who drank heavily in the acute period reported greater enhancement motives and depressive symptoms.

3.2. Odds of any acute drinking (ref = no acute drinking)

Table 2 (top left panel) displays the binary logistic regression results in which sex, past-year heavy drinking frequency, and coping motives were included. These results indicate that only past-year heavy drinking frequency increased the odds of *any acute drinking* (OR = 1.27, p < .01). After depressive symptoms were added to the model (Table 2, bottom left panel), the effect of past-year heavy drinking frequency was maintained, and it remained the only significant predictor.[2]

3.3. Odds of low acute drinking (ref = no acute drinking)

Regarding the multinomial regression analyses, first these results demonstrate that neither sex, past-year heavy drinking frequency, nor coping motives increased the odds of *low acute drinking*. These results were unchanged after controlling for depressive symptoms (Table 2; bottom center panel).[3]

3.4. Odds of heavy acute drinking (ref = no acute drinking) and (ref = low acute drinking)

Contrary to the above reported results, the multinomial regression analyses demonstrate that both past-year heavy drinking frequency (OR = 1.36, p < .01) and coping motives (OR = 1.69, p = .03) increased the odds of *heavy acute drinking*, as compared to *no acute*

[1] To facilitate interpretation of correlations, in addition to the three-category *level of acute drinking* variable (i.e., as described above and used in the main analyses) we created dichotomous versions of the components of this variable. This was done to directly compare each level of drinking to one, and only one, other level. Note that in these correlations, the sample sizes vary (i.e., due to omission of the third category, see Table 1 note for details), which causes variation in the significance of similarly sized correlations.

[2] Results were consistent in supplemental analyses where coping motives was replaced with social and enhancement motives (separate models). Specifically, past-year heavy drinking frequency was the only predictor of *any acute drinking (ref = no acute drinking)*, and results were consistent after controlling for depressive symptoms (Table S1, left).

[3] Results were consistent in supplemental analyses. Specifically, neither social nor enhancement motives (separate models) predicted *low acute drinking (ref = no acute drinking)*, and results were consistent after controlling for depressive symptoms (Table S1, center).

Table 1
Descriptive statistics and correlations among all study variables.

	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex (ref = male)	–											
2. Past-Year Heavy Drinking Frequency	**−.22**	–										
3. Coping Drinking Motives	−.02	**.39**	–									
4. Social Drinking Motives	−.05	**.19**	**.62**	–								
5. Enhancement Drinking Motives	−.16	**.42**	**.71**	**.72**	–							
6. Depressive Symptoms	.12	**.18**	**.26**	.07	.09	–						
7. Short Proximal Planning	.07	−.03	.04	−.02	−.05	−.04	–					
8. Violent Method	**−.21**	.04	.03	.12	.11	.01	.04	–				
Acute Alcohol Use Categories												
9. Any Acute Drinking[a]	.08	**.31**	**.27**	.08	**.24**	.12	.02	−.05	–			
10. Low Acute Drinking (ref = no acute drinking)[b]	.09	.02	.05	−.01	.07	−.05	−.01	−.15	**1.00**	–		
11. Heavy Acute Drinking (ref = no acute drinking)[c]	.05	**.40**	**.33**	.11	**.28**	**.19**	.04	.02	**1.00**	–	–	
12. Heavy Acute Drinking (ref = low acute drinking)[d]	−.08	**.33**	**.36**	.12	.22	.27	.06	.25	–	–	–	–
Mean	–	1.95	3.37	3.58	3.29	35.55	–	–	–	–	–	–
SD	–	2.56	1.34	1.27	1.32	12.03	–	–	–	–	–	–
%	66.15	–	–	–	–	–	79.10	14.66	32.31	12.87	24.80	69.50
n	86	–	–	–	–	–	102	19	42	13	29	29
N	130	130	130	130	130	130	129	130	130	101	117	42
Skewness	−0.69	1.30	−0.55	−0.71	−0.49	−0.39	−1.45	2.01	0.77	2.25	1.18	−0.85
Kurtosis	−1.55	0.53	−0.99	−0.73	−0.97	−0.43	0.09	2.88	−1.44	3.13	−0.61	−1.34

Note. $N = 130$; Sex coded 0 = male, 1 = female. Short Proximal Planning coded 0 = plan more than 3 h before attempt; 1 = plan 3 h or less before attempt (note 1 participant was missing data on this variable); Violent Method coded 0 = non-violent; 1 = violent method; Low Acute Drinking (ref = no acute drinking) = dichotomous variable indicating whether the participant consumed a low amount of alcohol (i.e., 3 [females] or 4 [males] or fewer standard drinks; coded as 1) vs. no alcohol (coded as 0) within 6 h of the suicide attempt; [b]Because individuals who drank heavily within 6 h of the suicide attempt were excluded from these correlations, $n = 101$ and reported percentages for this variable reflect percent of this sub-portion of the sample. Heavy Acute Drinking (ref = no acute drinking) = dichotomous variable indicating whether the participant drank heavily (coded as 1) vs. no alcohol (coded as 0) within 6 h of the suicide attempt; [c]Because individuals who consumed a low amount of alcohol within 6 h of the suicide attempt were excluded from these correlations, $n = 117$ and reported percentages for this variable reflect percent of this sub-portion of the sample. Heavy Acute Drinking (ref = low acute drinking) = dichotomous variable indicating whether the participant drank heavily (coded as 1) or consumed a low amount of alcohol (coded as 0) within 6 h of the suicide attempt; [d]Because individuals who did not consume any alcohol within 6 h of the suicide attempt were excluded from these correlations, $n = 42$ and reported percentages for this variable reflect percent of this sub-portion of the sample. **Bold** = significant at $p < .05$.

Table 2
Binary and multinomial logistic regression results on the odds of consuming various amounts of alcohol within six hours of suicide attempt.

	Binary Logistic Regression Results Any Acute Drinking (ref = no acute drinking)		Multinomial Logistic Regression Results[b] Low Acute Drinking (ref = no acute drinking)		Heavy Acute Drinking (ref = no acute drinking)	
Model 1.	Odds ratio	(95% CI)	Odds ratio	(95% CI)	Odds ratio	(95% CI)
Gender	2.14	(0.85 – 5.39)	2.05	(0.50 – 8.39)	2.11	(0.71 – 6.28)
Past-Year Heavy Drinking Frequency	**1.27**	**(1.07 – 1.51)**	1.05	(0.78 – 1.41)	**1.36**	**(1.12 – 1.65)**
Coping Drinking Motives	1.38	(0.97 – 1.95)	1.10	(0.69 – 1.77)	**1.69**	**(1.06 – 2.72)**
Model 2.						
Gender	2.13	(0.84 – 5.42)	2.22	(0.53 – 9.28)	1.99	(0.66 – 6.01)
Past-Year Heavy Drinking Frequency	**1.27**	**(1.07 – 1.51)**	1.06	(0.79 – 1.44)	**1.35**	**(1.12 – 1.64)**
Coping Drinking Motives	1.37	(0.96 – 1.96)	1.14	(0.71 – 1.85)	**1.63**	**(1.01 – 2.65)**
Depressive Symptoms	1.00	(0.97 – 1.04)	0.98	(0.93 – 1.03)	1.02	(0.97 – 1.06)

Note. $N = 130$; Sex coded 0 = male, 1 = female. [b]For the multinomial regression analyses, *no acute drinking* (i.e., no alcohol consumption within 6 h of the suicide attempt) was the reference group to which *low acute drinking* and heavy *acute drinking* were compared. These same analyses were re-run with *low acute drinking* as the reference group (i.e., in order to compare *heavy acute drinking* to *low acute drinking*), however all results were non-significant in predicting *heavy acute drinking (ref = low acute drinking)*, and therefore are not provided in detail). **Bold** = significant at $p < .05$.

drinking (Table 2; top right panel). These effects were maintained after controlling for depressive symptoms (Table 2; bottom right panel).[4] However, when these models were re-run to determine whether the same predictors increased the odds of *heavy acute drinking* as compared to *low acute drinking*, all predictors were non-significant.[5]

3.5. Post-hoc analyses: group-level comparisons on planning and violence of attempt

Because past research indicates a substantial number of suicide attempts characterized by acute heavy drinking involve the use of violent methods and may involve little planning, we conducted post-hoc descriptive statistics and group level comparisons on these variables. With regard to violence, 15% ($n = 19$) of the total sample reported utilizing a violent method. Although a greater percentage of heavy acute drinkers reported using a violent method (17.2%; $n = 5$) compared to non-heavy acute drinkers (i.e., combined no acute and low acute drinking; 13.9%; $n = 14$), a two-tailed Fisher's exact test demonstrated that this difference was not statistically significant ($p = .77$). With regard to proximal planning, the vast majority of participants reported that they did not start planning their suicide attempt until within 3 h of the attempt (i.e.,

[4] Results differed in supplemental analyses. Specifically, past-year heavy drinking frequency predicted *heavy acute drinking (ref = no acute drinking),* but neither social nor enhancement motives (separate models) were significant. Controlling for depressive symptoms did not change these results (Table S1, right).

[5] Results were similar in supplemental analyses [i.e., neither of the motives variables predicted *heavy acute drinking (ref = low acute drinking),* regardless of whether depression was in the model]; however, see Table S1 note for specifics on a single model in which past-year heavy drinking frequency was significant.

reported short proximal planning; 79.1%; $n = 102$). Consistent with the violence finding, the trend indicated that a greater percentage of heavy acute drinkers reported short proximal planning (82.1%; $n = 23$), as compared to non-heavy acute drinkers (i.e., combined no acute and low acute drinking; 78.2%; $n = 79$); however, this difference was not statistically significant ($p = .80$).

4. Discussion

This study was a preliminary examination of associations between typical drinking motives and acute alcohol use in the hours prior to a suicide attempt, and findings revealed that past-year heavy drinking frequency and endorsement of typical alcohol use for coping motives each increased the odds of heavy acute drinking. Unexpectedly, coping motives were not associated with any acute alcohol use. Supplemental analyses demonstrated that neither social nor enhancement motives impacted the odds of acute drinking. Post-hoc analyses were also conducted to further explore the links between acute alcohol use, violence of methods and proximal planning associated with attempts. While these results demonstrated trends consistent with prior research (i.e., a higher percentage of heavy acute drinkers reported use of violent methods and short proximal planning), there were no significant differences between the heavy acute drinkers and other participants in method violence or proximal planning.

In total, these findings suggest that in addition to typical heavy drinking frequency, the tendency to drink to cope may be a marker of risk for heavy acute alcohol use prior to a suicide attempt among individuals at high-risk for suicide. Given the physiological, cognitive, and emotional effects of heavy drinking in response to distress (as discussed below), these results highlight the heightened risk among those who typically drink to cope for the potentially lethal, and particularly preventable, suicide attempts characterized by acute heavy drinking. These results also have direct clinical implications for interventions with patients presenting for treatment of alcohol use disorder who describe drinking to cope with negative emotions.

In considering why greater endorsement of coping motives is linked to heavy acute alcohol use in the hours prior to a suicide attempt, it is worth noting that both behaviors (i.e., heavy drinking and attempting suicide) may represent the same maladaptive response to distressing situations and emotions: a desire for immediate escape. Consistent with the definition of negative urgency (Whiteside et al., 2005), and with Linehan's (2015) description of distress intolerance, individuals who commonly drink to cope report drinking as a means of escaping from difficult emotions (Cooper et al., 2015). Although maladaptive in both the short- and long-term, the pleasant effects of *initial* alcohol use may reinforce this coping strategy both within (i.e., greater alcohol consumption after the initial use during a single episode of distress) and across (i.e., continued use of this strategy overtime despite undesired consequences) situations. As noted in Hufford's (2001) model, this pattern can have devastating and unintended effects both within a single episode of distress, and when relied on over time. With regard to a single episode of distress, as alcohol consumption increases and BAC reaches higher levels, individuals may become increasingly focused on the most emotionally salient aspects of a situation, less able to inhibit impulsive responding, less capable of engaging in problem-solving, and less able to demonstrate flexibility in thinking (Hendler et al., 2011). Additionally, when relied on over time, this strategy could become the default method of responding, decrease the likelihood of utilization of adaptive coping strategies, and increase the frequency of experiencing distressing situations in the future (Holahan et al., 2001; Veilleux et al., 2014; Windle and Windle, 2015). In fact, a recent study by Gonzalez (2019) provided empirical support for these aspects of Hufford's (2001) model, demonstrating that low problem-solving, negative urgency, and the tendency to use escape mechanisms as a means to cope were each associated with suicide ideation, drinking to cope, and heavy drinking in a sample of young adults.

The finding that coping motives were associated with acute heavy drinking, but not with any acute alcohol use, prior to a suicide attempt is intriguing and warrants further attention. Although not explored in this study, past research has highlighted that drinking context plays an important role in the alcohol consumption – coping motives relationship, demonstrating that individuals who drink to cope are more likely to drink heavily alone (Mohr et al., 2001). In an extension of this work, Gonzalez (2012) demonstrated that drinking heavily while alone was associated with suicide attempt history and ideation severity. While it is unknown why some participants in our sample engaged in light drinking within the acute period, heavy drinking within the acute period appears to generally be in line with the maladaptive patterns that co-occur with drinking to cope with negative emotions (i.e., avoidant coping). Future studies should include additional questions about the context of alcohol use prior to a suicide attempt to further this line of research.

Additionally, despite non-significant differences between the heavy acute drinkers and other participants in violence of methods or proximal planning, over 80% of acute heavy drinkers reported that planning for their suicide attempt began *within the acute period*, which is a notable result. This finding is consistent with past research demonstrating fairly short proximal planning among suicide attempters in general (e.g., Bagge et al., 2013b). Further, given the known impacts of heavy alcohol use on executive functioning (Hendler et al., 2011), current findings lend support to the notion that reducing alcohol use during the acute period may reduce the likelihood of suicide attempts among a sizable group of individuals. Although past studies have consistently indicated acute alcohol use is associated with use of violent means among suicide attempters and decedents (Kaplan et al., 2013; Park et al., 2017; Sher et al., 2009), we did not find that acute heavy drinkers were significantly more likely to utilize violent methods (despite a trend in that direction), which may be due to a floor effect in our sample. Given that those who utilize violent means are more likely to die from their suicide attempts, few individuals who utilized these means were part of the study sample (i.e., suicide attempt survivors). Despite this, the fact that past research shows a link between use of violent means and heavy acute alcohol use (Kaplan et al., 2013; Sher et al., 2009) makes possible clinically observable markers of individuals at risk for this behavior, such as those identified in the current study, all the more imperative.

Given the substantially increased risk for suicide attempts posed by acute heavy drinking (Borges et al., 2017), our results suggest that in addition to more commonly assessed risk factors (e.g., ideation), it may be useful to assess patients' tendencies of drinking to cope, and of engaging in heavy drinking. Similarly from a harm-reduction standpoint, it may be prudent to prioritize decreasing the tendency to drink to cope among patients presenting for treatment of either disordered alcohol use and/or suicidal behavior. For example, incorporation of DBT based emotion regulation and distress tolerance skills (Linehan, 2015) into substance abuse treatment may be particularly helpful as a means of both 1) increasing recognition of the costs of drinking to cope (i.e., through psychoeducation about detrimental/paradoxical effects) and 2) providing adaptive alternative coping methods. By allowing opportunities for effective practice of these alternatives clinicians can help patients to both reduce heavy alcohol use in distressing situations, and by so doing, reduce risk of suicidal thoughts and behaviors. Targeting drinking to cope as a focus of intervention may be particularly useful for preventing suicide attempts that occur after heavy drinking among individuals at high-risk. Consistent with this approach, a recent study demonstrated that an internet delivered DBT course had promising effects on reducing suicidality and alcohol use in a heavy drinking sample (Wilks et al., 2018). Similarly, given the compelling results of the Attempted Suicide Short Intervention Program (ASSIP; Gysin-Maillart et al., 2016) on reducing risk for repeated attempts among hospitalized patients, Conner et al. (2019) are currently testing the efficacy of a modified ASSIP protocol in which the impact of alcohol use on individuals' suicidal thoughts and urges are explored with patients,

and information about adaptive replacement strategies for coping is provided. With regards to preventing attempts associated with heavy acute alcohol use, given that our results as well as past studies indicate such attempts may be preceded by short proximal planning, identifying and intervening upon static risk factors such as drinking for coping motives is critical.

4.1. Limitations and future directions

These findings must be considered in light of several limitations. First, because we employed a cross-sectional design, causality cannot be inferred. However, given the nature of the variables assessed (i.e., past-year and typical behavior vs. acute drinking) among a sample of inpatients who were hospitalized for a recent suicide attempt, it is likely that predictors temporally preceded outcomes. Additionally, acute alcohol use was measured via patients' retrospective self-report. While the Timeline Followback method is a validated approach to assessing alcohol use (Sobell and Sobell, 1992), future research supporting this method in the context of suicidal behavior through comparisons with real-time data (e.g., ecological momentary assessment) is needed. Finally, participants reported typical drinking motives, rather than specific reasons for consuming alcohol prior to attempting suicide. Due to this limitation, our findings cannot be interpreted as indicating individuals drink to cope immediately prior to attempting suicide. To our knowledge, no study has examined the extent to which coping motives drive acute alcohol use, but this is a critical area for future research.

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Contributors

Courtney Bagge designed the larger project and collected the data that was used for this study. Jami Gauthier and Courtney Bagge developed the hypotheses and study design for this project, and Ashley Cole provided input and helped to refine the project idea. Jami Gauthier conducted statistical analyses. Ashley Cole and Jami Gauthier conducted the literature review and developed outlines for the introduction and discussion sections. Jami Gauthier wrote the first draft of the manuscript, and all authors contributed to and have approved the final manuscript.

Declaration of Competing Interest

All authors declare that they have no conflicts of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2019.112626.

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