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Shame's Associations with Depression and Problem Drinking: An Ecological Momentary Study

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Abstract

Introduction: Depression and problem drinking are comorbid in emerging adulthood, yet the processes that link them are not well understood. Research has argued that shame has a unique influence on the experience of problematic drinking, but this has rarely been assessed at the state level. Using ecological momentary assessments (EMAs), we assessed whether shame, and not guilt, mediated the association between baseline depression and alcohol use and problems.

Methods: One hundred and eighty-four emerging adults ($M_{age} = 19.27$) completed a 12-day EMA study. Multilevel models were used to test hypotheses.

Results: In a model with alcohol use as the outcome, there were no significant associations between shame or guilt and alcohol use at the within- or between-subjects level. In a model with alcohol problems as the outcome, guilt was positively associated with alcohol problems but only at the daily level. At the between-subjects level and after controlling for guilt, there was a significant association between depression, shame, and alcohol problems; average levels of shame mediated the association between depression and alcohol problems. In post-hoc reverse directionality models, average alcohol problems mediated the relationship between depression and shame and guilt at the between-person level. No mediation was present for alcohol use.

Conclusion: After controlling for guilt, shame is an emotion that helps explain risk for alcohol problems among depressed emerging adults, which has implications for targeted interventions. Reciprocal associations between shame, guilt, and alcohol problems emerged highlighting the need for more fulsome assessments of shame and guilt in future EMA research.

Keywords: depression, shame, guilt, problem drinking, alcohol problems, EMA

Shame's Associations with Depression and Problem Drinking: An Ecological Momentary Study

Over 85% of emerging adults (ages 18-25; Arnett, 2000) report consuming alcohol in the past year (Adlaf et al., 2005), many of whom go on to experience negative consequences (Brière et al., 2014; Cohen et al., 2017). Coincidentally, emerging adulthood is also associated with the onset of mood disorders, with over 30% of emerging adults reporting depressive symptomatology (Ibrahim et al., 2013). The association between problem drinking and depression is strong; empirical and clinical research support its comorbidity (Lai et al., 2015). The self-medication hypothesis (SMH; Khantzian, 1985; 1997) argues that individuals drink alcohol to cope with depression which, over time, becomes negatively reinforced if the alcohol is perceived to dampen the depression (Khantzian, 1997). Indeed, coping models confirm that depression-related coping motives are a common reason for drinking among emerging adults (Grant et al., 2009; Kenney et al., 2018; O'Hara et al., 2014) and are the strongest predictor of severe alcohol problems including impaired control and risky behavior (Merrill et al., 2014). It is imperative to understand the underlying mechanisms that drive coping-motivated drinking among depressed emerging adults.

Extant literature has found that shame is an important emotion to consider in the context of comorbid depression and problem drinking (Bilevicius, Single, Bristow, et al., 2018; Luoma et al., 2017; Treeby & Bruno, 2012; Treeby et al., 2020). Shame is an unpleasant, normative emotion that can be experienced following a negative event (Lewis, 1971). According to seminal conceptualizations (Tangney & Dearing, 2002), shame is a negative, self-focused emotion encompassing the entire defective self that is associated with feelings of inferiority and often maladaptive coping behaviors including avoidance and externalization (e.g., blaming others). Shame is frequently conflated with guilt, a similar yet separate emotion. A primary distinction between these emotions is in the attribution; the focus of guilt is on the specific negative behavior

or event, whereas the focus of shame is directed inwards, with the entire self being deemed as defective. Indeed, although shame can be functional, it has been argued that shame becomes problematic and can lead to depression when the problems that trigger it are appraised as irreparable (Cibich et al., 2016). This whole-self, irreparable attribution characteristic of shame often drives individuals to socially withdraw in an attempt to conceal the shameful event (Tangney & Dearing, 2002), paralleling the social disconnection that is common in depression (American Psychiatric Association [APA], 2013). Shame, and not guilt, is often associated with greater social distancing (Pulcu et al., 2013), and given that self-blame and rumination are characteristic of shame (Orth et al., 2006), it is not surprising that shame can be central to the experience of depression for some. Recent research has corroborated the distinction between shame and guilt (Leach, 2017; Tignor & Colvin, 2017; Zhu et al., 2019) and found that shame, and not guilt, is associated with depression (Cheung et al., 2004; Orth et al., 2006; Treeby et al., 2020) and poorer psychological functioning (Webb et al., 2007). However, there is a large focus on guilt in current diagnostic nomenclatures of depression (APA, 2013) which is problematic given the aforementioned research highlighting shame's intimate and unique association with depression.

Some evidence has identified that shame, and not guilt, is predictive of problem drinking both in the context of depression (Bilevicius, Single, Bristow, et al., 2018; Luoma et al., 2019; Treeby & Bruno, 2012) and more generally (Luoma et al., 2017). For example, recent meta-analytic data found a small effect between shame and substance-related problems ($r = 0.16$; Luoma et al., 2019). In a cross-sectional study of emerging adults, a positive association between shame-proneness and drinking to cope with depression was found and a negative association between guilt-proneness and depression-driven drinking was observed (Treeby & Bruno, 2012). This finding was echoed in our recent prospective, longitudinal work that followed emerging adults

over the course of one month. In a sample of 210 participants, we found that shame mediated the effect of baseline depression and problem drinking one month later (Bilevicius, Single, Bristow, et al., 2018). Building on this, we recently experimentally induced shame and found that shame triggered depressed emerging adults to crave alcohol but only when they were in a solitary context (Bilevicius et al., 2020). In a more contemporary examination among two independent samples, Treeby and colleagues (2020) found that alcohol use-related shame and guilt were associated with distinct patterns of emotions and behavior; alcohol use-related shame was associated with negative affect and avoidance, but alcohol-related guilt had no association with negative affect and was associated with action-oriented behaviors. Given the clear distinction between shame and guilt (Tangney & Dearing, 2002) and the relevance of shame in both problem drinking and depression (Bilevicius, Single, Bristow, et al., 2018), the aim of the current study was to examine the potential specific influences of shame and guilt in the depression and problem drinking comorbidity.

Although it is clear that shame, depression, and problem drinking are related to one another, there is a need for intensive longitudinal designs (i.e., ecological momentary assessments [EMAs]) to understand how shame (versus other negative emotions) relates to proximal decisions to drink among emerging adults who are depressed. Using a cross-sectional design, Veilleux and colleagues (2014) found that general negative affect predicted drinking to cope among an emerging adult sample, which was further explained through lack of emotional clarity and emotional strategies. Although informative, this study did not examine what specific emotion (i.e., shame) drove the risky drinking behavior and poor emotion regulation. Luoma and colleagues (2018) built on Veilleux's study by collecting EMAs of negative affect, ashamed mood, and drinking context from a community-dwelling sample. Using multilevel models, results suggested that fluctuations in daily ashamed mood predicted solitary drinking, an atypical drinking behavior for emerging

adults (Neff, 1997), after controlling for general negative affect (excluding shame). This result is consistent with SMH (Khantzian, 1997) and coping-models of drinking (Cooper, 1994); individuals consumed alcohol to cope with distressing feelings of shame. However, this study utilized a non-emerging adult community-based sample, which may not generalize to the specific population of emerging adults – a population known to experience high rates of depression and alcohol use (Adlaf et al., 2005; Arnett, 2000) as well as their comorbidity (Ibrahim et al., 2013). Emerging adulthood is an opportune time to study depressive pathways and mechanisms and is the population of interest in the current study so we can understand and, ideally, intervene before patterns become more intractable. Additionally, Luoma et al. (2018) did not recruit a depressed sample or conduct mediation analyses. Theoretically, shame is emerging as a cardinal feature of depression (Kim et al., 2011; Orth et al., 2006), so it is likely a relevant factor for drinking among some emerging adults. Thus, it is necessary to examine the potential mediational role of shame to clarify the depression-problem drinking etiological pathway.

The specificity of shame in the context of problem drinking has been identified in cross-sectional (Luoma et al., 2017; Treeby & Bruno, 2012; Treeby et al., 2020), longitudinal (Bilevicius, Single, Bristow, et al., 2018), and burgeoning EMA designs (Luoma et al., 2018); however, there has been limited EMA research assessing the relevance of daily experiences of shame (versus guilt) in problem drinking among emerging adults with depression. This analytic approach is among the only methods that can provide nuanced information to understand the proximal emotions involved in coping-motivated drinking (Votaw & Witkiewitz, 2021). In the current study, we administered EMAs assessing daily mood and alcohol use and problems to emerging adults in the morning and evening for four consecutive weekends. Specifically, we examined whether depression was associated with increased levels of daily and average shame

across the EMA period and whether these increases in shame were associated with increased alcohol use and problems. We hypothesized that baseline depression would be associated with increased ratings of shame, not guilt, over the course of the EMA period, which in turn would be associated with increased alcohol use and problems. As prior research has not contrasted the in-the-moment effects of shame and guilt (Luoma et al., 2017), teasing apart the specific emotional triggers of problem drinking among depressed emerging adults is necessary. This research may allow us to clarify the etiological depression risk-pathway and identify treatment targets for emerging adults who are vulnerable to experiencing further problems, like substance use disorders.

Methods

Participants

Participants came from an online psychology pool at two Canadian universities. Eligible participants were emerging adults (i.e., ages 18 to 25) who scored above sex-specific established cut-offs for hazardous drinking (≥ 4 for men and ≥ 3 for women on the Alcohol Use Disorder Identification Test-Consumption [AUDIT-C; Saunders et al., 1993]). We oversampled for the presence of elevated depressive symptomatology (i.e., cut-off of ≥ 16 on the CES-D) by preferentially recruiting participants with elevated CES-D scores to increase variability in the predictor. Our sample was 184 participants ($M_{age} = 19.27$; 73.3% female; 60% above the depression cut-off at baseline). Many participants were in their first year of university (67.9%), identified as White (58.8%), and reported English as their first language (82.4%). Over half of participants were single (58.8%) and almost three quarters lived at home (71.7%).

Procedures

This study was approved by the REB at two Canadian universities. The study procedures occurred in three phases. First, potential participants completed an online screener survey to

determine eligibility. Eligible participants were invited to the lab to complete phase two which included providing informed consent and completing baseline questionnaires. Participants were then guided through creating unique accounts in the EMA smartphone application MetricWire and practiced answering EMAs that mimicked questions they would receive for the duration of the study. The final phase was the EMA period, which was comprised of EMAs completed over four consecutive weekends (Friday – Sunday), resulting in 12 days of EMA data total (Freisthler et al., 2014; Labhart et al., 2019; Wray et al., 2014). Weekend drinking was chosen as emerging adults are more likely to consume alcohol on weekends (Lau-Barraco et al., 2016), which increased the likelihood of capturing their drinking episodes. Participants were randomly prompted to complete surveys on their smartphones three times an evening within three equally-spaced intervals between 5:00 pm and 11:00 pm, and once at 11:00 am the next morning. In all three evening prompts, participants were asked to report their mood (i.e., shame/guilt) and alcohol use (based on standard drink size metric). In the morning, participants were asked about their mood and the total number of drinks consumed and problems experienced from the previous night; reports of use and problems in the morning were used as our outcome variables given that morning data are generally more complete for drinking estimates and are more likely to capture drinking that occurred outside of our prompt windows (i.e., can capture the entire drinking episode; Piasecki, 2019).

Measures

Centre for Epidemiologic Studies in Depression Scale (CES-D; Radloff, 1977)

Participants completed the 20-item CES-D to assess depression at baseline. Participants responded to questions on a 4-point Likert scale (0 = *rarely or none of the time*; 3 = *most or all of the time*). The CES-D is commonly used to identify clinically significant depression and it has

good psychometric properties (Chokkanathan & Mohanty, 2013; Malakouti et al., 2015). Internal consistency of the CES-D was good in our sample ($\alpha = .80$).

Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005)

Participants completed the 24-item B-YAACQ to assess alcohol problems. The B-YAACQ includes a list of problems (e.g., “I have taken foolish risks when I have been drinking; I have passed out from drinking”) that participants dichotomously rate whether they experienced (1 = *yes*, 0 = *no*). The B-YAACQ was administered both at baseline and daily during the EMA period. A total score captured whether emerging adults experienced alcohol problems after a drinking episode.

Ecological Momentary Assessments

Participants were asked to respond to five negative emotions (sad, shame, guilt, anger, and anxious), although we were most interested in shame and guilt as mediators, on a visual analogue scale ranging from 0-10 (“*Please rate your mood at this moment*”; 0 = *not at all*; 10 = *very much*), which is a common assessment of mood in daily diary and EMA designs (Luoma et al., 2018; Mohr et al., 2008; O’Hara et al., 2014). Participants were then asked to indicate whether they had consumed alcohol since the previous survey (“*Are you drinking?*”). If yes, participants were asked “*How many have you had to drink since the last prompt?*” participants indicated how many standard drinks they had consumed in that time period. This process occurred three times per evening. Individuals were also asked who they were consuming alcohol with (i.e., social or solitary drinking), but the low frequency of context-specific responses led us to collapse drinking across contexts (3% of drinking episodes were solitary). Participants received one prompt for a survey the next morning to assess mood, alcohol use, and problems. If participants endorsed drinking, they were asked how much was consumed and whether they experienced any problems (as

assessed by the B-YAACQ). If participants did not consume alcohol, the survey finished. The EMA cycle resumed at 5:00 pm on the next evening or weekend.

Data Analysis

We used multilevel modeling (MLM) in Mplus v.7 to test unique pathways from baseline depression (predictor) to number of drinks consumed (outcome; consumed the previous evening and assessed the next morning) and alcohol problems (outcome; assessed the morning after drinking) via shame and guilt (mediators; assessed across the evening surveys) across the 12-day EMA period. Given our alcohol outcomes (i.e., number of drinks, number of problems), count models were appropriate. As there was overdispersion in our outcomes, negative binomial models were preferred. Because we observed a high frequency of non-drinking days (60%), we tested the zero-inflated negative binomial model against the regular negative binomial model and found that the zero-inflated model did not fit substantially better. Thus, we report only the non-zero inflated models as they are more parsimonious.

We used two-level models to examine associations between negative emotion variables (shame, guilt) and alcohol use/problem outcomes at both within- (Level 1) and between-subject (Level 2) levels. We calculated person-level means for variables (averaging across all days) to include at the between-subjects levels, as well as person-centred variables at the within-subjects level such that each observation represents a deviation from an individual's own mean shame and guilt ratings (Preacher et al., 2010). Models were run with fixed slopes and random intercepts. Maximum likelihood robust estimation was used, which corrects for non-normality of data.

A high correlation ($r = 0.78$) was found between shame and guilt, so we chose to model data in two ways to address the overlapping variance and multicollinearity. We ran models with shame and guilt as separate mediators, and then combined them into the same model. This

approach allowed us to tease out the effects specific to the small proportion of unique variance. For each of these models we, first, assessed whether shame or guilt averaged within each weekend day (averaged across the three evening prompts) predicted the number of drinks consumed on the same day over the study period (i.e., 12 days; alcohol use model) and second, whether shame or guilt averaged within each drinking day predicted the total number of alcohol problems (as measured by the B-YAACQ; alcohol problems model). In the alcohol problems models, we chose to include only days where drinking occurred, as participants could not have experienced alcohol problems if they had not consumed any alcohol. Thus, a score of zero (on a drinking day) would reflect the absence of problems rather than non-drinking. We also modelled residual covariances between shame and guilt.

To test for mediation, we used indirect effects between baseline depression and each alcohol outcome mediated through shame or guilt. We adapted the 2-1-1 mediation syntax provided by Preacher et al. (2010) to get estimates of indirect effects. In this type of model, it is only possible to estimate indirect effects at the between-subjects level because the main predictor (baseline depression) is a Level 2 factor (Preacher et al., 2010). Indirect effects were assessed using Monte Carlo confidence intervals (CIs; with 20,000 repetitions; Selig & Preacher, 2008).

Post-hoc reverse multilevel structural equation models (MSEM) were run to understand reciprocal associations between alcohol use and problems and next-day shame and guilt (continuous outcome variables). In these models, we examined pathways between baseline depression (predictor) and shame (outcome; assessed in the morning) and guilt (outcome; assessed in the morning) via alcohol use and problems (mediators; assessed the morning after drinking) across the 12-day EMA period. MSEM uses latent variable modelling to partition the variance into

latent within-person (i.e., person-mean centred) and between-person (i.e., grand mean centred) components (Lüdtke et al., 2008).

Results

Data Distribution and Descriptive Statistics

Our shame and guilt variables exhibited a normal distribution (shame: skew = 2.45 < 3.0; kurtosis = 4.78 < 10.0; guilt: skew = 2.46 < 3.0; kurtosis = 5.50 < 10.0; Kline, 2009; 2010). We observed 22.8% of missing data across the EMA period. No systematic differences were observed for missingness, including baseline problem drinking, as assessed by the AUDIT, ($t(181) = -.34, p = .735$), depression ($t(181) = -.04, p = .966$), or past-month alcohol use ($t(179) = -.09, p = .930$). Over three quarters of the entire sample consumed alcohol at least once over the 12-day EMA period. The average number of drinks consumed on drinking occasions was 2.45 (standard deviation [SD] = 1.45) and the average number of problems experienced was 2.71 ($SD = 2.97$).

Alcohol Use Models

Two models were run with shame and guilt modelled as independent mediators (see Table 1). In both the shame and guilt models, there was no significant association between shame or guilt and alcohol use at the within or between subjects level ($p < .05$).

In the combined model at the within-person level, there were no significant associations between shame or guilt and alcohol consumption (see Table 2). The covariance between shame and guilt at Level 1 was statistically significant, suggesting that if individuals experienced elevated shame, they were also likely to report high guilt as well.

In Level 2 of the model, baseline depression was predictive of shame and guilt, whereby elevated depression was associated with higher levels of the emotions across the EMA period (see

Table 2). However, at the between-person level, there was no association between depression and alcohol use or between any emotions and the number of drinks consumed across the EMA period.

Alcohol Problems Models

Again, two models were run with shame and guilt modelled as independent mediators (see Table 3). In the shame model, there was no significant within-person association between shame and alcohol problems. However, in the guilt model, there was a significant association between guilt and alcohol problems at the daily level.

Level 2 revealed a significant, direct association between baseline depression and alcohol problems. In the individual shame and guilt models, only higher average levels of shame were associated with greater levels of alcohol problems aggregated over the EMA study period. Indirect effects suggested the presence of mediation: baseline depression was associated with greater alcohol problems via greater average levels of shame across the EMA period (indirect effect for shame: $b = 0.009$, $SE = 0.003$, 95% CI [0.003, 0.014]; see Table 3).

Table 4 represents the combined model with shame and guilt, controlling for the high overlapping variance between these variables. Although no specific within-person effects were observed, Level 2 results suggested that baseline depression predicted alcohol problems across the EMA period. We also observed that shame uniquely mediated the association between depression and alcohol problems, after controlling for the high overlapping variance between shame and guilt (indirect effect for shame: $b = 0.009$, $SE = 0.003$, 95% CI [0.004, 0.015]). Incidence rate ratios identified that shame was associated with an increase in alcohol problems by a factor of 1.198. There was no support for a unique role of guilt in this combined model (indirect effect for guilt: $b = -0.001$, $SE = 0.004$, 95% CI [-0.008, 0.007]).

Combined Reverse Models

Post-hoc reverse models testing pathways between depression (baseline), alcohol use and problems (from previous evening and assessed on morning surveys), and shame and guilt (assessed on morning surveys) are presented in Table 5. A combined model with shame and guilt was run twice, once assessing evening alcohol use as a mediator and once assessing evening alcohol problems as a mediator. In Level 1 of the alcohol use model, greater alcohol consumption in a given evening predicted greater levels of next-day shame and guilt. However, no significant associations were observed at Level 2; no mediation was present.

In Level 1 of the alcohol problems model, daily alcohol problems associated with previous evening drinking predicted both next-day shame and guilt. Level 2 results also found that average alcohol problems across the EMA period were associated with higher average levels of shame and guilt, with results identifying that alcohol problems were a mediator of depression and average shame and guilt (indirect effect for shame: $b = 0.072$, $SE = 0.02$, 95% CI [0.034, 0.109]; indirect effect for guilt: $b = 0.060$, $SE = 0.02$, 95% CI [0.019, 0.101]).

Discussion

The present study adds to the mounting literature that suggests average levels of shame are predictive of alcohol problems and are relevant for understanding problematic drinking among emerging adults with depression (Bilevicius, Single, Bristow, et al., 2018; Luoma et al., 2017, 2019; Treeby et al., 2020). Although guilt was associated with alcohol problems at the daily level, this association was attenuated when controlling for shame. Results also demonstrated that after controlling for the overlap between shame and guilt, a one-point increase in average ratings of shame across weekend drinking days was associated with almost 1.2x more alcohol problems. Further, in both separate and combined models, only shame and not guilt was associated with greater alcohol problems at the between-person level, and only shame mediated the association

between depression and alcohol problems. This suggests that shame is a unique emotional experience that plays a role in the link between depression and individual differences in alcohol problems among emerging adult drinkers. However, post-hoc reverse models identified complicated reciprocal effects whereby greater alcohol consumption and problems exacerbated feelings of both shame and guilt (i.e., no specificity of shame). Specifically, at the daily-level, a one unit increase in number of drinks was associated with 0.123 point increase in shame (equivalent to a change of 0.088 SDs) and a 0.094 point increase in guilt (equivalent to a change of 0.070 SDs). Further, a one unit increase in number of alcohol problems was associated with 0.277 point increase in shame (equivalent to a change of 0.199 SDs) and a 0.300 point increase in guilt (equivalent to a change of 0.222 SDs). Although we cannot know for sure, it is possible that emerging adults in the present study were unable to differentiate between shame and guilt, emotions known to be commonly conflated, and, as noted as a limitation in prior research, single-item assessments may not have picked up on subtle nuances between the emotions (Shaver et al., 1987). Nevertheless, strong self-conscious emotions help explain problematic drinking behaviors among emerging adults.

It is important to acknowledge the lack of within-subject effects of shame. Momentary experiences of shame, as assessed in the current study, may have been insufficient to trigger drinking that leads to alcohol problems, because the fleeting occurrence of shame may not have triggered the appraisal of irreparability (Cibich et al., 2016). However, more frequent feelings of shame on average may suggest the presence of deeper problems. It may be that experiences of shame alone are insufficient to trigger drinking or other problems unless they occur within a context of irreparable personal history (Andrews, 1995) which is supported by recent meta-analytic data that argues problematic shame may be related to sources external to the current substance use

behavior (Luoma et al., 2019). However, an alternate explanation is that shame was experienced as a consequence of drinking, although our reverse models do not support the specificity of shame. To date, limited research has investigated shame as a consequence of drinking (Luoma et al., 2019) but it is important to recognize that the experience of problems, particularly in the presence of others, may have triggered feelings of shame and embarrassment (Merrill et al., 2020), leaving the emerging adult with global negative feelings that linger into the next day. Given the lack of within-subject findings and increased feelings of both shame and guilt after experiencing alcohol problems, more thorough examinations of momentary feelings of shame (and how it is distinct from guilt) in depression-alcohol etiological pathways are warranted. For example, using a self-report measure such as the Test of Self-Conscious Affect (Tangney et al., 1989) would build on the present study and provide greater clarity of shame and guilt's nuanced impact on drinking to cope as it derives a measure of guilt-free shame and shame-free guilt.

No within- or between-level effects of shame on alcohol use were observed. There has been inconsistency in the literature surrounding whether depression is associated with increased or decreased alcohol use (Pedrelli et al., 2016). Burgeoning research highlights that it may be less about the amount of alcohol consumed but rather the context that alcohol is consumed in and the experience of problems. For example, our group recently demonstrated in an experimental study that the context of alcohol consumption moderates the association between depression, shame, and alcohol craving (Bilevicius et al., 2020). It has been argued that solitary drinking is a risky alcohol behavior in emerging adulthood (Bilevicius, Single, Rapinda, et al., 2018) given the tendency to self-medicate and experience alcohol problems (Khantzian, 1997). Solitary drinking has been linked to increased alcohol problems, not hazardous consumption, which has predicted an increased likelihood of developing an alcohol use disorder (AUD; Keough et al., 2015; 2018).

According to the DSM-5, it is the experience of alcohol problems that more readily makes up the criteria of an AUD (APA, 2013), providing further support to the absence of alcohol use findings in our current work. Given that previous research has highlighted the risks associated with solitary drinking (Creswell et al., 2014; Keough et al., 2015; 2018), it would be interesting to examine whether daily or average levels of shame contribute to increased episodes of solitary drinking or whether the lack of within-subjects findings highlight the absence of association between shame and social drinking that has been observed in literature (Luoma et al., 2018; Mohr et al., 2005; Yelsma et al., 2002). Although research has found evidence of shame contributing to solitary drinking (Bilevicius et al., 2020; Luoma et al., 2018), more work is needed to assess shame as a mediator in depression-motivated solitary drinking in emerging adulthood.

Interestingly, within-person, daily-level fluctuations in guilt emerged as a significant proximal correlate of same-day alcohol problems but only when guilt was modelled alone (i.e., without shame). Guilt is often viewed as an adaptive emotion in the sense that it typically activates more restorative actions than shame (Tangney & Dearing, 2002; Treeby et al., 2020). It is possible that guilt can lead to momentary alcohol problems, but not problems that are experienced long-term. For example, both alcohol-use related guilt and shame have been associated with high levels of alcohol consumption (Treeby et al., 2020); however, compared to shame-proneness, guilt-prone individuals tend to use protective behavioral strategies during alcohol use episodes which help minimize the experience of long-term negative alcohol use related consequences (Treeby et al., 2018). Taken with extant research, our results suggest that although daily variability in guilt can lead an emerging adult to experience alcohol problems, it is less likely that long-term problems will follow, which has been observed following experiences of state shame (Randles & Tracy,

2013). Consistent with coping models of drinking, it is likely the self-focused nature of shame (as opposed to guilt) that drives the experience alcohol problems.

Although greater average levels of shame are a clear predictor of alcohol problems in our study, post-hoc reverse models revealed that alcohol problems across the EMA period were associated with greater average levels of shame and guilt. This result may seem puzzling at first given aforementioned research highlighting the uniqueness of shame in depression-driven problem drinking (Luoma et al., 2019; Treeby & Bruno, 2012). While seminal conceptualizations posit that shame and guilt are distinct emotions (Lewis, 1971; Tangney & Dearing, 2002), our results suggest that emerging adults are unable to adequately differentiate between shame and guilt after experiencing alcohol problems. It has been found that young people have difficulty differentiating between similar, or within-category emotions (e.g., between sadness emotions such as shame and guilt; Erbas et al., 2019; Shaver et al., 1987) as these same-category emotions often share elements that make them difficult to distinguish, which is worsened when depressive symptoms are present (Willroth et al., 2020). For example, both shame and guilt have been found to be associated with low emotion differentiation in a sample of adults with depression, with poor shame differentiation being the largest predictor of depressive symptoms (Willroth et al., 2020). Similarly, alcohol problems are known to be associated with rumination (Caselli et al., 2008; 2010), which likely further precluded emotion differentiation. In the context of our study, it is also possible the poor morning-after differentiation between shame and guilt is the result of the single-item assessment that was used and did not provide opportunity to distinguish between the nuanced emotions (Shaver et al., 1987). Research has called for more detailed information to be collected in order to clearly separate shame from guilt in research settings (e.g., information regarding type of evaluation, perception of responsibility; Miceli & Castelfranchi, 2018; information about whether

a drinking event violates group norms and degree of group identification; Giguère et al., 2014). Thus, future research should implement multi-item assessments of shame and guilt to truly understand the reciprocal associations between depression, alcohol problems, and self-conscious emotions.

Our findings suggest that clinicians should probe for shame and drinking motives when working with emerging adults with depression and problem drinking. Targeting shame may reduce defensiveness surrounding the shameful event or feelings and ultimately promote more approach tendencies (Schmader & Lickel, 2006). Potential strategies for reducing shame include increasing self-compassion (Gilbert & Procter, 2006) and promoting more acceptance (e.g., defusion) to allow individuals to distance themselves from their negative feelings (Luoma & Platt, 2015). As argued by Treeby et al. (2018), even shifting the experience from shame to guilt through the use of motivational interviewing may reduce the extent of experienced problems. Regardless of the strategy, the evidence is clear that there is a need to directly target shame, particularly when it co-occurs with depression in the context of problem drinking.

There are limitations to this study. First, our data were collected by self-report, which can be sensitive to response bias. However, self-report in alcohol research has been found to be accurate in emerging adult samples (Northcote & Livingston, 2011) and we used a longitudinal design with repeated assessments which is superior to a single time-point assessment. Second, participants were asked about drinking context (i.e., solitary or social drinking) in this study. However, given the low number of solitary drinking episodes, we could only focus our models on overall use. It is still important for future research to more thoroughly assess daily shame and its associations with solitary drinking. Third, although we used an intensive, longitudinal EMA design, we were unable to collect momentary drinking data as it was occurring. This poses some

difficulty in temporally separating affect from drinking and limits the ability to provide a full temporal test of mediation. The current study provides a foundation for understanding the relevant emotions for risky drinking, but future event-based EMAs that assess mood as an immediate antecedent to drinking episodes (i.e., a study where participants complete a pre-drinking report prior to consumption) are necessary. Similarly, shame and guilt were assessed via a single VAS item which likely accounts for the poor differentiation of shame and guilt in morning surveys as participants were unable to respond to the nuances of their emotional experiences due to the surge of general negative affect (Shaver et al., 1987). Since there was such high overlap between shame and guilt, it also complicates interpretation of the unique effect of one while controlling for the other. Although the single-item method has empirical support (Mohr et al., 2008; O'Hara et al., 2014), future research should identify the events participants are reporting on to assess context, norm violation, and group identification, and utilize multi-item measures with better discriminant validity to provide a more fulsome understanding of shame's role in depression-motivated drinking. Fourth, we had a primarily White female college sample which means that the findings do not necessarily generalize to clinically depressed samples and non-White and non-student emerging adults more broadly. Finally, multicollinearity emerged as a limitation; however, our analytic strategy allowed us to assess the remaining unique variance between shame and guilt to reveal a positive and significant effect of shame.

Limitations notwithstanding, our study clarifies that experiences of shame across drinking episodes are associated with alcohol problems among emerging adults with depression, even after controlling for guilt. Although we identified that shame and guilt are outcomes of problem drinking, results underscore the importance of shame in depression-motivated drinking, an emotion largely ignored in contemporary diagnostic nomenclature. Convincing evidence has shed light on

the importance of assessing for shame and the need for using more explicit intervention strategies targeting shame to mitigate the harmful effects such as AUDs and relapse that follow from the experience of this potent emotion (Randles & Tracy, 2013).

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Table 1

Unstandardized parameter estimates for the multilevel models predicting number of drinks consumed over the EMA period with shame and guilt separately.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>Rate Ratio</i>
Shame				
Level 1				
Coefficients: Predicting daily number of drinks				
Shame	0.004	0.04	.905	1.004
Level 2				
Coefficients: Predicting average number of drinks				
Depression (baseline)	-0.004	0.01	.495	0.996
Shame	0.005	0.05	.924	1.005
Coefficients: Predicting average shame				
Depression (baseline)	0.055	0.01	<.001	1.057
Guilt				
Level 1				
Coefficients: Predicting daily number of drinks				
Guilt	0.043	0.03	.208	1.044
Level 2				
Coefficients: Predicting average number of drinks				
Depression (baseline)	-0.005	0.01	.445	0.995
Guilt	0.014	0.07	.835	1.014
Coefficients: Predicting average guilt				
Depression (baseline)	0.051	0.01	<.001	1.052

Note. EMA = ecological momentary assessment. This model was run with shame and guilt separately due to the high overlap between shame and guilt. Shame and guilt were assessed on the evening surveys over the course of the study period. Alcohol use was the next morning reports of previous evening drinking. Rate ratios provide measure of effect size.

Table 2

Unstandardized parameter estimates for the multilevel models predicting number of drinks consumed over the EMA period in a combined model.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>Rate Ratio</i>
Level 1				
Coefficients: Predicting daily number of drinks				
Shame	-0.041	0.05	.393	0.960
Guilt	0.073	0.04	.071	1.076
Covariances				
Shame with guilt	0.959	0.17	<.001	2.609
Level 2				
Coefficients: Predicting average number of drinks				
Depression (baseline)	-0.007	0.01	.193	0.993
Shame	-0.005	0.03	.871	0.995
Guilt	0.023	0.05	.651	1.023
Coefficients: Predicting average shame				
Depression (baseline)	0.055	0.01	<.001	1.057
Coefficients: Predicting average guilt				
Depression (baseline)	0.051	0.01	<.001	1.052
Covariances				
Shame with guilt	1.191	0.19	<.001	3.290

Note. EMA = ecological momentary assessment. Shame and guilt were assessed on the evening surveys over the course of the study period. Alcohol use was the next morning reports of previous evening drinking. Rate ratios provide measure of effect size.

Table 3

Unstandardized parameter estimates for the multilevel models predicting number of alcohol problems on drinking days over the EMA period with shame and guilt separately.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>Rate Ratio</i>
Shame				
Level 1				
Coefficients: Predicting alcohol problems				
Shame	0.033	0.03	.228	1.034
Level 2				
Coefficients: Predicting alcohol problems				
Depression (baseline)	0.043	0.01	<.001	1.044
Shame	0.166	0.06	.005	1.181
Coefficients: Predicting average shame				
Depression (baseline)	0.052	0.01	<.001	1.053
Guilt				
Level 1				
Coefficients: Predicting alcohol problems				
Guilt	0.061	0.03	.039	1.063
Level 2				
Coefficients: Predicting alcohol problems				
Depression (baseline)	0.045	0.009	<.001	1.046
Guilt	0.142	0.08	.066	1.153
Coefficients: Predicting average guilt				
Depression (baseline)	0.048	0.01	<.001	1.049

Note. EMA = ecological momentary assessment. This model was run with shame and guilt separately due to the high overlap between shame and guilt. Shame and guilt were assessed on the evening surveys over the course of the study period. Alcohol problems from the previous night's drinking were assessed on the morning surveys. Rate ratios provide measure of effect size.

Table 4

Unstandardized parameter estimates for the multilevel models predicting number of alcohol problems on drinking days over the EMA period in a combined model.

	<i>B</i>	<i>SE</i>	<i>p</i>	<i>Rate Ratio</i>
Level 1				
Coefficients: Predicting alcohol problems				
Shame	-0.012	0.04	.790	0.988
Guilt	0.079	0.04	.058	1.082
Covariances				
Shame with guilt	1.038	0.23	<.001	2.824
Level 2				
Coefficients: Predicting alcohol problems				
Depression (baseline)	0.037	0.01	<.001	1.038
Shame	0.181	0.05	<.001	1.198
Guilt	-0.011	0.08	.882	0.989
Coefficients: Predicting average shame				
Depression (baseline)	0.052	0.01	<.001	1.053
Coefficients: Predicting average guilt				
Depression (baseline)	0.048	0.01	<.001	1.049
Covariances				
Shame with guilt	1.028	0.21	<.001	2.795

Note. EMA = ecological momentary assessment. Shame and guilt were assessed on the evening surveys over the course of the study period. Alcohol problems from the previous night's drinking were assessed on the morning surveys. Rate ratios provide measure of effect size.

Table 5

Unstandardized parameter estimates for the reverse multilevel models predicting shame and guilt over the EMA period in a combined model.

	<i>B</i>	<i>SE</i>	<i>p</i>
Alcohol Use			
Level 1			
Coefficients: Predicting morning shame			
Alcohol use	0.123	0.03	<.001
Coefficients: Predicting morning guilt			
Alcohol use	0.094	0.03	.001
Covariances			
Shame with guilt	1.431	0.22	<.001
Level 2			
Coefficients: Predicting morning shame			
Depression (baseline)	0.062	0.01	<.001
Number of drinks	0.024	0.11	.833
Coefficients: Predicting morning guilt			
Depression (baseline)	0.059	0.01	<.001
Number of drinks	0.063	0.13	.612
Coefficients: Predicting number of drinks			
Depression (baseline)	-0.017	0.01	.211
Covariances			
Shame with guilt	1.093	0.19	<.001
Alcohol Problems			
Level 1			
Coefficients: Predicting morning shame			
Alcohol problems	0.277	0.04	<.001
Coefficients: Predicting morning guilt			
Alcohol problems	0.300	0.06	<.001
Covariances			
Shame with guilt	0.944	0.33	.005
Level 2			
Coefficients: Predicting morning shame			
Depression (baseline)	0.022	0.02	.265
Number of problems	0.442	0.11	<.001
Coefficients: Predicting morning guilt			
Depression (baseline)	0.026	0.02	.266
Number of problems	0.370	0.12	.002
Coefficients: Predicting number of problems			
Depression (baseline)	0.162	0.02	<.001
Covariances			

Shame with guilt	0.873	0.25	<.001
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Note. EMA = ecological momentary assessment. Alcohol use and problems from the previous evening were assessed on morning surveys over the course of the study period. Shame and guilt were also assessed on the morning surveys.

Table Captions

Table 1

Unstandardized parameter estimates for the multilevel models predicting number of drinks consumed over the EMA period with shame and guilt separately.

Table 2

Unstandardized parameter estimates for the multilevel models predicting number of drinks consumed over the EMA period in a combined model.

Table 3

Unstandardized parameter estimates for the multilevel models predicting number of alcohol problems on drinking days over the EMA period with shame and guilt separately.

Table 4

Unstandardized parameter estimates for the multilevel models predicting number of alcohol problems on drinking days over the EMA period in a combined model.

Table 5

Unstandardized parameter estimates for the reverse multilevel models predicting shame and guilt over the EMA period in a combined model.