Prospective examination of the effect of injunctive drinking norms on the association between social anxiety and coping motivated and problematic drinking

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Abstract

While most students "mature out" of normative undergraduate problematic drinking, many do not. Research demonstrates that drinking for coping motives impedes that maturing out process (Littlefield, Sher, & Wood, 2010). Social anxiety (SA) may be a particularly relevant risk factor for problematic drinking during these formative years. Drinking in university often occurs in (anxiety provoking for some) social situations and heavy drinking is often promoted and normalized by peers in these contexts. The goal of this study was to investigate SA as a risk factor for continued problematic drinking during the transition out of university. It was hypothesized that SA would be a positive predictor of drinking for coping motives and problematic drinking during the 9-months post-graduation, but only for those who believed that peers approved of heavy/risky drinking (i.e., high injunctive norms). Graduating students (N = 120 at baseline) completed online surveys pre- and post-graduation (3-, 6-, 9-month follow-ups). SA, injunctive norms, drinking motives, and problematic drinking were assessed. Latent growth curve modeling was used to test injunctive norms (between subject) as a moderator of the effect of SA (between subject) on within person change in coping drinking motives, alcohol use, and alcohol-related problems. Only the interactive effect on alcohol-related problems was supported. Counter to hypotheses, elevated SA was associated with a more rapid decline in alcohol-related problems, if injunctive norms were high. These results suggest that the transition out of university may be somewhat protective in terms of reducing risk for problematic drinking for some high SA individuals.

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The vast majority of undergraduates drink alcohol, and of those who drink, 72% regularly consume alcohol at levels considered hazardous (Adlaf, Demers, & Gliksman, 2005). Heavy drinking during these formative young adult years is linked to a host of alcohol-related problems (Balodis, Potenza, & Olmstead, 2009), and can presage lifelong problems with alcohol (Jennison, 2004). While most students reduce problematic drinking (heavy drinking; experiencing alcohol-related problems) upon graduation (Schulenberg, O'Malley, Bachman, Wadsworth, & Johnston, 1996), there is an appreciable number of students who do not "mature out" of problematic drinking (Zucker, 1987; Weingardt et al., 1998). At present, little is known about the factors that predict continued problematic drinking as students make the transition out of university.

Social anxiety (SA), which is characterized by a fear of negative evaluation by others (American Psychiatric Association, 2013), may be one individual-difference factor that is particularly relevant to problematic drinking during the undergraduate and young adult years. Approximately 10% of undergraduates suffer from clinically significant SA (Blanco et al., 2008; Russell & Shaw, 2009) and SA at a symptom-level affects 20-30% of adolescents and young adults (Wittchen, Stein, & Kessler, 1999). The undergraduate and young adult years are associated with new social contexts, which are not only anxiety provoking for those high on SA, but which also promote and normalize heavy drinking (Kushner & Sher, 1993). While SA and alcohol use disorders are consistently shown to be highly comorbid in adult populations, with evidence showing SA precedes alcohol misuse/abuse (Grant et al., 2005; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992), the link between SA and problematic drinking at earlier stages of drinking (i.e., undergraduate/young adult samples) has received mixed empirical support (Lewis et al., 2008; Eggleston, Woolaway-Bickel, & Schmidt, 2004; Neighbors et al.,

2007a). The goal of the current study was to investigate how SA emerges as a risk factor for problematic drinking as individuals make the transition into adulthood.

Tension reduction theory (Conger, 1956) identifies SA as a risk factor for problematic drinking as individuals may drink to alleviate the anxiety they experience in social situations. Fitting with this theory, motivational theories (Cooper, 1994; Cox & Klinger, 1988, 1990) identify drinking motives as important predictors of alcohol use and related problems. Cooper categorized four drinking motives along two dimensions: source (external, internal) and valence of reinforcement (positive, negative). External motives include *social* (positive; e.g., to enhance a social experiences) and *conformity* (negative; e.g., to avoid social disapproval) motives and are not consistently linked to problematic drinking in adults (Cooper, 1994; Crutzen, Kuntsche, & Schelleman-Offermans, 2013). Internal drinking motives, which include *enhancement* (positive; e.g., to increase positive mood) and *coping* (negative; e.g., to reduce negative mood) motives, have been consistently linked to problematic drinking (Cooper, Frone, Russell & Mudar, 1995; Martens, Cox, & Beck, 2003; Kassel, Jackson, & Unrod, 2000; Merrill & Read, 2010). Coping motives, which may be relevant to the SA risk pathway to problematic drinking, have been uniquely associated with alcohol use and a range of alcohol related problems (e.g., academic and occupational problems, risky drinking), including risk for long-term alcohol use disorders (Kassel et al., 2000; Merrill et al., 2010).

The majority of research on drinking motives has been cross-sectional. However, one study that used a prospective design and followed young adults as they transitioned out of university found that maturing out of problematic drinking was predicted by a reduction in coping drinking motives (Littlefield et al., 2010). Thus, those who continued to drink to cope continued to engage in problematic drinking. Tension reduction theory points to SA as one potential risk factor for continued coping motivated drinking during this transitional period. The

transition is marked by the emergence of new social and occupational contexts that those high on SA may find particularly difficult to navigate (Aderka et al., 2012; Stein & Kean, 2000). Isolating coping drinking motives as pivotal to SA risk for problematic drinking, may in part help to reconcile the disparate findings found at later (i.e., SA and alcohol use disorder co-morbidity) and earlier (i.e., undergraduate drinking) stages of alcohol misuse aetiology. When problematic drinking is normative (i.e., undergraduate context), SA may not stand out as a risk factor, while later on, SA may be linked to non-normative heavy alcohol use and related problems.

The theoretical complexity of SA as a risk factor for coping motivated and problematic drinking may also in part account for the mixed findings in the literature, where empirical evidence supports positive (Lewis et al., 2008; Stewart, Morris, Mellings, & Komar, 2006), null (Eggleston et al., 2004) and negative (Neighbors et al., 2007a; Buckner, Eggleston, & Schmidt, 2006) associations in young adult samples. On the one hand, those high in SA may drink to cope with negative affect experienced in or because of social situations. On the other hand, those high in SA may avoid heavy drinking given their heightened attention to the potential negative, socially embarrassing consequences of being intoxicated. It seems that for those high in SA to drink, they must get past this perceived social disapproval and discomfort.

There is a large literature that identifies perceived approval by others of heavy and risky drinking (i.e., injunctive norms) as predicting one's own drinking (Larimer, Turner, Mallett, & Geisner, 2004; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007b). As SA is characterized by a fear of negative evaluation by others, it makes sense that injunctive norms have been identified as a predictor of problematic drinking in those high in SA (Buckner, Ecker, & Proctor, 2011; LaBrie, Hummer, & Neighbors, 2008). Further, given the stressors associated with navigating new social and occupational contexts in the transition out of university, this period of time may pose a specific risk period for drinking for those high on both SA and injunctive norms. These

individuals may be at risk for establishing or continuing a coping-motivated and problematic pattern of alcohol use as they transition out of university, reducing the likelihood of maturing out.

To date, research has not investigated drinking norms in SA risk models of coping-motivated drinking, rather the focus has been on problematic drinking broadly, and injunctive norms has not been tested as a moderator in these models. Further, most research that has considered SA and drinking norms has utilized cross-sectional designs. Longitudinal designs are essential to identify the interplay of factors that are relevant to the process of maturing out of problematic drinking. Additionally, injunctive norms have been assessed for a wide range of reference groups with varying degrees of proximity to the assessor (Borsari & Carey, 2003). Drinking norms of groups considered proximal (e.g., friends) versus more distal (e.g., peers) are found to be more accurate and are better predictors of one's own alcohol use, but are shown to be less modifiable in norms-based interventions (Baer et al., 1991; Larimer et al., 2011; Lewis & Neighbors, 2004; Prentice & Miller, 1993; Neighbors et al., 2007b). As such, identifying the impact of norms for groups that are similar enough to the individual that they impact one's own drinking behaviours, but distal enough that they may be effectively used in norms-based interventions, is crucial.

The purpose of the proposed study is to prospectively assess the interactive effect of SA and injunctive norms on coping-motivated and problematic drinking during the transition out of university. It is hypothesized that those high on SA who believe that their friends and peers (i.e., individuals from one's graduating cohort) approve of heavy and risky drinking will be at risk for coping-motivated and problematic drinking during the transition out of university (i.e., not mature out of problematic drinking). Conversely, individuals with elevated SA who perceive their friends and peers as less approving of heavy and risky drinking will be less likely to engage

in coping-motivated and problematic drinking during the transition out of university (i.e., be more likely to mature out of problematic drinking).

Method

Participants

One hundred and twenty final-year undergraduate students aged 20-35 years old (M = 23.18; SD = 2.16) were recruited from English speaking universities in Montreal to participate in a larger study assessing transitions in cognition and drinking. At baseline, 86 (71.7%) participants identified as women, 31 (25.8%) as men, one identified as transgender, and two as "other." The majority of the sample (60.8%) identified as white/Caucasian. Participants were required to be in their final semester of an undergraduate program and must not have taken more than one semester (4 months) off of school since graduating high school, excluding summer.

Missing Data Analysis

Participants were assessed at baseline (N = 120), and 3-months (N = 101), 6-months (N = 88), and 9-months (N = 84) post-graduation. A missing data analysis was conducted to determine the nature of missing data. Seventy-eight of the original 120 participants (65%) had complete data for all time points. A dichotomous dummy variable was created to differentiate those who did and did not complete all data points and a series of t-tests were conducted on the baseline variables of interest. Results indicated that those with complete data did not differ statistically significantly at baseline from those with incomplete data in terms of social anxiety ($t_{(118)}$ = 1.42, p = .16), peer injunctive norms ($t_{(118)}$ = 1.18, p = .24), age $t_{(118)}$ = 0.76, p = .48) or gender ($t_{(118)}$ = 0.32, p = .75). However, those with complete data were higher at baseline from those with incomplete data in terms of coping-anxiety motives ($t_{(118)}$ = 2.73, p=.01), alcohol-related problems ($t_{(118)}$ = 2.67, p = .01), alcohol use ($t_{(118)}$ = 1.98, p = .05), and friends injunctive norms ($t_{(118)}$ = 2.07, p = .04). Cohen's d effect sizes were calculated for each association to assess the

influence of missing data and ranged from .37 to .49, indicating medium effect sizes (Cohen, 1988).

Measures

Demographics questionnaire. This measure included 14 items. Relevant to the current study, age, gender, and ethnicity were assessed**.**

Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). The SIAS is a 20-item measure assessing anxiety experienced while interacting with others. Participants were asked to indicate on a 5-point scale (0 = *not at all* to 4 = *extremely*) the degree to which each statement (e.g. "*I find myself worrying that I won't know what to say in social situations"*) was characteristic or true for them. Mean scores were computed with higher scores indicating relatively higher levels of SA. The SIAS has demonstrated very good internal consistency with Cronbach's αs ranging from .88 in undergraduate samples to .93 in those with social phobia (Mattick et al., 1998). High retest reliabilities have been demonstrated for the SIAS (r = .92; Mattick et al., 1998), as well as strong concurrent validity as the SIAS has been shown to correlate strongly with other validated measures of SA, such as the Social Phobia Scale (r = .72; Brown et al., 1997). In the current study, the internal consistency was adequate (see Table 1).

Injunctive Norms Questionnaire (INQ; Baer, 1994). The INQ is a measure of a person's perceptions of others' approval of heavy and risky drinking. Consistent with the original INQ, participants indicated on a 7-point scale (1 = *Strong Disapproval* to 7 = *Strong Approval*) the degree to which they thought others approved of the following four behaviours: "*You drank alcohol every weekend," "You drank alcohol daily," "You drove a car after drinking," and "You drank enough to pass out."* Relevant to the current study, participants indicated perceived approval of these behaviours by their friends (i.e., *your friends*) and peers (i.e., *same-age classmates at your university*). The score for each reference group is taken as the sum of the four

items. Adequate reliabilities have been found for injunctive norms of friends (α = .73) and of typical students on campus (α = .68; LaBrie, Hummer, Neighbors, & Larimer, 2010). Convergent validity of this measure has been supported, with correlations between one's own drinking and friends' approval (*r* = .41) and a typical student's approval (*r* = .14) (LaBrie et al., 2010). In the current study, internal consistencies were problematic for friends (α = .68) and peers (α = .68). Visual inspection of the indicated Cronbach's αs if each item were deleted from the remaining three revealed that the item "*You drinking alcohol every weekend,*" when deleted, resulted in improved scale reliability. This suggested that this item was distinct from the other heavy/risky drinking items. Conceptually, drinking alcohol every weekend fits within Canada's low risk guidelines (Butt et al., 2011) and may thus not necessarily reflect risky drinking. As such, this item was removed from the two final scale scores that were derived from this measure (Friends Norms, Peer Norms) on both statistical and theoretical grounds. Removal of this item resulted in improved internal consistencies to an adequate level for Friends Norms and Peer Norms (see Table 1).

Modified Drinking Motives Questionnaire-Revised (Modified DMQ-R; Grant, Stewart, O'Connor, Blackwell, & Conrod, 2007). The Modified DMQ-R is a 28-item measure of an individual's motives for drinking alcohol. The Modified DMQ-R is composed of five drinking motives subscales: enhancement (e.g. "*You drink because it's fun"*), coping-anxiety (e.g. "*You drink because it helps you when you feel nervous"*), coping-depression (e.g. "*You drink because it helps when you feel depressed"*), social (e.g. "*You drink because it makes social gatherings more fun"*) and conformity (e.g. "*You drink because your friends pressure you to drink"*). Participants indicated how often they drank for each motive during the past 3-months on a 5-point scale (1 = *almost never/never* to 5 = *almost always/always*). The score for each drinking motive is taken as the mean of the items that make up each subscale. Good internal consistency

has been found for the subscales, with Cronbach's αs ranging from .66 (social) to .91 (coping-depression; Grant et al., 2007). Concurrent validity is indicated for this measure as coping and enhancement motives are associated with heavy drinking (r = .42 and r = .56, respectively) and drinking problems (r = .34 and r = .34, respectively; Cooper, Agocha, & Sheldon, 2000). These five motives are shown to be correlated in previous studies (Grant et al., 2007; Grant, Stewart, & Mohr, 2009) and as such, motives apart from those tested in the hypothesized model (i.e., coping-anxiety drinking motives) should be controlled for. In the current study all motives demonstrated good internal consistency (see Table 1). Retest reliability for the motive of interest (coping-anxiety), utilizing the Intraclass Correlation Coefficient (ICC), was good (ICC = .88; for review on ICC for retest reliability, see Weir, [2005]).

Alcohol use. (Cahalan, Cisin, & Crossley, 1969; Read & O'Connor, 2006a). Self-reported quantity and frequency of alcohol use over the past 3-months was assessed. A standard drink was defined as a regular sized bottle of beer or wine cooler, a small glass of wine, or a shot of hard liquor. Participants were asked to indicate their quantity of drinking by indicating "*How many drinks did you usually drink on any one occasion in the past 3 months?"* on an 11-point scale (0 = *Did not drink in the past 90 days* to 10 = *Ten drinks per occasion*). Participants were also asked: "*In the past 3 months, on average how often did you have some kind of beverage containing alcohol?"* Responses were on an 11-point scale (0 = *Not at all in the past 90 days* to 10 = *Every day of the week*). These values were weighted and then multiplied to produce a composite quantity by frequency score that reflected the total number of alcoholic drinks consumed in a typical week over the past three months. This quantity by frequency score is a standard measure used in alcohol use literature. Test-retest reliability was good in the current study (ICC = .89).

Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006). The YAACQ is a 48-item measure assessing negative consequences of alcohol use (e.g. *"I have neglected my obligations to family, work, or school because of drinking"*). Participants made dichotomous (*Yes*/*No*) responses indicating whether or not they experienced each alcohol-related negative consequence in the past 3-months. The YAACQ taps the following eight domains of alcohol-related negative consequences: Social/Interpersonal, Academic/Occupational, Risky Behaviours, Poor Self-Care, Impaired Control, Diminished Self-Perception, Blackout Drinking, and Physiological Dependence. The YAACQ total sum score was utilized for this study and demonstrates strong concurrent validity with the Rutgers Alcohol Problem Index (r = .79; Read et al., 2006). The YAACQ total scale demonstrates excellent internal consistency (α = .96), as well as strong retest reliability (r = .86) (Read, Merrill, Kahler, & Strong, 2007). Excellent internal consistency was found in the current analysis (see Table 1), as well as adequate test-retest reliability (ICC = .78).

Procedure

Final year undergraduates were recruited through in-class and online advertisements to participate in a longitudinal study assessing cognition and drinking. Participants were screened for eligibility to participate in the study via either a brief telephone or online screening questionnaire. Eligible participants were emailed a link to the online questionnaire battery. Participants were asked to read the electronic Consent Form and indicate informed consent to participate prior to each assessment. Participants completed a battery of questionnaires assessing drinking behaviours, social anxiety and other variables. Assessments were completed within a month prior to graduating university, and three, six, and nine months following the initial assessment. Efforts were made to ensure all participants completed each follow-up assessment within a two-week period. Participants were compensated via $15 electronic gift cards for each

completed battery of questionnaires. Bonus incentives, such as $50 completion draws, were utilized to encourage participation at each time point.

Data Analytic Overview

Latent growth curve modeling (LGM) was used to examine the interactive effect of SA and injunctive norms (Friends Norms, Peer Norms) on predicting changes in coping-anxiety motives and problematic drinking as individuals make the transition out of university. LGM in MPlus v. 7.3 (Muthén & Muthén, 1998-2012) was used to test the moderation hypotheses following the recommendations of Preacher et al. (2008). Prior to analyses, all data were screened for violations of the assumptions of LGM. Scale scores were converted into Z-scores and outliers were defined as values that were more extreme than |3.29|. Outliers were changed to the next most extreme raw score with a Z-score less than |3.29|. Further, many variables had skewed and kurtotic distributions (Table 1). There was also missing data across the multi-wave design. Accordingly, full information maximum likelihood (FIML) estimation was utilized for hypothesis testing. FIML is preferable for use with variables that have skewed distributions and it utilizes all available information, thus is ideal for analyses where there is missing data (Enders, 2001; Enders & Bandalos, 2001).

The analyses were completed in two steps. First, the unconditional growth models of the outcome variables (coping-anxiety motives, alcohol use, alcohol-related problems) were tested. Essentially, the unconditional models allow for examination of the nature of growth for each outcome variable. The intercept-only model was tested prior to examining linear and non-linear growth for each outcome variable. Next, if an unconditional model provided good fit to the data and indicated growth and variability in growth, the model was conditioned on SA, Norms (Friends Norms, Peer Norms), and the SA×Norms interaction term. Two models were tested for each time-varying outcome, one model testing the moderating effect of Friends Norms and the

other testing the moderating effect of Peer Norms on the relation between SA and the time-varying outcome variable. In these conditional models, the predictors (SA, Friends Norms, Peer Norms) were mean centered to increase interpretability and to reduce multicollinearity. These between subject predictors all reflect baseline assessments. In addition, all drinking motives aside from the motive of interest (coping-anxiety) were intended to be controlled for in the conditional models testing SA, Norms, and SA×Norms predicting changes in coping-anxiety motives. If the SA×Norms interaction was statistically significant, the interaction term was probed using simple slopes analysis. Specifically, the effect of time on the outcome variables was conditioned at high (1 *SD* above mean) and low (1 *SD* below mean) SA and injunctive norms.

Model fit was assessed using multiple indicators. Chi-square (χ^2) was first used as an indicator of exact fit. However, given that Chi-square is sensitive to both sample size and violations of normality (Hu & Bentler, 1999), supplementary fit indices were utilized to further assess fit. Specifically, the comparative fit index (CFI), the root-mean square error of approximation (RMSEA), and the standardized root mean square residual SRMR) were used. Good fit is indicated if χ^2 is not significant (i.e., $p > .05$), CFI > .95, RMSEA <.05 and SRMR <.05 (Hu et al., 1999; Hooper, Coughlan, & Mullen, 2008). In addition, a model selection approach was used to evaluate the relative fit of nested models, utilizing the Chi-square different test ($\Delta\chi^2$), whereby improvement of fit is indicated if $\Delta\chi^2$ is statistically significant at the .05 level.

Power Analysis

The power analysis was conducted using G*Power (Erdfelder, Faul, & Buchner, 1996). With seven predictors in the most complex model (SA, Norms, SA×Norms, coping-depression motives, enhancement motives, social motives, and conformity motives) and medium effect sizes expected, a sample of 103 was required to field a power of .80 with Type I error (alpha) set at

.05. Allowing for a liberal 20% dropout from Time 1 to Time 4, we were well powered to test the most complex proposed model with a baseline sample of $N = 120$.

Results

Descriptive Statistics

Descriptive statistics of the predictors (SA, Friends Norms, Peer Norms), covariates (social motives, conformity motives, enhancement motives, coping-depression motives) and outcome variables (coping-anxiety motives, alcohol use, alcohol-related problems) are presented in Table 1.

Hypothesis Testing: Latent Growth Curve Modeling

Coping-anxiety motives. The model for cope-anxiety drinking motives with just the intercept provided an adequate fit to the data ($\chi^2_{(8)} = 10.97$ $p = .20$, CFI=0.98, RMSEA=0.06 90% CI [.00, .13], SRMR=.10), however, inclusion of a linear-slope factor (loadings were 0, 1, 2, and 3) provided an excellent fit to the data ($\chi^2_{(5)} = 4.44$ $p = .49$, CFI=1.00, RMSEA=0.00 90% CI [.00, .12], SRMR=0.05, $\Delta\chi^2_{(3)} = 6.53$ $p = .08$). As such, the linear growth model was retained as the unconditional growth model. The mean ($\mu = 2.32$, $p = .00$) and the variance ($\Psi = .568$, $p = .00$) of the intercept factor were statistically significant, indicating that individuals reported an average starting point of coping-anxiety motives that was different from zero, and that there was meaningful variance around this average. The marginally statistically significant mean of the slope factor ($\mu = -.06$, $p = .06$) indicates that, on average, individuals were decreasing their drinking for coping with anxiety motives over time. However, non-significant variance ($\Psi = -.002$, $p = .91$) in the slope factor suggests a lack of meaningful variability in change in drinking for coping with anxiety motives over time. Given a lack of variability in change over time, we did not move forward with the conditional models for coping-anxiety drinking motives.

Alcohol use. The model for alcohol use with just the intercept provided a poor fit to the data ($\chi^2_{(8)} = 24.85$ $p = .00$, CFI=0.94, RMSEA=0.13 90% CI [.07, .19], SRMR=0.09), however, inclusion of a linear-slope factor (loadings were 0, 1, 2, and 3) provided an improvement to the fit to the data ($\chi^2_{(5)} = 8.34$ $p = .14$, CFI=0.99, RMSEA=0.08 90% CI [.00, .16], SRMR=0.10, $\Delta\chi^2_{(3)} = 16.51$ $p = .00$). As such, the linear growth model was retained as the unconditional growth model. The mean ($\mu = 6.07$, $p = .00$) and the variance ($\Psi = 33.17$, $p = .00$) of the intercept factor were statistically significant, indicating that individuals reported an average starting point of alcohol use that was different from zero, and that there was meaningful variance around this average. The significant mean of the slope factor ($\mu = -0.26$, $p = .04$) indicates that, on average, individuals were decreasing their alcohol use over time, and the significant variance of the slope ($\Psi = 1.19$, $p = .00$) suggests meaningful variability in change in alcohol use over time.

Next the two conditional LGMs were tested, where the moderating role of Friends Norms and Peer Norms on the association between SA and changes in alcohol use were examined (see Table 2). The first conditional model, with Friends Norms as the moderator, fit the data well. The second conditional model, with Peer Norms as the moderator, also fit the data adequately. SA was not a statistically significant predictor of the intercept or slope factors for either the friends or peer models. Friends Norms was a statistically significant predictor of the intercept of alcohol use but not for change in alcohol use. Peer Norms did not statistically significantly predict the intercept or slope of alcohol use. For Friends Norms, the norms by SA interaction did not statistically significantly predict initial levels or change in alcohol use. The Peer Norms by SA interaction marginally statistically significantly predicted the intercept alcohol use and did not significantly predict changes in alcohol use over time.

Alcohol related problems. The model for alcohol related problems with just the intercept provided a poor fit to the data ($\chi^2_{(8)} = 60.28$ $p = .00$, CFI=0.67, RMSEA=0.22 90% CI [.18, .29],

SRMR=0.18). Inclusion of a linear slope (loadings 0, 1, 2, 3), despite an overall improvement, also provided a poor fit to the data ($\chi^2_{(5)} = 28.63$ p =.00, CFI=0.85, RMSEA=0.20 90% CI [.13, .27], SRMR=0.11, $\Delta\chi^2_{(3)}$ =31.65 p = .00). Inclusion of a non-linear-slope factor (linear coding for baseline, 3- and 6-months, with 9-months estimated freely) provided an excellent fit to the data ($\chi^2_{(4)} = 6.90$ p =.14, CFI=0.98, RMSEA=0.08 90% CI [.00, .17], SRMR=.052, $\Delta\chi^2_{(1)}$ =21.73 p = .00). As such, the non-linear growth model was retained as the unconditional growth model. The mean ($\mu = 8.00$, p = .00) and the variance ($\Psi = 41.44$, p = .00) of the intercept factor were statistically significant, indicating that individuals reported an average starting point of alcohol related problems that was different from zero, and that there was meaningful variance around this average. The statistically significant mean of the slope factor ($\mu = -2.08$, p = .00) indicates that, on average, individuals were decreasing in alcohol related problems over time, and the statistically significant variance of the slope ($\Psi = 4.62$, p = .05) suggests meaningful variability in change in alcohol related problems over time. The correlation between the intercept and slope ($r = -0.70$, p = .02) indicates that individuals who start at a higher level of alcohol-related problems reduce their problems more quickly over time.

Next the two conditional LGMs were tested, where the moderating roles of Friends Norms and Peer Norms on the association between SA and changes in alcohol-related problems were examined (see Table 3). Both conditional models fit the data well. SA was not a statistically significant predictor of the intercept or slope factors for either the friends or peer models. Friends Norms was a statistically significant predictor of both intercept and slope of alcohol related problems. Peer Norms marginally statistically significantly predicted the intercept of alcohol related problems and statistically significantly predicted change. For Friends Norms, the norms by SA interaction was a significant predictor of intercept alcohol-related problems as well as change in alcohol related problems. The SA by Peer Norms interaction was not a statistically

significant predictor of the intercept alcohol-related problems and did significantly predict changes in alcohol related-problems over time. Follow-up simple slopes analysis indicated that elevated levels of SA and elevated Friends Norms and Peer Norms (see Figures 1 and 2) predicted more rapid decreases in alcohol related problems over the 9-months following graduation (Friends Norms: B = -1.39 [SE=0.58], t = -2.39, p= .02; Peer Norms: B = -1.32 [SE=0.55], t= -2.39, p=.02). No other simple slopes were statistically significant.

Discussion

The purpose of this study was to assess SA as a risk factor for continued problematic drinking as individuals make the transition into adulthood. The transition out of university, while potentially exciting, may be a difficult time to navigate for those high on SA. Individuals high on SA may thus be at risk for coping-motivated and problematic drinking if they perceive that heavy and risky drinking is approved of by peers and friends. To assess this potential SA risk pathway to coping-motivated and problematic drinking in this transition, the moderating roles of friends and peer injunctive norms on the association between SA and changes in drinking outcomes (coping-anxiety motives, alcohol use and alcohol related problems) were investigated.

Overall, as expected, the results supported normative maturing out of problematic drinking. In particular there was an overall decrease in frequency of drinking for coping-anxiety motives, a decrease in the amount of alcohol consumed, and a decrease in the number of alcohol-related problems experienced over the 9-months following graduation. Evidence suggested within person variability in this maturation process, such that changes in alcohol use and alcohol related problems over time were not uniform. This is consistent with the previous work on maturing out indicating that while most individuals reduce problematic drinking into adulthood, many do not (Schulenberg et al., 1996; Jackson, Sher, Gotham, & Wood, 2001; Jennison, 2004; Littlefield et al., 2010).

In terms of the specific hypotheses, it was found that the association between SA and changes in alcohol-related problems through transition depended on levels of friend and peer injunctive norms. Specifically, counter to our hypothesis, socially anxious individuals rapidly matured out of alcohol-related problems after university, but only if they held high perceptions of their friends' and peers' approval of heavy and risky drinking at graduation. Despite being counter to our hypothesis, this may make sense given that theory and empirical evidence indicate that those high on SA are sensitive to signals of social disapproval (Rapee & Heimberg, 2007; Mogg, Philippot, & Bradley, 2004). Given the common trend is for a normative decline in alcohol use and related problems as individuals transition into adulthood (Littlefield et al., 2010; Schulenberg et al., 1996), individuals high on SA may be particularly aware this normative maturing out as they are particularly attuned to the potential for social disapproval. Cross-sectional analyses in young adults have demonstrated that individuals who are high on SA are also more strongly affected by their perceptions of normative and approved of drinking behaviours (Neighbors et al., 2007a; Buckner et al., 2011). In leaving this context where heavy and problematic drinking is normative (during university) and moving into new contexts where it may be less so, these individuals may be more likely to reduce problematic drinking patterns.

SA and injunctive drinking norms were not, however, found to interact to predict changes in alcohol use in the present analysis. This may reflect a unique association of SA to drinking problems rather than alcohol use more generally. This is consistent with a body of literature that points to SA as a positive predictor for alcohol related problems rather than alcohol use broadly (Lewis et al., 2008; Eggleston et al., 2004; Morris, Stewart, & Ham, 2005; Neighbors et al., 2007b). Individuals who are high on SA are believed to drink alcohol to alleviate anxiety (Conger, 1956) and individuals who drink for coping motivated reasons face risk for alcohol related problems, irrespective of use (Kassell, 2000; Merrill, 2010). This study represents a

longitudinal confirmation the unique association of SA to alcohol related problems. However, SA only emerged here as a predictor of changes in alcohol related problems in conjunction with injunctive norms, highlighting the importance of considering moderators to help explain the complex association of SA to problematic drinking.

While drinking for coping-anxiety motives reduced over the 9-months following graduation, we did not see variability within this change and this was counter to our hypotheses. Previous research has demonstrated variability within changes in coping motives over time, and suggests that changes in coping motives may be central to predicting who does and does not continue to drink problematically in early adulthood (Littlefield et al., 2010). However, Littlefield and colleagues (2010) assessed changes in motives in young adulthood over a much longer period of time, assessing individuals seven times across 16 years (between ages 18 and 35). Motives are cognitions that need to be learned (Cooper, 1994), and it may be that more time is required for changes in motives to unfold given that it takes time for learning to occur. It may be that the relatively short period of time that was assessed in the current study did not allow enough time allow for changes in drinking motives to emerge.

Despite the strengths of this study, there are some notable limitations. Foremost, there was statistically significant non-random missing data. Individuals who were higher at baseline on Friends Norms, alcohol use, alcohol related problems, and coping-anxiety motives were more likely to drop out of the study. This may affect the interpretability of these findings as it makes it difficult to know how our results might extend to heavier, more problematic drinkers. However, SA, drinking norms and the alcohol use outcomes are assessed in our current analysis on continuums, rather than at discrete levels. As such, the pattern of results seen in the present study would be expected to be consistent across these continuums. Future analyses would benefit from a better understanding of factors that might predict why individuals who are coping-motivated,

heavier, and more problematic drinkers are more likely to drop out as to enhance retention of these participants.

Another notable limitation is that changes in SA and injunctive norms over the 9-months post-graduation were not included in the models. Assessing within-person changes in SA and injunctive norms over this time, and how these changes may predict changes in coping motives and problematic drinking, may have provided a clearer picture of who is and isn't at risk for maturing out. While theoretically, SA may be considered a relatively stable construct, as it generally exhibits a chronic course (Keller, 2003; Bruce et al., 2008), post-hoc analyses did indicate statistically significant variability in change in SA, as well as in injunctive norms, over this transition. Future analyses would benefit from incorporating change in SA and injunctive norms into models predicting maturing out.

Overall, these results contribute meaningfully to the body of literature investigating the maturing-out process. The results indicate that reductions in coping-anxiety motives, alcohol use and alcohol related problems can be seen within the year following graduation from undergraduate studies. While previous research has investigated the association of SA and injunctive norms on alcohol use outcomes cross-sectionally, this is the first study (to the author's knowledge) that investigates the interactive effect of SA and injunctive norms prospectively. This longitudinal analysis helps to shed light on the mixed associations seen in the literature on the associations of SA to coping-motives and problematic drinking. While, during university, those individuals high on SA and injunctive norms for friends and peers may be at a heightened risk for experiencing alcohol related problems, leaving the context of university may instigate a positive change in alcohol misuse.

An additional contribution to the literature of the current analysis is the finding that both friends and peer injunctive norms emerged as a relevant moderator in the association of SA to

changes in problematic drinking. Perceived drinking norms are a strong predictor of one's own drinking habits, and individuals tend to overestimate how much they believe others drink and approve of heavy drinking (Lewis et al., 2004; Neighbors et al., 2007b). Social norms approaches to prevention of risky drinking provide individuals with feedback designed to correct misperceptions of drinking norms (Neighbors, Larimer, & Lewis, 2004). While perceived drinking norms for friends is consistently seen as a strong predictor of one's own drinking, individuals tend to be the least inaccurate of their friends' drinking attitudes and behaviours (Borsari et al., 2008). The present analysis has identified that *same age classmates* (i.e., peers) may be a useful target in norms-based interventions.

Table 1
Descriptive Statistics for Predictor and Outcome Variables

Variable	*N*	Mean	*SD*	Skewness	Kurtosis	Cronbach's α
Baseline Social Anxiety	120	1.45	.88	0.76	-0.11	.95
Baseline Friends Norms	120	6.49	3.86	1.45	1.77	.76
Baseline Peer Norms	120	7.05	3.56	1.40	2.04	.77
Baseline Drinking Motives						
Social	120	3.32	1.03	-0.38	-0.91	.86
Conformity	120	1.52	0.76	2.20	5.30	.90
Enhancement	120	2.99	1.06	-0.18	-0.65	.81
Coping-Depression	120	1.77	0.96	1.60	2.03	.95
Coping-Anxiety Motives						
Baseline	120	2.39	1.02	0.75	-0.19	.81
3-Months	101	2.16	1.02	0.89	-0.01	.83
6-Months	88	2.02	0.92	0.76	-0.46	.79
9-Months	84	2.17	1.08	1.03	0.41	.87
Alcohol Use						
Baseline	120	6.07	5.79	1.71	0.24	
3-Months	101	5.49	5.76	1.58	0.26	
6-Months	88	4.53	4.90	1.69	0.26	
9-Months	84	4.93	5.13	1.64	0.22	
Alcohol-Related Problems						
Baseline	120	8.24	7.49	1.07	0.65	.93
3-Months	101	5.00	6.59	1.70	2.50	.94
6-Months	88	3.47	4.79	1.74	2.61	.92
9-Months	84	4.36	6.73	2.45	6.45	.96

Table 2
Summary of Conditional Latent Growth Curve Models for Alcohol Use

Parameter	Unstandardized Estimate (SE)	Standardized Estimate	*p*	Model Fit
Intercept Alcohol Use				
SA	0.05(0.58)	0.01	.94	
Friends Norms	0.41(0.13)	0.27	.00	$\chi^2_{(11)} = 15.51$, $p = .16$, CFI=0.98, RMSEA=0.06 90% CI [.00, .12], SRMR=0.06
SA×Friends Norms	0.27(0.16)	0.15	.10	
Slope Alcohol Use				
SA	-0.22(0.14)	-0.17	.10	
Friends Norms	0.04(0.04)	0.15	.25	
SA×Friends Norms	-0.04(0.04)	0.12	.33	
Intercept Alcohol Use				
SA	0.10(0.60)	0.02	.87	
Peer Norms	0.18(0.15)	0.11	.23	$\chi^2_{(10)} = 19.34$, $p = .06$, CFI=0.97, RMSEA=0.09 90% CI [.00, .14], SRMR=0.07
SA×Peer Norms	0.35(0.19)	0.17	.07	
Slope Alcohol Use				
SA	-0.22(0.14)	-0.17	.11	
Peer Norms	0.04(0.04)	0.13	.31	
SA×Peer Norms	0.03(0.05)	0.07	.58	

Note. SA=Social Anxiety.

Table 3
Summary of Conditional Latent Growth Curve Models for Alcohol-Related Problems

Parameter	Unstandardized Estimate (SE)	Standardized Estimate	*p*	Model Fit
Intercept Alcohol-Related Problems				
SA	1.04(0.72)	0.13	.15	
Friends Norms	0.61(0.14)	0.35	.00	$\chi^2_{(10)} = 15.32$, $p = .12$, CFI=0.98, RMSEA=0.07 90% CI [.00, .13], SRMR=0.05
SA×Friends Norms	0.42(0.20)	0.19	.04	
Slope Alcohol-Related Problems				
SA	-0.50(0.33)	-0.17	.12	
Friends Norms	-0.28(0.08)	-0.43	.00	
SA×Friends Norms	-0.24(0.10)	-0.29	.02	
Intercept Alcohol-Related Problems				
SA	1.06(0.76)	0.14	.16	
Peer Norms	0.34(0.19)	0.18	.07	$\chi^2_{(10)} = 19.56$, $p = .03$, CFI=0.95, RMSEA=0.09 90% CI [.02, .15], SRMR=0.06
SA×Peer Norms	0.39(0.24)	0.16	.11	
Slope Alcohol-Related Problems				
SA	-0.49(0.34)	-0.19	.15	
Peer Norms	-0.25(0.09)	-0.39	.00	
SA×Peer Norms	-0.23(0.12)	-0.28	.04	

Note. SA=Social Anxiety.

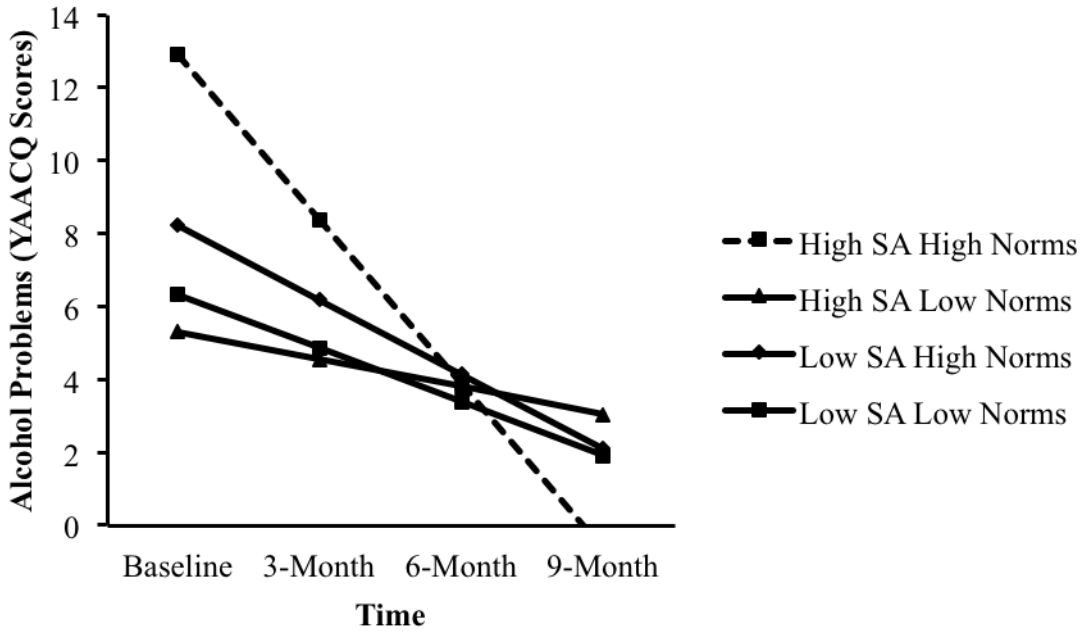

Figure 1. Conditional growth trajectories of alcohol-related problems over time for the interactive effects of social anxiety (SA) and Friends Norms (Norms). YAACQ=Young Adult Alcohol Consequences Questionnaire.

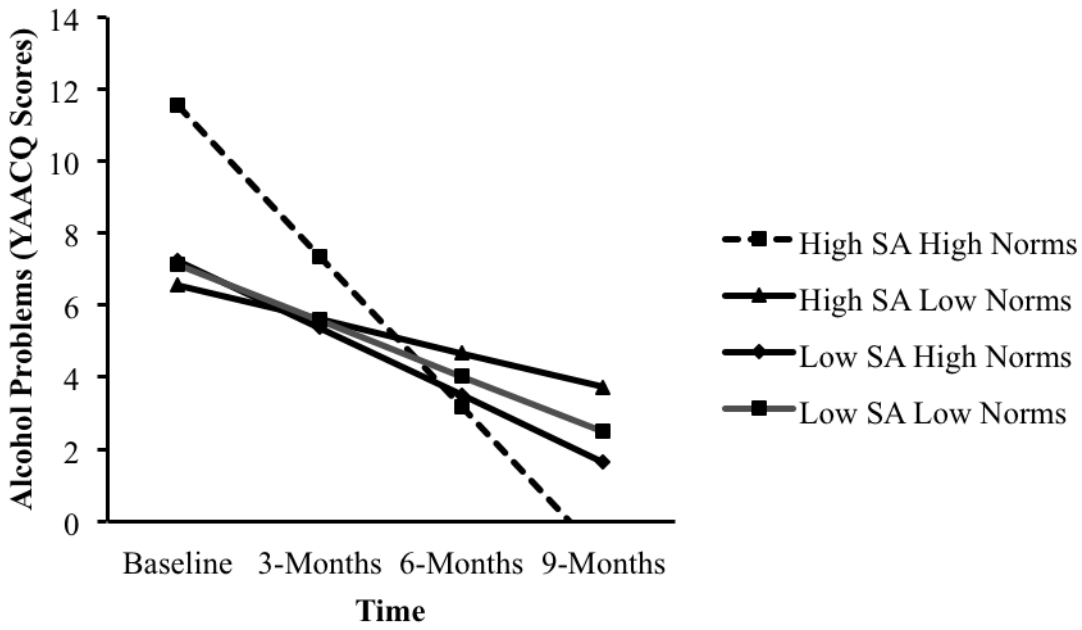

Figure 2. Conditional growth trajectories of alcohol-related problems over time for the interactive effects of social anxiety (SA) and Peer Norms (Norms). YAACQ=Young Adult Alcohol Consequences Questionnaire.

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