“Drinking heavily among young people, even before university, is often viewed as normal and expected behavior by youth and frequently condoned by their parents and the community because it is viewed as a rite of passage” (Nova Scotia Department of Health and Wellness, 2012). This statement appears in a Nova Scotia government report, and statistics support the assumed prevalence of heavy drinking. For example, in Canada, the 18 to 34 age group has the highest proportion of heavy drinking, with 34.4% of men and 23.4% of women reporting bingeing (Government of Canada, 2017). Similarly, in the United States, most young adults under the legal drinking age of 21 report binge drinking (CDC, 2019). North America is not unique in its high levels of binge drinking; in the 20 to 24 age group, 24.1% of women and 62% of men living in the European Union reported heavy episodic drinking (WHO Europe, 2019). Not only is binge drinking pervasive; it also carries heavy societal costs, including automobile accidents, alcohol poisoning, sexual assault, and various cancers (CDC, 2019). Thus, binge drinking is a widespread societal problem, and considerable research has examined various factors that predict it. The present research examined anticipated regret as a unique predictor of binge drinking among university students in a North American context.

**Binge Drinking**

Although specific criteria vary, a commonality in definitions of binge drinking is the consumption of large quantities of alcohol in a short time. The National Institute of Alcohol Abuse and Alcoholism (NIAAA) defines binge drinking as the consumption of four or more drinks by a woman or five or more drinks by a man over the course of about two hours (NIAAA, n.d.).

Researchers have tested various interventions designed to curb binge drinking, with varying levels of success (Kuntsche et al., 2017). One popular
strategy involves educating students about binge drinking rates, which tend to be lower than students estimate. Supporting this strategy are results from an experiment that randomly assigned incoming university students to participate in a peer-oriented discussion (which focused on norms) or an individual-oriented discussion (which focused on decision-making; Schroeder & Prentice, 1998). Months after the discussion, students reported significantly lower levels of alcohol consumption in the peer condition than in the individual condition. In contrast, other evidence has suggested that these norm strategies are counterproductive. For example, another norm-based intervention study found that providing information about drinking rates significantly lowered drinking levels among some students while raising drinking rates among other students (Werch et al., 2000). More recent evidence has suggested that self-affirmation—a strategy known to reduce defensiveness—may increase receptivity to persuasive messages regarding negative effects of alcohol only when not combined with information about drinking norms (Voisin et al., 2016). Thus, the available evidence suggests that, although norming interventions hold some promise, their benefits emerge inconsistently. In fact, a recent meta-analysis revealed that even large changes in norms may result in only small changes in alcohol consumption (Prestwich et al., 2016). An alternative strategy to reduce binge drinking without activating defensiveness involves inducing anticipated regret.

Anticipated Regret
Anticipated regret is a “cognitive emotion” that involves both thinking about the future and imagining potential feelings. As the term suggests, anticipated regret involves imagining wishing that one had acted differently (Zeelenberg & Pieters, 2006). Much research on anticipated regret places it in the context of an extended version of the Theory of Planned Behavior (Icek Ajzen: Homepage, n.d.). Accordingly, anticipated regret should exert its effects through strengthening behavioral intention. Applying the original theory would predict that the most proximal predictor of binge drinking is intention to binge drink. Three factors, in turn, predict intention: attitude (how one feels about binge drinking), subjective norm (how one perceives important others’ support for binge drinking), and perceived behavioral control (how much power one believes that one has over binge drinking). Research in various cultural contexts has supported the utility of the Theory of Planned Behavior to understand drinking intentions and behavior (e.g., Hamilton et al., 2020; Watakakosol et al., 2021).

Research has supported anticipated regret as another predictor of intention. A recent review illustrated that anticipated regret significantly—and often uniquely—predicted intentions to engage in various health-promoting behaviors (e.g., vaccination) and avoid various health-harming behaviors (e.g., unprotected sex; Koch, 2014; Sandberg & Conner, 2008; Sandberg et al., 2016). Perhaps surprisingly, the review revealed sparse research investigating the potential role of anticipated regret in binge drinking. In a notable exception, results of one study revealed that anticipated regret significantly predicted binge drinking intention, which, in turn, predicted binge drinking behavior one week later (Cooke et al., 2007). In another study, manipulating whether a sample of risky drinkers imagined how they felt before or after an episode of binge drinking created significant differences in negative affect, but changes in affect did not translate to changes in behavior (Murgraff et al., 1999). Finally, a more recent study found that anticipated regret did not significantly predict intention to not binge drink (Gagnon et al., 2012); however, a dichotomized outcome measure might have reduced the statistical power of detecting an effect.

An especially stringent test of the statistical effect of anticipated regret on intention to avoid binge drinking involves controlling other extended Theory of Planned Behavior variables. The study that measured binge drinking intention and self-reported behavior one week later also measured descriptive norms (i.e., perceptions of what most other people do; what norming interventions target) and past behavior (Cooke et al., 2007). Results suggested that anticipated regret uniquely predicted binge drinking intentions, even when analyses statistically controlled for original Theory of Planned Behavior variables, descriptive norm, and past behavior. The present research followed this practice of providing a conservative test of the power of anticipated regret by including these two additional variables.

Researchers have employed a variety of manipulations to induce anticipated regret. As mentioned previously, one simple manipulation involves asking participants about their predicted feelings after a potentially regret-evoking situation (compared with their feelings about or before the situation; Murgraff et al., 1999). Perhaps the simplest—yet
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often effective—induction of anticipated regret involves mere measurement. Multiple studies have demonstrated that simply having participants complete items that assess anticipated regret may effectively increase anticipated regret and/or intention. These studies have examined various domains, including cervical screening attendance (Sandberg & Conner, 2009), posthumous organ donation (O’Carroll, Foster, et al., 2011), and regular physical exercise (Abraham & Sheeran, 2004). Thus, the present research attempted to manipulate anticipated regret via mere measurement.

The Present Research

Research on anticipated regret in binge drinking is promising but incomplete. The present investigation advances prior research in several ways. First, most of the limited prior studies examining anticipated regret regarding binge drinking took place in Europe; research in other contexts (such as North America) is needed. As the “replication crisis” in psychology has shown, replications allow researchers to assess the credibility of findings (Maxwell et al., 2015); some journals have responded by explicitly welcoming replication studies because of their value (e.g., Edlund, 2016). Social norms and the legal drinking age vary both between and within North America and Europe (Howard, 2018), further highlighting the need to assess the generalizability of prior findings. Second, since the publication of the previous studies, research has found that modifications to measures may more accurately capture participants’ binge drinking levels. Specifically, research has demonstrated that providing detailed labels of what constitutes “one drink” increases accuracy of self-reported alcohol consumption levels (Osiowy et al., 2015). Thus, the present research applied this practice. Third, given the mixed success of Murgraiff et al.’s (1999) anticipated regret manipulation (involving imagining feelings before or after binge drinking), the present research tested a different manipulation, which prior research supported in other health domains. Fourth, the present research extended the time between measures of intention and behavior from one or two weeks to one month. Previous research found that longer time frames decrease the effects of context on drinking intentions (Cooke & French, 2011); thus, a longer time frame may provide a cleaner test of intention’s predictive value. Furthermore, finding a significant relationship between intention and behavior over a longer time frame would have promising intervention implications, suggesting that an intervention that alters intentions may have lasting effects on behavior.

The present three studies tested two hypotheses:

1. Anticipated regret was expected to uniquely predict intention to avoid binge drinking, which, in turn, would negatively predict binge drinking behavior.
2. Responding to items assessing anticipated regret was expected to increase intention to avoid binge drinking, which, in turn, would predict avoidance of binge drinking one month later.

Study 1: Pilot

The primary purpose of Study 1 was to develop a measure to assess extended Theory of Planned Behavior variables appropriate for binge drinking in a North American context. The process of piloting the measure follows Ajzen’s recommendations for creating a Theory of Planned Behavior measure (Icek Ajzen: Homepage, n.d.). The hypothesis was that anticipated regret would uniquely predict intention to avoid binge drinking.

Method

Participants

One hundred nine undergraduate students (84 women, 24 men, and 1 other) participated in an online study in exchange for extra credit in their Introductory Psychology course. Most (94.5%) reported that they consume alcohol.

Materials and Procedure

This study and the two subsequent studies received ethics clearance from St. Francis Xavier’s University Research Ethics Board (REB; Study 1: ROMEO #23024; Studies 2 and 3: ROMEO #23249) prior to being conducted. All materials and data for all studies are publicly available on the Open Science Framework (https://osf.io/qjv8f/). All participants provided electronic consent before proceeding with each study. Participants signed up online via Sona Systems for a study titled “Alcohol Survey: Pilot Study” and then completed the study at their convenience. The first page of the study’s website contained an item assessing whether participants consumed alcohol (“yes” or “no”) and another item assessing participants’ gender. The subsequent items, where relevant, followed Ajzen’s recommendations for constructing a Theory of Planned Behavior measure, including a preface that some “…questions appear to be similar, but they do address somewhat different issues” (Icek Ajzen: ...
Home page, n.d.). Wording also closely followed that of a previous study of binge drinking in undergraduates (Cooke et al., 2007). Participants then responded to an open-ended item in which they explained how they would define the term “binge drinking,” followed by a webpage that contained two fill-in-the-blank questions that began with the stem: “Some people define binge drinking by counting the number of drinks consumed over a short period of time. How would you define binge drinking? ___ drinks for men” and “___ drinks for women.” These items were included for exploratory purposes.

Following recent meta-analytic findings suggesting that anticipated regret for inaction (e.g., not binge drinking) may more strongly predict behavioral intention than does anticipated regret for action (e.g., binge drinking; Brewer et al., 2016), most of the present extended Theory of Planned Behavior items referred to avoiding—rather than partaking in—binge drinking. This wording selection also arose out of concerns that positively worded items might actually increase the frequency of maladaptive behaviors (Cooke et al., 2007; Wood et al., 2016), such as binge drinking. In addition, recent research suggested that an intention to drink heavily may be less important than a willingness to drink heavily (Stevens et al., 2022). Unless otherwise stated, each item had a 7-point response format; in all multi-item measures, responses were averaged to create scale scores. The first five items assessed attitudes toward avoiding binge drinking over the next month (e.g., “For me to drink fewer than 4 (females)/5 (males) drinks over the course of about two hours in the next month would be …,” ranging from unpleasant [1] to pleasant [7]; α = .81). The next four items assessed subjective norms (e.g., “Most people who are important to me think that I ___ drink fewer than 4 (females)/5 (males) drinks over the course of about two hours in the next month,” ranging from should to should not; α = .72). For these items only, higher scores indicate a lower value—in this case, weaker perceptions of a subjective norm supporting avoidance of binge drinking. Three items assessed perceived behavioral control (e.g., “If I wanted to, I could drink fewer than 4 (females)/5 (males) drinks over the course of about two hours in the next month,” ranging from definitely false to definitely true; α = .68).

The next page of the measure contained additional items assessing both original and extended Theory of Planned Behavior variables. Two open-ended items assessed descriptive norms, split by gender (e.g., “How many women do you know who avoid binge drinking?”). A single open-ended item assessed past behavior (“How many days in the previous month did you drink 4 (females)/5 (males) or more drinks over the course of about two hours?”). Two items assessed the crucial variable of anticipated regret (e.g., “In the next month, I would feel regret if I drank more than 4 (females)/5 (males) drinks over the course of about two hours”; α = .89). Some research suggests that placing anticipated regret items immediately before intention items strengthens intentions (Abraham & Sheeran, 2003); therefore, four intention items followed (e.g., “I plan to drink fewer than 4 (females)/5 (males) drinks over the course of about two hours in the next month”; α = .88). A final, open-ended item solicited feedback to help improve the measure.

Results and Discussion

Results that follow are based on participants (N = 98) who reported that they consume alcohol and who passed two embedded attention checks. A post hoc power analysis revealed that this sample size provided adequate power (.87) to detect a medium effect in a four-predictor regression model. Gender was not a significant covariate and so is not discussed further. Results of analyses of exploratory items appear on the OSF page (https://osf.io/qjv8f/).

Analyses began with an inspection of the open-ended data (assessing descriptive norms and past behavior), which revealed wide variation in both content and format, as Sona Systems does not permit restricting open-ended data to a numeric form. Thus, many participants provided responses that did not lend themselves to quantitative analyses (e.g., “a lot,” “On Fridays and Saturdays”). Therefore, due to the variable nature of the descriptive norm and past behavior responses, these items were not analyzed. Remaining items revealed no evidence of nonnormality (all skewness and kurtosis values < [1.0]), and no outliers (i.e., values > [3] SDs from the mean). Other descriptive statistics appear in Table 1. Furthermore, inspection of the data revealed no concerns about multicollinearity, as all correlations were < |.70|, all tolerance values were above .20, and all VIF values were below 2.0.

Table 1 also reveals that variables correlated in expected ways. Specifically, anticipated regret, attitude, perceived behavioral control, and subjective norms all significantly correlated with intention to avoid binge drinking. The strongest correlation
was between intention and anticipated regret \( (r = .67) \), which was significantly higher than the other correlations, \( Z = 3.11, p < .01 \). A follow-up multiple regression analysis tested whether anticipated regret uniquely predicted intention to avoid binge drinking. The full model explained 57% of the variance in intention. As Table 2 indicates, only anticipated regret and perceived behavioral control explained unique variance in intention. As with the zero-order correlations, anticipated regret was the strongest predictor of intention.

In sum, Study 1 provided strong evidence for the power of anticipated regret in predicting intention to avoid binge drinking. Study 2 addressed several shortcomings of Study 1. First, open-ended items assessing descriptive norms and past behavior were restricted to numeric responses. Second, although most Study 1 participants did not provide feedback, several described the question wording as “confusing” (e.g., “the wording of your questions with ‘over the course of 2 hours in the next month’ is very confusing”). In addition, Study 1 participants tended to overestimate the number of drinks that define binge drinking. Thus, to simplify the wording and to provide a standard definition of binge drinking, Study 2 included an explicit definition of binge drinking combined with a graphic defining “one standard drink.” Third, Study 1 did not assess subsequent behavior; thus, Study 2 involved contacting participants one month after their initial responses to obtain self-report data on drinking behavior.

### Study 2

#### Method

**Participants**

Undergraduate students received extra credit in their Introductory Psychology course for participating. At Time 1, 176 responses were received; however, inspection of participants’ self-reported identification numbers suggested that some participants completed the study more than once or provided incorrect identification information. Thus, data from these participants were discarded. All participants passed two embedded attention checks. One hundred forty-six participants (42 men, 104 women) provided unique, valid identifiers and reported that they consumed alcohol. A post hoc power analysis revealed that this sample size had high power (.95) to detect a medium effect in a six-predictor multiple regression analysis.

**Method and Procedure**

At Time 1, participants signed up online for a study called “Alcohol Survey” via Sona Systems; however, to permit restrictions on the response type in open-ended items, participants completed the study through Qualtrics. The study was accessible to participants for two days. Study materials were similar to those of Study 1. The primary difference was that the top of each page of the survey included an explicit definition of binge drinking (from the NIAAA) and a graphic illustrating “one standard drink.” These additions permitted simplification of the wording of items used in Study 1. For example, the revised stem for the attitude items was, “For me to avoid binge drinking in the next month would be…” The revised measure assessed the same variables as in Study 1: attitude, subjective norm, perceived behavioral control, descriptive norm, past behavior, anticipated regret, and intention, along with two embedded attention checks. Responses to the open-ended past behavior and descriptive norm items were restricted to numeric format.

### TABLE 1

**Study 1 Correlation Matrix and Descriptive Statistics**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Attitude</td>
<td>.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Subjective norm</td>
<td>–.22</td>
<td>.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. PBC</td>
<td>.41</td>
<td>–.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Anticipated regret</td>
<td>.07</td>
<td>–.28</td>
<td>.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Intention</td>
<td>.23</td>
<td>–.29</td>
<td>.29</td>
<td>.67</td>
<td></td>
</tr>
</tbody>
</table>

\( N = 97 \)  
Range: 1.40–7  
\( M = 4.20 \)  
\( SD = 1.19 \)

Note. Ns vary due to missing data. PBC = perceived behavioral control. Subjective norm was scaled such that higher scores indicate lower perceived support for avoiding binge drinking.  
\( p < .01 \)  
\( p < .05 \)

### TABLE 2

**Study 1 Simultaneous Linear Regression Results Predicting Intention to Avoid Binge Drinking**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>95% CI</th>
<th>( \beta )</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>0.13</td>
<td>[–0.08, 0.34]</td>
<td>.10</td>
<td>.21</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>–0.13</td>
<td>[–0.32, 0.06]</td>
<td>–.10</td>
<td>.18</td>
</tr>
<tr>
<td>Perceived behavioral control</td>
<td>0.32</td>
<td>[0.11, 0.52]</td>
<td>.23</td>
<td>.004</td>
</tr>
<tr>
<td>Anticipated regret</td>
<td>0.58</td>
<td>[0.45, 0.71]</td>
<td>.64</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note. Subjective norm was scaled such that higher scores indicate lower perceived support for avoiding binge drinking.
All participants who provided data at Time 1 were contacted via email and invited to a follow-up study approximately one month later (i.e., at Time 2). Eighty-three participants provided responses to two items: “At any time in the past month, did you binge drink?” (with response options of “yes” and “no”) and “In the past month, how may days did you binge drink?” (with an open-ended response format). Seventy of these participants reported that they consume alcohol; one of these participants had an outlier at Time 1 (as described below), leaving usable data from 69 participants at Time 2. A series of independent-samples t tests revealed no systematic differences in Time 1 variables between participants who did versus did not provide Time 2 data, all ts < 1.20, ps > .20. All Time 2 participants were entered in a lottery for gift cards.

Results and Discussion

Time 1

Table 3 presents descriptive statistics; as the table indicates, all multi-item measures demonstrated adequate internal reliability. (One subjective norm item demonstrated an unacceptable item-total correlation, \( r = .12 \), and removal of this item substantially increased internal reliability; thus, results are based on a three-item measure, with the problematic item removed.) Inspection of the data revealed that, with the exception of descriptive norm and perceived behavioral control, no nonnormality or outliers were present. The two descriptive norm items (assessing how many men and women participants knew who avoid binge drinking) were highly correlated (\( r = .91 \)). High levels of skewness and kurtosis necessitated a data transformation; thus, the descriptive norm variable was square-root transformed. Two outliers remained even after this transformation and therefore were omitted, and four outliers on perceived behavioral control were removed, leaving data from 140 participants for further analysis\(^2\). Inspection of the correlation matrix in Table 3 revealed no concerns about multicollinearity. Table 3 also indicates that, as in Study 1, all predictor variables significantly correlated with intention to avoid binge drinking.

Table 4 depicts the results of a simultaneous linear regression analysis that tested whether anticipated regret uniquely predicted intention to avoid binge drinking. This model explained 66% of the variance in intention. Attitude, perceived behavioral control, past behavior, and, crucially, anticipated regret uniquely predicted intention to avoid binge drinking. Unlike in Study 1, attitudes more strongly predicted intention than anticipated regret did, at least descriptively. Thus, results replicated those of Study 1, even with two additional predictors.

Time 2

Did intention to avoid binge drinking at Time 1 significantly predict binge drinking behavior at Time 2? Intention, attitude, subjective norm, perceived behavioral control, descriptive norm, and anticipated regret were predictors in the first

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\(^1\)Two participants at Time 2 provided Sona ID codes that did not match any ID codes provided at Time 1; therefore, their Time 2 data were omitted from analyses.

\(^2\)The pattern of results does not change appreciably when retaining the data of the six participants with outliers. In addition, two participants took much longer (i.e., > 3 SDs) than the average time of completion (approximately 10 minutes). Omitting these outliers does not change the pattern of data; thus, data from these two participants were retained.
step in a hierarchical regression analysis predicting the number of self-reported days in which participants binge drank. Past behavior was entered in the second (final) step (Chorlton et al., 2012), as unlike anticipated regret and the other predictor variables, past behavior cannot be modified in an intervention and therefore warranted its own step. As Table 5 indicates, intention significantly and exclusively predicted binge-drinking behavior; no other variables emerged as significant predictors in the first step. However, in the second step, only past behavior uniquely predicted binge-drinking behavior. The final model explained 41% of the variance in binge-drinking days. Thus, consistent with previous research (Cooke et al., 2007), past behavior emerged as the only unique predictor of binge drinking when all predictors were included in the regression model.

Most participants \((n = 51, 76\%)\) reported binge drinking at some point during the previous month. A logistic regression analysis predicting the dichotomous outcome of binge drinking followed the same procedure as the multiple regression analysis described above, with past behavior entered on the second step. As Table 6 reveals, in the first step, intention (and subjective norm) emerged as a significant predictor of whether participants binge drank; however, when past behavior was entered on the second step, the effect of intention dropped to just below statistical significance, and, unexpectedly, subjective norm remained a significant predictor. In sum, supporting Hypothesis 1, intention emerged as a significant, unique predictor of binge drinking (at least when past behavior was not included).

### Study 3

Study 1 provided evidence that anticipated regret uniquely predicts intention to avoid binge drinking. Study 2 replicated this finding and extended it by demonstrating that intention, in turn, predicts self-reported binge-drinking behavior one month later. These findings suggest anticipated regret as a promising intervention target to reduce binge drinking. Thus, Study 3 experimentally manipulated exposure to anticipated regret items to test the hypothesis that merely responding to anticipated regret items reduces binge drinking. In addition, Study 3 sought to broaden the generalizability of the research by recruiting a student sample outside of the psychology pool.

#### Method

**Participants**

An email to the student listserv at a primarily undergraduate university in Atlantic Canada invited students to participate in a study on alcohol-related attitudes and behavior. Two hundred forty-one (193 women, 46 men, 2 other) responded and were entered in a lottery for credits to be applied toward the university’s meal plan. Most \((n = 222)\) reported consuming alcohol.

**Procedure**

After reading an electronic informed consent form, participants reported their gender, whether they consume alcohol, and a self-generated code number (last four digits of phone number + two-digit number of birth month) to facilitate linking data across two time points. The remaining items were identical to those of Study 2, with one critical exception: participants were randomly assigned to respond to one of two versions of the measure. One...
contained the two anticipated regret items (experimental condition; \( n = 122 \)) and the other did not (control condition; \( n = 119 \)). Participants had the option of providing their email address if they chose to participate in the prize lottery. Approximately one month later, a second email invitation was sent to the student listserv. Students had access to the materials at each time point (Time 1 and Time 2) for two days. (Because providing an email address was optional, Time 1 email addresses could not be used to recruit participants at Time 2.) The email contained a link to the Time 2 measure, which was identical to that of Study 2. Time 2 participants were entered in a lottery for gift cards.

**Results and Discussion**

**Time 1**

Descriptive statistics and zero-order correlations appear in Table 7. Inspection of the data revealed no concerns about multicollinearity (all \(|r| < .80\), all VIF values < 4.0); however, both past behavior and descriptive norms showed signs of nonnormality (i.e., skewness and kurtosis > 1). A square-root transformation acceptably reduced the nonnormality of the descriptive norm distribution, and removal of four outliers on past behavior improved normality of its distribution. Three additional participants reported attitudes or perceived behavioral control values that were outliers; thus, their data were discarded. The remaining analyses also omit data from the 19 participants who reported at Time 1 that they do not consume alcohol and two participants who did not pass one of two attention checks. Thus, the analyses that follow are based on data from 213 participants. A post hoc power analysis revealed that this sample was highly powered (.95) to detect a medium effect using a two-tailed independent-samples \( t \)-test.

Contrary to predictions, on average, participants who responded to anticipated regret items reported significantly weaker intention to avoid binge drinking (\( M = 3.70, SD = 1.81 \)) than did participants who did not respond to the anticipated regret items (\( M = 4.26, SD = 1.97 \)), \( t(211) = -2.14 \), Hedge’s \( g = -.29 \), 95% CI (−0.56, −0.02), \( p = .03 \). Thus, results demonstrate that exposure to anticipated regret items, unexpectedly, lowered intention to avoid binge drinking.

**Time 2**

Because the Time 1 manipulation turned out to be ineffective, detailed Time 2 results are presented only on the OSF page (https://osf.io/qjv8f/). Fifty participants provided usable data at Time 2. In sum, no significant differences emerged between conditions for either the continuous or dichotomous measure of self-reported binge drinking one month later.

**General Discussion**

The present research demonstrated that self-reported anticipated regret uniquely predicts intention to avoid binge drinking. The predictive power of anticipated regret remained even when statistically controlling attitude, subjective and descriptive norms, perceived behavioral control, and past behavior. Furthermore, intention to avoid binge drinking negatively predicted self-reported binge drinking behavior. These results suggest anticipated regret as a promising intervention target. Past behavior also emerged as a unique predictor, but unlike anticipated regret, past behavior is not amenable to change.

The present research also suggests caution in designing interventions to evoke anticipated regret. Although prior research suggested mere measurement as an effective anticipated regret manipulation (e.g., Abraham & Sheeran, 2004; O’Carroll, Dryden et al., 2011; Sandberg & Conner, 2009), the present research did not replicate this effect. This unsuccessful attempt to manipulate anticipated regret items has emerged in some prior research. One recent study found that, although anticipated regret significantly correlated with health-promoting behaviors, it did not significantly correlate with health-risk behaviors, including binge drinking (Stevens et al., 2019). In other domains, although previous research suggested

<table>
<thead>
<tr>
<th>TABLE 7</th>
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<tbody>
<tr>
<td><strong>Study 3 Correlation Matrix and Descriptive Statistics at Time 1</strong></td>
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<tr>
<td>1</td>
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<tr>
<td>---</td>
</tr>
<tr>
<td>1. Attitude</td>
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<tr>
<td>2. Subjective norm</td>
</tr>
<tr>
<td>3. PBC</td>
</tr>
<tr>
<td>4. Past behavior</td>
</tr>
<tr>
<td>5. Descriptive norm</td>
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<tr>
<td>6. Intention</td>
</tr>
<tr>
<td>( N )</td>
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<tr>
<td>( a )</td>
</tr>
<tr>
<td>Range</td>
</tr>
<tr>
<td>( M )</td>
</tr>
<tr>
<td>SD</td>
</tr>
</tbody>
</table>

Note. PBC = perceived behavioral control.

\( p < .01 \), \( p < .05 \).
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the utility of exposure to anticipated regret items in increasing posthumous organ donation registration (O’Carroll, Dryden et al., 2011), a recent study failed to replicate this effect (O’Carroll et al., 2016). Similarly, a previous study failed to find that measuring anticipated regret for not donating blood ultimately increased blood donation behavior (Godin et al., 2010). The study’s authors speculated that anticipated regret may need to be particularly high to change intention, and perhaps it is generally not high for not donating blood. When giving blood, a donor is highly unlikely to know who—if anyone—will benefit. In contrast, in previous studies that successfully manipulated anticipated regret via mere measurement, the benefit of the behavior in question might be more obvious (e.g., cervical screening: Abraham & Sheeran, 2004; physical exercise: Sandberg & Conner, 2009). Thus, perhaps a different manipulation of anticipated regret that does not rely on mere measurement will be more effective.

Limitations and Future Directions

Although the present research has strengths, it also has limitations that future research may address. Although prior research guided the design of the anticipated regret manipulation in Study 3, the manipulation proved ineffective. Future research may use different manipulations. For example, early research on anticipated regret in a health domain used the time perspective manipulation (i.e., having participants report their feelings before/about or after a situation) with vivid, plausible scenarios (e.g., a casual sex encounter on a vacation; Richard et al., 1996). Similarly vivid, emotionally involving (e.g., embarrassing; Davies et al., 2017) scenarios involving binge drinking may be easy to generate, given the myriad of problems that binge drinking may cause. One such vivid event to which many people can relate is reflected in the present article’s title: a hangover. Future research may employ scenarios involving unpleasant hangovers to make the situations particularly relatable.

On a related note, the mean levels of anticipated regret in Studies 1 and 2 (in which all participants responded to anticipated regret items) were relatively low, near the theoretical midpoint. Mean levels of anticipated regret in experimental conditions may need to be relatively high to increase intention to avoid binge drinking.

The lack of information about participants’ racial/ethnic background precludes strong conclusions about the generalizability of the present results. Although the different recruitment methods (through campus email and via an Introductory Psychology sign-up system) might have ensured a broad cross-section of students, the lack of demographic data means that potential moderation by race/ethnicity cannot be examined. Future research examining potential links between anticipated regret and binge drinking would benefit from recruiting ethnically diverse samples and recording demographic information more thoroughly.

Theoretical and Practical Implications

As noted above, the present research suggests that, although anticipated regret may be a useful intervention target, researchers should exercise caution in designing an intervention strategy. A mere measurement manipulation that places anticipated regret items immediately before intention items may be too blatant (Godin et al., 2010; Wood et al., 2016), creating reactance. In addition, the pleasurable effects of drinking alcohol may outweigh negative feelings; thus, an effective anticipated regret manipulation may need to be vivid and emotionally involving.

The present research also contributes to the theoretical discussion of the utility of the original Theory of Planned Behavior. Although multiple studies have found that adding predictors (e.g., anticipated regret) increases the proportion of explained variance in intention, a recent study challenged the notion that such findings result from adding affect to the original theory. In this experiment, participants were randomly assigned to respond to items assessing either consuming or avoiding alcohol, or consuming or avoiding fast food (Ajzen & Sheikh, 2013). Results revealed that, as predicted, anticipated affect (including regret) explained additional variance in intention only when affect and other variables were measured “incompatibly.” Specifically, measuring anticipated affect for consuming alcohol contributed unique variance in intention only when all other variables measured avoided alcohol. When all variables were measured compatibly, anticipated affect no longer emerged as a unique predictor of intention. These results suggest that the apparent effects of anticipated regret are merely a methodological artefact. The present research (Studies 2 and 3) challenges this assumption by measuring anticipated regret and intention compatibly, with items referring to avoiding binge drinking.

1Thank an anonymous reviewer for this suggestion.

4Similarly, a recent criticism points to the studies’ relatively small sample sizes and correspondingly large confidence intervals around the correlation coefficients (Sandberg et al., 2016).
Conclusion
The present research suggests that anticipated regret for failing to avoid binge drinking uniquely predicts avoidance intention, which, in turn, predicts behavior. The results further suggest careful attention to interventions involving anticipated regret to reduce binge drinking, as placing face-valid anticipated regret items immediately before intention items unexpectedly lowered intention to avoid binge drinking. Future research may reveal more effective methods to induce anticipated regret, thereby increasing avoidance intention. Inducing students to imagine the hangover may ultimately turn out be a simple, cost-effective way to reduce problematic levels of binge drinking.

References


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