Writing about the future self to shift drinking identity: An experimental investigation

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ARTICLE INFO

ABSTRACT

College student drinking is prevalent and costly to public and personal health, leading to calls to identify and target novel mechanisms of behavior change. We aimed to manipulate drinking identity (a cognitive risk factor for hazardous drinking) via three sessions of narrative writing about a future self. We tested whether writing could shift drinking identity and would be accompanied by changes in alcohol consumption and problems. Participants were college students meeting hazardous drinking criteria (N = 328; M_{age} = 20.15; 59% women, 40% men, 1% gender-diverse; 60% white; 23% Asian; 12% multiple races; 2% other racial groups; 8% identified as Hispanic/Latino/a/x). The study had a 2 [narrative writing topic: low-risk drinker vs. reduced smartphone use] × 2 [writing perspective: first person vs. non-first-person] × 2 [social network instruction: instructed to include vs. not] factorial design. Outcomes were drinking identity, drinking refusal self-efficacy, alcohol consumption, alcohol-related problems, and craving. Participants completed three writing sessions and online follow-up assessments at 2, 4, and 12 weeks. The study is a registered clinical trial; hypotheses and analyses were preregistered (https://osf.io/vy2ep/). Contrary to predictions, narrative writing about a future self as a low-risk drinker did not significantly impact outcomes. Null results extended to expected interactions with writing perspective and social network instructions. The narrative writing task did not shift drinking or alcohol-related outcomes. Future experimental work may benefit from greater flexibility in conceptualizing a future self, recruiting individuals interested in behavior change, and more sensitive measures of drinking identity.

Introduction

Despite multiple efficacious brief intervention and prevention strategies (Cronce & Larimer, 2011; Merrill & Carey, 2016) and increasing awareness that even moderate drinking is associated with health risks (Zhao et al., 2023), college student hazardous drinking (i.e., heavy alcohol consumption and negative alcohol-related consequences) remains prevalent and costly to public and individual health. The high costs of hazardous drinking during the college years include death, injury, sexual and physical assault, legal troubles, and negative academic outcomes (Hingson, Zha, &

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Weitzman, 2009; Jones et al., 2020). The continued prevalence of hazardous drinking has contributed to calls to identify and target novel psychological mechanisms of change underlying hazardous drinking (see, for example, the strategic plan from the National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2017b). The current study aimed to experimentally decrease drinking identity (a promising cognitive risk factor for hazardous drinking) among college students who met hazardous drinking criteria via a narrative writing task, and evaluated the impact on drinking identity, alcohol consumption, and consequences.

Self-concepts related to drinking, referred to as drinking identity, have emerged as robust, unique predictors of college student hazardous drinking, both cross-sectionally and longitudinally (Lindgren et al., 2013, 2016, 2022). These findings are consistent with larger, long-standing literatures on recovery from alcohol dependence (e.g., Beckwith, Best, Dingle, Perryman, & Lubman, 2015; Dingle, Cruwys, & Frings, 2015) and initiation and cessation of smoking (e.g., Shadel & Mermelstein, 1996; Vangeli & West, 2012) that repeatedly link substance-related identity and substance behaviors. With respect to drinking, both explicit (self-report questionnaires) and implicit (reaction time [RT] tasks) measures of drinking identity are associated with drinking outcomes (Lindgren et al., 2013, 2016). Though there is debate about whether implicit and explicit measures index fundamentally different types of cognitive processes or different stages of cognitive processing (Cunningham, Zelazo, Packer, & Van Bavel, 2007; Wiers, Boelema, Nikolaou, & Gladwin, 2015), both implicit and explicit measures of drinking identity (referred to as implicit and explicit drinking identity for brevity) contribute uniquely to the prediction of hazardous drinking (see meta-analysis by Montes & Pearson, 2021). Further, there is emerging evidence that drinking identity can change naturally, with increases found during the early college years (Lindgren, Baldwin, Peterson, Wiers, & Teachman, 2020) and decreases found in hazardous drinkers during the transition out of college (Lindgren et al., 2022). Important next steps in this line of research are to develop and implement methods to manipulate — specifically, to decrease — drinking identity experimentally in those who drink hazardously. If changes in identity were accompanied by reductions in drinking, those methods could have potential as novel intervention strategies.

Narrative writing about the future self to reduce drinking identity

Narrative writing about the future self in relation to drinking is a potential candidate method to manipulate drinking identity. Theories of identity change suggest that envisioning and writing about a future self can initiate a process in which: 1) potential discrepancies between one's current and future self-concepts are noted; 2) goal and motivational processes related to the future self-concept become engaged; and 3) current self-concept and behavior change to align with the future self-concept (Frazier, Schwartz, & Metcalfe, 2021; Oyserman & James, 2009; West, 2006). This method has been proposed as a potential strategy to shift drinking identity and prevent or reduce problem drinking (see Corte, Lee, Stein, & Raszewski, 2022), but has not, to our knowledge, been tested. Similar strategies, however, have been used successfully to address other health behaviors and educational outcomes (King, 2001; Murru & Ginis, 2010; Oyserman, Terry, & Bybee, 2002; Rutchick, Slepian, Reyes, Pleskus, & Hershfield, 2018). Thus, we developed and tested a future self-writing task that aimed to shift drinking identity in hazardous drinkers. We hypothesized that envisioning and writing about a future self that drinks differently — less hazardously — would activate a new and different future self-concept in relation to drinking, highlight potential discrepancies between one's current and future self-concept in relation to drinking, and, in turn, lead to the

engagement of goal and motivational processes to change drinking behaviors to be more consistent with the new future self. We also tested whether changes in drinking identity would be accompanied by changes in drinking behavior.

Theory, policy, and research informed the narrative writing method we developed. First, we focused on a future self that was a moderate or lower-risk drinker, with an operational definition for women/men of no more than 3/4 drinks per day and no more than 7/14 total drinks per week, based on NIAAA's 2017 low-risk drinking definition (NIAAA, 2017a). We elected to focus on drinking moderately (vs. abstaining) as the target identity because this is the typical transition that most college student hazardous drinkers ultimately make (Lee, Chassin, & Villalta, 2013). NIAAA's definition was selected because, at the time of study conceptualization, it was a publicly available, evidence-informed definition offered by a major U.S. health organization focused on alcohol. Second, with respect to instruction content, studies suggest that having (or asking individuals to develop) detailed, specific plans for achieving an ultimate end state in a future self are more likely to facilitate change (Leondari & Gonida, 2008; Oyserman & James, 2009). Further, instructions that ask individuals to envision multiple aspects of their future selves, including their ideal self (who I want to be in the future) and ought self (who I think I should be) are consistent with self-regulation and motivational theories (Higgins, 1998; Higgins, Roney, Crowe, & Hymes, 1994) and should lead to a more complex future self, which should foster greater change in drinking behavior (Frings & Albery, 2015). Third, with respect to dose, narrative writing strategies are typically 20 min and repeated (e.g., Pennebaker, Kiecolt-Glaser, & Glaser, 1988), and meta-analytic findings suggest that having at least three writing sessions results in larger effect sizes than having fewer than three sessions (Frattaroli, 2006). Preliminary findings from a pilot study, which evaluated a single writing session with a sample of college student hazardous drinkers, supported this approach.[1] Participants' responses indicated that envisioning and writing about a future low-risk drinking self was realistic, plausible, and relatable. Further, participants believed they were capable of achieving that future self, and that the task was beneficial.

Self-distancing strategies and inclusion of one's social networks are potential task enhancements

We also elected to investigate the impact of manipulating two additional factors. Our intention was to test whether these theory- and research-driven factors could enhance the effectiveness of the task. The first factor was the perspective from which we asked participants to write (i.e., first person, using "I" or "me," or non-first-person, using "you" or addressing themselves by name). The inclusion of this factor stems from work in our laboratory demonstrating the utility of self-distance (vs. self-immersion) when reflecting about one's self and its positive subsequent impact on self-control and health outcomes (Kross & Ayduk, 2011). More specifically, the use of a non-first-person person (vs. first-person) perspective when writing about the self has been shown to enhance self-distancing and, in turn, to lead to less distress and rumination and better task performance, even when under stress (Kross et al., 2014; Park, Ayduk, & Kross, 2016). We hypothesized that self-distancing could be useful in this context: it may be stressful for college students who drink

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[1] Pilot data come from a sample of 164 participants recruited from mTurk who met hazardous drinking criteria (AUDIT score ≥8) and were full-time college students. The pilot study evaluated a single session of the lower risk drinking task (multiple iterations of which were previously piloted) and three possible control conditions. See https://osf.io/vy2ep/ for a summary of results.

hazardously to imagine a self − and ultimately act in accordance with that self − who drinks less alcohol and drinks less often. Thus, we expected greater reductions in drinking identity and hazardous drinking among participants writing about the future self from the non-first-person (more self-distanced) perspective versus from the first-person (more self-immersed) perspective.

Second, we elected to investigate the impact of asking participants to consider and write about the important people who are part of their drinking experiences (i.e., their social network). The inclusion of this factor was motivated by the large body of research that demonstrates the influential role that peers and perceptions of peers play in college student hazardous drinking. For example, heavy drinkers associate with heavier drinkers (Borsari & Carey, 2001), and identification with groups perceived as heavier drinkers is associated with one's own drinking (Neighbors et al., 2010). Also, stronger drinking identity has been linked to lower self-efficacy to resist drinking in social situations (Foster, Neighbors, & Young, 2014; Foster, Yeung, & Neighbors, 2014). Given links between social networks, peers, and drinking identity among heavy-drinking students, we hypothesized that our attempts to shift drinking identity would be more effective if individuals were explicitly asked to consider the important people who would be part of the future low-risk drinking self's experiences (vs. not asked to do so).

Study overview

Thus, this study tested whether a narrative writing task (writing about the future self as a low-risk drinker) could decrease drinking identity (measured implicitly and explicitly) and drinking behaviors. A 2 (write about a future self as a low-risk drinker vs. control [person who reduced their smartphone use]) × 2 (write in non-first-person vs. first person) × 2 (explicit instructions to include social network vs. not) design was used, and participants completed the writing task once weekly for 3 weeks. Writing about a future self spending less time on their smartphone use was chosen as a control based on pilot study findings.[2] Primary outcomes were drinking identity, drinking refusal self-efficacy, alcohol consumption, alcohol-related problems, and alcohol craving. Outcomes were assessed at 2-week, 4-week, and 12-week follow-ups. We hypothesized that participants in the low-risk drinker, non-first-person (self-distanced), and social network conditions would have greater reductions in drinking identity and alcohol-related outcomes and greater increases in drinking refusal self-efficacy. Interactions were also expected such that the writing task that focused on the future self as a low-risk drinker, written from a non-first-person perspective and including one's social network, was expected to have the strongest effects. This study is a registered clinical trial (NCT03889873). The study hypotheses and data analytic plan were preregistered (https://osf.io/vy2ep/).

Material and methods

Participants

Participants were 328 full-time undergraduate students (59% identified as women, 40% as men, 1% as other gender identity)

between the ages of 18 and 25 from a large public university in Washington State. Eligibility criteria included meeting hazardous drinking criteria, defined as scoring ≥8 on the Alcohol Use Disorder Identification Test (AUDIT, Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; current sample $M = 12.64$, $SD = 4.16$, range 8−31) and reporting alcohol consumption in the last week; endorsing fluency in written English; and owning a smartphone. Following the onset of the COVID-19 pandemic, participants had to report living in Washington State (prior to the pandemic, this inclusion criterion was implicit because university classes were conducted in person). The mean participant age was 20.15 years ($SD = 1.34$); 11.6% were first-year students, 17.4% were sophomores, 35.5% were juniors, and 35.5% were seniors. Sixty percent of participants self-identified as white, 23% as Asian, 12% as more than one race, 2% as unknown or declined to answer, 1% Black or African American, 1% Native Hawaiian or other Pacific Islander, and 1% as Native American/Alaska Native. Ninety-one percent self-identified as not Hispanic or Latino, 8% as Hispanic or Latino, and 1% as unknown.

Participants were recruited from lists provided by the university registrar's office. Study invitations were emailed in waves. They included a personalized link to a website where individuals could learn more about the study, complete informed consent procedures, and take the brief initial eligibility screening. Screening started in the spring of 2019 and ended in the summer of 2021; recruitment was paused from March 2020 to October 2020 due to the COVID-19 pandemic. Recruitment resumed in October 2020, but study procedures were altered to be entirely virtual (see *Procedures* below). The CONSORT diagram (Fig. 1) provides detailed information about screening, enrollment, and study flow. The study was issued a Federal Certificate of Confidentiality as part of its funding by the National Institutes of Health and was registered with ClinicalTrials.gov (NCT03889873). Procedures were approved by the University of Washington IRB.

We used the G*Power software (Faul, Erdfelder, Lang, & Buchner, 2007) to compute the necessary sample size for the main effects and interactions as a function of effect size (Cohen's *f*) and power. We set the Type I error rate to 0.05. We focused the sample size calculation on the effects at Follow-up 1. Power will typically increase with repeated measures due to additional precision of measurement. We selected a sample size of 328 (41 per cell), which provides 95% power for a small-to-medium effect (Cohen, 1988) for the main effects or the interaction. The small-to-medium effect is consistent with effect sizes observed in Shadel and Cervone (2006). We chose 328 because it ensured that we would have over 90% power in the event of missing data and sufficient power for the count outcomes.

There was one withdrawal during the three writing sessions, 95% of participants completed lab session 2, 95% completed session 3, 89% completed the 2-week follow-up, 84% completed the 4-week follow-up, and 79% completed the 12-week follow-up. Attrition analyses were conducted and focused on the drinking outcomes (consumption, problems, and craving). We identified participants who completed the baseline but did not complete any follow-ups. We examined whether those participants differed from all other participants as a function of condition, baseline AUDIT score, gender, and age. Analyses used logistic regression. There were no significant predictors for any of the drinking outcomes.

Procedures

Laboratory sessions were conducted individually, and research coordinators or undergraduate research assistants served as experimenters. The first session included the baseline assessment followed by the narrative writing task. After completing the writing task, participants completed a brief follow-up assessment that

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[2] We evaluated multiple possible control tasks focused on health or personal behaviors (i.e., increasing dental hygiene, increasing handwashing, and reducing smartphone use). The smartphone tasks performed best. Participants reported that writing about a future self who reduced their smartphone use could be vividly imagined, was easy to write about, changed their perspective, was plausible and relatable, and had benefits. Further, that condition also focused on decreasing (vs. increasing) a behavior, which matched the low-risk drinking task. Please see https://osf.io/vy2ep/for the summary of findings.

Enrollment

Assessed for eligibility (n = 1,542)

Excluded (n = 1,214)
- Did not meet inclusion criteria (n = 1,098)
- Declined to participate (n = 14)
- Did not schedule or repeatedly no-showed first session (n = 101)
- Incorrectly identified as eligible & withdrawn by study team (study protocol error) (n = 1)

Randomized (n = 328)

Allocation

	Drinker/no network/1st person	Drinker/network included/1st person	Drinker/no network/3rd person	Drinker/network included/3rd person	Smartphone/no network/1st person	Smartphone/network included/1st person	Smartphone/no network/3rd person	Smartphone/network included/3rd person
First session	n = 39	n = 46	n = 31	n = 40	n = 46	n = 43	n = 38	n = 45
Second session	n = 37	n = 43	n = 28	n = 36	n = 45	n = 41	n = 37	n = 45
Lost to follow-up	n = 0	n = 2	n = 1	n = 3	n = 1	n = 1	n = 0	n = 0
Missed	n = 2	n = 1	n = 2	n = 0	n = 0	n = 1	n = 1	n = 0
Withdrawal	n = 0	n = 0	n = 0	n = 1	n = 0	n = 0	n = 0	n = 0
Third session	n = 39	n = 43	n = 27	n = 35	n = 45	n = 41	n = 36	n = 44
Lost to follow-up	n = 0	n = 0	n = 0	n = 1	n = 0	n = 0	n = 0	n = 0
Missed	n = 0	n = 1	n = 3	n = 0	n = 0	n = 1	n = 2	n = 1
Withdrawal	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0

Follow-Up

	Drinker/no network/1st person	Drinker/network included/1st person	Drinker/no network/3rd person	Drinker/network included/3rd person	Smartphone/no network/1st person	Smartphone/network included/1st person	Smartphone/no network/3rd person	Smartphone/network included/3rd person
2 weeks	n = 37	n = 41	n = 30	n = 30	n = 42	n = 37	n = 35	n = 41
Lost to follow-up	n = 2	n = 0	n = 0	n = 2	n = 3	n = 3	n = 1	n = 3
Missed	n = 0	n = 3	n = 0	n = 3	n = 0	n = 2	n = 2	n = 1
Withdrawal	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0
4 weeks	n = 34	n = 36	n = 29	n = 30	n = 38	n = 36	n = 33	n = 39
Lost to follow-up	n = 2	n = 5	n = 0	n = 2	n = 2	n = 2	n = 2	n = 3
Missed	n = 1	n = 2	n = 1	n = 1	n = 2	n = 1	n = 2	n = 0
Withdrawal	n = 0	n = 1	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0
12 weeks	n = 30	n = 33	n = 29	n = 29	n = 37	n = 35	n = 32	n = 35
Missed	n = 5	n = 5	n = 1	n = 2	n = 3	n = 2	n = 2	n = 3
Withdrawal	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 1	n = 1
Withdrawal				n = 0				

Analysis

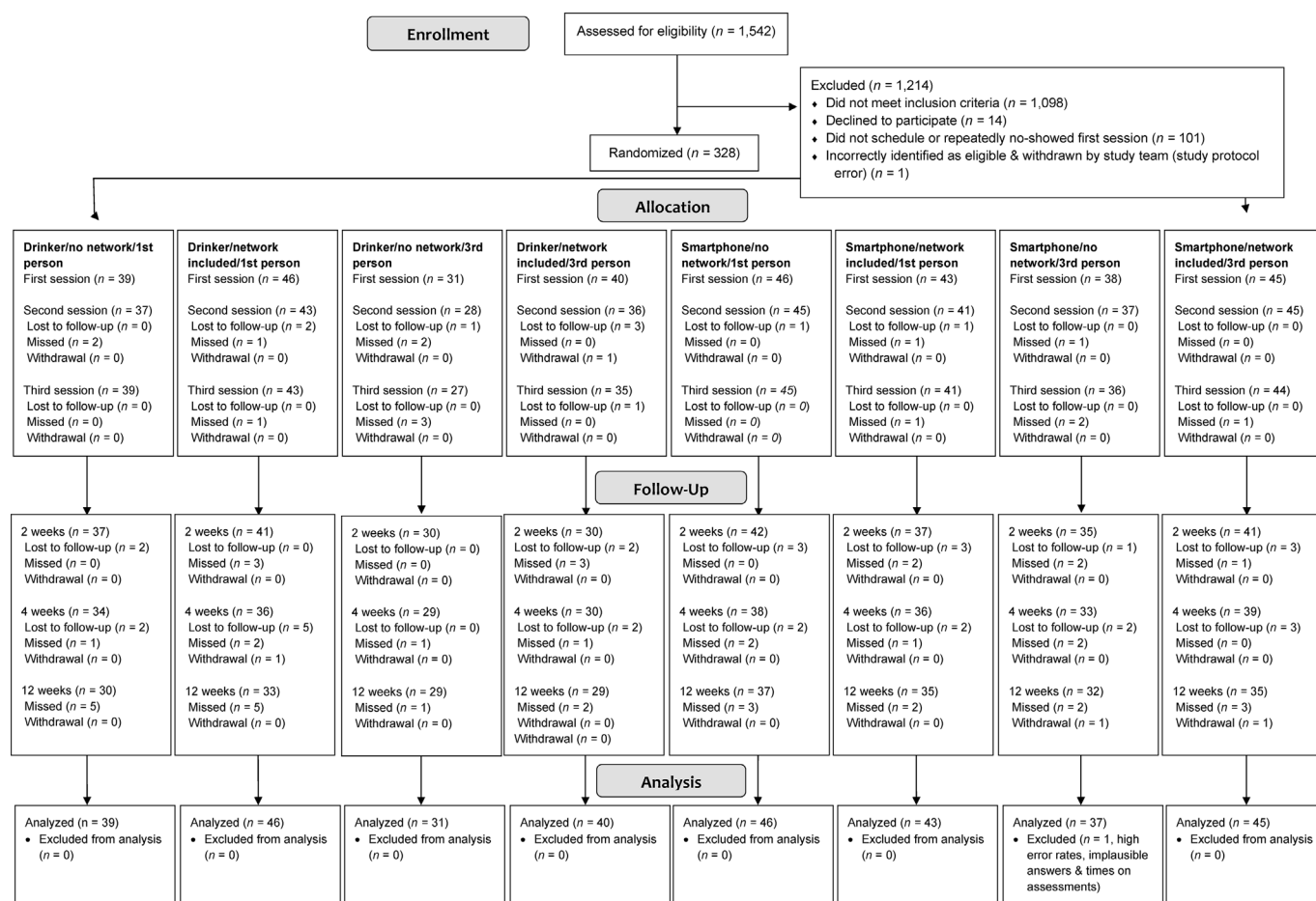|	Drinker/no network/1st person	Drinker/network included/1st person	Drinker/no network/3rd person	Drinker/network included/3rd person	Smartphone/no network/1st person	Smartphone/network included/1st person	Smartphone/no network/3rd person	Smartphone/network included/3rd person
Analyzed	n = 39	n = 46	n = 31	n = 40	n = 46	n = 43	n = 37	n = 45
Excluded from analysis	n = 0	n = 0	n = 0	n = 0	n = 0	n = 0	n = 1, high error rates, implausible answers & times on assessments	n = 0

Fig. 1. Study CONSORT flow diagram

included drinking identity measures, self-efficacy measures, affect measures, and measures of future drinking intentions. These assessments are part of a second, preregistered study evaluating within-session effects (see https://osf.io/r2yn4). The second session included the narrative writing task and the same measures, though they were administered pre- and post-writing. The third session was identical to the second, with the exception of a cue reactivity protocol.[3] Measures were completed via Project Implicit's online data collection platform. The above procedures were used through March 11, 2020. Recruitment was suspended until October 2020 due to the COVID-19 pandemic. When recruitment resumed, the cue reactivity protocol was discontinued, and laboratory sessions were shifted online and hosted on Zoom. An experimenter was present for all of the first session and the first 15 min of the second and third sessions. Procedures for the follow-up assessments were not affected by the pandemic. All follow-up assessments were completed online.

All laboratory and follow-up assessments included three attention check questions (e.g., to answer this question correctly, you must select "always" in the list below) that were interspersed throughout the assessments. Participants were given immediate feedback if they answered the question incorrectly. At baseline/session 1, 89% of participants answered all questions correctly; at session two, 97% of participants answered all questions correctly; at session 3, 99% of participants answered all questions correctly; at 2-week follow-up, 97% of participants answered all questions correctly; at 4-week follow-up, 97% of participants answered all questions correctly; and at 12-week follow up, 94% of participants answered all questions correctly. No participants missed more than one question across all assessments. Compensation for the lab sessions and follow-up assessments followed a stepped structure: $30, $35, $40, $20, $25, and $30, respectively. Compensation for the laboratory sessions was higher because the sessions were longer.

Narrative writing manipulation

The study had a 2 (writing topic: low-risk drinker vs. reduced smartphone use) × 2 (writing perspective: first person vs. non-first-person) × 2 (social network instruction: instructed to include vs. not) fully crossed factorial design. Participants were assigned to condition via simple random assignment done by computer. Investigators and experimenters were unaware of participants' assignments. The writing task was based on pilot work from our laboratory (see Footnotes 1 & 2) and incorporated elements from Oyserman, Destin, and Novin (2015) and Shadel and Cervone (2006). Participants were asked to imagine themselves a few months from now as either a low-risk drinker (defined using NIAAA's [2017a] criteria) or as a person who has reduced their smartphone use (defined as someone who reduced the amount of

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[3] Prior to the beginning of the COVID-19 pandemic, participants completed an alcohol cue reactivity protocol – which involved exposure to preferred alcoholic beverages – to evaluate the impact of the task on craving. The task was discontinued due to the pandemic and the need to move to virtual sessions. Sample size was roughly half of what was expected, and results were null. See Supplement 1 for a full description of the task and results.

time they spend on their phone). They were prompted to imagine the person they were trying to become as vividly as possible and write descriptions of that person. They were provided with suggested description topics, including their thoughts and feelings about this new self, the characteristics they hoped or wished to have, the characteristics they would need to have, and the roles they would take on. Participants in the first-person condition were instructed to use first-person pronouns (I, me, my) when writing and were provided with examples; those in the non-first-person condition were instructed to use their own name and the pronoun "you" and provided with examples.[4] Participants in the social network-included condition were also prompted to think about the important people that would be part of those experiences, characteristics, and roles; those in the social network-not-included condition had no additional prompt. Complete instructions are at https://osf.io/vy2ep/. Participants had 20 min and completed the same task at each session. The principal investigator (redacted) reviewed task data weekly for any participant safety concerns (i.e., for any mention of possible harm to self or others). No safety concerns were identified during the study.

Measures

Unless stated otherwise, each measure was assessed at baseline, 2-week, 4-week, and 12-week follow-up. The measures described below are primary and secondary outcomes. A list of all measures, which includes exploratory measures and measures assessed during the narrative writing phase, and their timeline for assessment, is available on OSF (https://osf.io/vy2ep/).

Drinking identity

Explicit Drinking Identity. The Alcohol Self-Concept Scale (Corte & Stein, 2007; Lindgren et al., 2013; adapted from Shadel & Mermelstein, 1996) was used to measure explicit drinking identity. Using a 7-point Likert-type scale (-3 = strongly disagree to $+3$ = strongly agree), participants rated the extent to which they agreed or disagreed with statements about drinking being part of their identity (e.g., "Drinking is a part of 'who I am'"). Average scores were computed, with higher scores indicating a stronger drinking identity. Cronbach's alphas ranged from .89 to .93 across timepoints.

Implicit Drinking Identity. The Drinking Identity Implicit Association Test (IAT; Lindgren et al., 2013; adapted from Greenwald, McGhee, & Schwartz, 1998) was used to assess implicit drinking identity. The IAT is based on the assumption that the strength of an association is reflected by the difference in reaction time (RT) with which one categorizes words or pictures into superordinate categories that have been paired together in a way that either matches or contradicts one's associations in memory. For example, in a key block of the drinking identity IAT, participants classify words about the self (e.g., me) together with words related to drinking (e.g., drink). In a second key block, they classify words about the self together with words that are related to not drinking (e.g., abstain). To the extent that the concept of drinking (compared to non-drinking) is more closely associated with the self (compared to others), participants would be expected to perform the me-drinking classification condition with greater speed.

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[4] The non-first-person condition technically includes a mix of second- and third-person language. In some places on the OSF registration and in the OSF supplemental materials we erroneously referred to the non-first-person condition as third person.

A traditional 7-block IAT task (see Greenwald et al., 1998) was used. Categories and stimuli were identical to Lindgren et al. (2013) and included the target concepts (me & not me) and attributes (drinker & non-drinker). The IAT was scored using the D1-scoring algorithm and scores were excluded when >10% of responses were faster than 300 msec (Greenwald, Nosek, & Banaji, 2003). Higher D-scores indicate stronger associations between me and drinker than between me and non-drinker. Less than 5% of scores were excluded at any timepoint. Internal consistencies were computed by calculating D-scores for Blocks 3 and 6 and for Blocks 4 and 7 and correlating them (Greenwald et al., 2003). Correlations ranged from .47 to .54 across assessments, consistent with prior studies using the drinking identity IAT (Lindgren et al., 2013, 2016), with the exception of the 12-week follow-up, which had a correlation of .32.

Self-efficacy

The Drinking Refusal Self-Efficacy Questionnaire (DRSEQ; Young, Hasking, Oei, & Loveday, 2007) assessed participants' beliefs about resisting drinking in 19 situations. Participants indicate their confidence in their ability to resist via a 6-point scale (1 "I am very sure I could NOT resist drinking" to 6 "I am very sure I could resist drinking"). Items were summed. Cronbach's alphas ranged from .91 to .92 across timepoints. A single item, adapted from Shadel and Cervone (2006), assessed participants' confidence that they could limit their alcohol use to the 2017 NIAAA low-risk drinking criteria over the next 2 weeks using an 11-point scale (0 "not at all confident" to 10 "extremely confident").

Alcohol-related variables

Alcohol consumption was evaluated using a modified timeline follow-back procedure (Sobell & Sobell, 1992). At each assessment, participants were asked to report the number of standard drinks they consumed each day for a specified number of weeks. At baseline, they reported their drinking over the last 4 weeks; at 2- and 4-week follow-ups, they reported their drinking over the last 2 weeks, and at 12-week follow-up, they reported their drinking over the last 4 weeks. The average drinks per week was calculated for each timepoint.

The Rutgers Alcohol Problem Index (RAPI (White & Labouvie, 1989) assessed alcohol-related problems. Participants reported how many times they experienced various negative consequences (e.g., "passed out or fainted suddenly") while drinking or because of their alcohol use during the past 3 months, using a 5-point scale (0 "never" to 4 "more than ten times"). Two items were added to assess driving under the influence. Responses were summed. The RAPI was assessed at baseline and at 12-week follow-up. Cronbach's alphas were .83 (baseline) and .88 (12-week follow-up).

Heavy episodic drinking was assessed via three questions adapted from Collins and colleagues (Collins et al. (1985)) and Schulenberg et al. (2017). The items assessed the number of times in the last month participants reported drinking heavily on a single occasion (with different numbers for women/men; item 1 = 4/5 or more drinks; item 2 = 8/10 or more drinks; and item 3 = 10/15 or more drinks). Participants' responses to a question about sex assigned at birth were used to determine which thresholds they were asked about.

The Penn Alcohol Craving Scale (PACS; Flannery, Volpicelli, & Pettinati, 1999) assessed craving for drinking over the past week. The PACS contains five items that assess the frequency, intensity, duration, and overall craving, along with the ability to resist drinking. Responses were summed. Cronbach's alphas ranged from .85 to .91 across timepoints.

Data analysis plan

Our analysis plan was preregistered: https://osf.io/vy2ep/. We used multilevel models to assess the writing task's effects over time (StataCorp, 2021). We used a multilevel negative binomial model for count outcomes (drinks per week and heavy drinking episodes), and a Gaussian model for continuous outcomes (explicit and implicit drinking identity, drinking refusal self-efficacy, and craving). Because the RAPI was only assessed at baseline and the final follow-up, we used a single-level negative binomial model controlling for baseline RAPI.

In all multilevel models, we included a random intercept to model the repeated measures within persons and included gender as a covariate. We treated time as a categorical variable with the baseline timepoint as the reference category. We specified time as categorical because we did not have any expectation that there would be linear change or a smooth curvilinear change across the four timepoints. In all multilevel models, as well as the single-level negative binomial model, we used indicator variables for the three conditions: a) writing topic (1 = low-risk drinker, 0 = reduced smartphone use), b) writing perspective (1 = first person, 0 = non-first-person), and c) social network (1 = asked to include, 0 = not asked). We estimated all 2-, 3-, and 4-way interactions between condition and time (see the pre-registration document for the relevant equations). To test the statistical significance of the main effects and interactions, we used Stata's contrast command, which performs a χ^2 test of the main effects and interactions (StataCorp, 2021) and is available for both continuous and count models. When there was a significant interaction, we decomposed the interactions into simple effects and interactions. The significance of the simple effects and interactions was adjusted for multiple comparisons using the Scheffe adjustment (Keppel & Wickens, 2004). This process is conceptually similar to the workflow in ANOVA — i.e., perform an omnibus test (χ^2 in our paper, *F* in an ANOVA) and then follow-up tests, corrected for multiple comparisons, for any significant omnibus tests.

We performed a sensitivity analysis for all models to assess whether changes to the protocol due to the COVID-19 pandemic affected the results. Specifically, we created a set of dummy variables that identified whether participants were in the pre-pandemic group (completed all study procedures and follow-ups before the pandemic), pandemic overlap group (at least some procedures or follow-ups overlapped with the pandemic declaration in March 2020), and fully pandemic group (enrollment after September 2020 when the protocol shifted to entirely remote). The pre-pandemic group was used as the reference. We included the dummy variables as covariates in the model.

We had two changes to our analyses from the pre-registration. First, we mistakenly referred to the DRSEQ as a dichotomous outcome in the pre-registration and said we would use a multilevel logistic model. The DRSEQ is continuous; thus, we used a Gaussian multilevel model in this analysis. Second, in the pre-registration, we said we would test the interaction between the COVID-19 dummy variables and all treatment effects and interactions. This would have doubled the number of parameters. Consequently, we included the COVID-19 dummy variables as a covariate in our analyses. Adding the COVID-19 dummy variable did not significantly impact any analysis; thus, the results are not reported here. Readers can find full results at https://osf.io/vy2ep/.

Results

Table 1 contains means, standard deviations, and cell sizes for the primary and secondary outcomes as a function of writing task condition and time (0 = baseline, 2 = 2-week follow-up, 4 = 4-week follow-up, and 12 = 3-month follow-up). Supplement 2 contains the same information for the questions about engagement in the writing task over the three laboratory sessions. Engagement was high and positive, typically between .5 and 1.2 out of a −3 to +3 scale, and was fairly stable within condition over time (nearly all means were within .5).

As seen in Table 2, the writing task did not have a significant effect on either implicit or explicit identity. This was true for both main effects and interactions. For implicit identity, there was a main effect of time, $\chi^2(3) = 54.65$, $p < 0.001$. As compared to baseline levels, implicit identity was significantly lower at 2-week follow-up (difference = −0.15, $p < 0.001$), 1-month follow-up (difference = −0.14, $p < 0.001$), and 3-month follow-up (difference = −0.14, $p < 0.001$). None of the follow-up timepoints significantly differed from one another. There was also a main effect of time for explicit identity, $\chi^2(3) = 25.78$, $p < 0.001$. As compared to baseline levels, explicit identity was significantly lower at the 2-week follow-up (difference = −0.16, $p = 0.008$) and follow-up 2 (difference = −0.14, $p = 0.025$), but not at the 3-month follow-up (difference = 0.04, $p = 0.903$). Two-week and 1-month follow-ups did not significantly differ from one another, but the 3-month follow-up was significantly higher than the 2-week follow-up (difference = 0.2, $p = 0.001$) and 1-month follow-up (difference = 0.18, $p = 0.004$).

The writing task also did not significantly affect drinking refusal self-efficacy or confidence to limit drinking to the low-risk drinking criteria (see Table 2). This was true for main effects and interactions. For drinking refusal self-efficacy, there was a main effect of time, $\chi^2(3) = 145.07$, $p < 0.001$. As compared to baseline levels, drinking refusal self-efficacy was significantly higher at 2-week follow-up (difference = 4.65, $p < 0.001$), 1-month follow-up (difference = 5.74, $p < 0.001$), and 3-month follow-up (difference = 4.73, $p < 0.001$). None of the follow-up timepoints significantly differed from one another. For confidence to limit drinking, there was a main effect of time, $\chi^2(3) = 27.86$, $p < 0.001$. As compared to baseline levels, confidence that one could limit one's drinking was significantly lower at the 2-week follow-up (difference = −0.56, $p = 0.009$) and the 1-month follow-up (difference = −0.57, $p = 0.009$), but not at the 3-month follow-up (difference = 0.14, $p = 0.881$). Two-week and 1-month follow-ups did not significantly differ from one another, but the 3-month follow-up was significantly higher than follow-up 1 (difference = 0.70, $p = 0.001$) and follow-up 2 (difference = 0.71, $p = 0.001$).

Table 2 shows that there were three significant effects for average drinks per week: a main effect for time, $\chi^2(3) = 50.24$, $p < 0.001$; a writing perspective by writing topic interaction, $\chi^2(1) = 5.32$, $p = 0.021$; and a social network by time interaction, $\chi^2(3) = 20.74$, $p = 0.001$. Follow-up tests indicated that, as compared to baseline, drinks per week were significantly lower at 1-month follow-up (diff = −0.23, $p < 0.001$) and 3-month follow-up (diff = −0.32, $p < 0.001$). The 2-week follow-up did not significantly differ from baseline. Additionally, drinks per week were lower at the 3-month follow-up versus the 2-week follow-up (diff = −0.21, $p < 0.001$). The other timepoints did not differ.

Decomposing the social network by time interaction indicated that the difference between the 1-month follow-up and baseline (diff = −0.37, $p < 0.001$), the difference between 3-month follow-up and baseline (diff = −0.46, $p < 0.001$), the difference between 1-month and 2-week week follow-ups (diff = −0.27, $p = 0.035$), and the difference between 3-month follow-up and 1-month follow-up (diff = −0.37, $p < 0.001$) were significant when participants were not asked to include their social network, but not when they were asked to do so (no significant differences). Finally, none of the simple effects from the writing perspective by writing

Table 1
Means and standard deviations for variables by condition by time.

		Reduced Smartphone User																								Low-risk Drinker																							
		First Person Writing Perspective						Non-first-person Writing Perspective						First Person Writing Perspective						Non-first-person Writing Perspective					
		No Social Network			Social Network			No Social Network			Social Network			No Social Network			Social Network			No Social Network			Social Network		
	Time	M	SD	n	M	SD	n	M	SD	n	M	SD	N	M	SD	n	M	SD	n	M	SD	n	M	SD	n
Implicit Identity	0	0.35	0.44	46	0.27	0.37	42	0.37	0.42	37	0.36	0.37	45	0.23	0.40	39	0.33	0.38	44	0.39	0.41	31	0.25	0.43	38
	2	0.14	0.39	41	0.25	0.41	35	0.10	0.40	34	0.17	0.40	39	0.17	0.44	35	0.19	0.37	39	0.30	0.35	29	0.11	0.41	27
	4	0.29	0.34	37	0.18	0.33	35	0.16	0.34	32	0.18	0.37	38	0.16	0.40	32	0.17	0.43	35	0.28	0.37	27	0.14	0.35	29
	12	0.18	0.34	37	0.22	0.40	34	0.11	0.44	31	0.22	0.38	34	0.21	0.39	30	0.14	0.34	31	0.25	0.36	27	0.16	0.36	27
Explicit Identity	0	−2.00	1.20	46	−1.93	1.03	43	−1.85	1.01	37	−1.82	1.29	45	−1.56	1.45	39	−1.77	1.04	46	−1.76	1.09	31	−2.04	1.14	40
	2	−2.20	1.08	42	−1.79	1.14	36	−1.78	1.09	34	−1.88	1.31	41	−1.92	1.19	37	−2.04	1.15	41	−1.97	0.98	30	−2.25	0.88	29
	4	−2.21	1.10	38	−1.86	1.25	36	−1.88	0.96	32	−1.98	1.15	39	−1.96	1.20	34	−1.74	1.29	36	−1.93	1.12	29	−2.30	0.90	30
	12	−1.97	1.20	37	−1.52	1.39	35	−1.77	1.23	31	−1.83	1.33	35	−1.75	1.57	30	−1.68	1.16	33	−1.74	1.26	29	−2.06	1.36	29
Drink Refusal Self-Efficacy	0	91.00	11.70	46	89.26	11.94	43	91.73	14.62	37	89.53	14.79	45	88.59	14.60	39	88.98	12.84	46	94.42	10.58	31	89.47	12.24	40
	2	96.81	10.02	42	94.50	12.26	36	93.24	14.38	34	91.63	16.09	41	95.30	13.37	37	94.49	12.17	41	98.70	11.78	30	95.28	11.87	29
	4	96.29	10.73	38	95.69	12.57	36	97.38	13.06	32	95.18	14.00	38	95.15	13.70	34	94.36	12.99	36	101.41	10.51	29	96.37	12.00	30
	12	94.56	11.64	36	92.63	13.76	35	93.81	17.08	31	93.34	14.34	35	100.03	9.91	30	95.85	9.34	33	98.79	11.08	29	96.66	11.10	29
Belief Could Limit Drinks	0	7.33	3.45	46	7.95	2.47	43	7.27	2.67	37	7.13	3.51	45	8.03	2.49	39	8.30	2.49	46	7.90	2.86	31	7.67	2.94	40
	2	7.79	2.78	42	7.44	2.86	36	6.29	3.07	34	7.41	2.78	41	7.16	2.92	37	7.07	3.05	41	6.93	3.25	30	7.07	2.53	29
	4	7.61	3.30	38	7.17	2.85	36	6.63	3.04	32	6.63	3.33	38	7.26	2.91	34	6.75	3.29	36	7.62	2.44	29	7.27	2.39	30
	12	8.24	2.88	37	7.74	2.77	35	7.81	2.87	31	7.57	3.09	35	8.03	2.97	30	6.97	3.38	31	7.86	3.08	29	8.66	1.78	29
Mean Drinks Per Week	0	8.39	4.65	46	8.74	5.20	43	9.50	5.74	37	10.24	6.67	45	11.54	8.82	39	10.94	7.89	46	10.37	7.73	31	8.38	5.25	40
	2	8.18	7.85	42	8.42	7.45	36	11.21	10.23	34	9.49	8.68	41	12.23	11.15	37	9.53	7.90	41	8.43	9.91	30	8.38	6.29	29
	4	4.79	5.40	38	7.79	6.72	35	8.61	8.95	31	8.47	7.47	38	8.29	6.14	34	10.63	7.14	36	7.84	7.74	29	8.33	5.93	30
	12	6.01	7.06	36	7.64	6.20	35	7.44	6.53	31	8.31	7.57	35	7.35	7.55	30	9.51	8.76	33	7.44	10.88	29	7.54	5.74	29
Alcohol Probs	0	8.50	7.37	46	8.58	6.22	43	8.70	5.23	37	10.80	8.26	45	11.54	8.10	39	10.37	7.58	46	8.16	5.29	31	9.78	7.67	40
	12	5.89	7.41	37	5.23	5.61	35	4.55	4.49	31	5.80	5.07	35	5.90	7.31	30	5.88	4.99	32	4.55	4.77	29	7.66	12.21	29
# of 4/5 Heavy Drink Episode	0	3.80	3.10	46	3.60	2.47	43	4.08	2.76	37	4.22	2.84	45	4.59	3.28	39	4.52	2.74	46	4.29	2.80	31	3.27	1.88	40
	2	3.57	3.16	42	3.31	2.56	36	4.06	2.45	34	3.76	3.01	41	4.11	3.22	37	3.80	2.73	41	3.47	2.89	30	3.76	2.73	29
	4	2.11	2.14	38	2.64	2.26	36	3.34	2.74	32	2.69	2.21	39	2.91	2.27	34	3.19	2.38	36	2.79	2.47	29	3.13	2.15	30
	12	2.70	2.82	37	3.51	2.79	35	3.26	2.46	31	3.49	2.97	35	3.13	2.91	30	3.41	2.59	32	3.03	3.10	29	3.48	2.34	29
Past Week Alcohol Craving	0	6.28	3.69	46	7.44	4.83	43	7.32	4.06	37	6.40	4.87	45	6.79	4.38	39	6.37	4.37	46	5.58	3.10	31	5.67	3.40	40
	2	5.00	3.96	42	5.89	4.90	36	6.56	4.63	34	6.32	4.87	41	5.30	3.95	37	4.90	3.94	41	4.00	3.10	30	5.28	4.88	29
	4	4.87	4.72	38	5.75	5.16	36	4.72	3.50	32	5.71	4.13	38	4.26	3.43	34	5.25	4.27	36	4.24	3.15	29	4.77	4.51	30
	12	5.11	5.39	37	5.23	4.35	35	4.48	3.02	31	5.09	4.02	35	5.20	3.96	30	4.72	3.56	32	3.34	2.93	29	4.48	4.98	29

Table 2
Main effects and interactions for analyses evaluating the effects of the writing task on drinking identity and alcohol-related outcomes.

	df	Implicit Identity χ^2	Explicit Identity	Drink Refusal Self-efficacy	Belief Could Limit Drinks	Drinks/Week	4/5 Drinks/Occasion	8/10 Drinks/ Occasion	10/15 Drinks/ Occasion	Alcohol Craving
Writing Perspective	1	<0.01	0.16	0.34	0.45	<0.01	0.42	0.32	0.82	0.67
Narrative Type	1	<0.01	<0.01	0.43	0.18	0.91	0.52	0.48	0.22	3.81
Social Network	1	0.55	0.44	2.82	0.29	1.56	0.31	0.18	0.22	1.23
Time	3	54.65*	25.78*	145.07*	27.86*	50.24*	62.58*	20.10*	9.83*	66.46*
Perspective × NarType	1	0.51	1.46	2.53	1.45	5.32*	2.16	0.25	0.31	2.02
Perspective × Network	1	0.40	1.26	0.78	0.08	0.07	0.09	0.04	<0.01	0.07
Perspective × Time	3	2.26	0.88	4.93	4.52	1.77	3.00	0.94	1.15	5.03
NarType × Network	1	1.58	1.26	0.05	0.03	0.08	0.26	0.12	0.53	0.03
NarTyp × Time	3	2.10	6.04	5.41	4.82	6.07	1.82	3.92	3.74	1.58
Network × Time	3	1.46	0.23	0.08	5.23	20.74*	6.45	3.30	0.02	4.05
Perspective × NarTyp × Network	1	3.41	<0.01	0.79	0.35	0.03	<0.01	0.03	0.33	1.28
Perspective × NarTyp × Time	3	1.65	0.83	1.71	2.19	2.88	2.11	1.53	3.44	1.96
NarTyp × Network × Time	3	6.59	0.92	1.42	0.51	2.01	2.39	0.73	1.57	0.28
Perspective × NarTyp × Network × Time	3	0.80	0.98	1.31	4.87	4.35	2.76	1.91	2.49	3.73
N		325	327	327	327	327	327	327	327	327
Total Obs		1117	1150	1148	1147	1146	1149	1149	1149	1148

Note. *$p < 0.05$. Writing perspective (Perspective) was coded 1 = first person, 0 = non-first-person. Narrative type (NarType) was coded 1 = low-risk drinker; 0 = reduced smartphone; social network (Network) was coded 1 = instructed to include; 0 = not instructed.
Implicit drinking identity was measured via the Drinking Identity IAT; higher scores = stronger drinking identity. Explicit drinking identity was measured via the Alcohol Self Concept Scale; higher scores = stronger drinker identity. Drinking refusal self-efficacy was measured using the Drinking Refusal Self-efficacy Questionnaire; higher scores = greater self-efficacy to resist drinking.
Confidence that one could limit one's drinking (Belief could limit drinks) was measured using an 11-point scale, higher scores = greater confidence. Drinks per week represents the average number of drinks consumed per week. 4/5, 8/10, and 10/15 drinks per occasion represents the number of heavy drinking episodes per month wherein women/men reported drinking at least that many drinks on a given occasion.
Alcohol craving over the last week was measured using the Penn Alcohol Craving Scale; higher scores = more craving.

topic interaction was significant after correction for multiple comparisons.

Table 2 also indicates that the writing task did not have a significant effect on any form of heavy episodic drinking. This was true for main effects and interactions. There was a significant main effect for time for all three heavy episodic drinking variables: 4/5 drinks, $\chi^2(3) = 62.58$, $p < 0.001$; 8/10 drinks, $\chi^2(3) = 20.10$, $p < 0.001$; 10/15 drinks, $\chi^2(3) = 9.83$, $p = 0.02$. As compared to baseline, 4/5 drink occasions were significantly lower at 1-month follow-up (diff = −0.34, $p < 0.001$) and 3-month follow-up (diff = −0.23, $p < 0.001$). Likewise, as compared to the 2-week follow-up, 4/5 drink occasions were significantly lower at the 1-month follow-up (diff = −0.26, $p < 0.001$) and 3-month follow-up (diff = −0.14, $p = 0.029$). As compared to baseline, 8/10 drink occasions were significantly lower at 1-month follow-up only (diff = −0.34, $p = 0.001$). As compared to 2-week follow-up, 8/10 drink occasions were significantly lower at 1-month follow-up only (diff = −0.34, $p = 0.001$). Finally, the only significant difference among time points for 10/15 drink occasions was that the 3-month follow-up was higher than the 1-month follow-up (diff = 0.50, $p = 0.03$).

Additionally, Table 2 indicates that narrative writing did not have a significant effect on alcohol craving. There was also a main effect of time for craving, $\chi^2(3) = 66.46$, $p < 0.001$. Follow-up tests indicated that, as compared to baseline, craving was significantly less at 2-week follow-up (diff = −1.12, $p < 0.001$), 1-month follow-up (diff = −1.46, $p < 0.001$), and 3-month follow-up (diff = −1.71, $p < 0.001$). No other follow-ups differed significantly. Table 3 provides the results of the analysis for alcohol-related problems showing no significant main effects or interactions among the conditions.

Table 3
Main effects and interactions for analyses evaluating the effects of the writing task on alcohol-related problems.

	df	Alcohol-related Problems χ^2
Writing Perspective	1	0.04
Narrative Type	1	0.78
Social Network	1	0.41
Perspective × NarType	1	0.21
Perspective × Network	1	0.15
NarType × Network	1	0.52
Perspective × NarType × Network	1	0.05
Gender	2	5.82

Note. N = 258; No effects were significant.
Writing perspective (Perspective) was coded 1 = first person, 0 = non-first-person. Narrative type (NarType) was coded 1 = low-risk drinker; 0 = reduced smartphone user; social network (Network) was coded 1 = instructed to include; 0 = not instructed.
Alcohol-related problems was measured used the Rutgers Alcohol Problem Inventory; higher scores = more problems.

Discussion

The current study tested a candidate method to decrease drinking identity − namely, writing about a low-risk drinking future self − and evaluated whether attempts to shift drinking identity would be accompanied by changes in drinking outcomes. The method was theory-driven and informed by pilot testing. Consistent with pilot findings, participants' evaluations of the writing task indicated engagement with the task, that the future self was plausible and relatable, and that the task shifted their perspective (see Supplement 2). Nonetheless, study results were contrary to predictions and null − the method was not generally effective above and beyond the control condition.

When considering what might account for null results, possibilities include study procedural weaknesses, the impact of the COVID-19 pandemic, participant characteristics, measurement issues, and the particular narrative writing task we developed. With respect to study procedures, the design, and methods as well as our implementation of them was rigorous and robust. Retention was excellent over the three sessions (approximately 95%) and through the 3-month follow-up (79%). Attentiveness to the study tasks appeared consistently high, given that 95% of participants' IAT data met screening criteria at every timepoint; the vast majority of participants answered all accuracy check questions correctly (89% at baseline/session 1, 94% or higher at every other timepoint). The content of writing tasks appeared to be on task based on reviews of the narratives performed by the PI, and the positive task evaluations described above. Data analysis practices were robust and included *a priori* hypotheses and data analytic plans that were specified in the original grant submission, on clinicaltrials.gov, and preregistered at OSF. There was little indication that lack of procedural rigor or fidelity was problematic. Finally, we note the potential for aspects of the design − e.g., having post-narrative writing task assessments with multiple measures at every session, the evaluation of two potential task enhancements (e.g., writing perspective and social network inclusion), and the cue reactivity assessment − could have had the unintended effect of diluting or nullifying the efficacy of writing about a future self as a low-risk drinker.

The impact of the COVID-19 pandemic also appeared to be relatively minimal, at least with respect to engagement in the study and impact on outcomes. Though the opportunity to complete the alcohol cue reactivity protocol was lost, the transition to online lab sessions was relatively seamless. Study retention and engagement in the study tasks and assessments were high and remained high. Further, sensitivity analyses that controlled for the impact of the pandemic on outcomes did not find evidence of a significant impact. We do note emerging evidence of a pandemic-related impact on college student drinking and that that impact may be a function of prior drinking behaviors (higher if heavy vs. light), prior living situation (higher if with peers vs. parents), or a residential change (lower if moved home vs. not) (Jackson, Merrill, Stevens, Hayes, & White, 2021; White, Stevens, Hayes, & Jackson, 2020). We are unable (and underpowered) to assess these factors in this study.

Regarding participant characteristics, study participants appeared to be engaging in hazardous drinking. Their baseline AUDIT scores were above the threshold for hazardous drinking (≥ 8), and visual inspection of baseline data (see Table 1) indicated that the lowest reported mean in any condition was eight alcohol-related problems and more than three past-month heavy drinking episodes (at least 4/5 drinks per occasion for women/men). We do note that to be enrolled in the study, participants did not have to report *interest* in *changing* their drinking or *concern* about their drinking, nor was the study advertised as an intervention. Those

were intentional decisions and reflected the study's experimental design and its aim of testing whether this method could shift drinking identity. It may be that writing about a future low-risk drinker self is effective only for heavy-drinking individuals who already have some level of openness to change. It may also be that this method could increase readiness/openness to change drinking but is less effective (or ineffective) at shifting drinking identity directly. An additional possibility is that the drinking patterns of individuals in the sample varied enough such that the future low-risk drinker self was not incompatible with the behavioral variation (in drinking) that was already part of their current self. Considerable variability in college student drinking, including those who engage in hazardous drinking, has been routinely observed in longitudinal studies (see, for example, Del Boca, Darkes, Greenbaum, & Goldman, 2004).

We also note the low means (approximately −2 on a −3 to +3 scale) on the explicit drinking identity measure. While this could reflect a true lack of endorsement of a drinking identity, this measure is historically negatively skewed in our college samples (Lindgren et al., 2013, 2016, 2022) and was here as well. The explicit measure may simply be less sensitive in assessing drinking identity and any change in that identity. This appears plausible as the implicit identity measure mean was above 0 (scores can range from −2 [non-drinker + me] to +2 [drinker + me]. Further, an exploratory item that evaluated how participants viewed themselves on a continuum from −3 *very much a non-drinker* to +3 *very much a drinker* had a baseline sample mean of 1.46, indicating overall endorsement of a drinking identity. *Post hoc* analysis (available on OSF) following the same strategy as the primary explicit identity also yielded null findings other than a time main effect. Thus, there appears to be evidence of drinking identity endorsement in the sample via other identity measures, but consistent null findings for the writing task's efficacy in shifting it.

Our writing method may not have been optimally designed to shift drinking identity in college student drinkers. The current study's results, coupled with a *post hoc* review of the literature, are informative. There is robust literature in other domains that a 'best possible self'-intervention can shift identity and health outcomes (e.g., Carrillo et al., 2019). That literature also reveals some important distinctions with respect to the current method versus the best possible selves task. First, our task used a single, *a priori* operational definition of the specific future self's identity concerning drinking, which was a relatively generous definition of moderation and was later reduced by NIAAA. Second, our task asked participants to envision a future self that was a few months out versus multiple years out, and our literature review revealed that envisioning a more distal self is more effective (Rutchick et al., 2018). Interestingly, the potential utility of giving participants greater flexibility in envisioning a future self and asking them to envision a more distal self is supported by recent, positive findings from a proof-of-concept trial of an episodic future thinking intervention for individuals with alcohol use disorder (Athamneh et al., 2022). Third, our task had an implicit assumption that the future self we asked participants to envision would be desirable. Though we evaluated many aspects of the experience of envisioning this self and the results were positive, we never specifically evaluated how much they desired to become this self. Also, the best possible selves task often asks individuals to envision an ideal future self they would like to become *and* a future self they would like to avoid. Collectively, this suggests that the efficacy of a writing task could likely be strengthened by asking participants to envision a more distal (vs. proximal) future self, to articulate their version of a best possible self in relation to drinking, and potentially, evaluating the impact of envisioning both a future desired self and a future feared self to avoid.

Finally, we note the main effects of time on implicit and explicit drinking identity, drinks per week, heavy episodic drinking, craving, and drinking-refusal self-efficacy. Though it is possible that the control task somehow had an effect on drinking outcomes, the writing task review of narratives (to check safety; e.g., no reports of suicidal intent) indicated only a few instances where participants suggested that becoming a person who used their smartphone less would affect their drinking. However, these time main effects could also be an indication of the impact of repeated assessment of alcohol-related behaviors and variables, specifically of measure reactivity (see McCambridge & Day, 2008; Schrimsher & Filtz, 2011). A rich literature also suggests that repeated assessment of drinking patterns may increase awareness of risk, increase self-regulation, and have a mild intervention effect (see, for example, Carey, Carey, Maisto, & Henson, 2006; Walters, Vader, Harris, & Jouriles, 2009). We note as well that the time main effects could indicate regression to the mean, given that the sample was composed of heavy-drinking individuals or some combination of the above along with unintended effects of the control task.

The writing task was not found to be effective at shifting drinking identity or alcohol-related variables. Future research would likely benefit from adapting the task to be more consistent with the best possible self-intervention, using or developing more sensitive explicit drinking identity measures, and evaluating the task in participants with some interest in changing their drinking.

Author note

This study was registered with ClinicalTrials.gov (NCT03889873). The hypotheses and data analysis plan were also registered with OSF (https://osf.io/vy2ep). Study data are available upon request to the first author.

Funding

Declarations of interest

Bethany Teachman has a significant financial interest in Project Implicit, Inc., which provided data collection services supporting this project under contract with the University of Washington. No other authors have any interests to declare.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.alcohol.2023.10.002.

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