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ORIGINAL ARTICLE

Mood Induction Changes Negative Alcohol Expectancies Among Japanese Adults with Problematic Drinking: Negative Mood Regulation Expectancies Moderate the Effect

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Abstract

One's beliefs about effects of alcohol, known as alcohol expectancies, are important constructs for understanding drinking behavior, but the literature on the influences of mood on alcohol-related negative beliefs and on memory accessibility is limited. The current study examined effects of a mood induction on alcohol expectancies and alcohol-related autobiographical memories; also, whether negative mood regulation expectancies (NMRE), which are beliefs about one's ability to control negative affect, moderated these effects. Recruited from the community, 485 Japanese problem drinkers first completed measures of NMRE and alcohol expectancies. A week later, participants completed an online experiment: they received a musical mood induction (238 participants were randomly allocated to a positive mood induction group and 239 participants to a negative mood induction group). Then, participants completed measures of alcohol expectancies and alcohol-related autobiographical memories. Results showed the mood induction significantly weakly affected two negative alcohol expectancies (physical ailments and dysphoria). NMRE moderated the effect of mood induction on negative alcohol expectancies for dysphoria. Findings suggest the importance of mood as an influence on negative beliefs about the effects of drinking among Japanese problem drinkers. Additionally, NMRE alter the impact of mood on more specific expectancies. Limitations about the online method of this experiment are discussed.

Keywords Affect regulation · Internet experiment · Japanese adults · Negative mood · Problem drinking

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Individuals' beliefs about the likely effects alcohol will have on their affect and behavior are known as alcohol expectancies (AE; Critchlow 1986; Jones et al. 2001). Positive AE are beliefs that alcohol enhances the pleasantness of one's experiences, increases one's assertiveness or aggression, or reduces feelings of tension (Brown et al. 1980). Positive AE develop through people's history of reinforcement. Drinking behavior is strengthened when drinking results in increased positive affect or reduced tension (Lang et al. 1999). On the other hand, negative AE generally motivate one to refrain from alcohol consumption because of anticipated unpleasant consequences. However, some studies show that stronger negative AE are associated with greater alcohol consumption (Hasking et al. 2011). Some argue that this positive relationship evolves as heavy drinking delivers more deleterious drinking consequences, like hangovers. There is some support for this supposition, though research findings are inconsistent (Goldman et al. 1999). Overall, negative AE appear more strongly associated with reduced frequency of drinking, while positive AE relate to more quantity of alcohol consumed (Lee et al. 1999; McMahon et al. 1994).

Individuals' memories of their alcohol-related experiences shape their AE. Based on Bower's (1981) associative network model of memory, when an individual is in a negative mood, he or she will more easily retrieve negatively valenced memories and expectancies that are congruent with that mood. Affect may also exert inhibitory influences on certain cognitions. For example, negative affect may suppress negative AE and stimulate positive AE that drinking can alleviate one's negative mood. Hufford (2001) reported that participants who were induced into a negative mood increased their endorsement of positive AE, compared to those induced into a positive mood. Additionally, Birch et al. (2004) and Goldstein et al. (2004) have demonstrated that positive and negative mood inductions are associated with different kinds of AE. However, to our knowledge no studies have yet experimentally examined effects of mood on negative AE.

With the importance of AE and affect as predictors of alcohol consumption, it seems reasonable that other affect-related expectancies will predict drinking behavior. Negative mood regulation expectancies (NMRE) are defined as people's beliefs about their capacity to improve the negative affect they experience (Catanzaro and Mearns 1990, 2016). Experimental studies have shown NMRE to moderate the mood-congruent effect of emotion on memory and cognition (Rusting and DeHart 2000; Smith and Petty 1995). Those with high NMRE, meaning strong confidence in their affective regulation, appear to immediately respond to negative mood inductions with mood repair by generating mood-incongruent material. Although no studies have yet been conducted on alcohol-related memory, it is plausible that NMRE will be associated with the accessibility of emotionally tinged alcohol-related memories.

In the West, research suggests that stronger NMRE are associated with less drinking to cope with distress (e.g., Catanzaro and Laurent 2004; Kassel et al. 2000; Lyvers et al. 2010). In Stasiewicz et al. (2013) treatment study, affect regulation training reduced alcohol use by outpatients with alcohol disorders and increased NMRE. In Japan, contrary to predictions, higher NMRE were related to increased heavy drinking in a treatment trial using a smartphone app intervention; overall, greater use of the app was associated with more problem drinking (Hamamura et al. 2018). On the whole, studies demonstrate that lower NMRE may accompany alcohol problems. But the literature on the relationship of NMRE with constructs related to alcohol-specific affect regulation is limited.

Purpose of the Current Study

The current study was undertaken to replicate and extend previous findings on the effects of mood on alcohol-related positive and negative expectancies and autobiographical memory. The current study investigated whether mood induction would alter beliefs regarding drinking outcome (AE) among Japanese problem drinkers as shown in studies in the West. Furthermore, this study aimed to extend the previous findings by examining negative drinking outcome (negative AE) and moderation by NMRE of the effects of emotion on AE. To our knowledge, no studies have examined these variables' relationships in the West or Japan.

Based on previous findings among college students (e.g., Birch et al. 2004; Hufford 2001), we hypothesized that participants induced into a negative mood would show (a) a significant increase in positive AE, (b) a significant reduction in negative AE, and (c) more positivity of their recalled autobiographical memories (Hypothesis 1). Additionally, we expected NMRE would moderate the effects of mood induction on positive AE, negative AE, and positivity of memory recall (Hypothesis 2).

Method

Participants

Participants were recruited from the community through a research marketing company. The inclusion criteria for the study were being between the ages of 20 and 69 and scoring one or higher on the CAGE questionnaire (Kawakami et al. 1993). A total of 485 adults living in Japan participated in the study (women = 50.3%). Their mean age was 48.51 ($SD = 12.74$). Regarding work status, 233 (48.0%) reported working full-time, 56 (11.6%) working part-time, 88 (18.1%) staying at home, 7 (1.5%) being a student, 81 (16.7%) not working at all, and 20 (4.1%) indicating as "other."

Measures

Problem Drinking A Japanese version of the CAGE questionnaire (Kawakami et al. 1993) measured the degree of problematic drinking. This questionnaire has four items and uses a yes-no response scale (0 = *no*, 1 = *yes*). An example items is "Have you ever felt you should cut down on your drinking?" Alpha was .41 in the current study. The CAGE questionnaire was used only as a screening measure for participant recruitment.

Affective States A Japanese version of the Brief Momentary Mood Checklist (Tanaka 2008) assessed the current experience of nine positive and negative emotions, using a seven-point response scale (0 = *not at all*, 6 = *extremely much*). Items for positive mood are "happy," "joyful," "pleased," and "enjoyment/fun," while items for negative mood are "depressed/blue," "unhappy," "frustrated," "angry/hostile," and "worried/anxious." Alpha ranged from .91 to .93 for positive and negative affect subscales across three administrations (see Fig. 1).

Alcohol Expectancies Sakurai's (1997) Japanese version of the Alcohol Outcome Expectancies Scale (Leigh and Stacy 1993) measured positive AE and negative AE regarding the outcomes or conditions people believe drinking will produce. The questionnaire starts with a

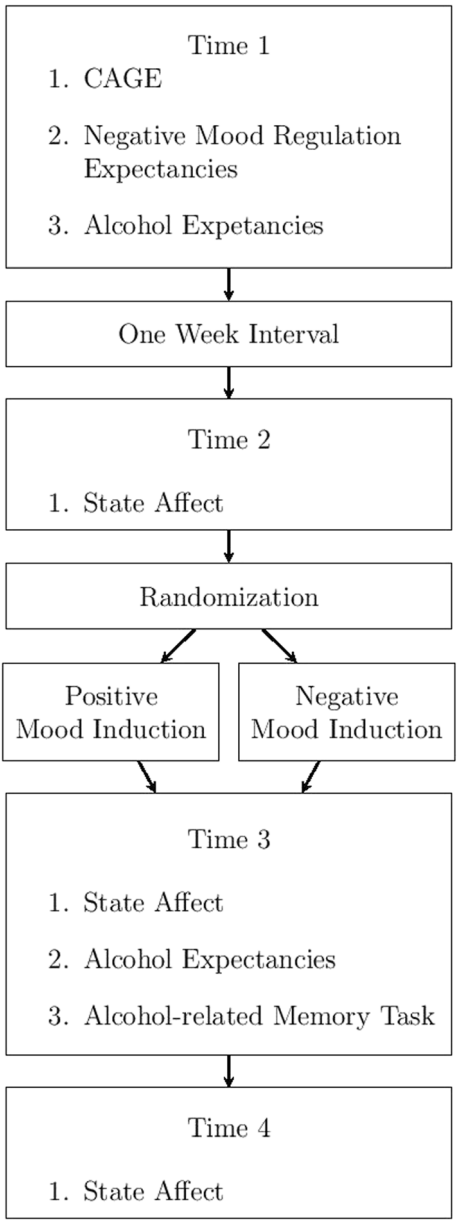

Fig. 1 Flow chart of the study procedure

statement, "In what state do you become when drinking alcohol?" The scale has 52 items using a six-point response scale regarding the likelihood of that outcome (1 = *no chance* to 6 = *certain to happen*). The current study scored four factors: mood enhancement (e.g., "feel euphoric") and stress reduction (e.g., "forget my worries") as positive AE, and physical ailments (e.g., "feel physically worse") and dysphoria (e.g., "feel pessimistic") as negative AE. Alphas ranged from .78 to .93 in the current study.

Negative Mood Regulation Expectancies The 40-item Japanese version of the Negative Mood Regulation Scale (NMR-J; Mearns et al. 2016) measured NMRE with a five-point response scale that ranges from 1 (*strongly disagree*) to 5 (*strongly agree*). The NMR-J is a culturally relevant translation. All items complete the stem, "When I'm mildly depressed or frustrated…." Example items are "I believe I'll feel okay if I think about more pleasant times" and "I believe I will be encouraged to do my best if I find someone who is doing his/her best in a more difficult situation." Alpha was .93 in the current study.

Autobiographical Memory We followed previous studies that assessed positivity of autobiographical recall (e.g., Rusting and DeHart 2000). Participants recalled five events related to alcohol and rated the positivity of each event on a scale from 1 (*very negative*) to 9 (*very positive*). The sum of the five self-ratings represented the positivity of autobiographical recall.

Procedure

All participation was via the internet. Prior to the study, the Life Science Research Ethics and Safety committee at the University of Tokyo reviewed and approved the study. The research marketing company announced that this study is "about health and musical preference" (cf. Kelly et al. 2011) to individuals registered in the monitoring pool. Upon agreeing to participate, participants first took measures of problem drinking. Those who met study eligibility next completed measures of NMRE, positive AE, and negative AE. This represented Time 1 (see the flow chart in Fig. 1).

About a week later, participants completed the rest of the study. This week-long interval was implemented to reduce participants' fatigue and inattentiveness during the experiment, as the literature indicates higher inattentiveness and attrition in internet research (Eysenbach 2005; Hamamura et al. 2018). The longitudinal design also eliminated contemporaneous situational factors as explanations for correlations between Time 1 questionnaires and subsequent measures (cf. Campbell and Fiske 1959). Participants were instructed to find a space where they were not distracted by the surrounding environment while taking the experiment on a computer. Participants first completed the baseline measure of state affect (Time 2) immediately before the mood induction.

Participants were then randomly assigned, by computer generated numbers, to condition-receiving either a positive or negative musical mood induction. For the positive mood induction, "Coppelia" by Delibes was played; and for the negative mood induction, "Russia under the Mongolian Yoke" by Prokofiev was played at half speed. These pieces have successfully induced particular moods in previous studies (e.g., Martin 1990). These pieces were 4 min 56 s and 5 min 20 s, respectively, and were repeated for a total of 10 min. Participants were asked to concentrate on the melody as they listened. While participants proceeded to complete the rest of the experiment, the music continued playing, and participants were instructed to listen to it as background music until the end of the experiment.

Immediately after the mood induction task, at Time 3, all participants completed the mood checklist and AE measure. Then, they recalled autobiographical memories. Finally, they completed the mood checklist a third time (Time 4). At the end of the study, participants were debriefed thoroughly about the purpose of the study.

Statistical Analyses

All analyses were calculated in R 3.4.2 (R Core Team 2018). To test the effect of the mood induction on AE and autobiographical recall (Hypothesis 1), mixed-effect analyses of variance (ANOVA) were performed. Condition (positive vs. negative mood induction), time (pre- vs. post-mood induction), and the condition × time interaction were independent variables. Positive AE, negative AE, and positivity of autobiographical recall were dependent variables. We used generalized eta squared (η^2_G) to show the effect size of the mood induction.

To test whether NMRE moderated the effect of the mood induction on the dependent variables (Hypothesis 2), multiple regression analyses were performed with condition, NMRE, and the condition × NMRE interaction as predictors. Dependent variables were positive AE, negative AE, and positivity of autobiographical recall. To simplify analyses, we created a change in AE index by subtracting Time 3 post-induction AE from Time 1 pre-induction AE. Beta (β) represented the effect size of the predictors. Post hoc analyses (i.e., simple slope analyses) were used to describe slope of the interaction effect.

Before analyses, data were screened for missing data, outliers, normality, linearity, heteroscedasticity, multicollinearity, and singularity. A square-root transformation was done on negative AE regarding physical ailments and dysphoria. We removed eight cases because they did not appear to have answered the questionnaires seriously (e.g., they responded to all items with "1"). The rest of the data from 477 participants were winsorized to adjust outliers.

Results

Descriptive Statistics and Mood Manipulation

Mean for CAGE and NMRE were 2.44 ($SD = 1.12$) and 126.11 ($SD = 19.69$), respectively, while that of other variables are shown by condition in Table 1. The condition × time interaction significantly predicted changes in both positive mood, $F(2,980) = 15.70$, $p < .001$, $\eta^2_G = .006$, and negative mood, $F(2,980) = 14.63$, $p < .001$, $\eta^2_G = .005$. Bonferroni's post hoc tests were used to compare participants' state affect between the two conditions at each time. Both positive and negative state affect differed by condition only at Time 3 (i.e., immediately after the mood induction), $d = .39$, 95% CI (.21, .57), $p = .001$, $d = .30$, 95% CI (.12, .48), $p < .001$, respectively. Participants in the negative mood induction condition reported lower positive affect, while participants in the positive mood induction reported lower negative affect immediately after the mood induction.

Effect of Condition, Time, and Condition × Time Interaction on AE and Autobiographical Memory

Multivariate ANOVA revealed no significant differences in the four AEs between the two conditions at baseline, Wilk's lambda = .99, $F(4, 475) = 1.64$, $p = .16$. The condition × time interaction was significant only for negative AE regarding physical ailments and dysphoria, $F(1,490) = 4.07$, $p = .04$, $\eta^2_G = .002$, $F(1,490) = 5.58$, $p = .02$, $\eta^2_G = .002$, respectively. For negative AE for physical ailments, the positive mood induction lowered AE, while the negative mood induction raised AE. For negative AE for dysphoria: both mood inductions

Table 1 Descriptive statistics for negative mood regulation expectancies, state affect, alcohol expectancies, and positivity of alcohol-related recall

Variable	Mood Induction	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 3 *M* (*SD*)	Time 4 *M* (*SD*)
Positive state affect	Positive	–	16.44 (4.88)	16.00 (4.72)	15.50 (4.93)
	Negative	–	16.27 (5.05)	13.98 (5.60)	14.82 (5.31)
Negative state affect	Positive	–	18.06 (7.14)	15.30 (7.09)	16.29 (7.02)
	Negative	–	17.82 (6.84)	17.41 (7.12)	16.92 (7.35)
Positive AE: mood enhancement	Positive	19.55 (5.05)	–	19.17 (5.27)	–
	Negative	18.70 (5.89)	–	18.64 (6.08)	–
Positive AE: stress coping	Positive	17.32 (4.76)	–	17.57 (4.72)	–
	Negative	16.36 (5.44)	–	16.33 (5.63)	–
Negative AE: physical ailments	Positive	13.52 (4.83)	–	12.87 (4.83)	–
	Negative	13.01 (5.04)	–	13.25 (5.45)	–
Negative AE: dysphoria	Positive	10.66 (4.97)	–	10.87 (4.99)	–
	Negative	9.88 (4.78)	–	10.89 (4.96)	–
Positivity of alcohol-related recall	Positive	–	–	26.16 (9.42)	–
	Negative	–	–	26.06 (9.17)	–

AE alcohol expectancies, *NMRE* negative mood regulation expectancies, *Time 1* one week prior to the experiment, *Time 2* immediately prior to the mood induction, *Time 3* immediately post-mood induction, *Time 4* after memory recall

increased AE, with the negative mood induction resulting in a greater rise. An independent-samples *t* test revealed non-significant effect of mood induction on positivity of alcohol-related autobiographical memory recall.

Moderating Effect of NMRE

We used multiple regression analyses to examine whether NMRE moderated the effect of the mood induction on AE and positivity of autobiographical memories. Since three-way interactions are cumbersome to interpret, we created change scores for AE by subtracting Time 3 AE from Time 1 AE. We conducted five separate regressions, each with condition, NMRE, and the condition × NMRE interaction as predictors. The condition × NMRE interaction, in which we were particularly interested, was significant for change in negative AE for dysphoria, $t(473) = -2.23$, $p = .03$, $\beta = -.10$ (see Fig. 2). Simple slope analyses indicated that, among participants with lower NMRE, positive mood induction decreased negative AE for dysphoria, while negative mood induction increased negative AE for dysphoria. However, among participants with higher NMRE, positive mood inductions increased negative AE for dysphoria while negative mood induction did not affect negative AE for dysphoria. NMRE appear to have buffered the effect of the negative mood induction on AE for dysphoria.

Discussion

The purpose of the current study was to examine whether mood induction would change beliefs about the effects of drinking among individuals with problem drinking. Specifically, we tested the effect of musical mood induction on positive and negative AE and positivity of alcohol-related autobiographical memory among Japanese problem drinkers. Additionally, we

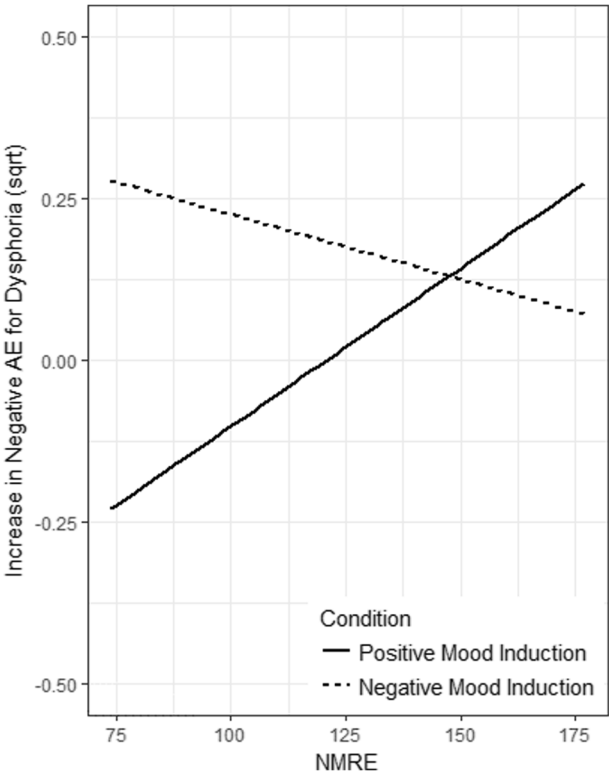

Fig. 2 Increases in alcohol expectancies (square rooted) for dysphoria by mood induction condition and NMRE

investigated whether NMRE would moderate the effect of mood induction on AE and autobiographical memories.

The effect size of the mood induction was small compared to other studies (e.g., Goldstein et al. 2004). Nevertheless, effects of mood induction on negative AE for physiological ailments and dysphoria were statistically significant with small effect size. Contrary to Hypothesis 1, the negative mood induction increased negative AE for physical ailments, while the positive mood induction decreased negative AE for physical symptoms. For dysphoria, both mood inductions increased negative AE; but the increase was much larger following the negative mood induction. It appears that the negative mood induction led individuals with problematic drinking to associate more physical and psychological negative consequences with drinking, while the positive mood induction led them to associate less negative physical consequences with drinking. This finding is consistent with the associative network theory of memory (Bower 1981), demonstrating a congruence between state affect and beliefs about outcomes of drinking. Thus, people with drinking problems most likely have negative beliefs about effects of their drinking, and induction of negative affect may stimulate retrieval of unpleasant alcohol-related consequences. While some previous studies have found that negative mood induction increased individuals' positive AE for stress coping among North American undergraduate students (e.g., Birch et al. 2004; Hufford 2001), this study did not replicate such findings among Japanese adults with problem drinking.

The effect sizes were small for several possible reasons: because of the small effect of the mood induction, negative AE in general may not have been affected. Also, mood inductions may not easily change Japanese problematic drinkers' AE. Beliefs regarding outcomes of drinking may be more complex among individuals with problem drinking. Drinking may function as both a coping strategy and a source of deleterious consequences. In Japan drinking is part of the cultural norm, especially in the workforce. According to national surveys, in Japan 76.4% of men and 61.9% of women self-report as drinkers (World Health Organization 2014). The highest consumers of alcohol in Japan are men between the ages of 40 and 60 (Higuchi 2013; National Tax Agency 2018), corresponding to the age range with the highest proportion of people in the workforce (Statistics Japan 2018). In recent years, the lack of restrictions on alcohol sales and advertising has led to increased alcohol-related problems (Higuchi et al. 2007). Possibly, many Japanese individuals engage in drinking not to regulate emotions but for social purposes, which may affect the cross-cultural generalizability of effects of mood on AE. Since this study is the first to experimentally examine effects of mood on negative AE, more studies are necessary to determine the generalizability of the findings.

NMRE moderated the effect of mood induction, but only for negative AE for dysphoria (Hypothesis 2). Among participants with lower NMRE, positive mood induction decreased negative AE for dysphoria, but negative mood induction increased negative AE for dysphoria. This effect was nearly reversed among those with higher NMRE: while positive mood induction increased negative AE, negative mood induction did not affect negative AE for dysphoria. This moderation by NMRE suggests the potential benefits of stronger NMRE among problem drinkers. Among those with higher NMRE, a positive mood induction increased negative AE, making alcohol less appealing, and a negative mood induction did not alter negative AE. This finding suggests that stronger NMRE participants may find less appealing drinking as a way of coping with unpleasant moods. The week-long longitudinal design rules out situational factors as an explanation for the findings, strengthening the result. These findings are consistent with previous literature demonstrating mood repairing effects of NMRE (e.g., Rusting and DeHart 2000; Tresno et al. 2013). Higher NMRE may have buffered the effects of negative mood induction on expectations about experiencing dysphoria.

Contrary to our hypothesis, the effect of the mood induction was not significant on positivity of alcohol-related autobiographical memories. One explanation for this non-significant result is that the mood induction only very weakly affected mood by the time participants completed the memory task at Time 3, and that effect seemed to have worn off by Time 4.

Limitations of the Current Study

There are several limitations, particularly regarding the online experimental design in the current study. First, the current study could not control the environment in which participants completed the experiment. This led to heterogeneity of situational factors, including using computers with different operating systems, participating at different times of day and in different place. Although our online experiment had little control over technology and the environment, such problems appear to affect offline methods, as well (Whitehead 2007). To attempt to control such factors, we asked participants to complete the experiment in a quiet place, included attention checks, and excluded participants with obviously questionable responses. But, in general, difficulty checking participants' inattention is a weakness of online studies (Andersson and Titov 2014). These are limitations of internet-based research.

However, the literature also suggests that the online method has advantages: avoiding data with missing items using forced-choice formats, rapid data collection, and recruiting large and heterogeneous samples. These advantages may favorably overcome shortcomings of typical in-lab research (Birnbaum 2004; van Steenbergen and Bocanegra 2016), increasing generalizability of findings.

Suggestions for Future Studies

Future experiments may improve upon the current research by including variables we did not measure. For example, a future study may include self-generated alcohol expectancies, which are open-ended questions participants fill out regarding outcomes of drinking; a third party rates the participants' responses (Goldstein et al. 2004). A future study can also add implicit measures of alcohol-related memory association, which examines participants' unconscious or autonomic responses to alcohol-related stimuli. Measuring reaction time in online experiments is a major concern expressed in the literature; however, recent studies have shown that online experiments are just as rigorous as those in laboratory settings (Hilbig 2016; van Steenbergen and Bocanegra 2016).

More studies among Japanese individuals with problem drinking are needed. Future studies should investigate relationships of NMRE with alcohol-related cognition, behavior, and symptoms. NMRE independently explain coping and psychological symptoms among Japanese (Hamamura and Mearns 2017). However, the influence of NMRE on specific beliefs, such as beliefs regarding the effects of alcohol (i.e., AE), quantity and frequency of drinking, and psychological and social consequences due to problematic drinking is not well known among Japanese. Additionally, while many Japanese individuals drink for social purposes, solitary drinkers have been shown to have greater alcohol-related problems (Ohtsu et al. 2013). Future studies may compare social drinkers with solitary drinkers to examine differences in the influence of negative mood on AE.

In conclusion, this study demonstrated that state affect can alter problem drinkers' beliefs about the negative outcomes of drinking. Additionally, effects of mood on negative beliefs about drinking differed according to individuals' levels of NMRE. Further studies on emotions and beliefs regarding alcohol can contribute to understanding problematic drinking patterns among Japanese individuals and possibly developing effective treatments for alcohol use disorders among Japanese problem drinkers.

Authors' Contributions Both authors contributed to the preparation of the manuscript.

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Compliance with Ethical Standards

Conflict of Interests The authors declare that they have no conflict of interest.

Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being in the study.

References

Andersson, G., & Titov, N. (2014). Advantages and limitations of Internet-based interventions for common mental disorders. *World Psychiatry, 13*, 4–11. https://doi.org/10.1002/wps.20083.

Birch, C. D., Stewart, S. H., Wall, A.-M., McKee, S. A., Eisnor, S. J., & Theakston, J. A. (2004). Mood-induced increases in alcohol expectancy strength in internally motivated drinkers. *Psychology of Addictive Behaviors, 18*, 231–238. https://doi.org/10.1037/0893-164X.18.3.231.

Birnbaum, M. H. (2004). Human research and data collection via the Internet. *Annual Review of Psychology, 55*, 803–832. https://doi.org/10.1146/annurev.psych.55.090902.141601.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*, 129–148. https://doi.org/10.1016/0005-7967(87)90052-0.

Brown, S. A., Goldman, M. S., Inn, A., & Anderson, L. R. (1980). Expectations of reinforcement from alcohol: their domain and relation to drinking patterns. *Journal of Consulting and Clinical Psychology, 48*, 419–426. https://doi.org/10.1037/0022-006X.48.4.419.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*, 81–105. https://doi.org/10.1037/h0046016.

Catanzaro, S. J., & Laurent, J. (2004). Perceived family support, negative mood regulation expectancies, coping, and adolescent alcohol use: evidence of mediation and moderation effects. *Addictive Behaviors, 29*, 1779–1797. https://doi.org/10.1016/j.addbeh.2004.04.001.

Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: initial scale development and implications. *Journal of Personality Assessment, 54*, 546–563. https://doi.org/10.1207/s15327752jpa5403&4_11.

Catanzaro, S. J., & Mearns, J. (2016). Generalized expectancies for negative mood regulation: development, assessment, and implications of a construct. In S. Trusz & P. Babel (Eds.), *Intrapersonal and interpersonal expectancies: Research, applications and future directions (pp. 52–61)*. Hove: Psychology Press.

Critchlow, B. L. (1986). The powers of John Barleycorn: beliefs about the effects of alcohol on social behavior. *American Psychologist, 41*, 751–764. https://doi.org/10.1037/0003-066X.41.7.751.

Eysenbach, G. (2005). The law of attrition. *Journal of Medical Internet Research, 7*, e11. https://doi.org/10.2196/jmir.7.1.e11.

Goldman, M. S., Del Boca, F. K., & Darkes, J. (1999). Alcohol expectancy theory: the application of cognitive neuroscience. In K. E. Leonard & H. T. Blane (Eds.), *Psychological theories of drinking and alcoholism* (pp. 203–246). New York: The Guildford Press.

Goldstein, A. L., Wall, A.-M., McKee, S. A., & Hinson, R. E. (2004). Accessibility of alcohol expectancies from memory: impact of mood and motives in college student drinkers. *Journal of Studies on Alcohol, 65*, 95–104. https://doi.org/10.15288/jsa.2004.65.95.

Hamamura, T. & Mearns, J. (2017). Depression and somatic symptoms in Japanese and American college students: negative mood regulation expectancies as a personality correlate. *International Journal of Psychology.* Advance online publication. https://doi.org/10.1002/ijop.12467

Hamamura, T., Suganuma, S., Ueda, M., Mearns, J., & Shimoyama, H. (2018). Standalone effects of a cognitive behavioral intervention using a mobile phone app on psychological distress and alcohol consumption among Japanese workers: pilot non-randomized controlled trial. *JMIR Mental Health, 5*, e24. https://doi.org/10.2196/mental.8984.

Hasking, P., Lyvers, M., & Carlopio, C. (2011). The relationship between coping strategies, alcohol expectancies, drinking motives and drinking behaviour. *Addictive Behaviors, 36*, 479–487. https://doi.org/10.1016/j.addbeh.2011.01.014.

Higuchi, S. (2013). Comprehensive research as part of the WHO global strategies to reduce harmful use of alcohol. *Heisei 25 nendo sokatsu kenkyu hokokusho.* Retrieved from https://mhlw-grants.niph.go.jp/niph/search/NIDD00.do?resrchNum=201315050A

Higuchi, S., Matsushita, S., Maesato, H., & Osaki, Y. (2007). Japan: alcohol today. *Addiction, 102*, 1849–1862. https://doi.org/10.1111/j.1360-0443.2007.01902.x.

Hilbig, B. E. (2016). Reaction time effects in lab- versus web-based research: experimental evidence. *Behavior Research Methods, 48*, 1718–1724. https://doi.org/10.3758/s13428-015-0678-9.

Hufford, M. R. (2001). An examination of mood effects on positive alcohol expectancies among undergraduate drinkers. *Cognition & Emotion, 15*, 593–613. https://doi.org/10.1080/02699930126252.

Jones, B. T., Corbin, W., & Fromme, K. (2001). Conceptualizing addiction: a review of expectancy theory and alcohol consumption. *Addiction, 96*, 57–72. https://doi.org/10.1080/09652140020016969.

Kassel, J. D., Jackson, S. I., & Unrod, M. (2000). Generalized expectancies for negative mood regulation and problem drinking among college students. *Journal of Studies on Alcohol, 61*, 332–340. https://doi.org/10.15288/jsa.2000.61.332.

Kawakami, N., Araki, S., Yokoyama, K., Murata, K., Imanaka, Y., Haratani, T., et al. (1993). CAGE arukorusho sukurining shakudo nihongo ban no shinraisei to datosei [Reliability and validity of a Japanese version of CAGE alcohol disorder screening scale]. *Nihon Eiseigaku Zasshi [Japanese Journal of Public Health], 48*, 401.

Kelly, A. B., Masterman, P. W., & Young, R. M. (2011). Negative mood, implicit alcohol-related memory, and alcohol use in young adults: the moderating effect of alcohol expectancy. *Addictive Behaviors, 36*, 148–151. https://doi.org/10.1016/j.addbeh.2010.08.025.

Lang, A. R., Patrick, C. J., & Stritzke, W. G. (1999). Alcohol and emotional response: a multidimensional-multilevel analysis. In K. E. Leonard & H. T. Blane (Eds.), *Psychological theories of drinking and alcoholism* (pp. 328–371). New York: The Guildford Press.

Lee, N. K., Greely, J., & Oei, T. P. S. (1999). The relationship of positive and negative alcohol expectancies to patterns of consumption of alcohol in social drinkers. *Addictive Behaviors, 24*, 359–369. https://doi.org/10.1016/S0306-4603(98)00091-4.

Leigh, B. C., & Stacy, A. W. (1993). Alcohol outcome expectancies: scale construction and predictive utility in higher order confirmatory models. *Psychological Assessment, 5*, 216–229. https://doi.org/10.1037/1040-3590.5.2.216.

Lyvers, M., Thorberg, F. A., Ellul, A., Turner, J., & Bahr, M. (2010). Negative mood regulation expectancies, frontal lobe related behaviors and alcohol use. *Personality and Individual Differences, 48*, 332–337. https://doi.org/10.1016/j.paid.2009.10.030.

Martin, M. (1990). On the induction of mood. *Clinical Psychology Review, 10*, 669–697. https://doi.org/10.1016/0272-7358(90)90075-L.

McMahon, J., Jones, B. T., & O'Donnell, P. (1994). Comparing positive and negative alcohol expectancies in male and female social drinkers. *Addiction Research, 1*, 349–365. https://doi.org/10.3109/16066359409005202.

Mearns, J., Self, E., Kono, K., Sato, T., Takashima, E., Tresno, F., et al. (2016). Measuring generalized expectancies for negative mood regulation in Japan: the Japanese language NMR Scale. *International Journal of Quantitative Research in Education, 3*, 109–127. https://doi.org/10.1504/IJQRE.2016.073675.

National Tax Agency. (2018). Alcohol report. *Sake no shiori.* Retrieved from https://www.nta.go.jp/taxes/sake/shiori-gaikyo/shiori/2018/pdf/000.pdf.

Ohtsu, T., Shirasawa, T., Ochiai, H., Hoshino, H., & Kokaze, A. (2013). Habitual alcohol consumers' understanding of "moderate drinking": a cross-sectional study in Japan. *Open Journal of Preventive Medicine, 3*, 238–245. https://doi.org/10.4236/ojpm.2013.32032.

R Core Team. (2018). *R: a language and environment for statistical computing*. Vienna: Austria Retrieved from https://www.r-project.org/.

Rusting, C. L., & DeHart, T. (2000). Retrieving positive memories to regulate negative mood: consequences for mood-congruent memory. *Journal of Personality and Social Psychology, 78*, 737–752. https://doi.org/10.1037/0022-3514.78.4.737.

Sakurai, S. (1997). Relationships of drinking motives and alcohol outcome expectancies to drinking-related behaviors and alcohol dependence. *Tsukuba Psychological Research, 19*, 111–128.

Smith, S. M., & Petty, R. E. (1995). Personality moderators of mood congruence effects on cognition: the role of self-esteem and negative mood regulation. *Journal of Personality and Social Psychology, 68*, 1092–1107. https://doi.org/10.1037/0022-3514.68.6.1092.

Stasiewicz, P. R., Bradizza, C. M., Schlauch, R. C., Coffey, S. F., Gulliver, S. B., Gudleski, G. D., & Bole, C. W. (2013). Affect regulation training (ART) for alcohol use disorders: development of a novel intervention for negative affect drinkers. *Journal of Substance Abuse Treatment, 45*, 433–443. https://doi.org/10.1016/j.jsat.2013.05.012.

Statistics Japan. (2018). A summary of average results from the 2017 Workforce Survey. *Somusho tokeikyoku.* Retrieved from http://www.stat.go.jp/data/roudou/rireki/nen/ft/pdf/2017.pdf

Tanaka, K. (2008). Kani kibun chosahyo nihongo ban (BMC-J) no shinraisei oyobi datosei no kento [The reliability & validity of Brief, Momentary Mood Checklist: Japanese version (BMC-J)]. *Journal of Osaka University of Economics, 58*, 271–275.

Tresno, F., Ito, Y., & Mearns, J. (2013). Risk factors for nonsuicidal self-injury in Japanese college students: the moderating role of mood regulation expectancies. *International Journal of Psychology, 48*, 1009–1017. https://doi.org/10.1080/00207594.2012.7333.

van Steenbergen, H., & Bocanegra, B. R. (2016). Promises and pitfalls of Web-based experimentation in the advance of replicable psychological science: a reply to plant (2015). *Behavior Research Methods, 48*, 1713–1717.

Whitehead, L. C. (2007). Methodological and ethical issues in Internet-mediated research in the field of health: an integrated review of the literature. *Social Science & Medicine, 65*, 782–791.

World Health Organization. (2014). Global status report on alcohol and health. Geneva, Switzerland. Retrieved from http://www.who.int/substance_abuse/publications/global_alcohol_report/en/