Evaluation of Web-Based Digital Intervention to Change Individual's Drinking Behaviours

Jowinn Chew, James Morris, Georgina Bartlett & Daniel Frings

Published online: 27 Jul 2024.

Submit your article to this journal ⍐

Article views: 68

View related articles ⍐

View Crossmark data ⍐

Evaluation of Web-Based Digital Intervention to Change Individual's Drinking Behaviours

Jowinn Chew PhD, James Morris PhD, Georgina Bartlett PhD, and Daniel Frings PhD

School of Applied Sciences, London South Bank University, London, UK

ABSTRACT

Alcohol Use Disorder is a complex and broad condition with multiple pathways to resolution. Only a small proportion of people with AUD seek formal treatment or support, whilst lower severity AUD is particularly under-addressed. In part, this reflects common misconceptions about AUD as an always severe condition requiring lifelong abstinence. The present study sought to investigate the impact of an online programme focused on supporting participants ($n = 928$) looking to change their drinking behaviors on outcomes of self-reported happiness with drinking and other well-being outcomes. Results showed that post-intervention, all participants reported significantly increased happiness with their drinking, greater drink-refusal self-efficacy, and improvements in how drinking impacted multiple well-being domains such as sleep and emotions. Importantly, it was found that all participants were happier with their drinking regardless of whether their goal was to abstain from drinking or to reduce their drinking. These results add to evidence highlighting the need to broaden the accessibility and range of options available to support a wider range of people with AUD, particularly via increasing understanding and acceptance of non-abstinent routes to AUD resolution.

Introduction

Approximately 1 in 4 adults in the UK regularly drink alcohol at levels above recommended lower-risk guidelines, accounting for significant health and social costs (Burton et al., 2016; NICE, 2010). Further, harms associated with Alcohol Use Disorder (AUD),[1] including alcohol-related deaths are expected to continue to rise following the COVID-19 pandemic (Angus et al., 2022; Garnett et al., 2021). Despite the significant public health burden associated with AUD, fewer than 1 in 6 people with severe AUD (i.e., moderate, or severe alcohol dependence) access structured alcohol treatment (Mekonen et al., 2021; Public Health England, 2017). Low treatment engagement has been attributed to a range of factors, particularly the heavy stigma associated with alcohol problems, low levels of problem recognition and people's desire to resolve problems on their own (Kilian et al., 2021; May et al., 2019; Morris et al., 2023a).

One factor behind high levels of AUD stigma and low treatment engagement is how alcohol problems are perceived by the public. Numerous accounts from individuals classified as "risky" or "heavy" drinkers (Davies et al., 2022; Larsen et al., 2023) the general public,

CONTACT Jowinn Chew ✉ Chewj2@lsbu.ac.uk 🏢 London South Bank University, London SE1 0AA, UK

and alcohol professionals (Melia et al., 2021) all show how people frame "problem drinkers" as an extreme minority in line with stereotypes of so-called "alcoholism," rather than as existing across a broad continuum of use and harms(Davies et al., 2022; Larsen et al., 2023; Melia et al., 2021; Morris et al., 2023a). This can impact people's engagement with alcohol reduction initiatives as they do not identify with the available representations of AUD or seek to avoid an association between themselves and extreme "alcoholism" stereotypes (Morris et al., 2023a).

To address this, the use of digital health interventions to treat a broader scope of AUD profiles has been increasingly available. This includes a range of digital and online-based programmes that range from behavior change-focused apps to online support forums (Chambers et al., 2017; Field et al., 2019; Kaner et al., 2017b). The effectiveness of such interventions is comparable to face-to-face treatments in the reduction of alcohol consumption (Bendtsen et al., 2022; Boumparis et al., 2019; Frings et al., 2020; Johansson et al., 2021; Kaner et al., 2017a). The anonymity and self-paced approach of digital interventions offers a more accessible option for hard-to-reach groups outside health settings (Gentili et al., 2022; Hyland et al., 2023) and those who are hesitant to engage with traditional face-to-face support (Boumparis et al., 2019; Gentili et al., 2022; Hyland et al., 2023; Kelemen et al., 2022; Schouten et al., 2023).

Another advantage of the wide scope of digital interventions available to the public is that they appear to reflect the diverse range of drinking behaviors by providing opportunities for those across the AUD spectrum to select or attempt moderation goals rather than only abstinence (Frings et al., 2018; Khadjesari et al., 2015; Morris et al., 2023b; Sanger et al., 2019). A significant body of literature spanning over 40 years shows that non-abstinent recovery (i.e., controlled drinking or moderation) is a significant and important component in the resolution of AUD (Henssler et al., 2020; Witkiewitz & Tucker, 2021). In a recent systematic review and meta-analysis, controlled drinking (the historically common term to describe moderation as a treatment or recovery outcome) was found to be non-inferior to abstinence (Henssler et al., 2020). Essentially, despite a widespread belief that abstinence is essential to recovery from alcohol dependence, the evidence clearly shows even a significant proportion of dependent drinkers are also suitable for – and do resolve their AUD via – moderation goals. Further evidence shows that even those who may not achieve moderation as defined by lower-risk drinking guidelines can still significantly improve a range of important outcomes via drinking reductions (Witkiewitz, Heather, et al., 2020; Witkiewitz, Pearson, et al., 2020). The importance of wider recognition and acceptability of moderation goals and "non-abstinent recovery" as valid and effective routes to resolving AUD has therefore been identified as a key public health goal (Morris et al., 2023b; Witkiewitz, Morris, et al., 2021). Online and digital interventions may be uniquely placed to provide the option for people to select their moderation or abstinence goals, due to increased ease of intervention personalization (Tong et al., 2021) compared to traditional, group-based interventions. Additionally, due to the anonymity of online interventions, people may feel free to indicate their goal of moderation without fear of judgment from a treatment group or professional because of the stigma associated with such goals (Morris et al., 2023b).

The current intervention under investigation offers individuals looking to change their drinking behaviors an opportunity to choose to focus on either abstinence or moderation. This is done by individuals choosing one of the two courses offered

online: "How to Stop Drinking," which focuses on abstinence, and "How to Drink Mindfully," which is designed for individuals who aim to reduce their drinking. This intervention is unique by the fact that we are not aware of any studies that have examined how drinking goals (i.e., abstinence versus moderation) as a component of these interventions may be associated with differences in AUD characteristics or outcomes. As such, in addition to evaluating the impact of this online, self-directed programme on various drinking and well-being outcomes as a whole using secondary data analysis, the current study also aims to investigate if individuals' happiness with their drinking behaviors differ depending on whether they chose to focus on abstinence or moderation.

Materials and methods

Design

This was a secondary data analysis to evaluate the efficacy of the online intervention (Club Soda) which was offered between March 2021 and August 2022. Data was collected by Club Soda during this period, and the anonymized data was passed onto London South Bank University for analysis at the end of August 2022. The data have not been published in other peer-reviewed journals. A within-subjects design was adopted, testing for differences across time. Outcome variables comprised self-report of drinking in the last seven days, withdrawal risk, impacts of drinking, confidence in maintaining goals and commitment to do so.

Sample selection

Participants were comprised of individuals who had voluntarily enrolled in either one of Club Soda's courses (HtSD & HtDM) between March 2021 and August 2022 ($n = 928$). When signing up for either course, all individuals had to agree to Club Soda's privacy policy (https://joinclubsoda.com/privacy/), which included the right to opt out of sharing their data for academic research.

Ethics

The current secondary data analysis was approved by the London South Bank University Research Ethics Committee (Ref: ETH2122–0108) and was pre-registered on Open Science Framework (https://osf.io/rgwuh/).

The intervention

Both courses offered by Club Soda ("How to Stop Drinking "and "How to Drink Mindfully") are comprised of 31 online lessons and 4 interim reviews (after lessons 7, 14, 21 and 28). Participants were encouraged to progress at their own pace and received daily motivational e-mail prompts encouraging them to continue.

Table 1. Data collected at each time point.

Time point	Data collected
Baseline	Age
	Gender
	Happiness with drinking
	Drinking in the last seven days
	Withdrawal risk
	Drinking refusal self-efficacy (adapted)
	Impacts
	Intention
	Confidence
	Commitment
Review 1	Drinking in the last seven days
	Impacts
	Intentions
	Confidence
	Commitment
Review 2	Drinking in the last seven days
	Impacts
	Intentions
	Confidence
	Commitment
Review 3	Drinking in the last seven days
	Impacts
	Intentions
	Confidence
	Commitment
Review 4	Drinking in the last seven days
	Impacts
	Intentions
	Confidence
	Commitment

Study flow

Participants provided demographic information and completed all measures at baseline (See Table 1). At the end of each lesson, participants completed the happiness with drinking measure. At each interim review, participants completed measures indicating their drinking in the last seven days, impacts, intentions, confidence, and commitment (See Table 1 below).

Measures

Primary outcome
Happiness with drinking. A sliding scale ranging from −5 (I feel completely unhappy) to + 5 (I feel completely happy), with 0.1. increments for the item "Overall, how happy are you with your drinking?." Happiness with drinking was chosen as a self-reported measure of how individuals feel about their drinking habits.

Secondary outcomes
Drinking in the last seven days. "Thinking about the last seven days, did you drink more or less alcohol than you normally would?" A Likert-type scale with response options: Much more (coded +2), A bit more (+1), About the same as normal (0), A bit less (− 1), Much less (−2), Not at all (−99).

Withdrawal risk. Three items, "Do you drink more than half a bottle of spirits, one and a half bottles of wine or six pints of beer every day?," "Do you have a drink soon after you wake up to relieve shakes or sweats?," "Have you had withdrawal symptoms (like sweating, shaking, feeling sick or anxious) in the past when cutting down or stopping drinking?" with a Yes/No option for each. One point is allocated for each "Yes" response. Higher total scores indicate a higher risk of withdrawal.

Drinking refusal self-efficacy (adapted). An adapted version of the drink refusal efficacy scale comprising 15 items, [1] When I am out to dinner, [2] When I am watching TV, [3] When I am angry, [4] When someone offers me a drink, [5] When I am having lunch, [6] When I feel frustrated, [7] When I am worried,[8] When I feel upset, [9] When I have finished work, [10] When I feel down, [11] When my partner is drinking, [12] When I am relaxing,[13] When my friends are drinking, [14] When I am by myself, [15] When I am at a pub, bar or club. Responses are measured on a sliding scale (−5, anchored at I definitely would not have a drink and + 5, anchored at I definitely would have a drink)., 0.1 increments). This measure is comprised of three subscales which are a sum score of the following items: Social efficacy (items [1], [4], [11], [13] and [15]), Emotional efficacy (items [3],[6], [7], [8], [10]) and Opportunistic efficacy), (items [2], [5], [9], [12], [14]). *Cronbach's alpha* was 0.85, 0.93, and 0.69 respectively in this study.

Impacts (energy, sleep, nutrition, emotions, relationships, social life, work, and money). "Changing your drinking can have an effect on other parts of your life. Overall, how are things going in these areas? Followed by a sliding scale anchored at −5 (things are going really bad) to + 5 (things are going really well) and measured in 0.1 increments. The impact measures are Energy, Nutrition, Emotions, Relationships, Social life, Work, and Money.

Intention. "How do you intend to change your drinking?," single choice response between 3 choices, "Be alcohol-free," "Moderate in some way," "Not sure."

Confidence. A single item, "How confident are you about changing your drinking?" measured on a −5 to + 5 sliding scale, in 0.1 increments, with no anchors.

Commitment. "How committed are you to changing your drinking?" measured on a −5 to + 5 sliding scale, in 0.1 increments, with no anchors.

Data analysis

To investigate if individuals' happiness with their drinking behaviors differed depending on whether they chose to focus on abstinence or moderation, a paired-sample t-test was conducted to compare scores on this measure between those who chose the "How to Stop Drinking" and "How to Drink Mindfully" course respectively.

To investigate the impact of the intervention on all individuals who used the Club Soda intervention, the outcomes of the two courses were collapsed together. Descriptive statistics were computed, and zero-order correlations were computed to

illustrate the relationships between all demographic and study variables. Additionally, ANOVAs were carried out on all study variables with lessons and review points as a within-subjects factor. If a main effect was found to be present, these were unpacked with Bonferroni-adjusted comparisons, comparing each timepoint to the previous session measure. Bootstrapping approaches were used to account for possible skews in data and outliers.

An attrition analysis was conducted using logistical regressions on attrition at each review point, predicted by intention (collected at baseline). A sensitivity analysis was undertaken by analyzing baseline intention (i.e., whether the individual chose to focus on abstinence or moderation, indicated by whether they chose the "How to Stop Drinking" and "How to Drink Mindfully" course respectively) and withdrawal risk as moderator variables. This was achieved using the Haye Process macro (Hayes, 2022).

Results

Participant characteristics

A sample of 928 participants was available for analysis. Descriptive statistics for demographic and study variables at baseline are presented in Table 2. Participants were predominantly female (77.59%) and on average approximately 50 years old ($M = 50.36$ years, $SD = 11.80$ years). Of the 926 participants who indicated how they intended to change their drinking behavior at baseline, 44.49% stated that they wanted to become "moderate in some way," 38.44% stated "be alcohol-free," and 17.06% stated "not sure."

Zero-order correlations were conducted to examine relations among demographic and study variables at baseline (see Table 3). Participants who reported being happier with their drinking at baseline indicated that they drank less alcohol than they normally would in the previous week, had a lower risk of withdrawal, higher drinking refusal self-efficacy, and minimal impact of alcohol across all life domains (energy, sleep, nutrition, emotions,

Table 2. Descriptive statistics for all demographic and study variables at baseline ($N = 928$).

Variable	Min	Max	Mean	SD
Age (years)	22	83	50.36	11.80
Happiness with drinking	−5	5	−2.88	2.22
Drinking in the last seven days	−99	2	−6.61	25.81
Withdrawal risk	0	3	0.30	0.60
Drinking refusal self-efficacy				
Social efficacy	−25	25	16.89	8.79
Emotional efficacy	−25	25	9.41	12.10
Opportunistic efficacy	−25	25	6.47	9.22
Impacts				
Energy	−5	5	−1.02	2.74
Sleep	−5	5	−0.90	2.99
Nutrition	−5	5	0.27	3.02
Emotions	−5	5	−1.35	2.63
Relationships	−5	5	0.18	2.98
Social life	−5	5	0.39	2.70
Work	−5	5	0.68	2.70
Money	−5	5	0.79	2.98
Confidence	−5	5	0.85	2.89
Commitment	−5	5	3.69	1.56

Table 3. Correlations between demographic and study variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
(1) Age	-																	
(1) Gender	-.06	-																
(1) Happiness with drinking	.06	-.00	-															
(1) Drinking in the last seven days	-.03	.02	-.23**	-														
(1) Withdrawal risk	-.08*	.11**	-.11**	.01	-													
(1) Drinking refusal self-efficacy (Social)	-.18**	-.02	-.10**	.06	-.08*	-												
(1) Drinking refusal self-efficacy (Emotional)	.02	-.08*	-.15**	.04	.17**	.15**	-											
(1) Drinking refusal self-efficacy (Opportunistic)	.10**	-.06	-.11**	.03	.16**	.29**	.48**	-										
(1) Impacts (Energy)	.13**	.01	.28**	-.17**	-.14**	-.00	-.14**	-.11**	-									
(1) Impacts (Sleep)	.02	.03	.25**	-.14**	-.12**	-.02	-.17**	-.15**	.60**	-								
(1) Impacts (Nutrition)	.21**	-.01	.22**	-.13**	-.18**	-.04	-.14**	-.16**	.56**	.40**	-							
(1) Impacts (Emotions)	.18**	-.05	.29**	-.12**	-.17**	-.7*	-.23**	-.09**	.54**	.46**	.48**	-						
(1) Impacts (Relationships)	.08*	-.15**	.19**	-.09**	-.20**	.03	-.17**	-.08*	.32**	.27**	.38**	.56**	-					
(1) Impacts (Social life)	.02	-.06	.12**	-.02	-.21**	.11**	-.21**	-.11**	.28**	.23**	.31**	.37**	.49**	-				
(1) Impacts (Work)	.11**	-.06	.11**	-.02	-.17**	.06	-.13**	-.00	.30**	.21**	.33**	.34**	.37**	.39**	-			
(1) Impacts (Money)	.22**	-.02	.15**	-.06	-.19**	.02	-.11**	-.08*	.29**	.21**	.38**	.32**	.36**	.34**	.48**	-		
(1) Confidence	-.09**	.01	.18**	-.18**	-.12	-.06	-.15**	-.14**	.16**	.11**	.11**	.10**	.04	.10**	.07*	.08*	-	
(1) Commitment	-.04	-.06	-.05	-.10**	-.02	.03	.05	-.00	.05	.01	.04	-.02	-.01	-.01	.06	.04	.39**	-

**p < .01, *p < .05.

Table 4. Happiness with drinking scores at baseline and post-intervention.

Course	Baseline M (SD)	Post-intervention M (SD)
HtSD	−3.21 (2.27)	−0.02 (3.61)
HtDM	−2.50 (2.11)	−0.25 (3.03)

Abbreviation: HtSD, How to Stop Drinking; HtDM, How to Drink Mindfully.

Table 5. Bonferroni comparison for happiness with drinking scores over time.

				95% CI	
Comparisons	Mean Score Difference	Std. Error	p	Lower Bound	Upper Bound
Lesson 23 vs. Baseline	4.97*	.637	.01	−9.17	−0.77
Lesson 24 vs. Baseline	5.37*	.712	.02	−10.06	−0.68
Lesson 25 vs. Baseline	5.37*	.742	.01	−10.76	−0.98
Lesson 26 vs. Baseline	5.97*	.757	.01	−10.96	−0.99
Lesson 27 vs. Baseline	5.87*	.807	.02	−11.18	−0.56
Lesson 28 vs. Baseline	5.97*	.834	.03	−11.46	−0.48
Lesson 29 vs. Baseline	6.17*	.816	.02	−11.54	−0.80
Lesson 30 vs. Baseline	6.37*	.807	.01	−11.68	−1.06
Lesson 31 vs. Baseline	6.47*	.836	.01	−11.98	−0.96

*$p < .05$.

relationships, social life, work, and money) and that they were confident in and committed to, changing their drinking behaviors.

Analysis of primary outcome measure

The paired-sample t-test revealed that there was a significant increase in happiness with drinking scores for all participants from baseline to post-intervention; t (927) = 22.79, $p < .001$ (95% CI, 0.11 to 0.24). There was no significant difference in happiness scores between participants who focused on abstinence ($M = −0.02$, $SD = 3.61$) compared to those who focused on reduction ($M = −0.25$, $SD = 3.03$); $t(926) = 1.03$, $p = .30$ (See Table 4) at post-intervention.

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean happiness with drinking scores differed significantly between time points (baseline & lessons 1–31) (F (3.30, 29.72) = 5.30, $p = .004$). Post hoc tests using the Bonferroni adjustment revealed that happiness with drinking scores significantly increased from baseline (pre-intervention) to lesson 23 ($p = .01$), lesson 24 ($p = .02$), lesson 25 ($p = .01$), lesson 26 ($p = .01$) lesson 27 ($p = .02$), lesson 28 ($p = .03$), lesson 29 ($p = .02$), lesson 30 ($p = .01$), and lesson 31 ($p = .01$) (See Table 5).

Analysis of secondary outcome measures

The following analyses report combined outcomes across the HtSD and HtDM groups and the following analyses are collapsed across conditions.

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean confidence scores showed a statistically significant difference between time points (baseline & review 1–4) (F (2.67,130.85) = 15.98, $p < .001$). Post hoc analysis with

a Bonferroni adjustment revealed that confidence scores significantly increased from baseline (pre-intervention) to review 2 (−1.70 (95% CI, −2.87 to −0.53), $p = .001$), review 3 (−2.17 (95% CI, −3.45 to −.88), $p < .001$), and review 4 (−2.44(95% CI, −3.73 to −1.14), $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean energy impact scores differed significantly between time points ($F(3.18, 158.81) = 31.22$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that energy impact scores significantly increased from baseline (pre-intervention) to review 1 (−2.07 (95% CI, −3.13 to −1.01), $p < .001$), review 2 (−2.14 (95% CI, −3.74 to −1.09), $p = .001$), review 3 (−2.95 (95% CI, −4.00 to −1.89), $p < .001$), and review 4 (−3.66 (95% CI, −4.86 to −2.45), $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean sleep impact scores differed significantly between time points ($F(2.99,149.35) = 27.67$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that sleep impact scores significantly increased from baseline (pre-intervention) to review 1 (−1.83 (95% CI, −3.16 to −0.51), $p = .002$), review 2 (−2.92 (95% CI, −4.10 to −1.74), $p < .001$), review 3 (−2.92 (95% CI, −4.25 to −1.60), $p < .001$), and review 4 (−3.54 (95% CI, −4.74 to −2.33), $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean nutrition impact scores differed significantly between time points ($F(2.78, 138.85) = 8.48$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that nutrition impact scores significantly increased from baseline (pre-intervention) to review 3 (−1.41 (95% CI, −2.62 to −0.21). $p = .012$), and review 4 (−1.79(95% CI, −2.96 to −0.63). $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean emotions impact scores differed significantly between time points ($F(3.21, 160.64) = 19.23$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that emotional impact scores significantly increased from baseline (pre-intervention) to review 1 (−1.61 (95% CI, −2.77 to −0.46). $p = .001$), review 2 (−2.01 (95% CI, −3.31 to −0.70). $p < .001$), review 3 (−2.54 (95% CI, −3.81 to −1.27). $p < .001$), and review 4 (−3.13 (95% CI, −4.47 to −1.79). $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean relationships impact scores differed significantly between time points ($F(3.10, 155.04) = 9.42$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that relationships impact scores significantly increased from baseline (pre-intervention) to review 1 (−1.13 (95% CI, −2.20 to −0.06), $p = .031$), review 2 (−1.38 (95% CI, −2.65 to −0.12), $p = .023$), review 3 (−1.47 (95% CI, −2.70 to −.25), $p = .009$), and review 4 (−1.99 (95% CI, −3.15 to −.84), $p < .001$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean social impact scores differed significantly between time points ($F(3.30, 165.21) = 4.47$, $p = .004$). Post hoc analysis with a Bonferroni adjustment revealed that social life impact scores significantly increased from baseline (pre-intervention) to review 4 (−1.31(95% CI, −2.43 to −.19). $p = .012$).

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean work impact scores differed significantly between time points ($F(3.25, 162.69) = 8.11$, $p < .001$). Post hoc analysis with a Bonferroni adjustment revealed that work impact scores significantly increased from baseline (pre-intervention) to review 4 (−2.00(95% CI, −3.17 to −.82). $p < .001$).

Table 6. Bonferroni comparison for confidence and impact scores over time.

Variable	Comparisons	Mean Score Difference	Std. Error	p	95% CI Lower Bound	95% CI Upper Bound
Confidence	Review 1 vs. Baseline	−.934	.404	.249	−2.120	.252
	Review 2 vs. Baseline	−1.698*	.399	.001	−2.871	−.525
	Review 3 vs. Baseline	−2.166*	.438	.000	−3.454	−.878
	Review 4 vs. Baseline	−2.436*	.441	.000	−3.732	−1.140
Impacts (Energy)	Review 1 vs. Baseline	−2.069*	.360	.000	−3.127	−1.010
	Review 2 vs. Baseline	−2.414*	.450	.000	−3.735	−1.092
	Review 3 vs. Baseline	−2.945*	.359	.000	−3.998	−1.892
	Review 4 vs. Baseline	−3.657*	.411	.000	−4.864	−2.450
Impacts (Sleep)	Review 1 vs. Baseline	−1.831*	.451	.002	−3.157	−.506
	Review 2 vs. Baseline	−2.918*	.402	.000	−4.097	−1.738
	Review 3 vs. Baseline	−2.920*	.453	.000	−4.249	−1.590
	Review 4 vs. Baseline	−3.539*	.409	.000	−4.740	−2.338
Impacts (Nutrition)	Review 1 vs. Baseline	−.661	.373	.824	−1.756	.434
	Review 2 vs. Baseline	−.820	.421	.570	−2.055	.416
	Review 3 vs. Baseline	−1.412*	.410	.012	−2.616	−.207
	Review 4 vs. Baseline	−1.790*	.397	.000	−2.955	−.625
Impacts (Emotions)	Review 1 vs. Baseline	−1.614*	.392	.001	−2.765	−.462
	Review 2 vs. Baseline	−2.006*	.444	.000	−3.309	−.702
	Review 3 vs. Baseline	−2.539*	.432	.000	−3.808	−1.271
	Review 4 vs. Baseline	−3.129*	.458	.000	−3.808	−1.271
Impacts (Relationships)	Review 1 vs. Baseline	−1.129*	.364	.031	−2.198	−.061
	Review 2 vs. Baseline	−1.380*	.430	.023	−2.645	−.116
	Review 3 vs. Baseline	−1.473*	.416	.009	−2.695	−.250
	Review 4 vs. Baseline	−1.992*	.393	.000	−3.147	−.837
Impacts (Social life)	Review 1 vs. Baseline	−.576	.296	.569	−1.445	.292
	Review 2 vs. Baseline	−.810	.378	.371	−1.921	.301
	Review 3 vs. Baseline	−.975	.342	.064	−1.980	.031
	Review 4 vs. Baseline	−1.310*	.382	.012	−2.430	−.189
Impacts (Work)	Review 1 vs. Baseline	−.659	.354	.686	−1.699	.381
	Review 2 vs. Baseline	−.916	.383	.206	−2.040	.209
	Review 3 vs. Baseline	−1.139	.453	.152	−2.471	.192
	Review 4 vs. Baseline	−1.998*	.400	.000	−3.174	−.822
Impacts (Money)	Review 1 vs. Baseline	−.727	.291	.158	−1.583	.128
	Review 2 vs. Baseline	−1.018	.394	.128	−2.175	.140
	Review 3 vs. Baseline	−1.067	.404	.111	−2.254	.121
	Review 4 vs. Baseline	−1.584*	.391	.002	−2.732	−.437

*$p < .05$.

A repeated measures ANOVA with a Greenhouse-Geisser correction determined that mean money impact scores differed significantly between time points ($F(2.69, 134.40) = 6.46$, $p=.001$). Post hoc analysis with a Bonferroni adjustment revealed that money impact scores significantly increased from baseline (pre-intervention) to review 4 (−1.58(95% CI, −2.73 to −.44). $p= .002$) (See Table 6).

In summary, participant impact scores changed significantly over time. Specifically, changes in energy, sleep, emotions, and relationships impact scores can be observed from review 1, changes in nutrition impact scores from review 3, and social life, work, and money impact scores from review 4.

Attrition analysis

Logistical regression was performed to investigate the effects of intention (i.e., whether the individual chose to focus on abstinence or moderation) and withdrawal risk at baseline on attrition at each review point. Results of the logistic regression indicated that individuals who reported a higher risk of withdrawal at baseline had higher attrition rates at review 2

only $\chi2(3) = 8.70$, $p = .034$. There were no significant associations between intention and attrition at any review point.

Sensitivity analysis

A series of moderated multiple regressions were conducted to predict the number of lessons completed by participants from baseline scores of 1) happiness with drinking, 2) drinking in the last seven days, 3) drinking refusal self-efficacy, 4) impacts, 5) confidence, and 6) commitment, with baseline intention and withdrawal risk serving as moderator variables. The analyses revealed that no interaction terms were statistically significant in the model.

  1) Happiness with drinking

  The interaction term was not statistically significant ($b= -1.95$, $s.e. = 1.44$, $p = .19$, 95% CI $[-4.90, 1.01]$) in the model, indicating that withdrawal risk was not a significant moderator of the effect of happiness with drinking on the number of lessons completed. Similarly, intention (baseline) was not a significant moderator of the effect of happiness with drinking on the number of lessons completed, as the interaction term was not statistically significant ($b = 0.50$, $s.e. = 0.82$, $p = .55$, 95% CI $[-1.19, 2.19]$) in the model.

  2) Drinking in the last seven days

  The interaction term was not statistically significant ($b= -2.22$, $s.e. = 1.75$, $p = .22$, 95% CI $[-5.83, 1.38]$) in the model, indicating that withdrawal risk was not a significant moderator of the effect of drinking in the last seven days on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of drinking in the last seven days on the number of lessons completed, as the interaction term was not statistically significant ($b = 3.46$, $s.e. = 2,52$, $p = .18$, 95% CI $[-1.72, 8.64]$) in the model.

  3) Drinking refusal self-efficacies

Social efficacy

The interaction term was not statistically significant ($b = 0.02$, $s.e. = 0.25$, $p = .93$, 95% CI $[-0.49, 0.53]$) in the model, indicating that withdrawal risk was not a significant moderator of the effect of social efficacy on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of social efficacy on the number of lessons completed, as the interaction term was not statistically significant ($b= -0.10$, $s.e. = 0.42$, $p = .82$, 95% CI $[-0.96, 0.77]$) in the model.

Emotional efficacy

The interaction term was not statistically significant ($b = 0.13$, $s.e. = 0.17$, $p = .44$, 95% CI $[-0.21, 0.47]$) in the model, indicating that withdrawal risk was not a significant moderator of the effect of emotional efficacy on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of emotional efficacy on the number of lessons completed, as the interaction term was not statistically significant ($b = 0.19$, $s.e. = 0.27$, $p = .48$, 95% CI $[-0.35, 0.74]$) in the model.

Opportunity efficacy

The interaction term was not statistically significant ($b= -0.03$, $s.e. = 0.18$, $p = .85$, 95% CI $[-0.40, 0.33]$) in the model, indicating that withdrawal risk was not a significant moderator of the effect of opportunity efficacy on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of opportunity efficacy on the

number of lessons completed, as the interaction term was not statistically significant (b= −0.08, $s.e.$ = 0.28, p = .77, 95% CI [−0.65, 0.49]) in the model.

4) Impacts

Energy

The interaction term was not statistically significant (b = 0.31, $s.e.$ = 0.83, p = .71, 95% CI [−1.40, 2.02]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of energy impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of energy impact on the number of lessons completed, as the interaction term was not statistically significant (b= −0.48, $s.e.$ = 0.92, p = .61, 95% CI [−2.38, 1.41]) in the model.

Sleep

The interaction term was not statistically significant (b = 0.18, $s.e.$ = 0.78, p = .82, 95% CI [−1.43, 1.78]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of sleep impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of sleep impact on the number of lessons completed, as the interaction term was not statistically significant (b = 0.30, $s.e.$ = 0.84, p = .72, 95% CI [−1.42, 2.03]) in the model.

Nutrition

The interaction term was not statistically significant (b = 0.63, $s.e.$ = 0.69, p = .37, 95% CI [−0.80, 2.05]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of nutrition impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of nutrition impact on the number of lessons completed, as the interaction term was not statistically significant (b = 0.07, $s.e.$ = 0.70, p = .93, 95% CI [−1.37, 1.50]) in the model.

Emotions

The interaction term was not statistically significant (b = 0.29, $s.e.$ = 0.79, p = .71, 95% CI [−1.33, 1.92]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of emotions impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of emotions impact on the number of lessons completed, as the interaction term was not statistically significant (b= −0.30, $s.e.$ = 0.91, p = .74, 95% CI [−2.18, 1.57]) in the model.

Relationships

The interaction term was not statistically significant (b= −0.62, $s.e.$ = 0.71, p = .39, 95% CI [−2.09, 0.84]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of relationships impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of relationships impact on the number of lessons completed, as the interaction term was not statistically significant (b = 0.82, $s.e.$ = 0.86, p = .35, 95% CI [−0.94, 2.57]) in the model.

Social life

The interaction term was not statistically significant (b= −0.85, $s.e.$ = 0.53, p = .12, 95% CI [−1.93, 0.23]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of social life impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of social life impact on the number of lessons completed, as the interaction term was not statistically significant (b= −0.18, $s.e.$ = 0.83, p = .83, 95% CI [−1.89, 1.54]) in the model.

Work

The interaction term was not statistically significant (b = 0.64, $s.e.$ = 1.03, p = .53, 95% CI [−1.46, 2.75]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of work impact on the number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of work impact on the number of lessons completed, as the interaction term was not statistically significant (b= −1.19, $s.e.$ = 1.18, p = .32, 95% CI [−3.61, 1.22]) in the model.

Money

The interaction term was not statistically significant (b = 0.35, $s.e.$ = 0.99, p = .73, 95% CI [−1.69, 2.38]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of money impact on number of lessons completed. Similarly, intention (at baseline) was not a significant moderator of the effect of money impact on the number of lessons completed, as the interaction term was not statistically significant (b= −0.34, $s.e.$ = 0.89, p = .70, 95% CI [−2.17, 1.49]) in the model.

   5) Confidence

   The interaction term was not statistically significant (b = 0.82, $s.e.$ = 0.74, p = .28, 95% CI [−0.71, 2.35]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of confidence on the number of lessons completed. Similarly, intention (baseline) was not a significant moderator of the effect of confidence on the number of lessons completed, as the interaction term was not statistically significant (b = 0.35, $s.e.$ = 0.72, p = .63, 95% CI [−1.13, 1.82]) in the model.

   6) Commitment

   The interaction term was not statistically significant (b = 1.86, $s.e.$ = 1.30, p = .16, 95% CI [−0.81, 4.53]) in the model, indicating that withdrawal risk was not a significant moderator of the effect of commitment on the number of lessons completed. Similarly, intention (baseline) was not a significant moderator of the effect of commitment on the number of lessons completed, as the interaction term was not statistically significant (b = 0.28, $s.e.$ = 1.49, p = .85, 95% CI [−2.79, 3.34]) in the model.

Discussion

The current study aimed to evaluate the efficacy of Club Soda's platform on drinking behavior and other well-being outcomes. It was found that all individuals who used Club Soda reported being significantly happier with their drinking behaviors by post-intervention compared to baseline. Importantly, it was revealed that this was the case regardless of whether individuals chose to focus on abstinence or moderation goals. These findings are in line with previous research which has indicated that interventions aimed at reducing

alcohol intake are no less effective in improving outcomes for people looking to change their drinking behavior (Henssler et al., 2021; Witkiewitz, Kranzler, et al., 2021). This further highlights the importance of recognizing reduction/moderation goals as an equally legitimate route to resolving AUD in addition to abstinence (Henssler et al., 2021). Several approaches have been proposed to further such goals, including promoting a more diverse range of "lived experience" accounts that reflect non-abstinent recovery and promoting a continuum-aligned model of alcohol use and problems amongst the general public.

It was also revealed post-intervention that all individuals who used Club Soda were more confident in changing their drinking behaviors, and improvements in how drinking impacted various domains in their lives (energy, sleep, nutrition, emotions, relationships, social life, work, work, and money) by the end of the intervention. In comparison with the growing number of other digital AUD interventions, the current online intervention is novel in that it targets people's perceptions of their drinking behaviors and the impact their drinking has on their lives. Contrastingly, the majority of similar interventions have focused on modifying drinking behaviors in terms of the number of drinks in a week/frequency of heavy episodic drinking/binge. The choice to not directly measure participants' levels of alcohol consumption pre-and-post-intervention was made by Club Soda deliberately, given that the current study focused on the psychological and social factors around drinking behavior rather than the quantity of alcohol consumed. However, given that reduction in alcohol use is frequently associated with improvements to various psychological and social outcomes, future evaluations of Club Soda's courses may be strengthened with measures of alcohol consumption (e.g., total consumption and heavy episodic drinking frequency), be that via self-report, or objective measures.

Given that significant improvements to happiness with drinking were not observed until lesson 23 across both groups and reviews 1 and 2 for impacts and confidence respectively (which requires participants to complete at least 7 lessons to reach that point), this indicates that individuals may need to engage with to the majority of the program to gain positive effects and is therefore consistent with the evidence of behavior change as a process of change (Donkin et al., 2011; Winter et al., 2022). This is aided by the fact that this is an online intervention, which improves accessibility and reduces barriers frequently associated with traditional face-to-face treatment (Andréasson et al., 2013; Ekström et al., 2020; Murray et al., 2012; Schuler et al., 2015).

There are several limitations to the present study. First, data was collected online through a self-report method and therefore may reflect recall bias and social desirability. Despite this, reliance on self-report measures is standard in alcohol treatment interventions (Deady et al., 2016). Secondly, no standardized measures were used and were developed internally by Club Soda. Future work would benefit from the use of previously validated measures to assess the outcomes investigated in the current study. Third, no control group was allocated in the current study and therefore any changes in participant's reported levels of happiness with drinking, confidence, and impacts may be the result of a nonspecific effect of engaging in any form of intervention. Fourth, the efficacy of the current intervention was not directly compared to a similar face-to-face treatment. Therefore, we are unable to draw any conclusions regarding whether the current online intervention was non-inferior to a traditional counterpart, and more research is required in this area. Finally, attrition in the current study was also high (for trials, but not for usual delivery of online interventions in the field), with a 62.28%,

81.03%, 90.30%, and 93.97% attrition rate at reviews 1,2,3 & 4 respectively. High attrition rates are consistently cited as a major limitation in research on similar online interventions, ranging from 19% to 82% (Bendtsen et al., 2022; Finfgeld-Connett & Madsen, 2008; Johansson et al., 2017; Martinez-Montilla et al., 2020; Postel et al., 2010; Riper et al., 2008; Schouten et al., 2023; Vangrunderbeek et al., 2022) However, the high rates observed in the current study are surprising considering the features included in the courses designed to maintain participant engagement. For instance, participants received daily motivational e-mails encouraging them to continue their course and were invited to engage in a private messaging group via Telegram and to attend weekly group discussions on Zoom. Attrition analyses revealed that the likelihood of a participant dropping out at each review point did not depend on their withdrawal risk or intention at baseline. Therefore, more work is required to determine the reasons behind attrition, and which factors govern the maintenance of engagement for the current intervention (Demartini et al., 2014; Radtke et al., 2017).

Fifth, participants were not asked about their withdrawal risk and drinking refusal self-efficacy at any other time points aside from baseline, and therefore any fluctuations in participant's withdrawal risk were unable to be tracked, and it is unknown how consistently participants were able to resist drinking alcohol over the intervention period. Finally, there were no follow-ups implemented in the current study after completing either course, therefore, whether changes to participant's drinking behaviors were maintained remains unknown. Future research will need to assess the effects over time before the long-term efficacy of this form of intervention can be determined (Vangrunderbeek et al., 2022). Despite these limitations, the current study adds to the literature by providing support for the efficacy of an online, mindfulness-based alcohol intervention and highlights the importance of recognizing moderation goals and "non-abstinent recovery" as a valid and effective option for individuals with AUD aiming to modify their drinking behavior.

This evaluation revealed that engaging in the online intervention had positive outcomes for participants, such as improvements in well-being-related measures and behavioral-related outcomes including drink refusal self-efficacy. Additionally, these outcomes for participants did not differ regardless of whether they selected abstinence or drinking reduction/moderation as their goal. Future research is required to investigate if these changes are maintained long-term and to address attrition issues that were present in this study. The current findings highlight the importance of increasing the acceptability and availability of non-abstinent-based understandings and support options for AUD.

Note

1. We refer to AUD as any level of alcohol use above the recommended guidelines, consistent with NICE/AUDIT approaches (Babor et al., 2001; NICE, 2010), but differently to the DSM-5 (American Psychiatric Association, 2013).

Acknowledgments

Disclosure statement

Funding

Data availability statement

The pre-registration plan, materials, and analysis plan are available in the Open Science Framework: https://osf.io/rgwuh/.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association. http://psychiatryonline.org/doi/book/10.1176/appi.books. 9780890425596.

Andréasson, S., Finn, S. W., & Bakshi, A.-S. (2013). Barriers to treatment for alcohol dependence: A qualitative study. *Addiction Science & Clinical Practice*, 8(S1). https://doi.org/10.1186/1940-0640-8-S1-A5

Angus, C., Henney, M., & Pryce, R. (2022). *Modelling the impact of changes in alcohol consumption during the COVID-19 pandemic on future alcohol-related harm in England*. ScHARR, University of Sheffield.

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). AUDIT - The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care. (2 nd ed.). World Health Organization. https://www.who.int/publications/i/item/WHO-MSD-MSB-01.6a.

Bendtsen, M., Åsberg, K., & McCambridge, J. (2022). Effectiveness of a digital intervention versus alcohol information for online help-seekers in Sweden: A randomised controlled trial. *BMC Medicine*, 20(1), 1–13. https://doi.org/10.1186/s12916-022-02374-5

Boumparis, N., Schulte, M. H. J., & Riper, H. (2019). Digital mental health for alcohol and substance use disorders. *Current Treatment Options in Psychiatry*, 6(4), 352–366. https://doi.org/10.1007/S40501-019-00190-Y

Burton, R., Henn, C., & Lavoie, D. (2016). The public health burden of alcohol and the effectiveness and cost-effectiveness of alcohol control policies: An evidence review.

Chambers, S. E., Canvin, K., Baldwin, D. S., & Sinclair, J. M. A. A. (2017). Identity in recovery from problematic alcohol use: A qualitative study of online mutual aid. *Drug & Alcohol Dependence*, 174, 17–22. https://doi.org/10.1016/j.drugalcdep.2017.01.009

Davies, E., Lewin, J., & Field, M. (2022). Am I a responsible drinker? The impact of message frame and drinker prototypes on perceptions of alcohol product information labels. *Psychology & Health*, 39(8), 1005–1022. https://doi.org/10.1080/08870446.2022.2129055

Deady, M., Mills, K. L., Teesson, M., & Kay-Lambkin, F. (2016). An online intervention for Co-occurring depression and problematic alcohol use in young people: Primary outcomes from a randomized controlled trial. *Journal of Medical Internet Research*, 18(3), e71. https://doi.org/10.2196/JMIR.5178

Demartini, K. S., Devine, E. G., Diclemente, C. C., Martin, D. J., Ray, L. A., & O'Malley, S. S. (2014). Predictors of pretreatment commitment to abstinence: Results from the COMBINE study. *Journal of Studies on Alcohol and Drugs*, 75(3), 438. https://doi.org/10.15288/JSAD.2014.75.438

Donkin, L., Christensen, H., Naismith, S. L., Neal, B., Hickie, I. B., & Glozier, N. (2011). A systematic review of the impact of adherence on the effectiveness of e-therapies. *Journal of Medical Internet Research*, *13*(3), e52. https://doi.org/10.2196/jmir.1772

Ekström, V., Johansson, M., & Johansson, M. (2020). Choosing internet-based treatment for problematic alcohol use—why, when and how? users' experiences of treatment online. *Addiction Science & Clinical Practice*, *15*(1), 1–11. https://doi.org/10.1186/s13722-020-00196-5

Field, M., Campbell, F., Hock, E., & Wong, R. (2019). Digital interventions to reduce alcohol-related harm: A rapid horizon-scanning review.

Finfgeld-Connett, D., & Madsen, R. (2008). Web based treatment of alcohol problems among rural women: Results of a randomized pilot investigation. *Journal of Psychosocial Nursing and Mental Health Services*, *46*(9), 46. https://doi.org/10.3928/02793695-20080901-05

Frings, D., Hogan, C. J., Jn-Pierre, K. H., Wood, K. V., Holmes, M., & Albery, I. P. (2018, December 15). Online and face-to-face extended brief interventions for harmful alcohol use: Client characteristics, attendance and treatment outcomes. *Counselling Psychology Quarterly*, *33*(3), 415–426. https://doi.org/10.1080/09515070.2018.1555516

Frings, D., Hogan, C. J., Jn-Pierre, K. H., Wood, K. V., Holmes, M., & Albery, I. P. (2020). Online and face-to-face extended brief interventions for harmful alcohol use: Client characteristics, attendance and treatment outcomes. *Counselling Psychology Quarterly*, *33*(3), 415–426. https://doi.org/10.1080/09515070.2018.1555516

Garnett, C., Jackson, S., Oldham, M., Brown, J., Steptoe, A., & Fancourt, D. (2021). Factors associated with drinking behaviour during COVID-19 social distancing and lockdown among adults in the UK. *Drug & Alcohol Dependence*, *219*, 108461. https://doi.org/10.1016/j.drugalcdep.2020.108461

Gentili, A., Failla, G., Melnyk, A., Puleo, V., Tanna, G. L., DiRicciardi, W., & Cascini, F. (2022). The cost-effectiveness of digital health interventions: A systematic review of the literature. *Frontiers in Public Health*, *10*, 787135. https://doi.org/10.3389/fpubh.2022.787135

Hayes, A. F. (2022). *From Guilford introduction to mediation, moderation, and conditional process analysis AF2E*. 7006, 9–10. https://www.guilford.com/books/Introduction-to-Mediation-Moderation-and-Conditional-Process-Analysis/Andrew-Hayes/9781462549030

Henssler, J., Müller, M., Carreira, H., Bschor, T., Heinz, A., & Baethge, C. (2020). Controlled drinking—non-abstinent versus abstinent treatment goals in alcohol use disorder: A systematic review, meta-analysis and meta-regression. *Addiction*, *116*(8), 1973–1987. https://doi.org/10.1111/add.15329

Henssler, J., Müller, M., Carreira, H., Bschor, T., Heinz, A., & Baethge, C. (2021). Controlled drinking—non-abstinent versus abstinent treatment goals in alcohol use disorder: A systematic review, meta-analysis and meta-regression. *Addiction*, *116*(8), 1973–1987. https://doi.org/10.1111/ADD.15329

Hyland, K., Hammarberg, A., Hedman-Lagerlöf, E., Johansson, M., Lindner, P., & Andreasson, S. (2023). The efficacy of an internet-based cognitive behavioral program added to treatment-as-usual for alcohol-dependent patients in primary care: A randomized controlled trial. *Addiction*, *118*(7), 1232–1243. https://doi.org/10.1111/ADD.16157

Johansson, M., Sinadinovic, K., Gajecki, M., Lindner, P., Berman, A. H., Hermansson, U., & Andréasson, S. (2021). Internet-based therapy versus face-to-face therapy for alcohol use disorder, a randomized controlled non-inferiority trial. *Addiction*, *116*(5), 1088–1100. https://doi.org/10.1111/ADD.15270

Johansson, M., Sinadinovic, K., Hammarberg, A., Sundström, C., Hermansson, U., Andreasson, S., & Berman, A. H. (2017). Web-based self-help for problematic alcohol use: A large naturalistic study. *International Journal of Behavioral Medicine*, *24*(5), 749–759. https://doi.org/10.1007/S12529-016-9618-Z

Kaner, E. F., Beyer, F. R., Garnett, C., Crane, D., Brown, J., Muirhead, C., Redmore, J., O'Donnell, A., Newham, J. J., de Vocht, F., Hickman, M., Brown, H., Maniatopoulos, G., & Michie, S. (2017a). Personalised digital interventions for reducing hazardous and harmful alcohol consumption in community-dwelling populations. *Cochrane Database of Systematic Reviews*, *9*(9). https://doi.org/10.1002/14651858.CD011479.PUB2

Kaner, E. F., Beyer, F. R., Garnett, C., Crane, D., Brown, J., Muirhead, C., Redmore, J., O'Donnell, A., Newham, J. J., de Vocht, F., Hickman, M., Brown, H., Maniatopoulos, G., & Michie, S. (2017b). Personalised digital interventions for reducing hazardous and harmful alcohol consumption in community-dwelling populations. *Cochrane Database of Systematic Reviews*, *2017*(9). John Wiley & Sons, Ltd. https://doi.org/10.1002/14651858.CD011479.pub2

Kelemen, A., Minarcik, E., Steets, C., & Liang, Y. (2022). Telehealth interventions for alcohol use disorder: A systematic review *. *Liver Research*, *6*(3), 146–154. https://doi.org/10.1016/j.livres.2022.08.004

Khadjesari, Z., Stevenson, F., Godfrey, C., & Murray, E. (2015). Negotiating the "grey area between normal social drinking and being a smelly tramp": A qualitative study of people searching for help online to reduce their drinking. *Health Expectations*, *18*(6), 2011–2020. https://doi.org/10.1111/hex.12351

Kilian, C., Manthey, J., Carr, S., Hanschmidt, F., Rehm, J., Speerforck, S., & Schomerus, G. (2021). Stigmatization of people with alcohol use disorders: An updated systematic review of population studies. *Alcoholism, Clinical and Experimental Research*, *45*(5), 899–911. https://doi.org/10.1111/acer.14598

Larsen, J., Christmas, S., & Souter, A. (2023). Perceptions of alcohol health harm among midlife men in England: A qualitative interview study. *Health, Risk & Society*, *25*(5–6), 216–233. https://doi.org/10.1080/13698575.2022.2138833

Martinez-Montilla, J. M., Mercken, L., De Vries, H., Candel, M., Lima-Rodríguez, J. S., & Lima-Serrano, M. (2020). A web-based, computer-tailored intervention to reduce alcohol consumption and binge drinking among Spanish adolescents: Cluster randomized controlled trial. *Journal of Medical Internet Research*, *22*(1), e15438. https://doi.org/10.2196/15438

May, C., Nielsen, A. S., & Bilberg, R. (2019). Barriers to treatment for alcohol dependence. *Journal of Drug and Alcohol Research*, *8*(2), 1–17. https://doi.org/10.4303/jdar/236083

Mekonen, T., Chan, G. C. K., Connor, J., Hall, W., Hides, L., & Leung, J. (2021). Treatment rates for alcohol use disorders: A systematic review and meta-analysis. *Addiction*, *116*(10), 2617–2634. https://doi.org/10.1111/add.15357

Melia, C., Kent, A., Meredith, J., & Lamont, A. (2021). Constructing and negotiating boundaries of morally acceptable alcohol use: A discursive psychology of justifying alcohol consumption. *Addictive Behaviors*, *123*, 107057. https://doi.org/10.1016/j.addbeh.2021.107057

Morris, J., Boness, C. L., & Burton, R. (2023a). (Mis)understanding alcohol use disorder: Making the case for a public health first approach. *Drug & Alcohol Dependence*, *253*, 111019. https://doi.org/10.1016/j.drugalcdep.2023.111019

Morris, J., Cox, S., Moss, A. C., & Reavey, P. (2023b). Drinkers like us? The availability of relatable drinking reduction narratives for people with alcohol use disorders. *Addiction Research & Theory*, *31*(1), 1–8. https://doi.org/10.1080/16066359.2022.2099544

Murray, E., Linke, S., Harwood, E., Conroy, S., Stevenson, F., & Godfrey, C. (2012). Widening access to treatment for alcohol misuse: Description and formative evaluation of an innovative web-based service in one primary care trust. *Alcohol & Alcoholism*, *47*(6), 697–701. https://doi.org/10.1093/ALCALC/AGS096

NICE. (2010). Alcohol-use disorders: Prevention [PH24].

Postel, M. G., De Haan, H. A., Ter Huurne, E. D., Becker, E. S., & De Jong, C. A. J. (2010). Effectiveness of a web-based intervention for problem drinkers and reasons for dropout: Randomized controlled trial. *Journal of Medical Internet Research*, *12*(4), E68. *https://Www.Jmir.Org/2010/4/E68*, *12*(4), e1642. https://doi.org/10.2196/JMIR.1642

Public Health England. (2017). *Alcohol: Applying all our health*. Guidance Paper. https://www.gov.uk/government/publications/alcohol-applying-all-our-health/alcohol-applying-all-our-health

Radtke, T., Ostergaard, M., Cooke, R., & Scholz, U. (2017). Web-based alcohol intervention: Study of systematic attrition of heavy drinkers. *Journal of Medical Internet Research*, *19*(6), e217. https://doi.org/10.2196/JMIR.6780

Riper, H., Kramer, J., Smit, F., Conijn, B., Schippers, G., & Cuijpers, P. (2008). Web-based self-help for problem drinkers: A pragmatic randomized trial. *Addiction (Abingdon, England)*, *103*(2), 218–227. https://doi.org/10.1111/J.1360-0443.2007.02063.X

Sanger, S., Bath, P. A., & Bates, J. (2019). 'Someone like me': User experiences of the discussion forums of non-12-step alcohol online support groups, June 2019. *Addictive Behaviors*, *98*, 106028. https://doi.org/10.1016/j.addbeh.2019.106028

Schouten, M. J. E., Derksen, M. E., Dekker, J. J. M., Goudriaan, A. E., & Blankers, M. (2023). Preferences of young adults on the development of a new digital add-on alcohol intervention for depression treatment: A qualitative study. *Internet Interventions*, *33*, 100641. https://doi.org/10.1016/J.INVENT.2023.100641

Schuler, M. S., Puttaiah, S., Mojtabai, R., & Crum, R. M. (2015). Perceived barriers to treatment for alcohol problems: A latent class analysis. *Psychiatric Services (Washington, DC)*, *66*(11), 1221–1228. https://doi.org/10.1176/APPI.PS.201400160

Tong, H. L., Quiroz, J. C., Kocaballi, A. B., Fat, S. C. M., Dao, K. P., Gehringer, H., Chow, C. K., & Laranjo, L. (2021). Personalized mobile technologies for lifestyle behavior change: A systematic review, meta-analysis, and meta-regression. *Preventive Medicine*, *148*, 106532. https://doi.org/10.1016/j.ypmed.2021.106532

Vangrunderbeek, A., Raveel, A., Matheï, C., Claeys, H., Aertgeerts, B., & Bekkering, G. (2022). Effectiveness of guided and unguided online alcohol help: A real-life study. *Internet Interventions*, *28*, 100523. https://doi.org/10.1016/J.INVENT.2022.100523

Winter, N., Russell, L., Ugalde, A., White, V., & Livingston, P. (2022). Engagement strategies to improve adherence and retention in web-based mindfulness programs: Systematic review. *Journal of Medical Internet Research*, *24*(1), e30026. https://doi.org/10.2196/30026

Witkiewitz, K., Heather, N., Falk, D. E., Litten, R. Z., Hasin, D. S., Kranzler, H. R., Mann, K. F., O'Malley, S. S., & Anton, R. F. (2020). World Health Organization risk drinking level reductions are associated with improved functioning and are sustained among patients with mild, moderate and severe alcohol dependence in clinical trials in the United States and United Kingdom. *Addiction*, *115*(9), 1668–1680. https://doi.org/10.1111/add.15011

Witkiewitz, K., Kranzler, H. R., Hallgren, K. A., Hasin, D. S., Aldridge, A. P., Zarkin, G. A., Mann, K. F., O'Malley, S. S., & Anton, R. F. (2021). Stability of drinking reductions and long-term functioning among patients with alcohol use disorder. *Journal of General Internal Medicine*, *36*(2), 404–412. https://doi.org/10.1007/s11606-020-06331-x

Witkiewitz, K., Morris, J., & Tucker, J. A. (2021). Commentary on Henssler et al.: The public health case for promoting and valuing drinking reductions in the treatment of alcohol use disorder. *Addiction*, *116*(8), 1988–1989. https://doi.org/10.1111/add.15429

Witkiewitz, K., Pearson, M. R., Wilson, A. D., Stein, E. R., Votaw, V. R., Hallgren, K. A., Maisto, S. A., Swan, J. E., Schwebel, F. J., Aldridge, A., Zarkin, G. A., & Tucker, J. A. (2020). Can alcohol use disorder recovery include some heavy drinking? A replication and extension up to nine years following treatment. *Alcoholism, Clinical and Experimental Research*, *44*(9), 1862–1874. https://doi.org/10.1111/acer.14413

Witkiewitz, K., & Tucker, J. A. (2021). Dynamic pathways to recovery from alcohol use disorder. In A. T. Jalie & K. Witkiewitz (Eds.), *Dynamic pathways to recovery from alcohol use disorder* (pp. 415–426). Cambridge University Press. https://doi.org/10.1017/9781108976213.030