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RESEARCH REPORT

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Cognitive style and drinking to cope: A prospective cohort study

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Abstract

Background and Aims: Having a negative cognitive style may lead someone to feel hopeless about his or her situation and be more likely to engage in coping-motivated drinking. We, therefore, aimed to investigate the association between cognitive style and drinking to cope.

Design: Prospective cohort study.

Setting: The former Avon Health Authority in South West England.

Participants: A total of 1681 participants of the Avon Longitudinal Study of Parents and Children.

Measurements: Participants completed cognitive style questions at age 17 and a subset of drinking to cope questions at age 24. We used linear regression to test the association between cognitive style and drinking to cope, controlling for confounders. Alcohol consumption and dependence scales were included in a secondary analysis.

Findings: A 20-point increase (that was the standard deviation of the exposure variable) in cognitive style score at age 17 was associated with an increase of 0.24 in drinking to cope scores at age 24 after adjustment for confounding variables (95% CI) = 0.08–0.41, $P = 0.003$). We found no evidence of an association between cognitive style and alcohol consumption (coefficient = 0.03, 95% CI = −0.08–0.14, $P = 0.591$) before or after adjustment. There was evidence for an association with alcohol dependence, but this was not present after adjusting for confounders (coefficient = 0.01, 95% CI = −0.04–0.05, $P = 0.769$).

Conclusions: In young adults in England, there appears to be a positive association between negative cognitive style and subsequent drinking to cope.

KEYWORDS
Alcohol use, ALSPAC, birth cohort, cognitive style, drinking to cope, learned helplessness, longitudinal, negative attributions

INTRODUCTION

Problematic alcohol use often starts during adolescence [1,2]. Although long-term heavy drinking can lead to problems such as stroke [3], cancer [4] and heart disease [5], it is also linked to mental health problems, relationship breakdowns, impaired social relationships and employment dismissal [6]. Reducing hazardous alcohol use in early life is

important and may prevent later development of alcohol-related problems.

Different motivational factors for drinking can produce different patterns of use and health outcomes, so exploring the motivations to drink would inform interventions to support those most at-risk of alcohol-related problems [7]. Research has found the association between alcohol use and mental health problems in young people is because of problematic use of alcohol as opposed to the quantity consumed [8]. Using alcohol to cope with problems can increase the risk of long term alcohol-related problems compared to other drinking motivations such as to socialise [9, 10], and this association is maintained even when controlling for alcohol consumption [11]. Mental health problems such as depression and anxiety may increase the likelihood of drinking to cope, because of people using alcohol to deal with underlying negative emotions and problems. [12, 13]. It is possible that coping-motivated drinking provides short-term relief from symptoms of low mood, therefore, negatively reinforcing the idea of drinking to cope. However, although alcohol use may provide relief from depression in the short-term, research has found that those who use substances to cope, even at subclinical levels, are less likely to work on their difficulties [14] meaning their depression may be less likely to improve. Moreover, people who use substances to cope with their difficulties are at higher risk of worsening depression over time [15]. It is likely that this population may be stuck in a 'vicious cycle', where depression is causing higher alcohol use, which in turn is causing higher levels of depression. It is important to investigate risk factors for coping-motivated drinking so that interventions can be targeted to support people before their drinking becomes problematic.

Existing evidence from the depression literature has suggested that negative cognitive style can create an underlying vulnerability to environmental stressors and increases risk of later depression [16]. Cognitive style is based on the hopelessness theory of depression and explores the causal attributions for negative life events. For example, if someone with a negative cognitive style fails a test, they may attribute this to internal factors (i.e. 'I am stupid'), stable factors (i.e. 'I will never pass') and global factors (i.e. 'I fail at everything'). Negative cognitive styles are associated with later depressed mood [17,18] and anxiety [19, 20]. It is possible that someone with a negative cognitive style may engage in more negative coping strategies, such as alcohol misuse, because of the mechanism of learned helplessness [21]. Learned helplessness is the idea that someone has no control over negative situations, and is largely linked to negative cognitive style [21]. Making internal, global and stable attributions to events could result in a feeling of helplessness and inability to change, and therefore, may make someone more likely to engage in negative coping behaviours. There is also a link between alcohol use and helplessness [22] and uncontrollable events [23]. Therefore, it is possible that negative cognitive style increases likelihood of drinking through the mechanism of learned helplessness.

To our knowledge, only one study has examined the relationship between cognitive style and drinking to cope [24]. An association was found between negative cognitive style and higher drinking to cope, however the study used a convenience sample of university students (n = 182), and the study was cross-sectional so a temporal relationship could not be assessed. Longitudinal research is needed in a larger, more representative sample.

This study investigated the prospective association between cognitive style at age 17 and drinking to cope at age 24. To our knowledge this is the first cohort study examining whether negative cognitive style is associated with later drinking to cope. We also examined alcohol consumption and dependence, as secondary outcomes.

METHOD

Sample

We used data from the Avon Longitudinal Study of Parents and Children (ALSPAC) [25–27].

The children of pregnant women residing in Avon, United Kingdom (UK), with expected dates of delivery 1 April 1991 to 31 December 1992 were invited to take part in the study. A total of 14 449 participants were included in our core sample (50% male, 47% female, 3% sex not known; 92% white, 3% non-white, 5% ethnicity unknown).

Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees. Informed consent for the use of data collected via questionnaires and clinics was obtained from participants following the recommendations of the ALSPAC Ethics and Law Committee at the time. The study website (http://www.bristol.ac.uk/alspac/researchers/our-data/) contains details of all the data that is available.

MEASURES

Drinking to cope

A subset from the Drinking Motives questionnaire [7] comprising of drinking to cope questions was administered at age 24 at the 'Focus@24 Clinic' (α = 0.85). This consisted of five questions asking participants how often in the last 2 years they have used alcohol to relax, forget their worries, cheer up, cope with depression/nervousness and feel more self-confident. We modified the original questionnaire by splitting the depression/nervousness item into two separate questions, and also adding two items assessing how often the participant uses alcohol because their mood changes a lot and because they have nothing better to do. A preliminary polychoric correlation showed no evidence of the original items being more strongly associated with cognitive style or with the other items on the drinking to cope scale. A factor analysis also demonstrated that 97% of the variance of this scale can be explained using the single dimension. The participants each question on a 4-point Likert Scale, rating from 0 (almost never), 1 (sometimes), 2 (often) and 3 (almost always).

The total scores could, therefore, range between 0 and 24. Non-drinkers were assigned a score of 0; high scores indicated a higher likelihood of drinking to cope. Mean scores and standard deviations for each item on the drinking to cope scale are shown in Supporting information Table S1.

Alcohol consumption/dependence

The Alcohol Use Disorders Identification Test (AUDIT) [28] consumption and dependence measures were administered to the participants at age 24 at the 10th Focus Clinic. The original questionnaire consists of 10 Likert scales that are split alcohol consumption, alcohol dependence and alcohol-related problems—we, therefore, explored the alcohol consumption and dependence measures separately. Both measures consisted of three questions where the participants scored between 0 and 4, meaning total scores for each measure ranged from 0 to 12. Non-drinkers were assigned a score of 0; higher scores indicated higher consumption/dependence levels.

The primary and secondary outcome measures were collected using the REDCap tool: https://projectredcap.org/resources/citations/.

Cognitive style questionnaire short-form

The Cognitive Style Questionnaire Short-Form (CSQ-SF) [29] was administered to participants at age 17 years. Participants to imagine themselves in eight negative situations (i.e. 'imagine you are getting along badly with your parents'), and rate whether the event was caused by internal vs external, global vs specific and stable vs unstable factors, and the extent to which this reflects their self-worth. All factors were rated on a Likert scale from 1 to 5, meaning that total scores ranged from 72 to 360. Higher scores indicated a more negative cognitive style.

Potential confounders

We adjusted for the following potential confounders [18, 30]: sex, parental social class (based on the Registrar's General classification and grouped into manual and non-manual; when the social class of each parent differed the higher level was taken), maternal education (measured by the mother's highest qualification level when the child was born), maternal depression (measured using the Edinburgh Postnatal Depression Scale [31]) and maternal age (measured in years when the child was born). We also adjusted for depression and anxiety at 17 (both measured by the Revised Clinical Interview Schedule [32]), alcohol use at 17 (measured by the AUDIT-10 [28]) and drinking to cope score at 17. Depression, anxiety and alcohol use were added to the model as a separate set of adjustments because we cannot exclude the possibility that they were on the causal pathway from negative cognitive style to drinking to cope.

Statistical analyses

Statistical analysis was conducted on Stata Version 16. The analysis was not pre-registered and therefore, these results should be considered exploratory.

RESULTS

Descriptive statistics

We divided the CSQ-SF scores by the median and reported sample characteristics for all variables according to CSQ-SF scores, using complete data. We repeated these descriptive statistics using all available data for all participants (regardless of whether they had complete data for the exposure, outcomes and confounders) to explore any differences for complete cases compared with all available cases.

Primary outcome

Linear regression models were used for the primary and secondary analysis. Although the drinking to cope score was positively skewed, parametric assumptions were assumed to be met because of the large sample size and the fact that the residuals were normally distributed. Histograms for the distribution of raw scores and residuals for the drinking to cope scale, AUDIT-consumption and AUDIT-dependence measures are shown in Supporting information Figures S1–S6.

We first conducted a linear regression with the drinking to cope scale as a continuous outcome and CSQ-SF scores as a continuous exposure. We divided the CSQ-SF by 20, its standard deviation, to produce a larger coefficient. The analysis was carried out before and after adjustment for confounders. We calculated the effect sizes for each mode by dividing the mean difference of the outcome by the standard deviation of the outcome. Next, we split the CSQ-SF scores into tertiles, and completed a second analysis with the drinking to cope outcome and the CSQ-tertile variable, to allow for an inspection of non-linearity. We did not report *P* values for the comparison of the tertiles as *P* values from subgroups can be unreliable [33]. Finally, we included a quadratic term into the model for each outcome to explore the linearity of the relationship between our exposure and outcome.

Univariable models were run unadjusted, and then were adjusted for: sex, parental social class, maternal education, maternal depression and maternal age. After this we included depression, anxiety, alcohol use and baseline drinking to cope score.

We also re-ran our analysis using the three subscales of the CSQ (internality, globality and stability) to explore any difference.

Secondary outcomes

For the secondary analysis, we repeated the above analyses, using the AUDIT-consumption and AUDIT-dependence scores in two

separate models as our outcome measures. Although the AUDIT-consumption measure was normally distributed, the AUDIT-dependence measure was positively skewed. However, it was decided that linear regressions would be used throughout the secondary analysis because of the large sample size and the normal distribution of the residuals.

Sensitivity analyses

We repeated our main analysis excluding any non-drinkers (people that scored 0 on the AUDIT-consumption scale) to ensure that this sample did not skew any associations found. We split all outcome measures; first, by a median split, and then by the top 20% compared to bottom 80% and we re-ran our analysis using logistic regression, with the same adjustments as in the main analysis.

We also repeated our analysis using the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria [34] for alcohol dependence as our outcome measure using data from the complete case sample.

Missing data

To address the possibility that missing data biased our results, we re-ran our all our models using a sample based on everyone with complete exposure data and imputed missing data in the primary and secondary outcome and the confounder data, increasing the sample size to 3881. We used multiple imputations by chained equations and imputed 50 data sets [35]. Our imputation models included all variables used in the main analysis plus auxiliary variables. The auxiliary variables used were the Moods and Feeling Questionnaire scores (ages 10 years, 12 years, 13 years, 17 years, 18 years, 22 years, 22 years and 11 months and 23 years) [36], maternal smoking during pregnancy, maternal alcohol use (before pregnancy, during the first 3 months of pregnancy and during the final 2 months of pregnancy), young person's alcohol dependence and abuse levels (ages 20 and 22) [34], young person's age at first drink and young person's alcohol expectancies (age 24) [37].

RESULTS

Descriptive statistics

Our final sample included 1681 complete cases (those with data for exposure, outcomes and confounding variables) (Figure 1). Comparisons between the complete cases and the rest of the ALSPAC sample are shown in Supporting information Table S2.

People with higher CSQ-SF scores had higher depression, anxiety, AUDIT and drinking to cope scores at 17 (Table 1). Descriptive data showing the association between CSQ-SF scores and each confounding variable for all available cases are shown in Supporting information Table S3.

Drinking to cope

Drinking to cope scores ranged from 0 to 19, with a mean of 4.24 (SD = 3.51).

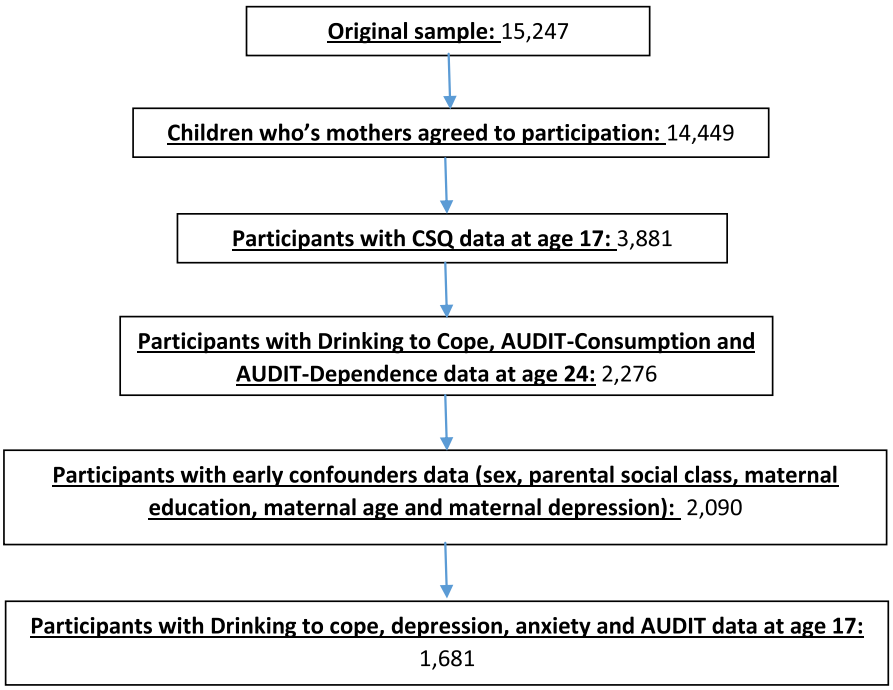

FIGURE 1 Flow of participants through the study

TABLE 1 Characteristics of the sample across high and low CSQ-SF scores for complete cases

	CSQ-SF score above median (range = 162–273) n = 852	CSQ-SF score below median (range = 92–161) n = 829	*P value*[a]
Parent variables			
Mean maternal age	30.0 (SD = 4.5)	29.7 (SD = 4.4)	0.197
Manual parental social class	315 (37%)	279 (34%)	0.155
Low maternal education[b]	374 (44%)	402 (49%)	0.059
High maternal depression[c]	121 (14%)	118 (14%)	0.985
Young person variables			
Female	551 (65%)	542 (62%)	0.256
High drinking to cope score at age 17[d]	435 (51%)	314 (38%)	<0.0001
High depression diagnosis score from CIS-R at age 17[d]	546 (64%)	356 (43%)	<0.001
High anxiety score diagnosis from CIS-R at age 17[d]	501 (59%)	346 (42%)	<0.0001
Hazardous/harmful drinking at age 17[e]	366 (43%)	297 (36%)	0.003

Abbreviation: SD, standard deviation.
[a]The *P* value was calculated using a *t* test for continuous data (maternal age). The *P* value was calculated using a χ^2 test for all binary data (parental social class, maternal education, maternal depression, sex, drinking to cope at 17, depression at 17, anxiety at 17 and AUDIT score at 17.
[b]No A-level or degree qualification.
[c]EPDS score >10.
[d]Based on median split.
[e]AUDIT score >7.

In the unadjusted model, an increase in CSQ-SF score was associated with an increase in the drinking to cope score, with a small effect size (coefficient = 0.64, 95% CI = 0.47–0.80, effect size = 0.15, $P < 0.001$). After adjusting for all potential confounders, the magnitude of the association attenuated, but the evidence remained strong (coefficient = 0.24, 95% CI = 0.08–0.41, effect size = 0.06 $P = 0.003$) (Table 2). Our findings were similar when the CSQ-SF was split into low, medium and high tertiles (Table 2).

When repeating the analysis using the three subscales of the CSQ, we found that stability had the largest association (coefficient = 1.03, 95% CI = 0.51–1.54, $P < 0.001$), followed by globality (coefficient = 0.60–, 95% CI = 0.04–1.16, $P = 0.036$), and that internality did not appear to have an association on drinking to cope (coefficient = −0.10, 95% CI = −0.65–0.45, $P = 0.720$) (Supporting information Tables S4–S6).

AUDIT-consumption and AUDIT-dependence

We found no evidence for an association between CSQ-SF score and AUDIT-consumption score in either the unadjusted model (coefficient = 0.05, 95% CI = −0.06–0.16, effect size = 0.01, $P = 0.351$) and when adjusting for all confounders in the same model (coefficient = 0.03, 95% CI = −0.08–0.14, effect size = 0.01, $P = 0.591$) (Table 3). There was also no evidence for an association when the CSQ was split into low, medium and high tertiles (Table 3).

We found some evidence of an association between an increase in CSQ-SF and an increase in AUDIT-dependence score, with a small effect size (coefficient = 0.06, 95% CI = 0.02–0.11, effect size = 0.01, $P = 0.006$). However, after adjusting for all potential confounders, this association attenuated (coefficient = 0.01, 95% CI = −0.04–0.03, effect size = 0.002, $P = 0.769$). The main confounders to alter this association were depression, anxiety and AUDIT score at age 17 (Table 4). Our finding remained similar when examining the CSQ-SF in low, medium and high tertiles (Table 4).

When repeating the analysis using the DSM-dependence scale as our outcome measure, we found no evidence for a relationship between cognitive style and DSM alcohol dependence score (Supporting information Table S7).

We repeated our findings excluding non-drinkers ($n = 163$) and did not find any differences in our findings. We also repeated the analysis using logistic regression, after creating binary outcomes for the drinking to cope, AUDIT-consumption and AUDIT-dependence. The results of the analysis showed no differences in findings depending on the statistical method used (Supporting information Tables S8–S13). There was also no evidence for a non- linear relationship between the CSQ-SF and drinking to cope ($P = 0.397$), AUDIT-consumption ($P = 0.666$) and AUDIT-dependence ($P = 0.240$).

Results based on the imputed sample were the same as to those found using the non-imputed data (Supporting information Tables S14–S22).

DISCUSSION

We found that a more negative cognitive style at 17 was associated with higher drinking to cope scores at 24, with a small effect size, and this remained after adjusting for confounders. However, we did not find evidence of an association between cognitive style at 17 and alcohol consumption or dependence at 24.

TABLE 2 Change/mean difference (95% CI) in drinking to cope score according to CSQ as a continuous variable and in tertiles

	n	*Model 1[a]: univariable*	*Model 2[b]: Model 1 adjusted for potential confounders*	*Model 3[c]: Model 2 further adjusted for depression at 17*	*Model 4[d]: Model 2 further adjusted for anxiety at 17*	*Model 5[e]: Model 2 further adjusted for alcohol use at 17*	*Model 6[f]: Model 2 further adjusted for depression, anxiety, alcohol use and drinking to cope at 17*
CSQ increase of 20	1681	0.64 (0.47–0.80) $P < 0.001$	0.60 (0.44–0.77) $P < 0.001$	0.45 (0.28–0.63) $P < 0.001$	0.47 (0.30–0.64) $P < 0.001$	0.53 (0.37–0.69) $P < 0.001$	0.24 (0.08–0.41) $P = 0.003$
CSQ tertiles							
CSQ (low)	554 (32.96%)	Reference category	Reference category	Reference category	Reference category	Reference category	Reference category
CSQ (medium)	564 (33.55%)	0.63 (0.23–1.03)	0.60 (0.19–1.00)	0.50 (0.10–0.90)	0.53 (0.13–0.93)	0.57 (0.18–0.96)	0.46 (0.10–0.83)
CSQ (high)	563 (33.49%)	1.49 (1.09–1.90)	1.43 (1.03–1.83)	1.13 (0.71–1.54)	1.17 (0.76–1.58)	1.28 (0.89–1.67)	0.79 (0.41–1.17)

Abbreviation: CI, confidence interval.
[a]CSQ and drinking to cope unadjusted.
[b]CSQ and drinking to cope adjusted for sex, parental social class, maternal age, maternal education and maternal depression.
[c]CSQ and drinking to cope adjusted for sex, parental social class, maternal age, maternal education, maternal depression and depression at 17.
[d]CSQ and drinking to cope adjusted for sex, parental social class, maternal age, maternal education, maternal depression and anxiety at 17.
[e]CSQ and drinking to cope adjusted for sex, parental social class, maternal age, maternal education, maternal depression and alcohol use at 17.
[f]CSQ and drinking to cope adjusted for sex, parental social class, maternal age, maternal education, maternal depression, drinking to cope at 17, depression at 17, anxiety at 17 and alcohol use at 17.

TABLE 3 Change/mean difference (95% CI) in in AUDIT-Consumption score according to CSQ as a continuous variable and in tertiles

	n	*Model 1[a]: univariable*	*Model 2[b]: Model 1 adjusted for potential confounders*	*Model 3[c]: Model 2 further adjusted for depression at 17*	*Model 4[d]: Model 2 further adjusted for anxiety at 17*	*Model 5[e]: Model 2 further adjusted for alcohol use at 17*	*Model 6[f]: Model 2 further adjusted for depression, anxiety, alcohol use and drinking to cope at 17*
CSQ increase of 20	1681	0.05 (−0.06–0.16) $P = 0.351$	0.04 (−0.07–0.15) $P = 0.436$	0.07 (−0.04–0.19) $P = 0.213$	0.08 (−0.04–0.19) $P = 0.184$	−0.03 (−0.13–0.07) $P = 0.585$	0.03 (−0.08–0.14) $P = 0.591$
CSQ tertiles							
CSQ (low)	554 (32.96%)	Reference category	Reference category	Reference category	Reference category	Reference category	Reference category
CSQ (medium)	564 (33.55%)	0.20 (−0.07–0.47)	0.16 (−0.10–0.43)	0.18 (−0.08–0.45)	0.18 (−0.09–0.45)	0.14 (−0.11–0.39)	0.18 (−0.06–0.43)
CSQ (high)	563 (33.49%)	0.25 (−0.02–0.52)	0.23 (−0.04–0.50)	0.29 (−0.01–0.57)	0.29 (0.02–0.57)	0.09 (−0.16–0.34)	0.21 (−0.05–0.47)

Abbreviation: CI, confidence interval.
[a]CSQ and AUDIT-consumption cope unadjusted.
[b]CSQ and AUDIT-consumption adjusted for sex, parental social class, maternal age, maternal education and maternal depression.
[c]CSQ and AUDIT-consumption adjusted for sex, parental social class, maternal age, maternal education, maternal depression and depression at 17.
[d]CSQ and AUDIT-consumption adjusted for sex, parental social class, maternal age, maternal education, maternal depression and anxiety at 17.
[e]CSQ and AUDIT-consumption adjusted for sex, parental social class, maternal age, maternal education, maternal depression and alcohol use at 17.
[f]CSQ and AUDIT-consumption adjusted for sex, parental social class, maternal age, maternal education, maternal depression, drinking to cope at 17, depression at 17, anxiety at 17 and alcohol use at 17.

TABLE 4 Change/mean difference (95% CI) AUDIT-dependence score according to CSQ as a continuous variable and in tertiles

	n	*Model 1[a]: univariable*	*Model 2[b]: Model 1 adjusted for potential confounders*	*Model 3[c]: Model 2 further adjusted for depression at 17*	*Model 4[d]: Model 2 further adjusted for anxiety at 17*	*Model 5[e]: Model 2 further adjusted for alcohol use at 17*	*Model 6[f]: Model 2 further adjusted for depression, anxiety, alcohol use and drinking to cope at 17*
CSQ increase of 20	1681	0.06 (0.02–0.11) *P* = 0.006	0.06 (0.01–0.10) *P* = 0.010	0.04 (−0.01–0.08) *P* = 0.115	0.04 (−0.01–0.08) *P* = 0.120	0.03 (−0.01–0.07) *P* = 0.132	0.01 (−0.04–0.05) *P* = 0.769
CSQ tertiles							
CSQ (low)	554 (32.96%)	Reference category	Reference category	Reference category	Reference category	Reference category	Reference category
CSQ (medium)	564 (33.55%)	0.08 (−0.02–0.19)	0.07 (−0.04–0.18)	0.06 (−0.05–0.17)	0.06 (−0.05–0.17)	0.07 (−0.04–0.17)	0.06 (−0.05–0.16)
CSQ (high)	563 (33.49%)	0.16 (0.04–0.27)	0.16 (0.05–0.26)	0.11 (−0.00–0.23)	0.12 (0.01–0.23)	0.10 (0.00–0.21)	0.06 (−0.04–0.17)

Abbreviation: CI, confidence interval.
[a]CSQ and AUDIT-dependence unadjusted.
[b]CSQ and AUDIT-dependence adjusted for sex, parental social class, maternal age, maternal education and maternal depression.
[c]CSQ and AUDIT-dependence adjusted for sex, parental social class, maternal age, maternal education, maternal depression and depression at 17.
[d]CSQ and AUDIT-dependence adjusted for sex, parental social class, maternal age, maternal education, maternal depression and anxiety at 17.
[e]CSQ and AUDIT-dependence adjusted for sex, parental social class, maternal age, maternal education, maternal depression and alcohol use at 17.
[f]CSQ and AUDIT-dependence adjusted for sex, parental social class, maternal age, maternal education, maternal depression, drinking to cope at 17, depression at 17, anxiety at 17 and alcohol use at 17.

Strengths and limitations

To our knowledge, this is the first study examining the association between cognitive style and drinking to cope using a prospective cohort study. We adjusted for a wide range of confounders, and the use of multiple outcome measures, including the drinking to cope, AUDIT and DSM-Dependence scale captures the different aspects of alcohol use, allows for a deeper understanding of the nature of the relationship with cognitive style.

A limitation of the study is that the sample may not fully represent the general population, because the Avon area has a high socioeconomic status. Although we controlled for social class throughout, it would be useful to replicate our research in a less affluent area, because alcohol use is related to lower socioeconomic status [38]. The ALSPAC study is also subject to high attrition. Although we ran multiple imputations to replace missing data, which had little influence on the results, the imputed sample would still be less representative than the broader ALSPAC sample. However, within cohort associations should remain valid even when the sample is not truly representative of the population. Residual confounding can never be ruled out in an observational study so we cannot be sure of causality in this investigation [39].

The ALSPAC study measured our exposure and outcome measures at 17 and 24, and we, therefore, did not have data to explore any patterns in cognitive style or drinking to cope between these ages. Nonetheless, age 17 is a time when high alcohol use is common [40], and by age 24 people have most people have more responsibilities and therefore, may be a time when heavy drinking first becomes problematic [41], meaning this is still an appropriate age group to use for this research.

One possibility is for a cyclical relationship between cognitive style and drinking to cope (i.e. drinking to cope could lead to social consequences that make people feel more out of control, leading them to make more negative attributions), and therefore, the link between cognitive style and drinking to cope could be more complex than our findings suggest. Some other psychological processes, such as affect dysregulation, could also have been potential confounders [42, 43]. Additionally, we were not able to repeat our analysis using alternative measures of drinking motives aside from drinking to cope scores. Although our drinking to cope measure had good internal consistency, we did not have access to the individual data points for our exposure and secondary outcomes, so could not explore internal consistency for these measures.

Depression, anxiety and alcohol use could be on the causal pathway, so adjusting for these could result in over adjustment and attenuating the relationship between our exposure and outcomes (because of mediation rather than confounding) [44]. Additionally, the difference in wording in the drinking to cope and AUDIT measures may have introduced measurement bias. The AUDIT questions are worded so that participants have to rate themselves on an objective timescale (i.e. never/less than monthly/monthly/weekly/daily or almost daily), whereas the drinking to

cope scale asks participants to hypothetically score themselves on a Likert Scale (i.e. almost never/often/sometimes/almost always). Although both measures have good evidence individually, the difference in wording may lead participants with a negative cognitive style to rate themselves higher on the subjective drinking to cope scale, but not on the objective AUDIT scales, causing differences in our outcome measures.

Mechanisms

The relationship between cognitive style and drinking to cope could be explained by the mechanism of learned helplessness [21]. If someone has a negative cognitive style, this could foster a feeling of helplessness and inability to change, which could explain the decision to use alcohol over alternative coping methods. The fact that the stability subscale had the largest effect on drinking to cope could lead someone to believe that negative events will always happen to them, further exacerbating the idea of learned helplessness. As drinking to cope is also associated with negative mental health outcomes [12, 13], these higher rates of negative outcomes could reinforce learned helplessness and negative cognitive style, further increasing coping-motivated drinking.

Our finding that cognitive style did not appear to be related to alcohol consumption could be explained by the fact mental health problems are more strongly associated with problem-use of alcohol, but not necessarily the amount of alcohol consumed [8]. It is important to emphasise that the AUDIT asks about frequency of alcohol use, whereas one can endorse items on the DMQ even if alcohol is used infrequently. Previous research has linked heavy alcohol use with extraversion [45]. However extraverts are less likely to drink for coping motives [46] and are less likely to develop other mental health problems associated with cognitive style [47, 48]. Therefore, it is possible that many of the participants drink alcohol for various motives such as social motives, but would not be considered as having an alcohol-related problem or a vulnerability to depression.

Our finding that there did not appear to be an association between cognitive style and alcohol dependence once depression, anxiety and baseline alcohol use were adjusted for was surprising. One possible explanation is that alcohol dependence occurs later in life so an association may not be demonstrated at the age of 24. However, another possibility is that the questions asked (i.e. 'were you able to stop drinking once you have started?') may be too extreme. For example, a person who scores low on the AUDIT-dependence scale may experience other difficulties associated with alcohol dependence, such as problems with relationships or lowering their self-esteem, which would not have been captured by the AUDIT-dependence questions. Further research is needed in this area to establish whether cognitive style is related to alcohol dependence, and if so, what underlying mechanisms support this.

Clinical implications

Our finding that negative cognitive style is associated with later drinking to cope has a number of implications. It may be useful to identify people with a negative cognitive style at a young age before they start using alcohol and provide alternatives ways of coping with difficulties and discourage them to engage in coping-motivated drinking. Because cognitive style is associated with other mental health problems, such intervention could lead to broader benefits. There is evidence that cognitive style can be altered using cognitive behavioural therapy (CBT) [49, 50], and that CBT for other mental disorders also reduces problem drinking [51, 52]. There is, therefore, scope for people seeking help for alcohol problems to target their negative cognitive style using CBT, so that they engage in healthier coping behaviours.

CONCLUSIONS

Our research found evidence for a relationship between cognitive style and drinking to cope. Our findings point toward changes that can be made to support those at risk of problematic drinking now and in the future, helping individuals lead a better quality of life, and relieving some of the financial burden of alcohol problems on the National Health Service (NHS).

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DECLARATION OF INTERESTS

None

AUTHOR CONTRIBUTIONS

Emma Corcoran: Conceptualization; formal analysis; methodology. **Gemma Lewis:** Conceptualization; data curation; formal analysis; methodology; supervision. **Jon Heron:** Data curation; funding acquisition; resources. **Matthew Hickman:** Data curation; funding acquisition; resources. **Glyn Lewis:** Conceptualization; formal analysis; methodology; supervision.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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