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Is alcohol use associated with psychological treatment attendance and clinical outcomes?

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Abstract

Objectives: To investigate associations between alcohol use, psychological treatment attendance and clinical outcomes.

Methods: We analysed electronic health records for *N*=7,986 patients accessing psychological treatment for common mental disorders. Data were collected for pre-treatment alcohol use (average units per week) and severity of dependence (SDS), number of therapy contacts attended, pre- and post-treatment anxiety (GAD-7) and depression (PHQ-9) symptom severity. Hierarchical regression was used to examine associations between alcohol use/dependence and post-treatment symptom severity controlling for intake severity and relevant confounders.

Results: After controlling for confounders, alcohol use had significant nonlinear associations with pre-treatment depression severity (R^2 =0.54, p<0.01, cubic trend), and post-treatment anxiety (R^2 =0.23, p<0.01, quadratic trend). Alcohol use was not significantly associated with intake anxiety, post-treatment depression or treatment duration. SDS was not significantly associated with depression severity, alcohol severity, or total contacts after controlling for confounders.

Conclusion: Alcohol users are just as likely to engage in and benefit from evidence-based psychological treatments for depression in primary care. A nonlinear association between alcohol use and anxiety treatment outcomes indicates that light-to-moderate drinkers have some shared characteristic that favours treatment response.

Key words: alcohol; depression; anxiety; comorbidity; dual diagnosis

1. Background

It has been estimated that around 19.7% of UK adults drink alcohol at levels above the recommended guidance (Drummond, McBride, Fear, & Fuller, 2016). According to epidemiological surveys, heavy alcohol users often have a co-occurring mental health problem (Merikangas et al., 1998; McManus et al., 2016; Teesson et al., 2012). In particular, depression and anxiety symptoms commonly co-occur with dependent alcohol use. Numerous studies investigating the association between depression severity and alcohol use have reported curvilinear (e.g., quadratic) associations where abstainers and heavy drinkers tend to be more severely depressed than light-to-moderate drinkers (e.g., Alati et al., 2005; Caldwell et al., 2002; Skogen, Harvey, Henderson, Stordal, & Mykletun, 2009). As such, the association between alcohol use and depression severity appears to be complex and nonlinear. It has been proposed that alcohol use may be used as a way to supress mental health symptoms (i.e., disturbing thoughts or memories), to downregulate intolerable emotions, or to upregulate desirable emotions (i.e., pleasure, feeling more confident in public). These explanations for this form of comorbidity are found in the literature on self-medication (Khantzian, 1985), experiential avoidance (Forsyth, Parker, & Finlay, 2003), coping styles (Levin, Ilgen, & Moos, 2007), and the role of negative affect and impulsive downregulation (Boness et al., *in press*).

The health and social impact of this type of comorbidity has been associated with increased risk of social difficulties including poor wellbeing, poor health related quality of life, and increased difficulty in accessing services (Lozano, Rojas, & Fernández-Calderón, 2017; Ujhelyi, Carson, & Holland, 2016). Despite this, few mainstream healthcare services offer evidence-based and integrated care for these co-occurring disorders (Tiet & Mausbauch, 2007; van Wamel, van Rooijen, & Kroon, 2015). In the UK for example, only 1 in 5 people (20%) involved with community drugs and alcohol services were reported to access mental health treatment (Marsden et al., 2000). This is likely to be explained partly by deficits in screening and assessment practices (Weaver et al., 2003), but also may be due to a common tendency for services to exclude these patients from treatment based on the assumptions that (1) people with comorbid addiction and mental health problems may not engage with

mainstream treatments and require highly specialist care; and (2) people need to quit or stabilise their substance use before they can benefit from psychological treatment. These two assumptions are commonly held by healthcare providers and influence decisions about suitability and access to care (Department of Health, 2002).

The present study aimed to investigate the above two assumptions. Drawing on prior research in the field outlined above, we expected that alcohol use would be nonlinearly associated with baseline depression and anxiety severity, negatively correlated with treatment attendance, but not associated with post-treatment outcomes. These assumptions were tested empirically using routinely collected data in a retrospective observational cohort study including patients treated for depression and anxiety problems in a primary care psychological service. Six hypotheses (H) were devised to operationalize this:

H1: There will be a statistically significant, nonlinear association between alcohol level and baseline severity of depression and anxiety symptoms.

H2: There will be a statistically significant negative association between alcohol use and treatment attendance.

H3: Associations between alcohol use and post-treatment symptom severity will not be statistically significant.

H4: There will be a statistically significant association between severity of dependence and baseline severity of depression and anxiety symptoms.

H5: There will be a statistically significant negative association between severity of dependence and treatment attendance.

H6: Associations between severity of dependence and post-treatment depression or anxiety symptoms will not be statistically significant.

2. Methods

2.1 Setting, interventions and participants

This study was based on the analysis of archival data collected in routine care by a primary care psychological therapy service in the North of England. The service was part of the national *Improving Access to Psychological Therapies* (IAPT) programme, which offers evidence-based psychological interventions recommended by clinical guidelines for common mental disorders (Clark, 2011). Interventions available in the service included guided self-help, cognitive behavioural therapy, interpersonal psychotherapy, counselling for depression, and eye-movement desensitization and reprocessing (EMDR). Consistent with clinical guidelines (NICE, 2011), these interventions were delivered in a stepped care model, where most patients initially accessed guided self-help, and later accessed other available psychotherapies if their symptoms persisted after the initial step. These interventions were delivered in accordance with treatment-specific competency standards (e.g., National IAPT Team, 2015; Roth & Pilling, 2008) by qualified psychological practitioners under regular clinical supervision, equivalent to 1 hour of supervision per week of full-time practice.

Overall, the study included fully anonymised data from N=7,986 patients who were assessed, accessed treatment, and were discharged from care within a 4.7 year data collection period (June 2011 to March 2016). Access to treatment was defined as having attended at least one therapy session after an initial assessment appointment that determined suitability for psychological treatment in primary care. Sample characteristics are presented below.

2.2 Measures

The study is based on data from a consecutive sample of patients who accessed a standard 45-60 minute screening appointment involving a semi-structured interview with a mental health practitioner to assess symptoms of depression, anxiety, alcohol use and dependence. After starting treatment, patients routinely self-reported symptoms of depression and anxiety by completing paper-and-pen questionnaires described below before the start of every therapy session. The dataset for the present study only included measures gathered at the initial assessment and at the last attended treatment session (including data for those who completed treatment and those who dropped out).

Consistent with practice in IAPT services (Clark, 2011), three measures were routinely administered in the participating service to screen for depression, anxiety and functional impairment, and to monitor treatment response. The Patient Health Questionnaire (PHQ-9) was used to screen for major depressive disorder. This is a 9-item, self-reported questionnaire, scored on a Likert scale ranging between 0-3, yielding a total severity score between 0-27 (Kroenke, Spitzer, & Williams, 2001). The cut-off ≥10 is recommended to screen for clinically significant depression symptoms, with adequate sensitivity (88%) and specificity (88%). The Generalised Anxiety Disorder questionnaire (GAD-7) was used to screen for anxiety disorders. This self-reported measure has 7-items, scored on a Likert scale between 0-3, with a total severity score between 0-21 (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007). A cut-off score ≥8 is recommended to screen for clinically significant anxiety disorders, with adequate sensitivity (77%) and specificity (82%). The Work and Social Adjustment Scale (WSAS) is a patient-reported measure of functional impairment in daily activities related to work, home management, social life, private leisure pursuits, and close relationships (Mundt, Marks, Shear, & Greist, 2002). The questionnaire has five questions scored using an 8-point Likert Scale; 0 indicates not at all, and 8 indicates very severe functional impairment. The total score ranges between 0-40.

All patients were screened for alcohol use at initial assessments, using a single question ("Do you drink alcohol?") followed by a timeline follow-back assessment for those who answered "yes", using the Treatment Outcomes Profile (Marsden et al., 2008), which is a validated questionnaire to gain information about drug and alcohol use. This enabled the assessing clinician to calculate the average alcohol units consumed per week in the last month. If a person drank more than the recommended number of units of alcohol per week, 14 for females and 21 for males which were consistent with contemporary clinical guidelines at the time of data collection (Anderson, 1996), they were subsequently asked to complete the Severity of Dependence Scale (SDS; Gossop et al., 1995). The SDS is a 5-item questionnaire used to screen for substance dependence, and is scored using a Likert scale between 0-3, with a total score of 0-15, enabling the assessment of mild (<5), moderate (5-10) and severe (≥11) dependence. The above alcohol screening process was established in the

service to screen for alcohol use and dependence in a way that would be (a) of low burden for therapists and patients – including the minimum necessary information; (b) time-efficient by using ultra-brief measures; (c) psychometrically valid and reliable; (c) cost-neutral in terms of using license fees. These conditions were met through the above process, which included a small set of questions, and permissions were obtained from the developers to use the measures for clinical screening and research purposes.

The outcome expectancy measure (Lutz, Leon, Martinovich, Lyons, & Stiles, 2007) is a single-item measure that assesses the extent to which patients expect psychological treatment to be potentially effective for their problems. It is scored between 0-10; where a higher score is indicative of high expectancy. Pre-treatment expectancy is well known to be associated with psychological treatment outcomes (Constantino, Arnkoff, Glass, Ametrano, & Smith, 2011).

2.3 Statistical analysis

Preliminary inspections of the data involved the calculation of descriptive statistics, tests of normality (skewness, kurtosis and Shapiro-Wilk test) and graphical inspection of histograms and Q-Q plots. Nonparametric correlations (Spearman's Rho) were used to examine associations between continuous variables that were not normally distributed. Tests of association were examined for the whole sample and also examined according to self-reported gender. Data analyses were only conducted using available data for participants who consented to go through alcohol screening and for these data to be used for research purposes.

The main data analysis strategy was based on hierarchical multiple regression where relationships between variables of interest were examined whilst controlling for the influence of potential confounding variables. Independent variables were entered into the model in blocks. In the first block, a simple linear association was modelled between the dependent variable (e.g., PHQ-9, GAD-7, or attendance) and patients' reported alcohol use variables (e.g., average units per week). In block two, a quadratic term for alcohol use was added. Block three added a cubic term. This enabled us to first examine the significance and explained variance of linear and nonlinear models unadjusted

for confounders. Block four adjusted for all potential confounders. Once this fourth model had been run, any non-significant ($p \leq 0.05$) confounders were removed in a backward elimination process, in order to obtain the most parsimonious (uncomplicated) model that explained a significant proportion of variance and which offered best goodness-of-fit. Based on prior findings in similar IAPT services and using the same outcome measures (e.g., see Delgadillo, Moreea, & Lutz, 2016; Delgadillo et al., 2017), potentially confounding variables controlled for were: baseline severity of anxiety/depression, baseline WSAS, age, self-reported disability, employment status, outcome expectancy, and ethnicity.

A simpler two-block hierarchical regression analysis (linear univariate association in block 1, followed by a confounder-adjusted model in block 2) was applied in secondary analyses examining the relationship between severity of dependence (SDS) with symptom severity. All analyses were conducted in SPSS v26.

2.4 Pre-registration and ethical approval

A study protocol was pre-registered with the (*University anonymized for peer review*), after being approved by two independent scientific reviewers. Ethical approval for the analysis of fully anonymized clinical data was obtained from a National Health Service research ethics committee (*anonymized for review*) and approved by the Health Research Authority (REC Reference: *anonymized for review*). All hypotheses and analyses conformed to the pre-registered protocol.

3. Results

3.1 Descriptive statistics

The majority of patients were white British (90.3%) females (65.4%) with an age range between16-89 (mean=37.24, SD=13.87), of whom 20.1% were unemployed and 13.4% reported a disability. Primary diagnoses recorded in clinical records included depression (29.0%), generalized anxiety disorder (11.5%), mixed anxiety-depressive disorder (42.2%), panic disorder (4.4%), obsessive-compulsive disorder (3.0%), social anxiety disorder (3.0%), post-traumatic stress disorder (2.2%), and other disorders were less commonly recorded. All participants engaged in at least one session of therapy, and the total number of session ranged between 1-39 (mean=7.78, SD=5.73).

Pre-treatment mean depression and anxiety scores for the study sample were PHQ-9=15.06 (SD=6.06) and GAD-7=9.17 (SD=6.87). Post-treatment mean scores were lower for both depression (PHQ-9=9.17, SD=6.87) and anxiety (GAD-7=8.27, SD=5.97).

A total of *n*=4,630 (57.9%) of participants reported current alcohol use. This ranged from 0-100 units per week, with an average of 5.31 (SD=10.02). To assess severity of dependence, *n*=195 (50.8% females) participants who drank above the recommended guidelines were asked and agreed to complete the SDS scale. The mean SDS score within this subsample was 3.91 (SD=3.27). All regression models described above had the same sample size (*n*=4,630 for alcohol use analyses; *n*=195 for SDS analyses).

3.2 Hypothesis testing models

3.2.1 Hypothesis 1: Alcohol use and baseline symptom severity

In the hierarchical regression with baseline depression (PHQ-9) as a dependent variable, a nonlinear cubic model for alcohol use (block 3) was statistically significant [F(1, 7446)=41.32, p<0.01] and explained a higher proportion of variance (R^2=0.02) relative to simpler models (linear, quadratic). The final fully-adjusted and parsimonious model obtained after removing non-significant variables (ethnicity) explained 53.5% of the total variance, R^2=0.54, F(9, 7,440)=951.65, p<0.01. Thus, a nonlinear (cubic) association between alcohol use and baseline depression severity was significant after controlling for potential confounders, explaining approximately 1.6% of variance in baseline depression. This relationship is graphically represented in Figure 1.

In the hierarchical regression with baseline anxiety (GAD-7) as a dependent variable, a nonlinear cubic model for alcohol use (block 3) was statistically significant [F(1, 7,446)=17.95, p<0.01] and explained a higher proportion of variance (R^2=0.007) relative to simpler models (linear, quadratic). The final fully-adjusted model (block 4) explained 39.8% of the total variance, R^2=0.40, F(7, 7,439)=492.11, p<0.01. The following variables were no longer significant in this block: alcohol use (linear and nonlinear terms), ethnicity, disability, and employment. Hence, there was no significant association between alcohol use and baseline anxiety severity after controlling for confounders.

3.2.2 Hypothesis 2: Alcohol use and treatment attendance

In the hierarchical regression with treatment attendance (number of therapy sessions) as a dependent variable, alcohol use was not statistically significant in any of the four blocks. The fully adjusted fourth block explained 0.7% of the total variance, R^2=0.007, F(8, 7,438)=4.59, p<0.01. The only significant variables in this model were: employment, baseline GAD-7 and WSAS.

3.2.3 Hypothesis 3: Alcohol use and post-treatment symptom severity

In the hierarchical regression with post-treatment depression (PHQ-9) as a dependent variable, a nonlinear cubic model for alcohol use (block 3) was statistically significant [F(1, 7,213)=34.86, p<0.01] and explained a higher proportion of variance (R^2=0.01) relative to simpler models (linear, quadratic). None of the alcohol use terms were significant in the fully adjusted fourth block, which explained 28.7% of the total variance, R^2=0.29, F(8, 7,205)=264.28, p<0.01. The only significant variables in this model were: baseline PHQ-9, WSAS, age, disability, employment, ethnicity, and expectancy.

In the hierarchical regression with post-treatment anxiety (GAD-7) as a dependent variable, a nonlinear cubic model for alcohol use (block 3) was statistically significant [F(1, 7,216)=24.54, p<0.01] and explained a higher proportion of variance (R^2=0.01) relative to simpler models (linear, quadratic). The final fully-adjusted and parsimonious model obtained after removing non-significant variables (cubic term for alcohol use) accounted for 23.3% of the total variance, R^2=0.23, F(10, 7,209)=218.61, p<0.01. Thus, a nonlinear (quadratic) association between alcohol use and post-treatment anxiety severity was significant after controlling for potential confounders, explaining approximately 0.7% of variance. This relationship is graphically represented in Figure 2.

3.2.4 Hypothesis 4: Severity of dependence and baseline symptom severity

In the hierarchical regression with baseline depression (PHQ-9) as a dependent variable, the first block explained 5% of the variance, R^2=0.05, F(1, 193)=10.15, p<0.01. The second fully-adjusted block explained 51.8% of the variance, R^2=0.52, F(7, 186)=24.96, p<0.01. SDS remained significant in block 2, along with baseline GAD-7 and WSAS (all other variables were not significant).

In the hierarchical regression with baseline anxiety (GAD-7) as a dependent variable, the first block explained 3.4% of the variance, R^2=0.03, F(1, 193) =6.84, *p*=0.01. The second fully-adjusted block explained 37.4% of the variance, R^2=0.37, F(7, 186), =13.90, *p*<0.01. SDS remained significant in block 2, along with baseline PHQ-9.

3.2.5 Hypothesis 5: Severity of dependence and treatment attendance

In the hierarchical regression with treatment attendance (number of therapy sessions) as a dependent variable, neither block 1 [R^2=0.02, F(1, 193)=3.31, *p*=0.07] nor block 2 [R^2=0.05, F(8, 185)=1.10, *p*=0.37] were statistically significant.

3.2.6 Hypothesis 6: Severity of dependence and post-treatment symptom severity

In the hierarchical regression with post-treatment depression (PHQ-9) as a dependent variable, the first block explained 5.5% of the variance, R^2=0.06, F(1, 181) =10.45, *p*=0.01. The second fully-adjusted block explained 29.7% of the variance, R^2=0.30, F(8, 173), =8.11, *p*<0.01. SDS was no longer significant in block 2, where the only significant variables were baseline PHQ-9 and employment.

In the hierarchical regression with post-treatment anxiety (GAD-7) as a dependent variable, the first block explained 5.0% of the variance, R^2=0.05, F(1, 182)=9.50, *p*=0.02. The second fully-adjusted block explained 26.0% of the variance, R^2=0.26, F(8, 174), =6.81, *p*<0.01. SDS was no longer significant in block 2, where the only significant variable was employment.

4. Discussion

4.1 Summary of findings

This observational cohort study aimed to investigate associations between alcohol use, symptoms of common mental disorders, psychological treatment attendance and clinical outcomes. After controlling for confounders, alcohol use had a nonlinear (cubic) association with baseline depression, but not with post-treatment depression outcomes. After controlling for confounders, alcohol use was not significantly associated with baseline anxiety severity, but a significant nonlinear (quadratic) association was found with post-treatment anxiety severity. Neither alcohol use nor

severity of dependence were associated with treatment attendance. Severity of dependence was significantly associated with baseline depression and anxiety severity, but not associated with post-treatment severity on either measure. These findings converge with evidence from prior studies. For example Clarkson et al. (2016) found no significant associations between alcohol misuse and treatment completion / dropout in an IAPT service for military veterans. Furthermore, Buckman et al., (2018) conducted a clinical audit in an IAPT psychological treatment setting and found that the severity of dependence (measured using the AUDIT measure) was not associated with post-treatment depression and anxiety outcomes. Overall, the findings provided clear support for two hypotheses (4, 6), partial support two hypotheses (1, 3), and no support for two hypotheses (2, 5).

4.2 Interpretation and wider empirical context

Consistent with prior evidence (e.g., Alati et al., 2005; Caldwell et al., 2002; Skogen et al., 2009), alcohol use had a nonlinear association with depression symptom severity at the time when the sample was not exposed to psychological treatment. As illustrated in Figure 1, abstainers and harmful drinkers tended to have higher depression severity compared to moderate drinkers. The elevated levels of psychological distress in abstainers have previously been explained by three hypotheses. The "sick quitters" hypothesis suggests that some abstainers in study samples may be ex-dependent drinkers or people with serious illnesses that may require them to avoid alcohol use and may be associated with poor psychological health (Power et al., 1998). The "stress buffer" hypothesis (Peele & Brodsky, 2000) suggests that moderate levels of alcohol use may dampen the intensity of psychological distress due to the psychoactive effects of ethanol. Furthermore, the "adjusted drinkers" hypothesis (Pape & Hammer, 1996) suggests that healthier and well-adjusted individuals are able to maintain light-to-moderate levels of drinking, and it is possible that they may also be capable of moderation in other aspects of their behavior such as exercise and diet.

Studies investigating the relationship between alcohol use and anxiety are scarce and indicate mixed findings. Some studies investigating cross-sectional associations report no significant associations (e.g., Delgadillo, Godfrey, Gilbody, & Payne, 2013; Delgadillo, Böhnke, Hughes, & Gilbody,

2016). Other studies indicate that remitted or severe alcohol dependence are associated with a poorer longitudinal course of anxiety severity (e.g., Boschloo et al., 2012), which fits a nonlinear pattern as described above. In the present study, no significant associations between alcohol use and baseline anxiety severity were found. However, pre-treatment alcohol use had a nonlinear (quadratic) association with post-treatment anxiety severity. As illustrated in Figure 2, abstainers and heavy drinkers had higher mean levels of post-treatment anxiety compared to moderate drinkers. The lack of consistency between the pre-treatment and post-treatment analyses makes it improbable that alcohol use per se is associated with "alcohol induced" anxiety symptoms. As argued by Delgadillo, Böhnke et al. (2016), the lack of a linear dose-response relationship between alcohol use and anxiety severity makes it less plausible that alcohol use has a direct influence on anxiety symptoms, and any apparent relationship may therefore be explained by intermediate (i.e., mediating) variables.

A plausible explanation is that patients with light-to-moderate levels of alcohol use may have some other characteristics that also support their ability to manage anxiety and to derive maximum benefits from anxiety-focused therapies (CBT in this context). One possibility is that moderate alcohol use may be a proxy indicator for a capacity to tolerate distress. Studies indicate that distress tolerance is inversely correlated with alcohol use, showing that light drinkers have higher levels of distress tolerance than heavy drinkers (Holliday, Pedersen & Leventhal, 2016; Khan et al., 2018; Seo & Kwon, 2016). Studies also indicate that distress tolerance mediates the relationship between impulsivity and alcohol use (Greenberg, Martindale, Fils-Aimé, & Dolan, 2016; Marshall-Berenz, Vujanovic, & MacPherson, 2011). Both distress tolerance (Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010) and impulsivity (Jakuszkowiak-Wojten, Landowski, Wiglusz, & Cubała, 2015) have been correlated with anxiety severity across various anxiety disorders. As such, light-to-moderate alcohol use may simply be a proxy indicator for people who are less impulsive and with higher levels of distress tolerance compared to abstainers (i.e., those potentially avoiding alcohol use due to fear of illness or addiction) and heavy drinkers (i.e., those potentially using alcohol impulsively a means of coping with distress). It seems plausible that such capacity for distress tolerance could also favor better treatment

outcomes in CBT-oriented treatments that apply exposure and behavioral experiments. Evidence-based psychological treatments for anxiety problems require patients to approach and tolerate anxiety provoking situations, and to refrain from relying on safety and avoidant behaviours (Roth & Pilling, 2008).

4.3 Strengths and limitations

Strengths of the study include the large sample of patients consecutively recruited in routine care, the use of validated routine outcome measures, and the investigation of linear and nonlinear associations. The study was limited to a single outpatient primary care mental health service. The patient-reported measures could be subject to social desirability bias in some cases (Van de Mortel, 2008) and recall bias in the case of alcohol screening using the timeline follow-back method (Marsden et al., 2008). Because of the conditions of ethical approval for the study, we were not able to examine the potential influence of missing data in cases that either refused alcohol screening or who did not provide consent for this information to be used for research purposes. Furthermore, only *n*=195 participants completed the SDS for alcohol use, and it is likely that this small sample (relative to the large overall sample) may be influenced by response bias and/or selection bias by assessing clinicians. A further consideration is that

4.4 Conclusions

This study indicates that there is no evidence of a dose-response linear relationship between alcohol use with depression and anxiety severity, and thus little support for the notion that heavy drinkers are generally more psychologically distressed before or after psychological treatment. We found little evidence of associations between alcohol use or dependence with treatment attendance. Such evidence suggests that alcohol users are just as likely to engage in and benefit from evidence-based psychological treatments for depression in primary care. These findings support the recommendation in practice guidelines for IAPT services that alcohol or drug use should not be an automatic exclusion from psychological treatment for common mental health problems (National Treatment Agency for Substance Misuse, 2012). Furthermore, a nonlinear association between

alcohol use and anxiety treatment outcomes indicates that light-to-moderate drinkers benefit more from therapy. This latter finding is unlikely to be explained by the psychoactive effects of alcohol use, and requires further investigation.

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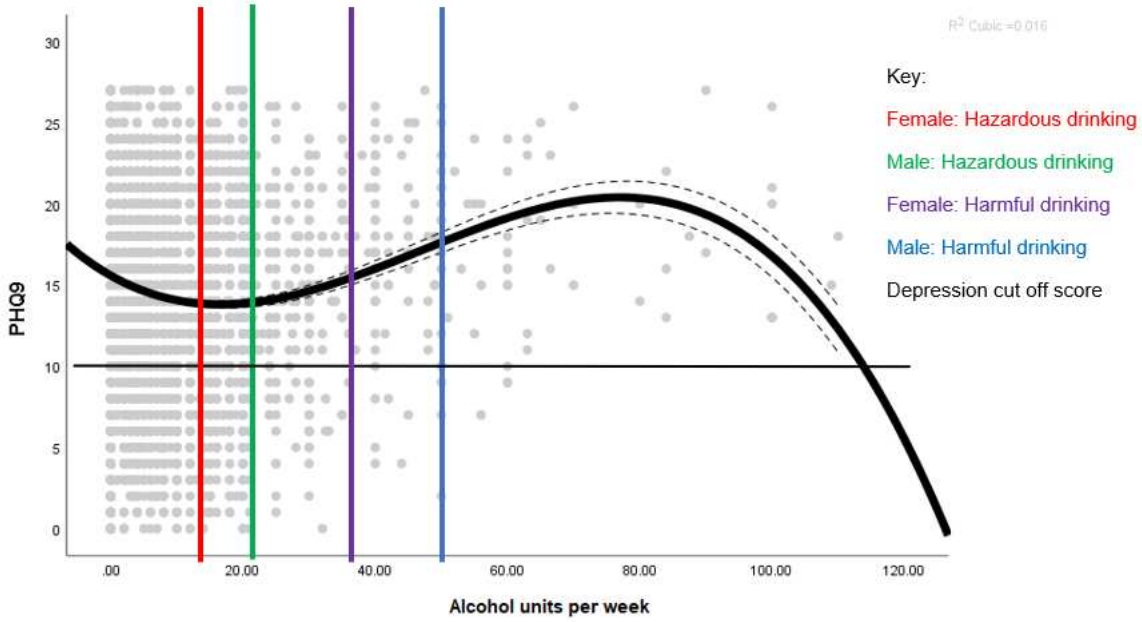

Figure 1. Nonlinear association between pre-treatment alcohol units per week and depression severity

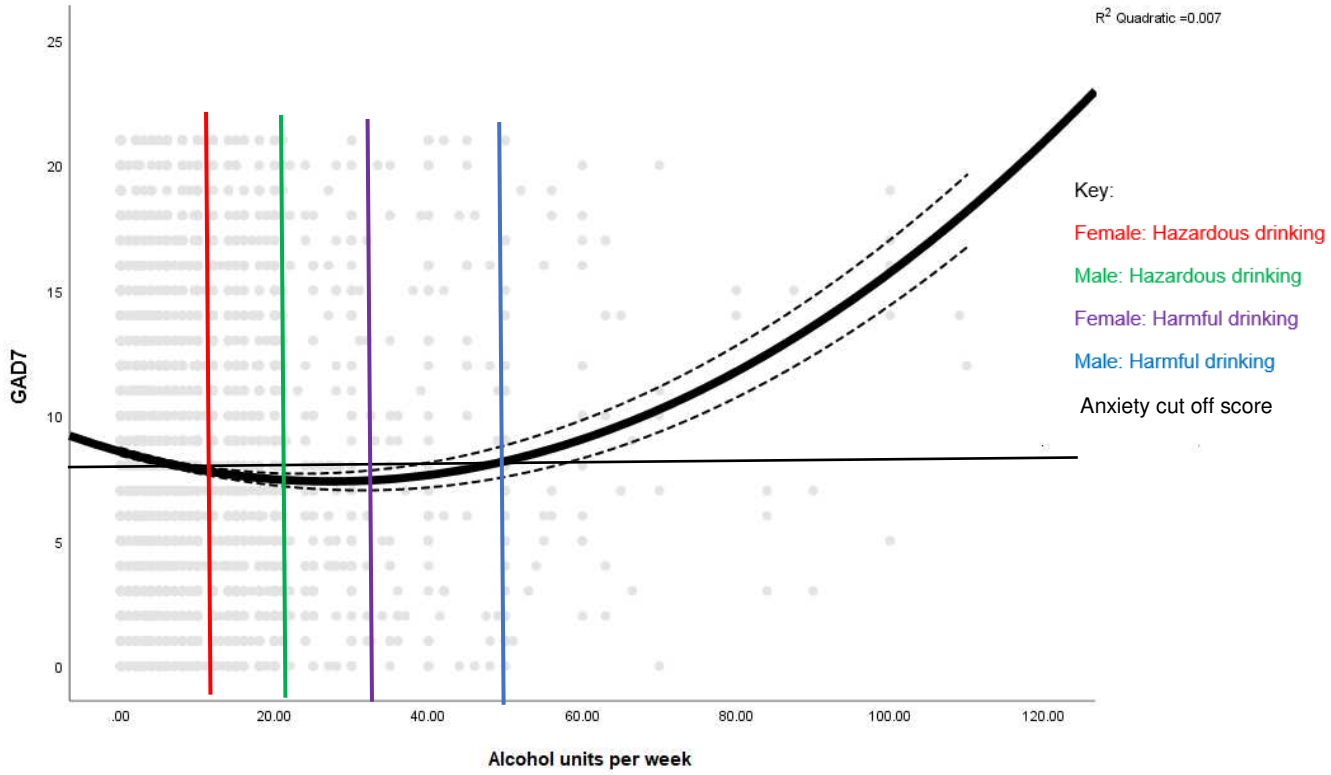

Figure 2. Nonlinear association between pre-treatment alcohol units per week and post-treatment anxiety severity