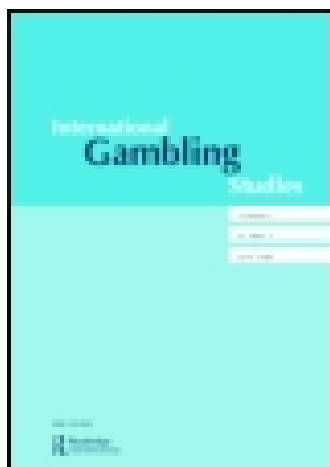


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The role of homework in exposure-based CBT outcome for problem gambling

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Assigning homework is a key component of cognitive behavioural therapy (CBT) and engagement of homework has been shown to predict CBT outcomes for a range of disorders. However, no previous study has empirically examined directly the effect of homework engagement on CBT outcome for problem gambling (PG). To address this gap in the literature this study examined the role of homework along with two non-specific variables (treatment credibility and expectancy), and their prediction of short-term outcome in the context of exposure-based CBT for a group of treatment-seeking problem gamblers. Seventy-four treatment-seekers were invited to participate in a graded cue exposure with response prevention programme developed for problem gambling. The primary outcome measure was the Victorian Gambling Screen Harm to Self sub-scale. Homework engagement data were examined for participants who engaged in the programme and provided outcome data ($n = 45$). Homework engagement but not treatment credibility or expectancy predicted outcome at post-treatment and at one-month follow-up. The present findings suggest that engaging in homework has a strong association with immediate and short-term outcome, and that improvement of homework engagement has the potential to improve clinical outcomes in CBT targeting PG.

Keywords: Cognitive; behavioural; treatment; problem gambling; homework; CBT

Introduction

Cognitive behaviour therapies have yielded strong evidence for the effective treatment of a broad range of psychopathology such as substance use disorders, depression, anxiety disorders, eating disorders and general stress. Whilst a range of cognitive behaviour therapy (CBT) protocols exist, they generally share the same approach to treatment – that is, addressing various cognitive and behavioural maintenance factors of the different disorders – and emphasize a collaborative relationship between client and therapist. A key component of CBT is the acquisition and practice of new skills; thus the inclusion of homework is considered a common factor in psychotherapies (Kazantzis & Ronan, 2006). Furthermore, engagement with homework has been shown to predict CBT outcomes for a variety of anxiety and affective disorders such as obsessive compulsive disorder, panic with agoraphobia, and depression (Coon & Thompson, 2003; Woods, Chambless, & Steketee, 2002), as well as substance use disorders such as cocaine and nicotine addiction (Carroll, Nich, & Ball, 2005; Funk, Zvolensky, & Schmidt, 2011; Gonzalez, Schmitz, & DeLaune, 2006). There is a lack of empirical data available appraising the effects of homework engagement on CBT outcomes for problem gambling (PG). However, in a qualitative study, Dunn, Delfabbro, and Harvey (2012) reported that homework non-compliance may be an indicator of treatment drop-out.

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Patient improvement through psychotherapy is influenced by a number of non-specific factors (Kazdin, 1979). One factor aside from homework engagement which has received attention, and has been demonstrated to predict a positive effect on psychotherapy outcomes, is patient expectation of treatment. For example, treatment outcome expectancy significantly predicted symptom improvement for individuals undergoing CBT for major depression (Webb, Kertz, Bigda-Peyton, & Björgvinsson, 2013) and social anxiety (Price & Anderson, 2012). The authors of a recent meta-analysis reported that the effect size for treatment expectancy on treatment outcome was significant though quite small (weighted $r = .12, p < .001$; Constantino, Arnkoff, Glass, Ametrano, & Smith, 2011). Devilly and Borkovec (2000) distinguished between treatment expectancy, which they suggested is related more to clients' affective processes, and treatment credibility, which relates more to the logical thought processes of clients; for example, how believable and logical the treatment appears. The authors demonstrated, through analysis of the psychometric properties of a specially designed questionnaire, that some potentially functional difference exists between treatment rationale credibility and treatment expectancy (Deville & Borkovec, 2000). Nordgreen et al. (2012) observed an association between treatment credibility and treatment adherence among socially anxious individuals engaged in a CBT self-help programme. More recently, Hundt et al. (2013) demonstrated that treatment credibility among anxious patients undergoing CBT was associated with greater treatment adherence, which in turn predicted patients' satisfaction with treatment. To date, the relationships between non-specific factors such as treatment expectancy and credibility, and CBT outcomes for PG have received little attention.

Reviews of the homework compliance literature have revealed a number of limitations. For example, many studies rely on one-time retrospective client estimations of overall compliance (Hughes & Kendall, 2007). Rating homework compliance retrospectively can be problematic as clients who have experienced improvement may inflate the extent of their compliance (Kazantzis, Deane, & Ronan, 2000, 2004). Another inconsistency among studies is the source of homework compliance rating. Some studies have used objective ratings from homework sheets submitted by clients, while others have used subjective ratings by therapists. The caveat here is that therapists who provide ratings may give better scores to those who are making greater improvements in therapy (Kazantzis et al., 2000). Very little data is available regarding the specificity of homework tasks (Hughes & Kendall, 2007), with the majority of studies using more than one type of homework activity (Kazantzis et al., 2004). Incorporating different types of homework without specifying compliance with each type makes it difficult for us to understand which types of homework are more beneficial. A recent study by Cammin-Nowak et al. (2013) found that the specific type of homework was important, with greater compliance with exposure tasks a better predictor of outcomes for agoraphobia than self-monitoring or psychoeducation.

The inclusion of homework is a common feature among CBT treatment manuals for PG (Battersby, Oakes, Redpath, Harris, & Riley, 2012; Blaszczynski, 1998; Grant, Donahue, & Odlaug, 2011; Ladouceur & Lachance, 2007; Raylu & Oei, 2010), with a variety of homework activities being utilized. Some manuals incorporate both cognitive and behavioural techniques such as cognitive restructuring and relaxation (Blaszczynski, 1998), cognitive restructuring and exposure (Grant et al., 2011) or a blend of all three: cognitive restructuring, relaxation and exposure (Raylu & Oei, 2010). Others use predominantly one or the other, such as exposure (Battersby et al., 2012) or cognitive interventions (Ladouceur & Lachance, 2007). Oddly, the relationship between homework

compliance and CBT outcome for PG has received almost no attention in the PG literature. This is surprising, given the emphasis on homework among PG treatment manuals, and CBT has produced favourable outcomes for PG in both the short and long term (Pallesen, Mitsem, Kvale, Johnsen, & Molde, 2005). In an exploratory qualitative study investigating predictors of drop-out, Dunn et al. (2012) interviewed 10 participants of a CBT programme involving graded cue exposure for PG. Many participants reported difficult experiences during the performance of their graded exposure tasks, describing them as difficult and time-consuming. The authors' findings suggested that in some cases homework non-compliance may be associated with fear of relapse. Furthermore, they suggested that difficulty in performing homework and non-compliance may facilitate treatment drop-out, and emphasized the importance of strong therapeutic alliance. These findings further highlight the importance of improving our understanding of the role of homework in CBT for PG. Given the demonstrated efficacy of CBT for PG and the emphasis on homework tasks during the course of therapy, it is important that we investigate the relationship of homework to outcome. The role of homework is fundamental to our understanding of how CBT affects clinical outcomes. It is anticipated that the current study will assist clinicians providing CBT for PG in advising their clients of the prospective importance of homework, and potentially increase their motivation to engage in treatment.

Aims and hypotheses of the present study

The preliminary aim of the current study was to evaluate the relationship between homework engagement and exposure-based CBT outcome in a sample of treatment-seeking problem gamblers. The present study endeavoured to improve upon some of the methodological limitations of previous CBT homework engagement studies: all participants were given the same form of homework (exposure); homework engagement data was collected from participants at each session in attempt to reduce therapist bias. A secondary aim was to examine client characteristics that predict homework engagement. To achieve this, potential predictors examined comprised age, gender, education, psychotropic medication, alcohol use, and treatment credibility and expectancy. No previous study has directly examined the role of homework engagement in CBT outcomes for PG. The hypotheses for the present study were derived from the general CBT homework engagement literature, including the few CBT homework engagement studies concerning substance addictions. First, it was hypothesized that greater homework engagement would be associated with more favourable outcomes at post-treatment and one-month follow-up. It was further hypothesized that homework engagement would predict PG outcome after controlling for the number of therapy sessions attended and pre-treatment PG severity.

Method

Study design

This was a repeated measures study design investigating predictors of outcome in a sample of participants ($N = 74$) who received treatment for PG. The study was conducted at a PG treatment service in South Australia and was approved by the Southern Adelaide Clinical Human Research Ethics Committee. All participants signed individual consent forms. Participants completed their baseline battery of measures individually, sitting in a quiet waiting room prior to their initial screening assessment.

Participants

Seventy-four consecutive treatment-seeking adult problem gamblers attending a PG treatment centre participated in the study. Nine participants ceased contact following their initial screening session, with a further 12 ceasing contact after their second session. Fifty-three participants (72% of the total sample) completed three or more sessions. Of these 53 treatment-engagers, 8 did not provide follow-up measures, leaving 45 participants with a complete set of measures: baseline, post-treatment and follow-up.

Treatment

The treatment was delivered by two clinicians: a mental health social worker and an honours psychology graduate, both with postgraduate (masters) qualifications in CBT (<http://www.flinders.edu.au/medicine/sites/psychiatry/>) and each with more than five years clinical experience delivering CBT for gambling problems. Treatment comprised graded cue-exposure with response prevention, aimed at extinguishing gambling related cue-reactivity. A conditioning interpretation of cue-reactivity has been reported widely over the past several decades in attempting to understand addicts' reactions to various drug-related stimuli (see meta-analytic review by Carter & Tiffany, 1999). A growing body of research suggests the cue-reactivity paradigm can be useful in understanding gambling addictions (Blanchard, Wulfert, Freidenberg, & Malta, 2000; Potenza et al., 2003; Sodano & Wulfert, 2010). Cue-exposure is based on the theory that cue-reactivity is classically conditioned. Cue-reactivity is an unconditioned response (UR) to the stimulus of gambling behaviour itself. By repetition it becomes associated with a wide variety of conditioned stimuli (CS) which are associated with gambling. Based on conditioning theory, repeated un-reinforced exposure to the CS will result in extinction of the CR. That is, gambling cue-reactivity will be extinguished though repeated cue-exposure with response prevention (see Battersby, Oakes, Tolchard, Forbes, & Pols, 2008; Oakes, Battersby, Pols, & Cromarty, 2008; Tolchard, Thomas, & Battersby, 2006 for further details). The treatment was delivered via individual face-to-face sessions and conducted according to a detailed manual (Battersby et al., 2012) which consists of up to 12 60-minute sessions. Clients may receive slightly fewer or a greater number of sessions depending on the pace at which they move through their graded cue-exposure hierarchy. All participants were given a standardized treatment rationale towards the end of their first session, along with an information booklet about the treatment to read before their second session. During the second session a hierarchy of gambling cues was developed with each participant. This was a collaborative process between therapist and participant and included cues such as images and sounds of their preferred gambling activities, graded up to in vivo exposure in a gambling environment. When performing graded exposure tasks, participants were instructed to rate their urge to gamble at regular intervals, and stay with the urge until habituation had occurred. Urge ratings for each task were documented by participants in a treatment diary provided, which was brought to each session. Once participants had extinguished their urge response from a particular cue, they moved to the next cue on their graded hierarchy. Therapists discussed this with participants during their sessions. Exposure homework was assigned from the second session. Prolonged exposure tasks were discussed and taught but not performed in therapy sessions. During their final treatment session, participants completed measures in the waiting room. They then attended a face-to-face follow-up session one month later and again completed a set of outcome measures in the waiting room. Participants who were not able to attend the one-month follow-up appointment were sent outcome

measures by mail, which they completed and returned in a stamped self-addressed envelope supplied.

Measures

Homework engagement: to avoid potential rater effects and memory biases, two dichotomous measures were used to measure homework engagement: the number of times a client performed an exposure task; time (minutes) spent engaging in the tasks. This data was collected weekly starting from the third session via homework forms submitted by participants, and then collated at the end of treatment to produce an aggregate score for each variable.

Victorian Gambling Screen Harm to Self sub-scale (VGS-HS; Ben-Tovim, Esterman, Tolchard, & Battersby, 2001)). The VGS-HS is a 15-item simple and valid measure of PG. It is a sub-scale of the Victorian Gambling Screen (VGS). The VGS-HS scores range from 0 = no harm to self to 60 = high harm to self. The VGS-HS has demonstrated high internal consistency among a clinical population of problem gamblers with a Cronbach's alpha of .89 (Tolchard & Battersby, 2010). A score of 21 or greater indicates a pathological gambling disorder.

Treatment Credibility and Expectancy Scale (CEQ; Devilly & Borkovec, 2000). The CEQ is a simple six-item scale deriving two factors: credibility of treatment (CEQ-Credibility) and expectancy of improvement (CEQ-Expectancy). The CEQ-Credibility comprises the first 3 items of the CEQ, measured on a 9-point scale ranging from 1 (*Not at all logical/useful/confident*) to 9 (*Very logical/useful/confident*), with a total possible score range of 3 to 27. The CEQ-Expectancy comprises items 4 to 6 of the CEQ. One item contains the same 9-point scale as the CEQ-Credibility, and 2 items contain an 11-point scale (from 0 to 100% in 10-point increments). The CEQ has demonstrated sound psychometric properties with reported standardized Cronbach alphas of between 0.79 to 0.90 for the expectancy factor, 0.81 to 0.86 for the credibility factor and 0.84 to 0.85 for the whole scale. As recommended by Devilly and Borkovec (2000) all items were standardized and composites were derived for the credibility and expectancy factors. Participants completed the CEQ at the end of the first session after the treatment rationale had been thoroughly explained. To preserve confidentiality and encourage honest responding, participants were informed that the treating therapist would not have access to the results from this questionnaire.

Alcohol Use Disorders Inventory Tool (AUDIT; Saunders, Aasland, Babor, De la Fuente, & Grant, 1993). The AUDIT is a 10-item screening tool for hazardous and harmful alcohol consumption. It has demonstrated sound psychometric properties with reported Cronbach alpha levels of between 0.80 to 0.94 (Allen, Litten, Fertig, & Babor, 1997).

Results

Sample characteristics and descriptive statistics

Analyses were performed using PASW Statistics 22. Prior to analyses, data screening was performed. Inspection of histograms, residuals scatter plots and diagnostic tests revealed that post-treatment and follow-up VGS-HS scores were positively skewed (clustered at low values) consistent with the desired treatment response. Number of homework tasks completed, total homework time, and AUDIT were also positively skewed (absolute skewness and kurtosis values ranged from 0.74 to 1.70 and 0.31 to 2.83 respectively). Subsequently a square root transformation was performed on these variables

(Tabachnick & Fidell, 2007) and skewness and kurtosis values improved (absolute values ranged from 0.02 to 0.29 and 0.15 to 1.41 respectively).

Preliminary analyses of treatment dropouts

Treatment dropout was regarded if a client attended fewer than three sessions. As homework (exposure) was introduced at session 2 and recorded from session 3, clients attending at least three sessions provided homework engagement data, and thus were considered to have received a measurable 'dose' of treatment. Initially a series of analyses were performed ($N = 74$) to investigate any group differences between treatment-engagers ($n = 53$) and treatment dropouts ($n = 21$). T-tests revealed no significant group differences on pre-treatment PG severity, alcohol use and age. CEQ data was missing for seven of the treatment dropouts. T-tests revealed no significant group differences on treatment credibility and expectancy between treatment-engagers and treatment-dropouts. Chi-square tests were performed to investigate any group differences between treatment-engagers and treatment-dropouts on categorical client characteristic variables. No significant differences were found between the groups on education (completed high school or not); psychotropic medication and gender (all $ps > 0.05$).

The remainder of analyses were performed using only the treatment-engagers who provided a full set of measures ($n = 45$). Descriptive statistics of all variables used in the main analyses are presented in Table 1. There was a near equal ratio of men and women, 51% and 49% respectively. The racial/ethnic composition was 96% Caucasian, 2% Aboriginal and 2% Vietnamese. Most were married or living with a partner (47%), with the remaining single, separated or widowed: 20%, 27% and 6% respectively. The majority were employed, either full-time or part-time: 42% and 17% respectively. Eleven percent were unemployed, 9% retired, 11% receiving a government disability pension, 7% performing home duties and 4% reporting 'other'. Almost half the group (47%) had not completed high school. Thirty-eight percent reported completion of high school as their highest education level achieved and 15% had commenced or completed a tertiary or college qualification. The majority of the group (84%) reported electronic gaming machines as their main problem, with remainder reporting horse racing or casino table games: 14% and 2% respectively. Almost the entire group (98%) scored over the VGS-HS PG cut-off at pre-treatment. Thirty-eight percent of the group were taking psychotropic medication.

Table 1. Descriptive statistics for treatment completers ($n = 45$).

Variable	Mean score	Standard deviation	Range
Age	41.18	13.87	19 – 80
Treatment credibility	7.48	1.17	5 – 9
Treatment expectancy	8.33	1.76	4 – 10
No. sessions	7.04	2.58	3 – 13
AUDIT	6.42	6.58	0 – 24
No. HW tasks	17.44	17.54	0 – 71
Time (hrs) performing HW tasks	6.68	7.08	0 – 31.15
Pre-treatment VGS-HS	44.33	8.45	20 – 59
Post-treatment VGS-HS	14.71	15.33	0 – 48
Follow-up VHS-HS	13.49	16.57	0 – 50

Note: AUDIT = Alcohol Use Disorders Inventory Tool, HW = homework, VGS-HS = Victorian Gambling Screen Harm to Self sub-scale.

The mean number of sessions attended was 7.04 (SD = 2.58, range 3 to 13). Overall, the degree of homework engagement was high with only 11% of participants completing no exposure tasks, around half (51%) reporting engagement of exposure tasks at every session, and the remaining 38% making some attempts. The average total time spent engaging in homework was 6.68 hours (SD = 7.08) and the average number of homework tasks performed was 17.44 (SD = 17.54). Overall, the treatment was effective, with 65% and 74% of participants scoring below the VGS-HS PG cut-off at post-treatment and follow-up respectively. A one-way repeated measures ANOVA with a Greenhouse-Geisser correction revealed a significant reduction in VGS-HS scores across the three time points: pre, post and FU ($F(1.56,68.70) = 93.36$, $p < 0.001$).

A series of t-tests was then performed to investigate any differences in the following continuous variables: number of homework tasks completed, time spent performing homework, treatment credibility and expectancy, and number of sessions attended, between the following categorical groups: gender, psychotropic medication and education. No significant differences were found (all $ps > 0.05$). Possible group differences between the two therapists were also examined using t-tests. No significant group differences were detected (all $ps > 0.05$) on treatment credibility and expectancy scores, treatment engagement (number of sessions attended; number of homework tasks performed; amount of time spent performing tasks) and treatment outcomes (VGS-HS scale at post-treatment; one-month follow-up).

Main study analyses

Bivariate correlations among study variables are presented in Table 2. Age and number of homework tasks performed and time spent performing them were negatively correlated. Older participants engaged in less homework. Treatment credibility, treatment expectancy and alcohol use were unrelated to homework engagement or PG outcome. Participants who attended more sessions engaged in more homework. Consistent with the first hypothesis, participants who engaged in more homework reported lower PG scores at both end of treatment and follow-up.

Table 2. Correlations among study variables ($n = 45$).

Variable	1	2	3	4	5	6	7	8	9
1. Age	–								
2. T Cred	–.26	–							
3. T Exp	–.27	.77***	–						
4. No. sessions	–.16	–.12	–.05	–					
5. sqrt AUDIT	–.23	.12	.28	.13	–				
6. sqrt HW tasks	–.42**	.01	.08	.58**	–.13	–			
7. sqrt HW time	–.37**	.01	.14	.60***	–.02	.85***	–		
8. Pre VGS-HS	–.15	.24	.19	.29	–.01	.25	.09	–	
9. sqrt Post VGS-HS	.05	–.02	.08	–.12	.24	–.40**	–.53***	.21	–
10. sqrt FU VGS-HS	.11	–.21	–.25	–.16	.15	–.41**	–.46**	.24	.82**

Notes: T Cred = treatment credibility, T Exp = treatment expectancy, sqrt = square root transformation, AUDIT = Alcohol Use Disorders Inventory Tool, HW = homework, VGS-HS = Victorian Gambling Screen Harm to Self sub-scale, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The second hypothesis was that a significant relationship between homework compliance and treatment outcome would remain even when controlling for the potentially confounding effects of baseline PG severity and the number of sessions attended. Given the significant negative association revealed between age and homework engagement, age was also included as a covariate. To test this hypothesis, separate hierarchical multiple regression analyses were performed at each assessment point (i.e. post-treatment and one-month follow-up) with VGS-HS scores serving as the criterion. The number of homework tasks completed and time spent performing homework were highly correlated ($r = 0.85$, $p < 0.01$) suggesting that these variables are essentially interchangeable. According to the conditioning theory discussed, repeated unreinforced exposures will lead to a reduction in gambling cue reactivity, and therefore a reduction in PG. It was decided that the number of exposure tasks completed would be a more theoretically and clinically relevant predictor variable to use, than an aggregate of the time spent performing homework. Therefore, to avoid multicollinearity and build the most parsimonious model, the number of homework tasks was used in the subsequent analyses (Hosmer, Lemeshow, & Sturdivant, 2013). Table 3 presents a summary of the hierarchical regression analyses. As revealed in Table 3, the overall model was significant at both time points. At step 1, the number of sessions attended, pre-treatment VGS-HS and age were entered. At step 2, homework engagement was entered. As hypothesized, homework engagement significantly predicted PG outcome even when controlling for pre-treatment PG severity, age and the number of sessions attended. The addition of homework engagement to the model led to a significant increase in R^2 at the second step, explaining a further 20% and 17% of the variance in post-treatment and follow-up VGS-HS scores respectively. The model was then run using the time spent performing homework in place of number of homework tasks. Similar results were observed with the overall model significant at both time points.

Discussion

This study sought to add to the existing literature concerning the role of CBT in treating PG by examining the relationship between treatment engagement variables and their prediction of treatment outcome. To date, this is the first study to empirically examine directly the relationship between homework engagement and CBT outcome for PG. Consistent with the hypotheses, participants who engaged in more exposure tasks reported lower PG scores at both post-treatment and follow-up, irrespective of their baseline PG scores or the number of treatment sessions they attended.

A second aim of this study was to examine client clinical and socio-demographic characteristics that might be associated with homework engagement. No significant associations were revealed. Of note in this sample is that more than a third of participants were taking psychotropic medication and around half had limited education, having not completed high school. The current findings suggest that exposure-based CBT is well tolerated among problem gamblers with limited education levels. The data also suggests that taking psychotropic medication did not impose on the current participants' engagement with psychotherapy. Given reported high rates of co-morbid mental health issues among problem gamblers (Lorains, Cowlshaw, & Thomas, 2011) this is encouraging, and further supported by a recent study by Smith, Harvey, Humeniuk, Battersby, and Pols (2014), which found that individuals with co-morbid anxiety and affective disorders enjoyed similar reductions in gambling behaviours from routine CBT. The finding that older participants had lower expectations about treatment outcome and engaged in less homework is of interest. Though this was unrelated to outcome, future

Table 3. Hierarchical multiple regression analyses for variables predicting problem gambling outcome ($n = 45$).

Model	R ²	R ² Δ	F	F Δ	B	SE B	β	t
1. CV:VGS-HS at post-treatment								
Step 1	.08	-	-	(3,41 = 1.20)	-.17	.16	-.19	-1.19
No. sessions					.08	.04	.27	1.71
VGS-HS pre-treatment					.01	.03	.06	.42
Age								
Step 2	.28	.20	(4,40 = 3.97)**	(1,40 = 11.35)**	.12	.16	.13	.75
No sessions					.08	.04	.20	3.11*
VGS-HS pre-treatment					-.02	.03	.20	-.91
Age								
HW					-.69	.20	-.61	-3.37**
2. CV:VGS-HS at 1-m follow-up								
Step 1	.13	-	-	(3,41 = 2.06)	-.24	.15	-.24	-1.55
No. sessions					.10	.05	.33	2.14*
VGS-HS pre-treatment					.02	.03	.12	.82
Age								
Step 2	.30	.17	(4,40 = 4.27)**	(1,40 = 9.61)**	.05	.17	.05	.29
No sessions					.11	.04	.35	2.54*
VGS-HS pre-treatment					-.01	.03	-.06	-.41
Age					-.68	.22	-.55	-3.01**
HW								

Note: CV = criterion variable, VGS-HS = Victorian Gambling Screen Harm to Self sub-scale, HW = homework engagement and entails the square root transformed homework tasks variable, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

research could consider these relationships with a larger sample. The duration of participants' gambling problem and details of any previous treatments were not recorded in the current study. Future research could examine these variables and their relationship to treatment expectancy and homework engagement. For instance, perhaps older participants had struggled with their problem for longer and had previously attempted treatment unsuccessfully, which may explain their lower expectation of outcome. Interestingly, treatment expectancy and credibility were unrelated to homework engagement or treatment outcome. The placebo effect has been observed in medical research for decades (Harrington, 1999) and has received similar attention in the psychotherapy literature (Justman, 2011; O'Connell, 1983; Rosenthal & Frank, 1956). Patient expectations (their beliefs about how treatment will affect them) are hypothesized to be a major pathway of the placebo effect (Stewart-Williams & Podd, 2004); that is, the act of seeking formal therapy may in itself have an effect on psychopathology due to patients' expectation of improvement. This hypothesis has not been directly tested in the treatment of PG. The current data suggests, however, that expectation of improvement did not in fact have an effect on outcome. Rather, engagement of agreed homework tasks predicted outcome.

According to the theory previously discussed, cue exposure targets gambling urges. A growing body of evidence exists, demonstrating that problem gamblers exhibit heightened physiological arousal in response to gambling-related cues (Baudinet & Blaszczynski, 2013). A more direct approach to examine if engagement in cue exposure tasks is related to reduced gambling related cue-reactivity might be to measure physiological arousal before and after cue exposure. The present study used PG (VGS-HS) as the main outcome measure. Gambling urge has been demonstrated to play a significant role in predicting relapse of PG (Smith et al., 2015). Therefore, it is reasonable to hypothesize that the mechanism of action in the present study is the deconditioning of gambling related urges. However, it is unclear with the present data if the act of engaging with or the actual content of the homework was responsible for change. Further research is required to examine this more directly.

This study has a number of limitations which should be noted. Firstly, homework was not a randomized variable; therefore, some caution must be used when inferring causal relations between homework and outcome. Future research could use an experimental design, randomizing participants to homework versus no homework conditions, which would allow us to make stronger conclusions about causal relationships. Nevertheless, the data are consistent with the main study hypothesis; that is, engagement in homework was related to treatment outcome. Secondly, the relatively small sample size should be noted. Replication of the current findings with a larger sample will allow us to make stronger conclusions about the role of homework in CBT for PG. Thirdly, the measure of homework engagement entailed the quantity of homework performed: the number of tasks performed and time spent performing them. Quality of homework was not measured; therefore, future research is required to determine the role of homework quality. A fourth limitation is that although treatment expectancy and credibility were unrelated to outcome, this may have been due to the time of their measurement; that is, immediately after the provision of the treatment rationale at the end of the first session. Treatment expectancy and credibility judgements may have changed over the course of therapy. Future studies could be improved by measuring these variables over time. A fifth limitation concerns the use of engagement in cue exposure tasks as the only homework engagement measure. Technically, reading the rationale in the workbook provided at the initial session could be considered as homework. No data for this activity or outcomes for participants who

attended only 2 sessions ($n = 9$) were recorded. It is therefore unclear whether this particular homework activity had any effect on outcome. One possible effect of reading the treatment rationale between sessions 1 and 2 might be an effect on treatment credibility. The present data indicated that treatment credibility and treatment expectancy were unrelated to outcome. Finally, follow-up was recorded at one month. Future research could consider the effect of homework on CBT outcomes over the longer term.

As formerly discussed, CBT programmes for PG adopt a variety of homework tasks. The question remains as to whether the current findings might relate to alternative forms of PG CBT homework other than exposure, such as cognitive restructuring. This is yet to be examined by PG researchers, though previous CBT homework studies have shown that engagement in cognitive restructuring predicted improvement in patient CBT outcome for depression (Coon & Thompson, 2003; Woods et al., 2002). Given the existing homework compliance literature concerning other forms of psychopathology, and the robust nature of the relationship between homework and outcome revealed in the present data, it seems reasonable to surmise that engagement in other forms of CBT homework may also relate to PG outcome. It is hoped that the present study will encourage other researchers to investigate this area further.

Despite the limitations discussed, these data are significant in that they represent the first empirical evaluation of the role of homework in CBT for PG. These results suggest that engaging in assigned homework tasks has a strong association with immediate and short-term follow-up outcomes. The present study suggests that improvement of homework engagement has the potential to improve clinical outcomes in CBT treating PG. It is hoped that these findings will provide clinicians with some preliminary evidence to encourage and help motivate their clients to engage with assigned therapy tasks.

Conflicts of interest

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