Outcome of psychological treatments of pathological gambling:

A review and meta-analysis.

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Abstract
Disordered gambling is a potentially serious mental health issue that continues to create considerable public concern. Data concerning the efficacy of the treatments of disordered gambling continues to be sparse. This study examined the efficacy of cognitive-behavioural treatments, using a meta-analytical approach which extended on previously published studies, and coded and classified a broader range of methods and interventions. The sample consisted of studies published in the last 25 years (1990-2015) related to cognitive-behavioural interventions for disordered or pathological gambling. Results of the current meta-analysis indicate that cognitive-behavioural treatment (CBT) strategies are effective at reducing problem gambling, and the effects appear to be maintained at follow ups of up to 24 months. Although CBT appears to be effective in all three settings (inpatient, outpatient and self-help), outpatients approaches appear to have the strongest impact in reducing problematic gambling behaviours. There was no difference between studies that used individual and group therapy.
1. Introduction
Gambling disorder is a serious mental health issue that continues to generate considerable public concern in Canada and many other countries. This disorder is characterised by a loss of control over gambling, deception about the extent of one’s involvement with gambling, family and job disruption, theft, and chasing losses or an effort to win back money lost whilst gambling (DSM-5; American Psychiatric Association, 2013). The term “disordered gambling” is sometimes used in the literature to describe a spectrum of gambling-related health problems that include gambling disorders within the psychiatric nomenclature, as well as subclinical problems and issues connected to problem gambling. A considerable body of research now exists from population surveys on the prevalence of disordered gambling. Although there are challenges created by methodological differences in measuring gambling behaviour, meta-analytic work (e.g., Stucki & Rihs-Middel, 2007) has confirmed the relative stability of prevalence estimates across countries, ranging from between 1 and 2% of the adult population for pathological gambling and between 2 and 3% of the adult population for problem gambling (Wardle, Griffiths, Orford, Moody & Volberg, 2012; Welte, Barnes, Tidwell, Hoffman & Wieczorek, 2015; Williams & Volberg, 2013).

1.2. Treatment of Disordered Gambling
Given the magnitude of the mental health problem, it is not surprising that a range of interventions have evolved to address disordered gambling. The majority of approaches to treating disordered gambling fall within a broad spectrum of cognitive-behavioural interventions, although Gamblers Anonymous, and self-help treatments continue to be utilized in various jurisdictions (for more detailed reviews, see Hodgins & Holub, 2007; Ledgerwood & Petry, 2005; Wynn, Hudyma, Hauptman, Houston & Faragher, 2014). Some medications (e.g., anti-depressants, mood stabilizers, and opiate antagonists) have shown promise in reducing gambling-related symptoms (see Łabuzek, Beil, Beil-Gawelczyk, Gabryel, Franik & Okopień, 2014; Pallanti, Grassi, Tofani & Spitoni, 2013 for reviews); however, these medications are not approved to specifically treat problem gambling (Grant, Schreiber & Odlaug, 2013) so will not be discussed further.

The following sub-sections briefly describe the most common treatment approaches to disordered gambling. It is important to highlight that the goals of specific intervention techniques can be quite different, often reflecting the assumed etiology for disordered gambling (Wynn et al., 2014). For some treatment approaches the overall goal is to control gambling behaviours (e.g., psychodynamic), while other approaches focus on an abstinence goal (e.g., Gamblers Anonymous). It should also be noted that while we can formally distinguish among different treatment approaches according to specific theoretical or technical orientations, many health care professionals take a “multimodal” approach to treatment (i.e., therapists may incorporate several
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Types of treatments for a more comprehensive approach than would be provided with any single strategy. In fact, this multimodal approach to treatment is often a core feature of inpatient approaches to treating gambling problems (Buchner, Erbas, Stürmer, Arnold, Wodarz & Wolstein, 2013; Morefield, Walker, Smith, Harvey, Dunn & Battersby, 2014).

1.2.1. Twelve-step facilitated programs
One group of approaches to treating disordered gambling with a long history are Twelve-step facilitated (TSF) programs, such as Gamblers Anonymous (Hodgins & Holub, 2007). TSF programs view disordered gambling as an illness which can be treated. The gambler is an addict, and recovery is focused on abstinence and avoidance of situations that may trigger a relapse and a return to gambling activities. TSF use spirituality and social support to help gamblers abstain from gambling (Gamblers Anonymous, 1984). Core features of TSF programs are group meetings, which provide gamblers with an opportunity to discuss their difficulties, and discover ways to remain abstinent (George, Ijeoma & Bowden-Jones, 2013). Data on the efficacy of TSF programs are limited because membership is anonymous, and most sessions are “drop-in” support groups which may not keep attendance records (for more details on these and related issues see Rash & Petry, 2014).

1.2.2. Psychodynamic treatments
One of the oldest therapeutic approaches to treating disordered gambling problems is psychodynamic therapy (see Rosenthal, 1987 for a detailed review). As often noted (Hodgins & Holub, 2007; Stea & Hodgins, 2011), psychodynamic approaches often vary according to the specific orientation of the therapist; nevertheless, there is a shared core assumption that problematic gambling behaviours can be explained in terms of unconscious motivations and internal conflicts (Rosenthal & Rugle, 1994). Treatment typically consists of long-term sessions (sometimes including group sessions) that assist the individual to gain insight into the emotional origins and meaning of their maladaptive gambling behaviours. Psychotherapy for disordered gambling is usually conducted by a health care specialist in private practice. Given that these sessions are usually private, fee for service based sessions, it is often difficult to track the number of individuals receiving such therapy. There are also few published studies devoted to the topic, therefore conclusions about the effectiveness of such treatment tends to be highly speculative (Hodgins & Holub, 2007; Stea & Hodgins, 2011).

1.2.3. Behavioural therapies
There are also a set of therapeutic strategies developed on the notion that disordered gambling is a learned behaviour (e.g., Dixon & Holton, 2009); thus it can be controlled or eliminated using principles of reinforcement and conditioning. Common behavioural interventions for disordered gambling include imaginal desensitization, aversion therapy, stimulus control, and in-vivo
exposure. For example, imaginal desensitisation is a relaxation-based intervention also used to treat gambling problems (McConaghy, Armstrong, Blaszczynski & Allcock, 1983). Patients are first taught progressive muscle relaxation. Once relaxed, they are asked to visualize a personally relevant gambling scene in which they resist the urge to gamble. Patients remain relaxed throughout the visualization, and they are asked to leave the scene situation without having gambled. Usually several attempts are required to achieve therapeutic effects, which can be understood using a learning paradigm. The visualization provides a means for the gambler to practice the desired behaviour (i.e. resist gambling) in a safe environment, which in turn, increases feelings of self-efficacy with repeated successful outcomes. Relaxation is also reinforcing because it feels good. Repeated trials reinforce the link between resisting gambling and feeling good (which also increase the likelihood the gambler will resist in a real gambling situation).

Aversive conditioning has also been employed to replace the positive emotions of excitement and pleasure associated with gambling with negative or aversive emotional reactions (e.g., Tolchard, Thomas & Battersby, 2006). This type of therapy can involve mental stimuli (e.g., imagining devastating consequences), or physical stimuli such as electric shocks or nausea-inducing drugs. There are also various stimulus control approaches which focus on reducing problem gambling by teaching the client coping and social skills, as well as techniques to control their finances (e.g., Gomes & Pascual-Leone, 2014). For example, a gambler may only carry to the casino the amount of money that has been predetermined as the daily betting limit (for this to work the gambler is taught to plan ahead and not bring debit, or credit cards with access to additional funds, when they visit a gambling venue).

1.2.4. Cognitive-behavioural therapies.
Most treatments for disordered gambling fall within a broad spectrum of cognitive-behavioural strategies (Gooding & Tarrier, 2009; Grant et al., 2013; Rash & Petry, 2014; Stea & Hodgins, 2011; Wynn et al., 2014). Cognitive-behavioural therapy (CBT) represents a synthesis of cognitive and behavioural interventions which have been used to treat a variety of psychological problems and health-related behaviours. Cognitive therapy assumes that behaviours are controlled by cognitive processes (e.g., thoughts, judgments, reason, plans, beliefs, etc.), and the root of gambling problems are faulty ideas about chance, and the gaming process (Gobet & Schiller, 2014). One of these misperceptions is known as the gambler’s fallacy, or the belief that a win is due, following a series of losses (Ayton & Fischer, 2004). This fallacy has a powerful influence on behaviour and is often the reason players continue to gamble despite mounting losses (see Wilke, Scheibehenne, Gaissmaier, McCanney & Barrett, 2014). For example, slot players often feel a strong urge to continue playing the longer they play without winning, trusting
that the machine must eventually pay-out. This belief is of course inaccurate, and slot machines pay out according to a random schedule, which cannot be predicted.

The goal of cognitive therapy for disordered gambling is to correct misperceptions and teach gamblers about randomness and the real odds of winning (Gooding & Tarrier, 2009; Gobet & Schiller, 2014). This education provides the gambler with more accurate and realistic notions about gaming, and promotes healthier gambling behaviour. The approach rests on the assumption that alterations in behaviour will result from cognitive changes (i.e. if you change an idea, belief or attitude, behavioural change should follow). Because CBT treatments are generally highly structured, they can be incorporated into existing hospital-based, inpatient programs, or used as stand-alone outpatient therapy in community settings. The structured nature of CBT means that it can also be delivered in workbooks or online, using a self-help format (see, for example, Carlbring & Smit, 2008). Increasingly, treatment studies in the literature are citing the use of alternative mediums and modalities of CBT delivery, a trend which may represent a unique opportunity to broaden access to gambling treatments (see Gainsbury & Blaszczynski, 2011 for a detailed discussion on these issues). Specifically, “as available resources for gambling-related problems are limited or nonexistent in many geographic areas, telephone-based support, mailed self-help manuals, and online resources can potentially increase outreach” (Hodgins & Holub, 2007, p. 382-383).

1.3. Efficacy of Treatment Approaches
As others have noted in detail (e.g., Gooding & Tarrier, 2009; Hodgins & Holub, 2007; Ledgerwood & Petry, 2005; Rash & Petry, 2014), there is limited data concerning the efficacy of psychological treatments for disordered gambling, especially for interventions that do not fall under the CBT umbrella (e.g., psychodynamic, TSF, and eclectic treatments.). Part of the challenge is the variability across studies with respect to the defining and assessment of disordered gambling behaviours, especially when reviewing older treatment modalities (e.g., older psychodynamic and behavioural treatments). Because much of the older published literature on the efficacy of treatment used vague or problematic definitions of disordered gambling, systematic attempts to determine the efficacy of treatments has focused primarily on CBT strategies. For example, of the 22 studies reviewed by Pallesen, Mitsem, Kvale, Johnsen & Molde (2005), 73% employed CBT strategies. Cognitive-behavioural treatments were also the focus of the Gooding and Tarrier (2009) study, which identified 25 articles from the literature.

There are conceptual and methodological issues to consider when evaluating treatment approaches. Walker et al. (2006) noted three important elements for determining the efficacy of interventions: i) there is a reduction in the frequency and/or intensity of gambling, ii) the negative consequences and/impacts of gambling are lessened, and iii) these outcomes are directly
attributable to the therapy’s mode of action. Meta-analysis is a useful method for integrating results from several studies and allows for conclusions to be made (e.g., regarding the efficacy of a particular intervention) on a scale not possible from single study (Rosenthal & Dimatteo, 2001). The two previously published meta-analyses (Gooding & Tarrier, 2009; Pallesen et al., 2005) provide a starting point and an empirical framework for evaluating the efficacy of specific treatments for disordered gambling. There is considerable overlap in the methods and samples used in these two studies (and some inconsistencies due to the differing selection criteria), however, Gooding and Tarrier (2009) likely represent a better estimation of treatment efficacy because it is more methodologically rigorous than the Pallesen et al. (2005) study.

When conducting meta-analysis, the summary data (or other statistics) are converted into effect sizes (e.g., Cohen’s d, or Hedges g; Cooper, 2010). Effect sizes represent the magnitude of the difference between the treatment group and the control group, divided by a pooled variance. In a typical study, post-treatment scores on an outcome measure are compared between a treatment and waitlist control groups. Effect sizes can also be conceptualized as standardized differences scores. The Gooding and Tarrier (2009) meta-analysis of CBT treatment studies for disordered gambling found significant effect sizes at post-treatment (g = 0.72), and at follow-ups of 6 months (g = 0.58), and 12 months (g = 0.40). This result suggests that following treatment, participants who received CBT strategies averaged approximately 0.72 standard deviations above the waitlist control group on a measure of disordered gambling (e.g., days abstinent, hours or dollars spent gambling, etc.). Thus, findings indicate a medium to large overall effect of CBT treatments on reducing disordered gambling. Although efficacy appears to decrease over time at subsequent follow-ups, the results across all three time points were statistically significant. Furthermore, Gooding and Tarrier (2009) found that the mode and type of treatment did not influence the efficacy. CBT with motivational or imaginative desensitization were equally effective as generic CBT, and treatments that were delivered one-on-one were equally effective as those in groups or alone (i.e., self-help workbooks).

2. Present Study
The present study sought to update and extend previously published meta-analyses (Gooding & Tarrier, 2009; Pallesen et al., 2005) on published studies that used cognitive-behavioural treatments to reduce disordered gambling. The focus was on CBT strategies because the majority of recently published studies have employed these methods (Gooding & Tarrier, 2009; Grant et al., 2013; Rash & Petry, 2014; Stea & Hodgins, 2011; Wynn et al., 2014), and too few studies systematically evaluate other types of treatment (e.g., TSF, psychodynamic) to allow for valid comparisons. As with Gooding and Tarrier (2009) and Pallesen et al. (2005), we used a meta-analytic framework to assess the overall efficacy of CBT treatments, as well as examine the influence of study characteristics on the magnitude of the study effects. Of particular importance
was comparing treatment setting, as well as mode of delivery and medium of therapy, because these moderator variables are relevant to contemporary gambling strategies. For example, setting (comparing inpatient to outpatient settings) was selected because the responsibility for treating gambling and other addictions has recently shifted from hospitals to community-based mental health agencies (Buchner et al., 2013; Hodgins & Holub, 2007; Wynn et al., 2013). Of particular importance in the current meta-analysis was addressing the following set of questions: Are CBT treatments effective at reducing disordered gambling? Does the setting, delivery format, or medium influence study effects? For example, are inpatient and outpatient programs equally effective at reducing gambling behaviours? Are therapies delivered individually (i.e., one-on-one with a therapist or counsellor) as effective as those delivered to groups, or presented in a self-help format? Are online interactions and workbooks as effective sessions with a live therapist or counsellor?

The present study also examined whether design features and methodology quality influenced study effects. A particular interest was possible differences in effect sizes between studies that use pre-post designs as compared to controlled trials that compare a treatment and control group. Methodological quality was assessed using the *Clinical Trail Assessment Measure* (CTAM; Tarrier & Wykes, 2004), a psychometric scale which evaluates the rigor of clinical trial methods (see Appendix A for a copy of the CTAM). Negative associations between effect sizes and study quality have been previously reported (Gooding & Tarrier, 2009), indicating that studies with poorer methodology tend to report more elevated effect sizes.

2.1. Method

2.1.1. Sample and search strategies. The sample consisted of studies published in the last 25 years (1990-2015) related to cognitive-behavioural interventions for disordered or pathological gambling. Most articles were accessed using PsycINFO and other electronic scholarly databases (e.g., Scholars Portal Search, Web of Science, Ovid, etc.). The search strategy involved first locating all the articles cited in Gooding and Tarrier (2009), as well as any relevant studies from Pallesen et al. (2005). After collecting these articles, an additional search of the scholarly databases was conducted for any newly published research, and any studies that may have been missed, or omitted from these two previous reviews. The search process used the same search criteria suggested by Gooding and Tarrier (2009) and was restricted to papers published in refereed journals and most were downloaded from electronic databases.

2.1.2. Inclusion and exclusion criteria. Following the methods in Gooding and Tarrier (2009), studies were eligible for inclusion only if they were published in English, in peer-reviewed journals (i.e., we did not include unpublished reports or “grey” literature). The focus was empirical research related to treating problem, or pathological gambling with cognitive-
behavioural treatments. Only studies with explicit cognitive-behavioural orientations (or psychological methods which were clearly of a cognitive or behavioural nature) were selected. Only studies that exposed a group of individuals to treatment and reported an outcome measure which could be used to assess treatment efficacy were selected. Both study designs that compared a treatment group to a comparison group (i.e., wait-list control, treatment as usual, or some other form of treatment) or compared pre-treatment to post-treatment levels of gambling in one group of participants (i.e. pre-test vs. post-test designs) were included.

Studies were excluded if they employed a treatment that was not cognitive-behavioural in nature (e.g., Angelo, Tavares & Zilberman, 2013; Jackson, Francis, Byrne & Christensen, 2013), or were single case studies, clinical descriptions or used only qualitative analyses. Studies were also excluded if they focused on the characteristics of gamblers in treatment (e.g. Champine & Petry, 2010; Dowling & Cosic, 2011; Dowling, Smith & Thomas, 2009; Gomes & Pascual-Leone, 2009; Ladouceur, Lachance & Fournier, 2009; Legerwood, Arfken, Wiedemann, Bates, Holmes & Jones, 2013; McCormick & Taber, 1991, Ramos-Grille, Goma-i-Freixanet, Aragay, Valero & Valles, 2015; Smith, Battersby, Harvey, Pols, Baigent & Oakes, 2011), or focused on drop-out, retention or relapse prevention (e.g., Aragay et al. 2015; Dowling, 2009; Smith et al., 2010; Wulfert, Blanchard, Freidenberg & Martell, 2006), rather than treatment efficacy per se. Studies were also excluded if they failed to provide sufficient information to empirically evaluate the effectiveness of the treatment program (e.g., Hodgins, Fick, Murray & Cunningham, 2013; Oakes, Gardiner, McLaughlin & Battersby, 2012).

Meta-analysis requires that each effect size comparison be independent, which poses a problem when the same principal investigators publish more than one study using the same sample of participants, at the same site (i.e., dependent samples). Thus, when our searches uncovered two or more studies from same principle investigators which used data from same participants, we chose the most representative study for the meta-analysis. For example, Petry and Weiss (2009) examined the impact of social support on treatment, and Rash, Weinstock and Petry (2011) examined patterns of drinking during treatment using the same sample that was also used by Petry et al. (2006). Because the 2006 study was a controlled study that compared the efficacy of cognitive-behavioural treatment to Gamblers’ Anonymous, it was selected to represent the treatment effect in the current study. Similarly, Manning et al. (2014) and Guo et al. (2014) published treatment efficacy data using the same participants at a Singapore site (and the latter study was selected for the meta-analysis). We also uncovered two functionally identical studies that was published in two different journals, with slightly different titles (Ramos-Grille, Goma-i-Freixanet, Aragay, Valero & Valles, 2013 and Ramos-Grille et al., 2015; Smith, Battersby, Harvey, Pols & Ladouceur, 2013 and Smith, Battersby, Harvey, Pols & Ladouceur, 2015). The more recent Smith et al. (2015) paper was selected for the meta-analysis, however the Ramos-
Gilles et al. papers were excluded because the sample was also used in Jimenez-Murcia et al. (2012) and that study was considered the most representative of the treatment effect.

Appendix A presents the research studies (N=40) that were retrieved from our search strategy and selected for the meta-analysis. Several of these papers were also used in Gooding and Tarrier (2009) and Pallesen et al. (2005), however several new studies have been included in the current study. As shown in Appendix A, all studies either compared a treatment group to a control or comparison group, or used pre-test vs. post-test designs to test the effectiveness of a specific treatment program. A few studies provided a sufficient number of treatment groups to allow for additional study comparisons. Specifically, Dowling et al. (2007) and Echeburua et al. (2000) provided sufficient information to compare individual therapy to a waitlist control, as well as group therapy using a pre-test vs post-test design. LaBrie et al. (2012) allowed for separate comparisons for Massachusetts and Nevada samples.

2.1.3. Classification, coding, and scoring. For each study included in Appendix A, the type of therapy was identified, and coded for setting (inpatient vs. outpatient vs. self-help), mode of delivery (individual, group, or combined therapy) and medium (live in-person, or alternative interaction using the telephone, online, or a workbook). The methods were coded for type of design (controlled trial vs. pre vs. post-test design), number of sessions, and hours of treatment. Attrition rates from active treatment were also calculated, or were adapted from Gooding and Tarrier (2009) and various demographic characteristics of the sample were also coded (e.g., mean age of the sample, % male participants, primary type of gambling, etc.).

As shown in Appendix A, the majority of studies were conducted in outpatient settings (n = 29, 72%) as compared to inpatient settings (n = 4, 10%). In a sizeable number of studies (n = 7; 17%) the research participants were treated for their gambling problems at home. The most common mode of delivery was individual therapy (n = 21, 52%), followed by group therapy (n = 12, 30%) and combined approaches (n = 7, 17%). In most studies, the medium was a living person, such as a counsellor or therapist (n = 32, 80%) however, alternative mediums (i.e., digital, audio or workbooks) were used in several studies (n = 8; 20%). Overall, more studies used controlled trials (n = 25, 62%) rather than pre vs. post-test designs (n = 15, 38%).

The quality of each study was assessed using the Clinical Trail Assessment Measure (CTAM; Tarrier & Wykes, 2004). The CTAM consists of 15 items that assess the following aspects of study methodology: sample size and recruitment, allocation to treatment, assessment of outcome, description of treatment and groups, and appropriateness of the analysis (see Appendix B for a copy of the CTAM). This measure has demonstrated reasonable internal consistency (Cronbach’s alpha = .69) and good concurrent validity in previous studies (see Gooding & Tarrier, 2009).
Higher scores (maximum 100) indicate increased methodological rigor, and previous research has suggested a cut-off score of 65 to identify adequate quality (Gooding & Tarrier, 2009; Wykes et al. 2008). As noted in Table 1, in the current study only five studies achieved this level of quality (Hodgins, Currie & El Guebaly, 2001; Hodgins, Currie, Currie & Fick, 2009; Neighbors et al., 2015; Petry et al., 2006; Petry, Weinstock, Ledgerwood & Morasco, 2008). The mean CTAM score was 41.68 (SD=19.47).

The outcome most proximal to gambling was identified and used to calculate the effect size of treatment efficacy for each study (see Table 1). Following the methodology used by Gooding and Tarrier (2009), whenever possible, a measure of gambling frequency was selected. As demonstrated in Table 1, for the majority of studies (n = 20) a measure of frequency was available to calculate effect sizes: frequency (n = 7), days gambled (n = 10), hrs gambled (n = 2), and bout duration (n = 1). Other outcomes included abstinence (n = 7), desire to gamble (n = 2), DSM-IV symptoms (n = 2) and scores on subjective ratings scales and questionnaires (n = 9) such as the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987).

Standardized mean differences (d) was used to calculate effect sizes (Cooper, 2010). For interpreting effect sizes, Cohen (1977) provides some general guidelines. Values of 0.20 to 0.49 are small, between 0.50 and 0.80 are moderate, and above 0.80 represent large effects. In a typical case, means and standard deviations were reported, and these were used to calculate effect sizes. In a controlled trial, effect sizes were calculated as the mean difference between the treatment group and the control group at post-treatment, divided by a pooled variance. When the study used a pre- vs. post-test design, effect sizes were calculated using the mean difference between pre-treatment and post-treatment scores, divided by a pooled variance. In some atypical cases, effect size was estimated using t, Chi-square, or p values, using Comprehensive Meta-Analysis (CMA) software, or calculated manually using recommendations outlined in Card (2012) and Cooper (2010). Some researchers, such as Gooding and Tarrier (2009) prefer to report Hedge’s g (Hedges & Olkin, 1985) which applies a correction factor to the effect size for sample size. However, as Cooper (2010) suggest that a Hedge’s g correction factor can be useful and applied with small samples (N< 20). However, with larger samples d is the generally accepted standard for calculating effect sizes (Card, 2012; Cooper, 2010; Lipsey & Wilson, 2000).

3.0. Results and Discussion
The overall effect size for the set of studies presented in Table 2 (based on 40 individual comparisons, and using a fixed effects model) was -0.45 (0.02), CI = -0.49 to -0.41, Z= -19.69, p < .0001. This suggests a moderate and significant overall effect of CBT for treating problem gambling. The sign is negative because a positive outcome is evidenced by less gambling.
behaviour. Effect sizes can be conceptualized as standardized difference scores, and an effect size of zero would indicate the same average level of symptomatology in the two groups being compared (Pallesen et al., 2005). Thus, in the current study, participants who received CBT treatments averaged almost half a standard deviation less than the comparison group on outcome measures of problem gambling. This result is similar, but lower than the overall effect size (-0.72) reported in Gooding and Tarrier (2009). The present study used similar selection criteria to Gooding and Tarrier (2009), therefore it is not surprising that findings are fairly consistent. Our result was much more conservative than the overall effect size (2.01) reported by Pallesen et al. (2005). The difference may reflect the selection criteria because Pallesen et al. (2005) included all types of treatment modalities in their sample, including eclectic and older psychodynamic treatments. These findings indicate a change in the magnitude of the efficacy of this type of treatment over time, but an overall robust and significant effect of CBT on gambling behaviors, despite the variability in research design, client demographics, treatment type, mode of delivery, and outcome measures in the studies.

The overall effect is just one issue to be explored. A test of homogeneity for the overall effect was significant, $Q_{(39)}= 398.62, p < .0001$, suggesting that effect sizes in the 40 studies are heterogeneous, and not all estimates of a single population value, but rather multiple population values. The $I^2 = 90.21$ indicated a large amount of heterogeneity and supports exploring the role of possible moderators to identify characterises of the studies that may be associated with higher or lower effects sizes. Of particular interest was the impact of setting, delivery format, and medium on treatment efficacy.

3.2.1. Treatment settings. Studies conducted using outpatient settings (Mean = - 0.54, $Z = - 18.54, p < .0001$) had higher effect sizes than studies using self-help in home settings (Mean = - 0.27, $Z = -5.09, p < .0001$) and this difference was significant ($Q_{(1)}= 18.22, p < .0001$). Studies with outpatient settings had higher effect sizes than inpatient settings (Mean = - 0.38, $Z = -6.15, p < .0001$) and the difference in settings was also statistically significant, $Q_{(1)}= 3.95, p = .05$. Self-help and inpatient settings did not differ from one another ($p = .149$).

Although CBT appears to be effective in all three settings (inpatient, outpatient and at self-help at home), outpatients approaches appear to have the strongest impact in reducing problematic gambling behaviours. It is not surprising because outpatient treatments tend to be preferred by clients (Dowling & Cosic, 2011) and they may provide the most benefit to the client with this least amount of disruption to his/her life. Specifically, he/she can participate in treatment and continue to maintain a relatively normal routine. It is also possible that outpatient settings force clients to deal more frequently with the “temptation” to gamble because they have more access to gambling venues while residing in the community than would clients in inpatient programs.
Thus, clients attending outpatient programs must negotiate and cope with these treats to relapse, which may also contribute to treatment efficacy. Certainly, the modest effect size of the benefits of inpatient treatment needs to be balanced with resource requirements. As Jackson, Thomas and Blaszczynski (2003) have noted, “Given the expense associated with the length of treatment and the manpower utilised, the cost-benefit of employing such resources for such gains as are achieved needs to be evaluated. Analyses of these interventions suggested that less costly and briefer methods of behavioural intervention need to be explored” (p. 48).

Although Gooding and Tarrier (2009) reported a trend towards greater effectiveness of individual therapy sessions, there was no significant difference ($p = .06$) in the present study in the magnitude of effect sizes between studies that used individual (Mean = -0.47, $Z = -13.92$, $p < .0001$), or group delivery strategies (Mean = -0.37, $Z = -9.46$, $p < .0001$). However, studies that used a combined approach (Mean = -0.55, $Z = -10.60$, $p < .0001$) had slightly higher effect sizes than those using group delivery, and the difference was significant, $Q(1) = 7.37$, $p = .007$).

### 3.2.2. Treatment medium

With respect to the medium of treatment, studies that used live, in-person interactions (Mean = -0.47, $Z = -19.05$, $p < .0001$) had higher effect sizes than studies that used alternative mediums, such as telephone or internet-based interactions (Mean = -0.31, $Z = -5.93$, $p < .0001$) and the difference was significant, $Q(1) = 10.29$, $p = .001$. The effect for telephone or internet-based treatment is still encouraging, because it suggests that treatment can be tailored towards such cost-effectiveness features. This may also benefit individuals living in rural communities or other remote areas where access to health-care resources is limited (see Hodgins, 2004; Hodgins & Holub, 2007) for a more detailed discussion on this point).

### 3.2.3. Study design

We also examined the influence of type of design (controlled trials and pre vs. post-test) on study effect size. Controlled studies which compared a treatment group to a control or comparison group had lower effect sizes (Mean = -0.30, $Z = -8.19$, $p < .0001$) than studies that used pre- vs. post-test designs (Mean = -0.57, $Z = -9.99$, $p < .0001$) and this difference was statistically significant, $Q(1) = 45.04$, $p < .001$. It is possible that pre- vs. post-test designs may have overestimated the treatment efficacy of CBT for reducing problem gambling. Controlled trials may provide a more accurate representation of the CBT treatment effect because they account for the changes that may occur naturally over time, or simply because the participants attended therapy, regardless of type of treatment they received. Taken together, this suggest that CBT is effective, but perhaps not remarkably different than other types of evidence-based treatments. Recent controlled studies that directly compared CBT to Twelve Step Programs with problem gamblers appear to support this view (Marceaux & Melville, 2011; Toneatto & Dragonetti 2008). However, as Marceaux and Melville (2011) pointed out, poor success rates and high drop-out in some early Twelve Step Programs, such as Gamblers
Anonymous “have led clinicians to alter the traditional GA approach or to utilize it in conjunction with other treatments” (p.173). This suggests that contemporary Twelve Step Programs may also be incorporating psychoeducation, and cognitive and behavioral components, making it increasingly difficult to disentangle the possible mechanisms of action, and identify the factors which may be responsible for the treatment effects.

3.2.4. Gender. On average across all 40 studies, the samples were composed largely (65%) of men. Only a few studies focused on gambling issues in women or report results by gender, making it difficult to examine the influence of gender on treatment efficacy. However, because most studies reported details of the sample, we examined the influence of the gender distribution on effect sizes by comparing the effect sizes of studies that had less women (less than 50% women) to those that had more women (more than 50% women). Results indicated that the effect sizes were moderate in both groups, however the effect sizes were higher in studies with less women than men (Mean = -0.49, Z = -17.01, p < .0001) as compared to studies with more women than men (Mean = -0.39, Z = -10.13, p < .0001) and the difference was significant, Q (1) = 4.14, p = .04.

This finding suggests that current cognitive-behavioural treatments for problem gambling may be less efficacious with samples composed of more women than men. Because much of the early gambling research was conducted with male gamblers, it is possible that the treatment protocols that emerged from these studies may not be as relevant and applicable to female gamblers. Recent studies also indicate that men and women may start gambling and develop problematic gambling behaviors for different reasons (e.g., Grant, Odlaug & Mooney, 2012); men and women also appear to differ with respect to comorbid conditions when seeking treatment for gambling problems (González-Ortega, Echeburúa & Polo-López, 2015). Thus, cognitive-behavioural treatments may need to be tailored to reflect these individual differences.

Other factors influencing treatment efficacy

The relationship between effect sizes and methodological quality is presented in Figure 1. There was a low association between study effect sizes and CTAM scores, but the relationship was not significant (r = .19, p > .05). Similarly, study effect size was only mildly associated to study sample size (Mean = 86.00, SD = 73.43, r = .21, p > .05).

The magnitude of the effect sizes was not related to the number of treatment sessions (Mean = 21.94, SD = 32.73, r = .09, p > .05), hours of treatment (Mean = 14.84 hrs, SD = 18.76, r = -.06, p > .05), or attrition from active treatment (Mean = 25.80%, SD = 16.22, r = .12, p > .05). Gooding and Tarrier (2009) found similar trends in their data, suggesting that outcomes may be independent of treatment length or number of sessions. If brief interventions are as effective at
reducing disordered gambling, then these types of treatments may have specific practical applications in situations where access to resources may be limited (see Diskin & Hodgins, 2009; Gooding & Tarrier, 2009; Hodgins & Holub, 2007).

3.2.5. Follow-up analysis. Table 3 presents the effects for cognitive behaviour treatments for problem gambling in studies that provided data at 1-3 months, 4-6 months, 9-12 months, and 24 month follow-ups. Because effects sizes varied by design type (with higher effects sizes reported in pre- vs. post-test designs than controlled studies) the results are also presented by design type. Consistent with findings presented in Gooding and Tarrier (2009), treatment effects appear to be maintained at follow-ups of 1-3 months (Mean = -0.38), 4-6 months (Mean = -0.43), 9-12 months (Mean = -0.45) and 24 months (Mean = -0.43). As highlighted in Table 2, follow-up data from controlled studies (which compared a treatment group to a control or comparison group) provided more conservative estimates of effect size than follow-up data from pre- vs. post-test designs. Moreover, follow-up analysis of the pre- vs. post-test designs showed a surprising increase in effects sizes at 9-12 months, an anomalous finding which may be a reflection of the small sample of studies in this category (n= 5) and further evidence of increase variability in pre- vs. post-test designs.

4.0. Conclusions and Future Directions
Although there continues to controversy about “best practices” in relation to the treatment of gambling problems (Grant et al., 2013; Rash & Petry, 2014; Stea & Hodgins, 2011; Wynn et al., 2014), cognitive-behavioural interventions have demonstrated encouraging levels of empirical support. The overall effect size for the set of studies included in the current meta-analysis suggests that cognitive-behavioural strategies are effective at reducing gambling. Findings in the present study were similar to those reported by Gooding and Tarrier (2009) and Pallesen et al. (2005), however current results were more conservative than the latter prior study. The differences are likely due to the different selection criteria; the present study used selection criteria very similar to Gooding and Tarrier (2009), whereas Pallesen et al. (2005) included all types of treatment, including eclectic and older psychodynamic treatments.

Although CBT appears to be effective in all three settings (inpatient, outpatient and self-help at home), outpatients approaches appear to have the strongest impact in reducing problematic gambling behaviours. As noted earlier, the substantially higher costs associated with inpatient treatment needs to be balanced with this pattern of results. There are other important resource implications associated with key findings. Specifically, there were no differences in treatment efficacy between studies that used individual or group therapy. Treatment efficacy was also not linked to the number of treatment sessions or hours of treatment. As a number of researchers have noted (Diskin & Hodgins, 2009; Gooding & Tarrier, 2009; Tolchard et al., 2006), the
efficacy of brief interventions (relative to longer treatment) has considerable practical application in situations where treatment resources may be limited.

It is important to acknowledge that little is known about the efficacy of treatments for disordered gambling in many important subgroups such as youth and the elderly (Levens, Dyer, Zubritsky, Knott & Oslin, 2005). The results of the present study, like the existing literature, is based on very homogeneous samples with respect to variables like age, ethnicity, and gender. This is an area that would benefit from more targeted research. The current findings also suggests that gender may be a moderate factor, and that current cognitive-behavioural treatments for problem gambling may need to be tailored to better reflect the specific issues of female gamblers. We recommend further research into this area.
5.0. References


Grant, J. E., Odlaug, B. L., & Mooney, M. E. (2012). Telescoping phenomenon in pathological gambling: Association with gender and comorbidities. *Journal of Nervous and Mental Disease, 200*, 996-998.


Psychological treatments of pathological gambling


Table 1. Standardized mean differences ($d$) for treatment effects for cognitive-behavioural treatment for problem gambling in the total sample.

<table>
<thead>
<tr>
<th>Study</th>
<th>Outcome</th>
<th>$d$</th>
<th>Std. error</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>Z</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blaszczynski et al. (2005)</td>
<td>Hrs Gambled</td>
<td>-1.27</td>
<td>0.20</td>
<td>-1.65</td>
<td>-0.88</td>
<td>-6.47</td>
<td>0.00</td>
</tr>
<tr>
<td>Breen et al. (2001)</td>
<td>Beliefs/Attitudes</td>
<td>-1.04</td>
<td>0.17</td>
<td>-1.37</td>
<td>-0.72</td>
<td>-6.29</td>
<td>0.00</td>
</tr>
<tr>
<td>Carlbring et al. (2012)</td>
<td>Days Gambled</td>
<td>-0.12</td>
<td>0.10</td>
<td>-0.32</td>
<td>0.09</td>
<td>-1.13</td>
<td>0.26</td>
</tr>
<tr>
<td>Carlbring &amp; Smit (2008)</td>
<td>Gambling Problems</td>
<td>-1.36</td>
<td>0.27</td>
<td>-1.90</td>
<td>-0.82</td>
<td>-4.98</td>
<td>0.00</td>
</tr>
<tr>
<td>Diskin &amp; Hodgins (2009)</td>
<td>Days Gambled</td>
<td>-1.67</td>
<td>0.16</td>
<td>-1.98</td>
<td>-1.36</td>
<td>-10.49</td>
<td>0.00</td>
</tr>
<tr>
<td>Doiron &amp; Nicki (2007)</td>
<td>Cognitive Distortions</td>
<td>-0.93</td>
<td>0.24</td>
<td>-1.39</td>
<td>-0.47</td>
<td>-3.95</td>
<td>0.00</td>
</tr>
<tr>
<td>Dowling et al. (2007)</td>
<td>Frequency</td>
<td>-0.74</td>
<td>0.27</td>
<td>-1.26</td>
<td>-0.21</td>
<td>-2.76</td>
<td>0.01</td>
</tr>
<tr>
<td>Dowling et al. (2007) Group</td>
<td>Frequency</td>
<td>-0.81</td>
<td>0.17</td>
<td>-1.14</td>
<td>-0.47</td>
<td>-4.72</td>
<td>0.00</td>
</tr>
<tr>
<td>Echeburua et al. (2000)</td>
<td>Subjective Gambling Score</td>
<td>-0.57</td>
<td>0.17</td>
<td>-0.91</td>
<td>-0.23</td>
<td>-3.29</td>
<td>0.00</td>
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<tr>
<td>Echeburua et al. (2000) Group</td>
<td>Subjective Gambling Score</td>
<td>-0.51</td>
<td>0.17</td>
<td>-0.84</td>
<td>-0.18</td>
<td>-3.06</td>
<td>0.00</td>
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<tr>
<td>Grant et al. (2011)</td>
<td>Abstinence</td>
<td>-0.37</td>
<td>0.17</td>
<td>-0.71</td>
<td>-0.03</td>
<td>-2.11</td>
<td>0.04</td>
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<tr>
<td>Guo et al. (2014)</td>
<td>Days Gambled</td>
<td>-1.13</td>
<td>0.15</td>
<td>-1.42</td>
<td>-0.84</td>
<td>-7.67</td>
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<td>Hodgins et al. (2001)</td>
<td>Days Gambled</td>
<td>-0.44</td>
<td>0.25</td>
<td>-0.93</td>
<td>0.05</td>
<td>-1.75</td>
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<td>Days Gambled</td>
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<td>0.09</td>
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<td>-2.90</td>
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<td>Jimenez-Murcia et al. (2007)</td>
<td>Abstinence</td>
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<td>0.06</td>
<td>-0.42</td>
<td>-0.20</td>
<td>-5.50</td>
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<tr>
<td>Labrie et al. (2012) Massachusetts</td>
<td>Days Gambled</td>
<td>-0.07</td>
<td>0.17</td>
<td>-0.39</td>
<td>0.25</td>
<td>-0.42</td>
<td>0.67</td>
</tr>
<tr>
<td>Labrie et al. (2012) Nevada</td>
<td>Days Gambled</td>
<td>-0.42</td>
<td>0.15</td>
<td>-0.71</td>
<td>-0.12</td>
<td>-2.77</td>
<td>0.01</td>
</tr>
<tr>
<td>Ladouceur et al. (1998)</td>
<td>Urge to gamble</td>
<td>-0.33</td>
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<td>-1.54</td>
<td>0.88</td>
<td>-0.54</td>
<td>0.59</td>
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<tr>
<td>Ladouceur et al. (2001)</td>
<td>Frequency</td>
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<td>-0.44</td>
<td>-4.86</td>
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<td>Ladouceur et. al. (2003)</td>
<td>Combined</td>
<td>-0.99</td>
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<td>-0.70</td>
<td>-6.70</td>
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<tr>
<td>Larimer et al. (2012)</td>
<td>Frequency</td>
<td>-0.23</td>
<td>0.21</td>
<td>-0.63</td>
<td>0.18</td>
<td>-1.10</td>
<td>0.27</td>
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<tr>
<td>Lesieur &amp; Blume (1991)</td>
<td>Days Gambled</td>
<td>-1.07</td>
<td>0.15</td>
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<td>-7.25</td>
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<td>Marceaux &amp; Melville (2011)</td>
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<td>-0.54</td>
<td>0.28</td>
<td>-1.09</td>
<td>0.00</td>
<td>-1.96</td>
<td>0.05</td>
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<td>Melville et al. (2004)</td>
<td>bout duration</td>
<td>-2.27</td>
<td>0.67</td>
<td>-3.58</td>
<td>-0.95</td>
<td>-3.37</td>
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<td>Milton et al. (2002)</td>
<td>SOGS scores</td>
<td>-0.20</td>
<td>0.22</td>
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<td>-0.89</td>
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<td>Measure</td>
<td>Estimate</td>
<td>SE</td>
<td>Lower CI</td>
<td>Upper CI</td>
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<td>P Value</td>
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<td>------------------------------</td>
<td>------------------------</td>
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<td>----------</td>
<td>----------</td>
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<td>---------</td>
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<td>Myrseth et al. (2009)</td>
<td>DSM IV symptoms</td>
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<td>0.44</td>
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<td>Neighbors et al. (2015)</td>
<td>Frequency</td>
<td>-0.03</td>
<td>0.09</td>
<td>-0.21</td>
<td>0.15</td>
<td>-0.31</td>
<td>0.76</td>
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<td>Oakes et al. (2012)</td>
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<td>-0.30</td>
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<td>Parhami et al. (2012)</td>
<td>Abstinence</td>
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<td>-0.91</td>
<td>0.67</td>
<td>-0.30</td>
<td>0.76</td>
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<tr>
<td>Pasche et al. (2013)</td>
<td>PG-YBOCS score</td>
<td>-2.10</td>
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<td>-1.79</td>
<td>-13.27</td>
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<td>Petry et al. (2006)</td>
<td>Days Gambled</td>
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<td>0.10</td>
<td>-0.43</td>
<td>-0.05</td>
<td>-2.48</td>
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<td>Petry et al. (2008)</td>
<td>Dollars gambled</td>
<td>-0.16</td>
<td>0.15</td>
<td>-0.45</td>
<td>0.13</td>
<td>-1.10</td>
<td>0.27</td>
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<td>Robson et al. (2002)</td>
<td>Days Gambled</td>
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<td>0.14</td>
<td>-1.31</td>
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<td>Abstinence</td>
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<td>0.24</td>
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<td>Smith et al (2015)</td>
<td>Victorian Gambling Screen</td>
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<td>Sylvain et al. (1997)</td>
<td>Frequency</td>
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<td>0.02</td>
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<td>Toneatto &amp; Dragonetti (2008)</td>
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<td>0.07</td>
<td>-1.42</td>
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<td>Tse et al. (2013)</td>
<td>Hrs Gambled</td>
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<td>0.21</td>
<td>-0.83</td>
<td>0.00</td>
<td>-1.96</td>
<td>0.05</td>
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<tr>
<td>(Fixed effects model)</td>
<td></td>
<td>-0.45</td>
<td>0.02</td>
<td>-0.50</td>
<td>-0.41</td>
<td>-19.69</td>
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</table>
Table 2. Meta analysis of the treatment effects for cognitive-behavioural therapy for problem gambling.
Table 3. Effect sizes for studies that conducted follow ups

<table>
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<th>Follow-up</th>
<th>$d$ (std error)</th>
<th>CI</th>
<th>Z</th>
<th>$p$</th>
</tr>
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<tr>
<td><strong>Controlled Studies (n= 26)</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>1-3 months (n=7)</td>
<td>-0.37 (0.09)</td>
<td>-0.56 to -0.18</td>
<td>-3.76</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>4-6 months (n=11)</td>
<td>-0.31 (0.06)</td>
<td>-0.43 to -0.19</td>
<td>-4.94</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>9-12 months (n=8)</td>
<td>-0.28 (0.08)</td>
<td>-0.43 to -0.13</td>
<td>-3.73</td>
<td>&lt;.0001</td>
</tr>
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<td><strong>Pre vs. Post Test (n=16)</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>1-3 months (n=1)</td>
<td>-0.47 (0.32)</td>
<td>-1.12 to 0.16</td>
<td>-1.45</td>
<td>.149</td>
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<td>4-6 months (n=8)</td>
<td>-0.56 (.07)</td>
<td>-0.69 to -0.43</td>
<td>-8.35</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>9-12 months (n=5)</td>
<td>-0.96 (0.13)</td>
<td>-1.21 to -0.71</td>
<td>-7.43</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>24 months (n=2)</td>
<td>-0.43 (0.18)</td>
<td>-0.78 to -0.07</td>
<td>-2.34</td>
<td>.019</td>
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<tr>
<td><strong>Total Sample (n=42)</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>1-3 months (n=8)</td>
<td>-0.32 (0.09)</td>
<td>-0.56 to -0.19</td>
<td>-4.018</td>
<td>&lt;.0001</td>
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<td>4-6 months (n=19)</td>
<td>-0.43 (0.05)</td>
<td>-0.52 to -0.34</td>
<td>-9.32</td>
<td>&lt;.0001</td>
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<td>9-12 months(n=13)</td>
<td>-0.45 (0.06)</td>
<td>-0.58 to -0.32</td>
<td>-6.95</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>24 months (n=2)</td>
<td>-0.43 (0.18)</td>
<td>-0.78 to -0.06</td>
<td>-2.34</td>
<td>.019</td>
</tr>
</tbody>
</table>
### Appendix A. Study Characteristics

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Setting</th>
<th>Medium</th>
<th>Delivery</th>
<th>Post Time</th>
<th>Follow Up (Months)</th>
<th>n</th>
<th>% Male</th>
<th>CTAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blaszczynski et al. (2005)</td>
<td>Pre-Post</td>
<td>Home/Self-Help</td>
<td>Alternative</td>
<td>Individual</td>
<td>2 months</td>
<td>6 &amp; 12 months</td>
<td>47</td>
<td>77</td>
<td>25</td>
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<tr>
<td>Breen et al. (2001)</td>
<td>Pre-Post</td>
<td>Inpatient</td>
<td>Person</td>
<td>Combined</td>
<td>28 days</td>
<td>6, 18 &amp; 36 months</td>
<td>56</td>
<td>94</td>
<td>25</td>
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<tr>
<td>Carlbring et al. (2012)</td>
<td>Control</td>
<td>Outpatient</td>
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<td>6 &amp; 12 months</td>
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<td>3, 6 &amp; 12 months</td>
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<td>Petry et al. (2008)</td>
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<td>Live/Person</td>
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<td>6 &amp; 12 months</td>
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<td>Live/Person</td>
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<td>Live/Person</td>
<td>Group</td>
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<td>&lt;12 months</td>
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<td>Control</td>
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<td>Live/Person</td>
<td>Individual</td>
<td>92</td>
<td>3 months</td>
<td>67, 42</td>
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Appendix B
The Clinical Trail Assessment Measure (CTAM; Tarrier & Wykes, 2004)

The Clinical Trials Assessment Measure (CTAM)

Sample—two questions: maximum score = 10
Q1: is the sample a convenience sample (score 2) or a geographic cohort (score 5), highly selective sample, e.g., volunteers (score 0)
Convenience sample—e.g., clinic attenders, referred patients or Geographic cohort—all patients eligible in a particular area
Q2: is the sample size greater than 27 participants in each treatment group (score 5) or based on described and adequate power calculations (score 5)

Allocation—three questions: maximum score = 16
Q3: is there true random allocation or minimisation allocation to treatment groups (if yes score 10)
Q4: is the process of randomisation described (score 3)
Q5: is the process of randomisation carried out independently from the trial research team (score 3)

Assessment (for the main outcome)—five questions: maximum score = 32
Q6: are the assessments carried out by independent assessors and not therapists (score 10)
Q7: are standardised assessments used to measure symptoms in a standard way (score 6), idiosyncratic assessments of symptoms (score 3)
Q8: are assessments carried out blind (masked) to treatment group allocation (score 10)
Q9: are the methods of rater blinding adequately described (score 3)
Q10: is rater blinding verified (score 3)

Control groups—one question: maximum score = 16
Q11: TAU is a control group (score 6) and/or a control group that controls for non-specific effects or other established or credible treatment (score 10)

Analysis—two questions: maximum score = 15
Q12: the analysis is appropriate to the design and the type of outcome measure (score 5)
Q13: the analysis includes all those participants as randomised (sometimes referred to as an intention to treat analysis) (score 6) and an adequate investigation and handling of drop outs from assessment if the attrition rate exceeds 15% (score 4)

Active treatment—three questions: maximum score = 11
Q14: was the treatment adequately described (score 3) and was a treatment protocol or manual used (score 3)
Q15: was adherence to the treatment protocol or treatment quality assessed (score 5)

where the criterion is not reached for any question score = 0
Total score: maximum score = 100