Review

Predictors of outcomes of psychological treatments for disordered gambling: A systematic review

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HIGHLIGHTS

- First systematic review of predictors of gambling treatment outcomes across time.
- Most studies examined client-related characteristics as predictors.
- Most predictors were examined in a limited number of studies and warrant future research.
- Further research using treatment outcome framework required.

ARTICLE INFO

ABSTRACT

This systematic review aimed to synthesise the evidence relating to pre-treatment predictors of gambling outcomes following psychological treatment for disordered gambling across multiple time-points (i.e., post-treatment, short-term, medium-term, and long-term). A systematic search from 1990 to 2016 identified 50 articles, from which 11 socio-demographic, 16 gambling-related, 21 psychological/psychosocial, 12 treatment, and no therapist-related variables, were identified. Male gender and low depression levels were the most consistent predictors of successful treatment outcomes across multiple time-points. Likely predictors of successful treatment outcomes also included older age, lower gambling symptom severity, lower levels of gambling behaviours and alcohol use, and higher treatment session attendance. Significant associations, at a minimum of one time-point, were identified between successful treatment outcomes and being employed, ethnicity, no gambling debt, personality traits and being in the action stage of change. Mixed results were identified for treatment goal, while education, income, preferred gambling activity, problem gambling duration, anxiety, any psychiatric comorbidity, psychological distress, substance use, prior gambling treatment and medication use were not significantly associated with treatment outcomes at any time-point. Further research involving consistent treatment outcome frameworks, examination of treatment and therapist predictor variables, and evaluation of predictors across long-term follow-ups is warranted to advance this developing field of research.

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1. Introduction

Disordered gambling is defined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as "persistent and recurrent problematic gambling behaviour leading to clinically significant impairment or distress" (American Psychiatric Association (APA), 2013, p. 585). Standardised international prevalence rates estimate that disordered gambling affects, on average, 2.3% of the adult population, ranging from as low as 0.5% to 7.6% (Williams, Volberg, & Stevens, 2012). At this disordered level, gambling can severely impact on personal, vocational, financial and psychological wellbeing (Delfabbro, 2011; Dowling et al., 2014; Dowling et al., 2015; Lorains, Cowlishaw, & Thomas, 2011).

Current treatment options for disordered gambling include various psychological, pharmacological, self-help and peer-support interventions. Recent systematic reviews suggest that psychological interventions, namely cognitive-behavioural therapy (CBT) and motivational interviewing (MI), can be efficacious in treating disordered gambling (Cowlishaw et al., 2012; Gooding & Tarrier, 2009; Thomas et al., 2011; Toneatto & Ladouceur, 2003; Yakovenko, Quigley, Hemmelgarn, Hodgins, & Ronksley, 2015). These reviews, however, also indicate that not all disordered gamblers benefit from psychological interventions and that there is considerable individual variation in the extent of benefits achieved. For example, success rates at the completion of treatment have been found to range from 39% to 89% (Carlbring, Degerman, Jonsson, & Andersson, 2012; Dowling, Smith, & Thomas, 2006, 2007, 2009; Jimenez-Murcia et al., 2007; Ladouceur, Boutin, Lachance, Doucet, & Leblond, 2003; Ladouceur et al., 2001; Marceaux & Melville, 2011), with success rates at 12-months follow-up ranging from as low as 30% and as high as 71% (Echeburua, Fernandez-Montalvo, & Baez, 2001; Hodgins, Currie, & El-Guebaly, 2001; Ladouceur et al., 2001).

This variation in success rates could be attributed to the variability in the definition and measurement of successful treatment outcomes. The aforementioned reviews encompass a wide range of outcome domains and measures, which include various self-report or clinically administered measures of gambling behaviour, gambling symptom severity, diagnosis, relapse, abstinence and controlled gambling (Cowlishaw et al., 2012; Pallesen, Mitsem, Kvale, Johnsen, & Molde, 2005; Toneatto & Ladouceur, 2003). Given that this range of measures has been a major

limitation of the gambling treatment outcome literature, to date, Walker et al. (2005) describe a framework for reporting treatment outcomes, developed by an expert committee. This framework, known as the Banff consensus, proposed the minimal requirements in relation to the types of outcomes to be examined. These included specific recommendations relating to measures of gambling behaviour, including net gambling expenditure per month, gambling frequency measured in days per month, and time spent thinking about or engaged in gambling per month. Although this framework also proposed that gambling treatment research should include measures of the problems caused by gambling, it was beyond the scope of the framework to recommend any specific measures. The framework also recommended the use of standardised follow-up assessment time-points, including post-treatment, short-term follow-up (3–6 months post-treatment), medium-term follow-up (approximately 12 months post-treatment) and long-term follow-up (24 months or more post-treatment).

The differences in success rates for psychological gambling interventions may also be attributed to the heterogeneity in the disordered gambling population. The treatment of disordered gambling is complicated by substantial comorbidity with other psychiatric disorders, such as alcohol and substance use disorders, mood and anxiety disorders, other impulse control disorders, and personality disorders (Dowling et al., 2014; Dowling et al., 2015; Lorains et al., 2011). Comorbid mental health disorders in disordered gambling are associated with increased gambling severity, gambling urges and cognitions, gambling-related consequences, psychiatric symptoms, impulsivity, and other psychosocial difficulties (Blaszczynski & McConaghy, 1994; Blaszczynski & Steel, 1998; Blaszczynski, Steel, & McConaghy, 1997; Grall-Bronnec et al., 2011; Kruedelbach et al., 2006; Ledgerwood & Petry, 2006; Pietrzak & Petry, 2005; Stinchfield, Kushner, & Winters, 2005). Problem gamblers also differ with respect to aetiological pathways (Blaszczynski & Nower, 2002; Milosevic & Ledgerwood, 2010; Suomi, Dowling, & Jackson, 2014) and other characteristics, such as gender, age, impulsivity, anger problems, cravings or urges, readiness to change, gambling motivations, and preferred gambling activities (Dannon, Lowengrub, Gonopolski, Musin, & Kotler, 2006). Such heterogeneity in disordered gambling may introduce a source of variance that interacts with the delivered intervention (Toneatto & Millar, 2004). The impact of this heterogeneity on treatment outcomes, however, has received little

consideration (Blaszczynski & Nower, 2002). The disordered gambling treatment outcome literature has generally ignored this heterogeneity, excluded individuals with comorbid psychiatric disorders, or employed small samples that prevent the detection of subgroup differences in treatment responses (Cowlishaw et al., 2012; Dowling, Merkouris, & Lorains, 2016; Thomas et al., 2011).

As such, an important step in improving the efficacy of disordered gambling treatment is to ascertain who is more and less likely to benefit from psychological interventions. The identification of client characteristics that are predictive of successful treatment outcomes can potentially improve the efficacy of treatment by tailoring interventions to meet individual needs (Adamson, Sellman, & Frampton, 2009; Barnicot et al., 2012; Daughters, Lejuez, Lesieur, Strong, & Zvolensky, 2003). For example, client characteristics that are subject to change, such as unemployment or alcohol consumption, can be specifically targeted for change during the treatment process (Adamson et al., 2009). A better understanding of the variables that predict successful treatment outcomes would also allow for more accurate prognoses (Adamson et al., 2009).

Another important issue in improving treatment outcomes is the identification of non-client-related characteristics that can influence treatment outcomes. Understanding the influence of treatment and therapist characteristics on treatment outcomes would enable the enhancement of treatment outcomes through the modification of treatment processes and therapist training. Previous research has recognised the influence of treatment and therapist-related characteristics on treatment outcomes in various disorders, including borderline personality disorder and obsessive-compulsive disorder (Barnicot et al., 2012; Knopp, Knowles, Bee, Lovell, & Bower, 2013). There have, however, been few studies exploring the influence of these characteristics in treatment outcome studies in the gambling field (Crisp, Thomas, Jackson, & Thomason, 2001; Dowling & Cosic, 2011; Ladouceur et al., 2006).

To date, only one systematic review in the peer-reviewed literature has examined predictors of indices of gambling-related treatment success. Melville, Casey, and Kavanagh (2007) conducted a systematic review examining predictors of dropout from psychological treatment for disordered gambling. Only ten studies were identified for inclusion in this review, and the predictor variables included a range of socio-demographic and contextual, gambling-related, psychological and treatment-related variables. The findings of this review revealed that treatment dropout was significantly associated with older age, lack of full-time employment, stressful life events, lack of social support, younger age of gambling onset, longer duration of disordered gambling, greater amount of time invested in gambling, less gambling debt, co-morbid anxiety and drug or alcohol disorder, and increased impulsivity. In contrast, treatment dropout was not associated with gender, ethnicity, education, income, relationship status, money invested in gambling, gambling severity, type of gambling, motivation to stop gambling, gambling urges, self-efficacy, comorbid depression, social problem-solving skills, prior treatment experience, satisfaction with treatment and treatment motivation. The findings from this review were limited by the few studies that examined the majority of predictor variables (i.e. one to three studies), and the failure to examine predictors of dropout at the various time-points throughout the treatment process (e.g. pre-treatment, during treatment and follow-up). Moreover, the focus of this review was specifically on the factors associated with dropout from psychological treatments for disordered gambling, rather than those associated with the broader outcomes of treatment response or success.

Using the Banff consensus framework, this review aims to extend this previous work by identifying and critically reviewing the evidence relating to predictors of gambling outcomes (not including drop-out) at various time-points (i.e., post-treatment, short-term, medium-term and long-term) following psychological treatment for disordered gambling.

2. Method

The methodology in this review is compliant with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) (Moher, Liberati, Tetzlaff, & Altman, 2009).

2.1. Search strategy

A systematic search was conducted to identify all relevant peer-reviewed and grey literature exploring predictors of gambling outcomes of psychological interventions for disordered gambling. The search strategy included an electronic database search of Ovid Medline, Ovid PsycInfo, EMBASE, CINAHL and CENTRAL, using a combination of MESH terms, wildcards and key words relating to gambling, treatment, outcomes and predictors, and was limited to human subjects. Reference lists of the included studies were searched manually. The following journals were also searched manually as they are not indexed in the above databases (Gambling Research from 2003 and onwards; International Gambling Studies between 2001 and 2003; Journal of Gambling Issues between 2000 to 2006; and Journal of Gambling Studies for articles published online first and have not been allocated an issue number). A grey literature search was also conducted by examining the first 100 citations in a Google search. The search terms for the grey literature search were gambling and (treatment or intervention) and outcome. The searches were limited to articles published from 1990 to March 2016. This restriction coincided with the development of the first assessment tool for the identification of problem gambling (Lesieur & Blume, 1987). A detailed description of the search strategy is provided in Appendix A.

2.2. Eligibility criteria

Studies were considered eligible for the current review if they conducted quantitative statistical tests to examine the relationship between client or treatment characteristics (i.e., predictor variables) on subsequent gambling treatment outcomes. Specifically, studies were included if: (1) the predictor variables examined related to pre-treatment client characteristics, or treatment or therapist characteristics that were measured at any time-point; (2) consistent with the Banff consensus framework (Walker et al., 2005), they employed validated and/or replicable measures assessing changes in or classifications based on: (a) gambling behaviours (e.g., expenditure, frequency or time spent gambling) and/or (b) gambling symptom severity (in which factors such as preoccupation with gambling, gambling urges, gambling harm or gambling-related problems such as health or financial difficulties are evaluated); (3) the treatment outcomes were measured from a post-treatment time-point or onwards; (4) any psychological treatment for a primary gambling problem was administered (e.g., face-to-face, online, self-help); (5) they included adult samples of individuals seeking treatment for a gambling problem; it was not required that participants meet criteria for a gambling disorder; (6) the full-text report was available in English; and (7) they were reported in complete manuscripts outlining original work.

Studies were excluded if they: (1) failed to provide sufficient statistical information to evaluate the significance, direction or classification of the results; (2) assessed general functioning, non-gambling specific measures, or dropout only as a treatment outcome; (3) provided pharmacological treatments, as many of these studies apply stringent exclusion criteria based on the presence of co-morbid mental health disorders; (4) examined gambling outcomes while participants were still receiving treatment; (5) only assessed treatment type as a predictor variable, with no other client, treatment or therapist characteristics examined (6) assessed an adolescent sample only; (7) were review articles; and (8) were not published in English. Where there was insufficient information to make a judgement on the eligibility criteria, the study was excluded from the review.

2.3. Data extraction and synthesis

Data was extracted using a standardised form that included characteristics relevant to this review, including the sample size used in the predictor analysis, study design, treatment type, the predictor variables examined, the timing and type of treatment outcomes, the type of analysis conducted (e.g. univariate or multivariate) and the significance and direction of results. The first author (SM) extracted the data from all included studies. A second reviewer, to guarantee the accuracy of the data extraction, independently coded a randomly selected third (k = 11) of the included studies. The inter-rater agreement was 94%. Discrepancies were resolved through discussion.

Although desirable, a meta-analysis was not possible due to the variability in the treatment outcomes and predictor variables examined. An alternative box-score approach was utilised, where the results were tabulated based on the number of studies that examined a characteristic, the number of statistically significant results and the direction of these results (Brorson, Arnevik, Rand-Hendriksen, & Duckert, 2013; Green & Hall, 1984).

The results were broken down by outcome type and outcome assessment time-point, based on the Banff consensus framework (Walker et al., 2005). Treatment outcomes included: (i) gambling symptom severity; (ii) gambling expenditure; (iii) gambling frequency; and (iv) any combination of the above outcomes. The outcome assessment time points included: (i) immediately post-treatment (up to one month following treatment); (ii) short-term follow-up (three to six months following treatment); (iii) medium-term follow-up (nine to 12 months following treatment); and (iv) long-term follow-up (24 or more months following treatment).

The results for each time-point are presented separately in order to identify the predictors of post-treatment, short-term, medium-term and long-term gambling treatment outcomes. The results for each outcome variable have been displayed separately, where a positive symbol (+) is indicative of the predictor variable being associated with better treatment outcomes and a negative association (−) is indicative of the predictor variable being associated with poorer treatment outcomes (see results Tables 2–5). A more detailed discussion of the predictor variables examined in three or more studies will follow, as this was considered an appropriate number for a cross-study synthesis of research findings. Predictor variables examined in less than three studies will be mentioned briefly, with particular reference to significant findings, with a view to stimulating further research exploring the role of these variables in gambling treatment outcomes.

Multiple articles, based on the same study sample or subsample, were included in the review. Data were extracted from each article with the following issues taken into consideration when using the box-score approach to synthesise the results (i.e., number of studies and number of statistically significant results in results Tables 2-5). If articles, based on the same sample or subsample, assessed:

- *different predictors*: each result was counted;
- *the same predictor variable on the same outcome measured at a different time-point*: each result was counted within the relevant outcome assessment time-point;
- *the same predictor variable on different treatment outcomes measured at the same time-point*: the study was only counted once and significant results took precedence in calculating the number of statistically significant results;
- *the same predictor variable on the same treatment outcome measured at the same time-point*: the study was only counted once and significant results took precedence in calculating the number of statistically significant results;
- *the same predictor variable on the same treatment outcome assessed at multiple time points that were classified in the same time-point in this review* (e.g. age as a predictor of gambling severity at 3 and 6 months follow-up): the study was only counted once and the results of the

latter time point took precedence in calculating the number of statistically significant results (e.g. the results relating to the outcomes for 6 month results took precedence for the short-term prediction).
- *univariate and multivariate analyses to examine the predictive ability of variables*: the results from the univariate analyses took precedence.

2.4. Quality assessment

Given that scoring quality assessment approaches are generally not recommended as best practice due to a lack of demonstrated validity (Higgins & Altman, 2008), a components approach using the following quality assessment criteria was employed in this review. The quality assessment criteria were adapted from those developed by Barnicot et al. (2012) in a systematic review of predictors of treatment outcome in borderline personality disorder. These criteria were selected as they reflect the quality of the study in relation to the predictor-outcome relationship which is necessary for this type of targeted review.

1. Was an adequate sample size used based on the predictor analysis conducted? This was determined based on two criteria: (1) a minimum of 30 participants (Barnicot et al., 2012); and (2) the sample size was adequate based on the analysis conducted, using rules such as Tabachnick, Fidell, and Osterlind (2001) multiple regression sample size requirement.
2. Was the severity of the gambling problem assessed at pre-treatment?
3. Was a validated and reliable tool used to assess the treatment outcome?
4. Was a validated and reliable tool used to assess the predictor variable?
5. For randomised controlled trials only, were the outcome assessors blinded to the treatment allocation of participants?
6. Was intention to treat (ITT) data used in the predictor analysis?
7. Was missing data dealt with appropriately so as not to bias the results? (e.g. evidence of no difference between completers and drop-out on predictors, or evidence of no difference in relationship between predictor and outcome after accounting for missing data)
8. Did the main analyses use appropriate analyses to minimise bias from dropout? (e.g., maximum likelihood or multiple imputation, rather than completers only analysis or imputation methods, such as, the last observation carried forward (LOCF) that have been shown to introduce bias (Saha & Jones, 2009))
9. Was the distribution of the outcomes checked and appropriate analyses used?
10. Were continuous predictor variables used over dichotomised predictor variables, where appropriate?

The first author (SM) examined the quality criteria for all studies, with a second independent reviewer examining a randomly selected third of the studies (k = 11). The inter-rater agreement was 91%. Any discrepancies were resolved through discussions.

3. Results

3.1. Search results

Once duplicate citations were removed, the systematic search identified 625 articles for screening. Overall, 50 articles based on 33 studies were identified for inclusion (see Appendix B for the PRISMA flow diagram of included studies). Several of the included articles came from the same sample or had overlapping samples. These have been denoted in the relevant tables using superscript symbols.

3.2. Characteristics of included studies

Table 1 displays the characteristics of the 50 included articles. All but two articles were published from 2000 onwards, with sample sizes ranging from 18 to 4410 (M = 263.9, SD = 624.9, Mdn = 127.0). Across the included studies (k = 33), most were conducted in the United States (36.4%, k = 12) and Canada (24.2%, k = 8), with smaller proportions conducted in Australia (15.2%, k = 5), Spain (15.2%, k = 5), Sweden (3.0%, k = 1), Germany (3.0%, k = 1) and New Zealand (3.0%, k = 1).

The psychological treatments varied across the 33 included studies, with some delivering multiple types of psychological treatments. CBT was most common (84.8%, k = 28), followed by MI therapies (21.2%, k = 7). Two studies did not clearly indicate the theoretical orientation of the therapy provided (Ingle, Marotta, McMillan, & Wisdom, 2008; Odlaug, Stinchfield, Golberstein, & Grant, 2013). Therapist-delivered, face-to-face treatment in either individual or group format was the most common mode of delivery (87.8%, k = 29). Of these, seven studies (21.2%) provided inpatient treatment ranging from 7 to 30 days (M = 20.6, SD = 9.8, Mdn = 24.0) and 26 studies (78.8%) provided outpatient treatment ranging from one to 24 sessions in duration (M = 9.8, SD = 6.6, Mdn = 8.0). Six studies (18.2%) did not have a pre-determined treatment duration and two studies (6.1%) did not report treatment duration. Three studies (9.1%) used the telephone as the mode of treatment delivery, with each of these studies consisting of a single telephone session. Five studies (15.2%) examined self-help treatments, in conjunction with or in comparison to, therapist-delivered treatment and one study (3.0%) provided Internet delivered self-help psychological treatment, with minimal therapist involvement (weekly 15 min telephone calls) (Carlbring et al., 2012).

The treatment outcomes were examined at various time points, with several studies examining the influence of the predictor variables at more than one time-point. Across the 33 included studies, post-treatment outcomes (up to one month following treatment) were examined in 18 studies (54.5%), short-term outcomes (3–6 months follow-up) were examined in ten studies (30.3%), medium-term outcomes (9–12 months follow-up) were examined in 17 studies (51.5%), and long-term treatment outcomes (24 months or more) were examined in only two studies (6.1%).

The definition and measurement of treatment outcomes varied considerably across the 33 included studies (see Table 1 for a detailed description). Several studies examined multiple relevant treatment outcomes (45.5%, k = 15). The most common treatment outcome was gambling symptom severity (60.6%, k = 20), followed by gambling frequency (42.4%, k = 14) and gambling expenditure (27.3%, k = 9). Eleven studies (33.3%) used a combination of treatment outcomes including gambling behaviours and/or symptom severity. The terminology employed to describe treatment outcomes also varied greatly, with labels such as abstinence, controlled gambling, uncontrolled gambling, relapse, treatment success, treatment response, and therapeutic failure.

In this review, the predictor variables were classified into five categories: (1) socio-demographic client characteristics (e.g. age, gender); (2) gambling-related client characteristics (e.g. gambling-related debt, pre-treatment gambling behaviours); (3) psychological/psychosocial client characteristics (variables that examine psychological and/or psychosocial characteristics; e.g. depression, social support); (4) other client-related characteristics (characteristics that do not fit within the previous client-related characteristic categories; e.g. current medication use); and (5) treatment and therapist-related characteristics (e.g. therapist gender, number of sessions attended). The predictor variables most commonly examined in the 33 included studies related to psychological/psychosocial client characteristics (72.7%, k = 24), gambling-related client characteristics (66.7%, k = 22), socio-demographic client characteristics (57.6%, k = 19), treatment and therapist-related characteristics (42.4%, k = 14) and other client characteristics (30.3%, k = 10).

Across the 50 included articles, 33 articles (66.0%) conducted univariate statistical analysis and 19 articles (38.0%) conducted multivariate statistical analysis (i.e., covarying for other predictor variables), with some articles using different statistical analyses for different variables.

3.3. Predictors of post-treatment outcomes

Eighteen studies examined predictors of outcomes immediately following treatment. The results of these studies are displayed in Table 2. Overall, ten socio-demographic, eleven gambling-related, 17 psychological/psychosocial, seven other client-related and ten treatment-related characteristics were examined as predictors of post-treatment outcomes.

Of those examined in three or more studies, older age (k = 1, 18%), having a significant other (k = 2, 33%), no gambling-related debt (k = 1, 33%), lower levels of pre-treatment gambling symptom severity (k = 3, 38%), low levels of alcohol use (k = 1, 33%), low levels of depression (k = 2, 50%), being in the action stage of change (k = 3, 75%), personality traits such as low self-transcendence, novelty seeking, and avoidance and greater persistence (k = 3, 100%), and higher number of treatment sessions attended (k = 3, 75%) were consistently associated with positive treatment outcomes.

In contrast, characteristics including gender, ethnicity, gambling behaviours and treatment goal were associated with mixed findings. With the exception of one study (Petry, 2012), the results indicate that females were more likely to have positive post-treatment outcomes. In relation to ethnicity, Ingle et al. (2008) found that when compared to White Americans, Asian Americans were more likely to have successful treatment outcomes, where as other ethnic minority groups, such as Native Americans, were less likely to have successful treatment outcomes. Contradictory findings were also identified for gambling behaviours. Two studies found that higher levels of gambling behaviours at pre-treatment were associated with poor treatment outcomes, whereas Aragay et al. (2015) found that those who spent smaller amounts gambling per week were associated with a higher risk of relapse. Lastly, mixed results were identified for treatment goal in two different studies, whereby abstinence (Toneatto & Dragonetti, 2008) and controlled gambling (Ladouceur, Lachance, & Fournier, 2009) were associated with positive treatment outcomes.

Education level, employment status, income, preferred gambling activity, having any psychiatric comorbidity, pre-treatment levels of substance use, medication use and previous treatment for gambling were not significantly associated with post-treatment outcomes in any of the studies.

Characteristics that were examined in less than three studies but for which there were significant findings included having children, dissociative gambling, illegal behaviours, anxiety, mental health status, psychological distress, readiness to change, social support, suicidal intent, probability discounting, effort at recovery, engaging in homework, having a significant other participate in treatment, completing treatment and treatment setting.

3.4. Predictors of short-term treatment outcomes

Ten studies examined predictors of short-term outcomes (three to six months follow-up). The results of these studies are displayed in Table 3. Overall, nine socio-demographic, eight gambling-related, 12 psychological/psychosocial, two other client-related and seven treatment-related characteristics were examined.

The results indicated that for characteristics that were examined in at least three studies, being male (k = 1, 20%), having a significant other (k = 1, 25%) and lower levels of depression (k = 1, 25%) were consistently associated with positive short-term treatment outcomes. In contrast, no significant findings were identified for age, education level, employment status, gambling symptom severity, anxiety, substance use and previous gambling treatment.

Table 1
Characteristics of included studies.

Study ID	Sample size	Country	Study type	Treatment type; and duration	Predictor variables assessed	Outcome assessment time-point	Treatment outcome(s)	Analysis type
Abbott et al. (2013)	150	New Zealand	Obs	Telephone delivered helpline session including brief screening, reflective listening to clients' concerns and referrals; 1 session	Age; Alcohol use (AUDIT-C); Area of residence; Belief in treatment success; Control over gambling; Current medication for mental health issues; Days since last gambled; Depressive disorders (PRIME-MD); Deprivation (NZDI); Education level; Employment status; Ethnicity; Family income; Gambling consequences (e.g. work, social); Gambling expenditure; Gambling frequency; Gambling symptom severity (PGSI); Gender; Legal problems; Marital status; Motivation to change; Past year addiction treatment; Perceived level of difficulty in overcoming gambling problems; Preferred gambling activity; Prior gambling treatment; Prior mental health treatment; Problem gambling duration; Psychological distress (K6); Quality of life (WHOQoL); Seeking or receiving additional gambling treatment; Substance abuse (DAST); Suicidal ideation; Tobacco use; Treatment goal	Up to 12 months follow-up	Gambling expenditure (money lost); Gambling frequency; Gambling symptom severity (PGSI)	Univariate and multivariate
Aragay et al. (2015)	566	Spain	Obs	Face-to-face outpatient CBT; 6 months of weekly or biweekly sessions	Age; Age at gambling onset; Alcohol dependence (MCM-III); Anxiety (MCMI-III); Depression (major depression and dysthymia, MCMI-III) Education (years); Employment status; Family history of gambling; Gambling when starting therapy; Gambling frequency; Gambling-related legal problems; Gambling symptom severity (NODS); Gender; Marital status; Money spent on activity weekly; Other psychiatric comorbidities (somatoform, bipolar-hypomania, psychotic thinking, delusional disorders, MCMI-III); Personality disorders (MCMI-III); Personality traits (TCI-R; MCMI-III); Preferred game of choice; Problem gambling duration; Self-exclusion from bingo halls; Use/abuse of illegal substances	Post-treatment and 6 months follow-up	Relapse as more than two episodes of gambling documented at two consecutive visits or one gambling episode that showed no sense of control, with loss of control defined as total expenditure higher than that of 1 week of gambling prior to entering therapy	Multivariate
Blaszczynski et al. (1991b)[a]	63	Australia	RCT	Face-to-face delivered imaginal desensitisation vs brief or prolonged in vivo exposure vs aversive therapy vs relaxation training; 1 week inpatient program	Anxiety (STAI); Personality Traits (EPQ subscales – Psychoticism, Extraversion, Neuroticism); Sensation Seeking (Zuckerman's Sensation Seeking Scale)	2–9 years follow-up	Abstinent, controlled or uncontrolled gambling (Abstinence defined as no episodes of gambling in the month immediately preceding interview and for the predominant portion of the post-treatment period. Controlled gambling in the absence of both a subjective sense of impaired control and adverse financial consequences.)	Univariate
Blaszczynski et al. (1991a)[a]	18	Australia	RCT	Face-to-face delivered imaginal desensitisation vs brief or prolonged in vivo exposure vs aversive therapy vs relaxation training; 1 week inpatient program	Anxiety (STAI); Personality Traits (EPQ subscales); Sensation Seeking (Zuckerman's Sensation Seeking Scale)	2–9 years follow-up	Relapse or abstinence (Relapse defined as an episode or period of excessive gambling accompanied by a subjective sense of loss of control. Abstinence defined as no episode of gambling	Univariate

							during the month immediately preceding the follow-up interview.)	
Breen, Kruedelbach, and Walker (2001)	45	USA	Obs	Face-to-face delivered individual and group inpatient CBT and standard didactic component; 28 days	Current antidepressant medication use; Depression (BDI); Gambling symptom severity (GABS and SOGS)	Post-treatment	Gambling symptom severity (GABS)	Multivariate
Carlbring et al. (2012)	218 and 196	Sweden	Obs	Internet delivered self-help CBT; 8 weeks	Alcohol consumption (1 item AUDIT); Dissociative gambling; Gambling debt; Income; Primary gambling activity; Social support; Stage of change (1 item Swedish Readiness to Change questionnaire); Work-life satisfaction (1 – item QOLI)	Post-treatment and 36 months follow-up	Treatment response (a NODS score of 0 and 0 days spent gambling over the past month)	Multivariate
Dowling et al. (2009)[b]	41	Australia	RCT	Face-to-face delivered individual outpatient CBT; 12 sessions	Treatment goal	Post-treatment and 6 months follow-up	Average weekly expenditure using gambling diary records; Average weekly number of gambling sessions using gambling diary records; Gambling symptom severity (DSM-IV)	Univariate
Dowling (2009)[b]	57	Australia	RCT	Face-to-face delivered individual or group outpatient CBT; 12 sessions	Age; Anxiety (STAI) Depression (BDI-II); Duration of gambling problem; Education level; Employment status; Gambling symptom severity (DSM-IV-TR); Group vs individual treatment; Living situation; Longest abstinence period; Marital status; Prior gambling treatment; Substance abuse (AAS); Treatment goal; Weekly gambling frequency; Weekly gambling expenditure	6 month follow-up	Abstinence, controlled or uncontrolled gambling (Abstinence defined as no episodes of gambling during the 1-month period and for the predominant proportion of the inter-evaluation period. Controlled gambling defined as spending no more than AUS$20 per week and spending no more than intended at any one session during the month and for the predominant proportion of the 5-month inter-evaluation period. Uncontrolled gambling when the criteria for abstinence or controlled gambling not met.)	Univariate
Echeburua et al. (2001)	69	Spain	Obs	Outpatient face-to-face delivered stimulus control and in vivo exposure with response prevention; duration NR	Alcohol use (Drink Index); Anxiety (STAI); Gambling symptom severity (SOGS); Personality traits (EPI); Treatment satisfaction (Questionnaire of Satisfaction with Treatment)	12 months follow-up	Therapeutic failure (dropout and relapse combined; dropout defined as a gambler who left treatment before completing it and relapse defined as more than two isolated episodes of gambling in the 12 months follow-up or a total expense higher than a week of gambling before treatment)	Multivariate
Grant et al. (2009)[c]	68	USA	RCT	Outpatient face-to-face delivered imaginal desensitisation and motivational interviewing vs GA referral; 6 sessions	Gender	Post-treatment	Gambling symptom severity (PG-YBOCS; GSAS)	Multivariate
Grant, Donahue, Odlaug, and Kim (2011)[c]	35	USA	RCT	Outpatient face-to-face delivered imaginal desensitisation and motivational interviewing vs GA referral; 6 sessions	Anxiety disorder (SCID), Eating disorder (SCID), Impulse Control disorder (SCID), Mood disorder (SCID)	6 months follow-up	Treatment response (35% reduction in PG-YBOCS total score in previous month)	Univariate
Hodgins et al. (2001)	102	Canada	RCT	CBT self-help workbook vs CBT self-help workbook and motivational style telephone interview vs WLC; 1 session	Gambling symptom severity (SOGS); Gender	Post-treatment, 3, 6 and 12 months follow-up	Days gambled per month; Total amount of dollars lost per month; Mean amount of dollars lost per gambling day.	Multivariate
Hodgins, Ching, and McEwen (2009)	40	Canada	RCT	CBT self-help workbook and motivational style telephone interview; 1 session	Pre-treatment days of gambling; Pre-treatment dollars lost; Self-Efficacy (GASS)	Up to 12 months follow-up	Two outcome clusters based on 3, 6, 9 and 12 months outcomes: 1. gambling days 2. dollars lost gambling 3. goal success	Multivariate

Table 1 (*continued*)

Study ID	Sample size	Country	Study type	Treatment type; and duration	Predictor variables assessed	Outcome assessment time-point	Treatment outcome(s)	Analysis type
							4. Gambling Abstinence Self-efficacy Scale (GASS)	
Ingle et al. (2008)	4410	USA	Obs	Face-to-face delivered outpatient treatment; no pre-determined duration	Age; Education level; Employment status; Ethnicity; Gambling debt; Gender; Presence of significant other; Significant other participating in treatment	Post-treatment	Successful outcome (achievement of at least 75% of short-term treatment goals that were agreed upon at enrolment; completion of a continued relapse prevention plan; and lack of engagement in problem gambling behaviours for at least 30 days prior to discharge)	Multivariate
Jimenez-Murcia et al. (2007)[d]	205	Spain	Obs	Face-to-face delivered outpatient group CBT; 16 sessions	Age, Age of problem gambling onset; Bet size; Education level; Gambling frequency; Gambling symptom severity (SOGS); Impulsivity (Eysenck's Impulsiveness Scale I7); Living arrangements; Marital status; Motivation to receive treatment; Occupation; Personality traits (TCI-R); Previous treatments for gambling; Psychological distress (SCL-90-R); Smoking status	Post-treatment	Relapse (any episode of gambling associated with the main gambling problem during treatment or follow-up)	Multivariate
Jimenez-Murcia et al. (2010)[d]	904	Spain	Obs	Face-to-face delivered outpatient group CBT; 16 weekly sessions or 8 fortnightly sessions	Age; Age of problem gambling onset; Gambling symptom severity (SOGS); Gender	Post-treatment	Relapse (any episode of gambling (commercial and non-commercial, involving a money bet) during the 4-month treatment)	Multivariate
Álvarez-Moya et al. (2011)[d]	88	Spain	Obs	Face-to-face delivered outpatient group CBT; 16 sessions	Age; Education level; Employment status; Gambling symptom severity (SOGS); Gender; Marital status; Neurocognitive measures (BBS, BDS, IGT, COWAT, WCST, Stroop Colour and Words Test, TMT); Personality traits (TCI-R novelty seeking subscale only); Problem gambling duration; Use of medication; Vocabulary (WAIS-III)	Post-treatment	Relapse (as the presence of any episode of gambling during treatment associated with a subjective sense of loss of control over gambling)	Univariate for demographic variables and multivariate for neurocognitive and other measures
Jimenez-Murcia et al. (2012)[d]	502	Spain	Quasi-experimental	Face-to-face delivered outpatient group CBT with or without exposure and response prevention; 16 sessions	Age; Gambling symptom severity (SOGS); Personality traits (TCI-R); Problem gambling duration	Post-treatment	Gambling symptom severity (SOGS); Relapse (any episode of gambling associated with a previously problematic game during treatment)	Multivariate
Jiménez-Murcia et al. (2015)	440	Spain	Obs	Face-to-face delivered outpatient group CBT; 16 sessions	Age; Accumulated debts; Amount of money spent per episode; Civil status; Education level; Employment status; Gambling symptom severity; Gender; Income; Partner attending therapy; Personality traits (TCI-R); Presence of comorbid disorders; Total number of games played	Post-treatment	Gambling symptom severity (SOGS); Relapse (one or more gambling episode)	Multivariate
Gómez-Peña et al. (2012)[d]	191	Spain	Obs	Face-to-face delivered outpatient group CBT; 16 sessions	Age; Gambling symptom severity (SOGS); Personality traits (TCI-R novelty-seeking and persistence subscales only); Problem gambling duration; Psychological distress (SCL-90-R); Readiness to change (URICA)	Post-treatment	Gambling symptom severity (SOGS); Relapse (any episode of gambling associated with a previously problematic game during treatment)	Multivariate
Ladouceur et al. (2006)	233	Canada	Obs	Face-to-face delivered CBT; Inpatient 21–28 days or outpatient 15 weekly sessions	Treatment setting	Post-treatment	Gambling symptom severity (DSM-IV criteria)	Univariate
Ladouceur et al. (2009)	89	Canada	Obs	Face-to-face delivered individual outpatient CBT; 12 weekly sessions	Age; Anxiety (BAI); Depression (BDI-II); Education level; Employment status; Gender; Income; Marital status; Money lost when gambling; Negative consequences of	Post-treatment and 12 months follow-up	Treatment success (<5 DSM-IV criteria met)	Univariate

					problem gambling; Stage of change (RTC); Treatment goal; Suicidal intent			
Marceaux and Melville (2011)	33	USA	RCT	Face-to-face delivered outpatient node-link mapping-enhanced group CBT vs twelve-step facilitated (TSF) group treatment vs WLC; 2 weekly meetings for 8 weeks	Depression (BDI-II)	Post-treatment and 6 months follow-up	Combined in analysis: frequency of gambling episodes; Gambling symptom severity (past month DSM-IV); Money spent gambling	Multivariate
Milton, Crino, Hunt, and Prosser (2002)	40	Australia	RCT	Face-to-face delivered outpatient CBT vs CBT and compliance improving intervention; 8 sessions	Alcohol use (AUDIT); Anxiety (STAI); Depression (BDI); Drug Abuse (DAST); Readiness to change (Contemplation Ladder); Problem gambling duration	9 month follow-up	Clinically significant change based on score of 5 + on SCIP or SOGS; Clinically significant change based on change of at least 50% of percentage of monthly income lost gambling in past month	Univariate
Monnat, Bernhard, Abarbanel, John, and Kalina (2012)	361	USA	Obs	Face-to-face delivered outpatient individual, family and group counselling, CBT, self-help groups and psycho-education; No pre-determined duration	Treatment satisfaction (MHSIP treatment satisfaction scale); Treatment setting (specialised gambling treatment program vs generalised mental health program)	3 months follow-up	Abstinence (gambling frequency since completing treatment); Gambling symptom severity (based on two items relating to minimising harm from gambling and reduction in thoughts of gambling)	Univariate
Odlaug et al. (2013)	275	USA	Obs	Face-to-face delivered individual or group therapy in outpatient and inpatient facilities; No pre-determined duration	Age; Age of problem gambling onset; Education level; Gambling symptom severity (DSM-IV, SOGS and ASI); Gender; Lifetime treatment for alcohol/drugs; Marital status; Previous gambling treatment; Mental Health Status (BASIS); Race; Tobacco use;	6 months follow-up	Days gambled in the past month	Multivariate
Petry et al. (2006)[e]	201 and 178	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Age; Gambling symptom severity (ASI-G); Gender; Psychological distress (BSI); Race; Number of GA sessions attended	Post-treatment and 12 months follow-up	Abstinence (past month based on amount wagered)	Multivariate
Petry (2005)[e]	189	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Gender; Readiness to change (URICA); Stage of change	Post-treatment	Gambling symptom severity (ASI-G)	Multivariate
Ledgerwood, Weinstock, Morasco, and Petry (2007)[e]	171	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Age; Antisocial personality disorder (DSM-IV checklist); Illegal behaviours	Post-treatment	Gambling symptom severity (ASI-G and SOGS)	Multivariate
Petry, Litt, Kadden, and Ledgerwood (2007)[e]	127	USA	RCT	GA referral vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Coping skills (CSS); Days spent gambling; Dollars gambled; Gambling symptom severity (SOGS)	Post-treatment and 12 month follow-up	Days gambled in the past month; Dollars wagered in the past month; Gambling symptom severity (SOGS)	Multivariate
Weinstock, Ledgerwood, and Petry (2007)[e]	178	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Age; Annual income; Education level; Employment status; Ethnicity; Gambling frequency; Gender; Hours spent gambling; Marital status; Percentage of income spent gambling	12 month follow-up	Gambling symptom severity (SOGS)	Univariate
Petry and Weiss (2009)[e]	230	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Gambling symptom severity (ASI-G); Social support (Social Support Scale)	Post-treatment and 12 months follow-up	Gambling symptom severity (ASI-G)	Univariate
Champine and Petry (2010)[e]	185	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Previous mental health treatment	Post-treatment	Gambling symptom severity (ASI-G)	Univariate
Ledgerwood and Petry (2010)[e]	171	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and face-to-face delivered outpatient individual CBT; 8 weeks	Gambling subtypes based on impulsivity (EIS-7), depression (BSI) and anxiety (BSI)	Up to 12 months follow-up	Gambling symptom severity (categorised as asymptomatic based on 0 on SOGS; categorised based on 5 + on SOGS; continuous measure on ASI-G)	Univariate
Petry (2012)[e]	178 and 153.	USA	RCT	GA referral vs GA referral and self-help CBT workbook vs GA referral and	Age; Dollars gambled; Delay discounting; Gender; Probability discounting; Race	Post-treatment and 12 months	Abstinence (any gambling days or dollars at any of the follow-up);	Multivariate

Table 1 (continued)

Study ID	Sample size	Country	Study type	Treatment type; and duration	Predictor variables assessed	Outcome assessment time-point	Treatment outcome(s)	Analysis type
Petry, Weinstock, Ledgerwood, and Morasco (2008)	226 for abstinence 149	USA	RCT	face-to-face delivered outpatient individual CBT; 8 weeks Face-to-face delivered outpatient CBT and MET vs MET vs brief advice vs assessment only; 1–4 sessions	Age; Alcohol use (ASI); Gambling symptom severity (SOGS); Gender; Medical issues (ASI); Psychological distress (BSI); Substance use (ASI)	follow-up 9 months follow-up	Average money spent gambling in past month, on days gambled Recovered, improved or unchanged status (recovered based on <30% decrease in dollars wagered from baseline and SOGS score < 3; improved change in SOGS or dollars wagered as above but not both; unchanged SOGS ≥ 3 and small or no reduction in dollars wagered)	Multivariate
Petry, Weinstock, Morasco, and Ledgerwood (2009)[g]	117	USA	RCT	Face-to-face delivered outpatient CBT and MET vs MET vs brief advice vs assessment only; Up to 4 sessions	Alcohol use (TLFB); Gambling symptom severity (SOGS); Gender	9 months follow-up	Substantial improvement (post-treatment dollars wagered < 10.5% of monthly income at month 9)	Multivariate
Petry and Gonzalez-Ibanez (2015)[g]	117	USA	RCT	Face-to-face delivered outpatient CBT and MET vs MET vs brief advice vs assessment only; Up to 4 sessions	Recent Internet gambling status	9 months follow-up	Gambling symptom severity (ASI-G)	Univariate
Ramos-Grille, Goma-i-Freixanet, Aragay, Valero, and Valles (2015)	44	Spain	Obs	Face-to-face delivered outpatient individual CBT; 6 months	Age; Age of problem gambling onset; Gender; Personality traits (ZKPQ subscales - Neuroticism-Anxiety; Activity; Sociability; Impulsive sensation seeking; Aggression-Hostility) Pharmacological treatment; Problem gambling duration; Psychopathological co-occurrence Substance use	12 months follow-up	Abstinence or treatment failure (Combined relapse and dropout. Relapse defined as more than two isolated episodes of gambling during the 12-month follow-up or one episode with a loss of control quantified as a total expense higher than a week of gambling prior to entering treatment. Dropout defined as client-initiated termination occurring without discussion with the therapist, or when the therapist believes the client is in need of further therapy but the client quits.)	Univariate (demo-graphic variables); multivariate (personality traits)
Riley (2015)	45	Australia	Obs	Face-to-face delivered outpatient individual graded cue-exposure with response prevention; Up to 12 sessions	Age; Alcohol use (AUDIT); Gambling symptom severity (VGS); Homework engagement (number of times client performed exposure task and time (minutes) spent engaging in the task); Number of treatment sessions; Treatment credibility (CEQ); Treatment expectancy (CEQ)	Post-treatment and one month follow-up	Gambling symptom severity (VGS)	Univariate
Sander and Peters (2009)	147	Germany	Obs	Face-to-face delivered inpatient CBT; No pre-determined duration	Psychological distress (SCL-90-R)	12 months follow-up	Abstinence or relapse (Abstinence defined as not having gambled during follow-up. A relapse is any gambling during the 12-month follow-up.)	Univariate
D. P. Smith et al. (2011)[f]	127	Australia	Obs	Face-to-face delivered outpatient exposure therapy; Up to 12 weeks	Age; Alcohol use (AUDIT); Anxiety (DASS-21 and STAI); Depression (DASS-21); Education level; Employment status; Gender; Living arrangements; Marital status; Problem gambling duration; Sensation seeking traits (AISS); Stress (DASS-21)	12 months follow-up	Gambling symptom severity (Categorised as a problem gambler based on 21 + on VGS)	Multivariate
Morefield et al. (2014)[f]	53	Australia	Obs	Face-to-face delivered inpatient exposure therapy; 2 weeks	Treatment length (days) (number of sessions attended)	12 months follow-up	Gambling symptom severity (VGS)	Multivariate
Stinchfield et al. (2005)	765	USA	Obs	Multimodal including, outpatient group therapy, psychoeducation, structured group therapy, individual therapy,	Alcohol use; Previous alcohol or drug treatment	6 month follow-up	Number of games played and highest level of gambling; Gambling symptom severity (SOGS)	Multivariate

				financial counselling, and GA; No pre-determined duration				
Stinchfield, Winters, and Dittel (2008)	146–292	USA	Obs	Residential and outpatient treatment including individual and group counselling, education, Gamblers Anonymous (GA) twelve-step work, and family groups; 30 day residential treatment and outpatient duration NR	Age; Client effort at recovery; Education level; Employment status; GA participation; Gambling frequency; Gambling symptom severity (SOGS, DSM); Gender; Having children; Income; Living arrangements; Marital status; Mental Health Status (BASIS); Number of psychiatric diagnoses; Number of sessions attended; Preferred gambling activity; Previous gambling treatment; Psychiatric symptoms (ASI); Race; Stage of change; Treatment completion; Treatment modality (outpatient vs residential)	Post-treatment, 6 and 12 months follow-up	Gambling symptom severity (categorised as clinically significant change based on SOGS scores and DSM-IV scores); Gambling frequency (categorised as clinically significant change based on a move from weekly or daily gambling before treatment to monthly or less frequent gambling after treatment); Gambling frequency (categorised as abstinent or relapse)	Univariate
Toneatto, Skinner, and Dragonetti (2002)	126 and 79	Canada	Quasi-experimental	Face-to-face delivered outpatient group CBT vs individual brief MI vs group 12-step therapy vs individual solution focused therapy; Up to 8 weekly sessions	Lifetime history of drug use; Lifetime history of medication use	Post-treatment and 12 month follow-up	Abstinent (% and mean days abstinent in past month); Gambling symptom severity (% meeting problem gambling criteria and mean scores on SOGS and DSM-IV)	Univariate
Toneatto and Dragonetti (2008)	81	Canada	Quasi-experimental	Face-to-face delivered outpatient group CBT vs Group 12 step therapy; 8 weekly sessions	Number of treatment sessions attended; Treatment goal	Post-treatment, 6 and 12 months follow-up	Abstinence (past month gambling frequency); Amount wagered in past month	Univariate
Toneatto and Gunaratne (2009)	99	Canada	RCT	Face-to-face delivered outpatient CT vs BT vs MI vs minimal intervention consisting of advice and a self-help booklet; CT, BT and MI 6 sessions and Minimal intervention 1 session	Gambling-related cognitive distortions (GCQ)	12 month follow-up	Gambling frequency; Gambling symptom severity (DSM-IV criteria)	Multivariate
Toneatto and Wang (2009)	46	Canada	Obs	Face-to-face delivered outpatient individual CBT; Duration determined mutually by client and therapist	Gender	6 months follow-up	Abstinence (Frequency from treatment termination); Expenditure from baseline to follow-up; Gambling symptom severity (DSM-IV criteria)	Univariate
Winfree, Ginley, Whelan, & Meyers (2015)	64	USA	Obs	Face-to-face delivered outpatient CBT; 5–8 weekly sessions	Cognitive distortions (GBQ)	Post-treatment	Treatment responders (did not meet criteria for probable disordered gambling using DSM-Q and SOGS)	Univariate

Table 2
Predictors of post-treatment outcomes.

Predictor	Study ID	Post-treatment (up to 1 month)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Socio-demographic client characteristics							
Age	Aragay et al. (2015)				x	8	13%
	Ingle et al. (2008)				+		
	Jimenez-Murcia et al. (2007)/Jimenez-Murcia et al. (2010)/Alvarez-Moya et al. (2011)/Jimenez-Murcia et al. (2012)/Gómez-Peña et al. (2012)	x		x	x		
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	x					
	Petry et al. (2006)/Ledgerwood et al. (2007)/Petry (2012)	x	x		x		
	Riley (2015)	x					
	Stinchfield et al. (2008)			x			
Education level	Aragay et al. (2015)				x	6	0%
	Ingle et al. (2008)				x		
	Jimenez-Murcia et al. (2007)/Alvarez-Moya et al. (2011)			x	x		
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	x					
	Stinchfield et al. (2008)			x			
Employment status	Alvarez-Moya et al. (2011)				x	6	0%
	Aragay et al. (2015)				x		
	Ingle et al. (2008)				x		
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	x					
	Stinchfield et al. (2008)			x			
Ethnicity	Ingle et al. (2008)				+ (Asian American) − (Other ethnic groups e.g. Native Americans)	3	33%
	Petry et al. (2006)/Petry (2012)		x		x		
	Stinchfield et al. (2008)			x			
Gender (male)	Aragay et al. (2015)				x	9	33%
	Grant et al. (2009)	x					
	Hodgins et al. (2001)		x	x			
	Ingle et al. (2008)				−		
	Jimenez-Murcia et al. (2010)/Alvarez-Moya et al. (2011)				x		
	Jiménez-Murcia et al. (2015)	−		x			
	Ladouceur et al. (2009)	x					
	Petry et al. (2006)/Petry (2005)/Petry (2012)	x			+		
	Stinchfield et al. (2008)			x			
Having children	Stinchfield et al. (2008)			+		1	100%
Income	Carlbring et al. (2012)				x	4	0%
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	x					
	Stinchfield et al. (2008)			x			
Living situation	Jimenez-Murcia et al. (2007)			x		2	0%
	Stinchfield et al. (2008)			x			
Marital status/having significant other	Aragay et al. (2015)				+	6	33%
	Ingle et al. (2008)				+		
	Jimenez-Murcia et al. (2007)/Alvarez-Moya et al. (2011)			x	x		
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	x					
	Stinchfield et al. (2008)			x			
Occupation	Jimenez-Murcia et al. (2007)			x		1	0%
Gambling-related client characteristics							
Age of disordered gambling onset	Aragay et al. (2015)				x	2	0%
	Jimenez-Murcia et al. (2007)/Jimenez-Murcia et al. (2010)			x	x		
Cognitive distortions	Winfree et al. (2015)	x				1	0%
Debt	Carlbring et al. (2012)				x	3	33%
	Ingle et al. (2008) – low debt vs no debt				−		
	Jiménez-Murcia et al. (2015)	x		x			

Table 2 (continued)

Predictor	Study ID	Post-treatment (up to 1 month)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Dissociative gambling	Carlbring et al. (2012)				−	1	100%
Family history of gambling	Aragay et al. (2015)				x	1	0%
Gambling behaviours	Aragay et al. (2015)				+	5	60%
	Jimenez-Murcia et al. (2007)			x			
	Jiménez-Murcia et al. (2015)	x		x			
	Ladouceur et al. (2009)	−					
	Petry et al. (2007)/Petry (2012)		−	−	−		
Gambling symptom severity	Aragay et al. (2015)				x	8	38%
	Breen et al. (2001)	−					
	Hodgins et al. (2001)		x	x			
	Jimenez-Murcia et al. (2007)/Jimenez-Murcia et al. (2010)/Alvarez-Moya et al. (2011)/Jimenez-Murcia et al. (2012)/ Gómez-Peña et al. (2012)	x		x	x		
	Jiménez-Murcia et al. (2015)	−		x			
	Petry et al. (2006)/Petry et al. (2007)/ Petry and Weiss (2009)	−	x				
	Riley (2015)	x					
	Stinchfield et al. (2008)			x			
Illegal behaviours (presence of)/ legal problems	Aragay et al. (2015)				x	2	50%
	Ledgerwood et al. (2007)	−					
Negative consequences due to gambling	Ladouceur et al. (2009)	−				1	100%
Preferred gambling activity	Aragay et al. (2015)				x	3	0%
	Carlbring et al. (2012)				x		
	Stinchfield et al. (2008)			x			
Problem gambling duration	Alvarez-Moya et al. (2011)/Jimenez-Murcia et al. (2012)/Gómez-Peña et al. (2012)	x		x	x	2	0%
	Aragay et al. (2015)				x		
Psychological/psychosocial client characteristics							
Alcohol use	Aragay et al. (2015)				x	3	33%
	Carlbring et al. (2012)				−		
	Riley (2015)	x					
Anxiety	Aragay et al. (2015)				x	2	50%
	Ladouceur et al. (2009)	−					
Coping skills	Petry et al. (2007)	x	x	x		1	0%
Depression	Aragay et al. (2015)				x	4	50%
	Breen et al. (2001)	−					
	Ladouceur et al. (2009)	−					
	Marceaux and Melville (2011)				x		
Impulsivity	Jimenez-Murcia et al. (2007)			x		1	0%
Mental health status	Stinchfield et al. (2008)			−		1	100%
Other personality traits or dimensions	Aragay et al. (2015)				− (avoidance)	3	100%
	Jimenez-Murcia et al. (2007)/Alvarez-Moya et al. (2011)/Jimenez-Murcia et al. (2012)/ Gomez-Pena et al. (2012)	− (self-transcendence)		+ (persistence) − (novelty seeking)	x		
	Jiménez-Murcia et al. (2015)	− (self-transcendence; novelty seeking)		x			
Psychiatric comorbidities (any)	Aragay et al. (2015)				x	3	0%
	Jimenez-Murcia et al. (2015)	x		x			
	Stinchfield et al. (2008)			x			
Personality disorders	Aragay et al. (2015)				x	2	0%
	Ledgerwood et al. (2007)	x					
Psychiatric symptoms	Stinchfield et al. (2008)			x		1	0%
Psychological distress	Jimenez-Murcia et al. (2007)/Gomez-Pena et al. (2012)	x		−		2	50%
	Petry et al. (2006)		x				
Quality of life	Carlbring et al. (2012)				x	1	0%
Readiness to change	Gómez-Peña et al. (2012)	x		x		2	50%
	Petry (2005)	+					

Table 2 (continued)

Predictor	Study ID	Post-treatment (up to 1 month)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Social support	Carlbring et al. (2012)				x	2	50%
	Petry and Weiss (2009)	+					
Stage of change (action)	Carlbring et al. (2012)				x	4	75%
	Ladouceur et al. (2009)	+					
	Petry (2005)	+					
	Stinchfield et al. (2008)			+			
Substance use (inc. tobacco use)	Aragay et al. (2015)				x	3	0%
	Jimenez-Murcia et al. (2007)			x			
	Toneatto et al. (2002)	x		x			
Suicidal intent	Ladouceur et al. (2009)	−				1	100%
Other client-related characteristics							
Delay discounting	Petry (2012)		x		x	1	0%
Medication use (psychiatric and other conditions)	Alvarez-Moya et al. (2011)				x	3	0%
	Breen et al. (2001)	x					
	Toneatto et al. (2002)	x		x			
Neurocognitive measures	Alvarez-Moya et al. (2011)				x	1	0%
Previous treatment for gambling (inc. self-exclusion)	Aragay et al. (2015)				x	3	0%
	Jimenez-Murcia et al. (2007)			x			
	Stinchfield et al. (2008)			x			
Probability discounting	Petry (2012)		−		−	1	100%
Treatment for other mental health disorders	Champine and Petry (2010)	x				1	0%
Vocabulary	Alvarez-Moya et al. (2011)				x	1	0%
Treatment and therapist-related characteristics							
Effort at recovery	Stinchfield et al. (2008)			+		1	100%
Homework engagement	Riley (2015)	+				1	100%
Motivation for treatment	Jimenez-Murcia et al. (2007)			x		1	0%
Number of treatment sessions attended (inc. GA)	Petry et al. (2006)		+			4	75%
	Riley (2015)	x					
	Stinchfield et al. (2008)			+			
	Toneatto and Dragonetti (2008)		+	+			
Significant other participating in treatment	Ingle et al. (2008)				+	2	100%
	Jimenez-Murcia et al. (2015)	x		−			
Treatment credibility	Riley (2015)	x				1	0%
Treatment completed	Stinchfield et al. (2008)			+		1	100%
Treatment expectancy	Riley (2015)	x				1	0%
Treatment goal (abstinence)	Dowling et al. (2009)	x	x	x		3	67%
	Ladouceur et al. (2009)	−					
	Toneatto and Dragonetti (2008)			+			
Treatment setting (outpatient)	Ladouceur et al. (2006)	+				1	100%

Note: + positive significant relationship where increase in predictor is associated with better treatment outcomes; − negative significant relationship where increase in predictor is associated with poorer treatment outcomes; x no significant relationship between predictor and treatment outcome.

Characteristics examined in less than three studies, but with significant associations identified, included ethnicity, having children, gambling behaviours, mental health status, stage of change, effort at recovery, number of sessions attended, completion of treatment and treatment satisfaction.

3.5. Predictors of medium-term treatment outcomes

Seventeen studies examined predictors of medium-term treatment outcomes (nine to 12 months follow-up). The results of these studies are displayed in Table 4. Ten socio-demographic, 13 gambling-related, 16 psychological/psychosocial, six other client-related and six treatment-related characteristics were examined.

Of the characteristics examined in three or more studies, older age (k = 1, 14%), being employed (k = 1, 20%), being male (k = 1, 11%), being single (k = 1, 20%), lower levels of gambling behaviour (k = 2, 50%), lower levels of gambling symptom severity (k = 3, 43%), lower levels of alcohol use (k = 2, 33%), personality traits (k = 2, 67%), such as lower levels of neuroticism and impulsive sensation seeking, higher number of sessions attended (k = 2, 50%) and abstinence as a treatment goal (k = 1, 33%) were consistently associated with positive treatment outcomes.

In contrast, mixed findings were identified for depression. Milton et al. (2002) noted that higher levels of depression were associated with poor treatment outcomes, whereas Abbott et al. (2013) found that while having major depressive disorder was associated with poor treatment outcomes, having minor depressive disorder was associated with positive treatment outcomes. Education level, ethnicity, income, preferred gambling activity, problem gambling duration, anxiety, psychological distress, substance use and medication use had no significant associations with treatment outcomes.

Characteristics examined in less than three studies, but with significant associations identified, included having children, cognitive distortions, number of abstinent days, self-efficacy, mental health status, stage of change, behaviourally conditioned gambling subtype, having medical issues, previous gambling treatment, previous mental health treatment, completion of treatment and treatment satisfaction.

3.6. Predictors of long-term treatment outcomes

Only two studies were identified that examined predictors of long-term treatment outcomes (24 months follow-up or more) (Blaszczynski, McConaghy, & Frankova, 1991a, 1991b; Carlbring et al., 2012). See Table 5 for the results of these studies. One socio-demographic, three gambling-related and seven psychological/

psychosocial client characteristics were examined. While no characteristics were examined in three or more studies, significant findings were identified for gambling debt and experience seeking personality trait.

3.7. Quality assessment

The quality assessment for each included article can be found in Table 6. The majority of articles used an adequate sample size for the predictor analysis they conducted (94.0%, k = 47), examined the severity of the gambling problem at pre-treatment (94.0%, k = 47), and used valid and reliable measures to examine the treatment outcomes (74.0%, k = 37). The majority of articles used valid and reliable measures to examine the predictor variables (92.8%, k = 39) and used continuous predictor variables (83.7%, k = 36). Only 20.0% (k = 45) of articles, however, reported that outcome assessors were blinded, with most articles not providing any information about blinding (72.0%, k = 18). Only 20.8% (k = 10) of the included articles explicitly stated that ITT data was employed. Handling of missing data was conducted and reported appropriately (e.g., evidence of no difference between dropout and completers in the follow-up evaluations) in 47.5% (k = 19) of the articles. The criteria for minimising bias due to dropout in follow-up evaluations was addressed appropriately in only 10.2% (k = 5) of articles, with 57.1% (k = 28) of articles classified as not employing appropriate procedures to minimise bias (e.g., analysis using completers only or ITT using LOCF (Saha & Jones, 2009)). Where applicable, half of the articles did not report if the outcome distribution was checked (i.e., assumption of normality) (52.9%, k = 18), while 41.2% (k = 14) of the articles appropriately addressed this issue in the analysis.

3.8. Discussion

The aim of this review was to identify and critically review the available evidence for post-treatment, short-term, medium-term and long-term gambling outcomes following psychological treatment for disordered gambling.

3.8.1. Socio-demographic client characteristics

A number of socio-demographic client characteristics were investigated in a sufficient number of the included studies to allow a cross-study synthesis of the findings. These include gender, age, marital status, education, employment, ethnicity and income. Of these, gender, age, marital status, ethnicity and employment status displayed at least one significant finding across the outcome assessment time-points. Results indicated that males produced better outcomes than females across multiple evaluation periods (short-term, and medium-term), with the exception of post-treatment where females produced better outcomes than males. Older age was also associated with better outcomes across multiple time points (post-treatment and medium-term), however, age did not influence short-term treatment outcomes. Interestingly, having a significant other was related to having better outcomes at post-treatment and short-term, whereas being single was associated with better medium-term treatment outcomes. While examined at multiple time-points, ethnicity and employment status were only associated with treatment outcomes at a single time-points (post-treatment and medium-term, respectively). This review also identified that education and income were consistently not associated with treatment outcomes across multiple time periods.

Despite these significant associations, caution is required in their interpretation as there were only a small number of studies that examined each of the aforementioned variables, and even fewer studies with significant findings. Further research is therefore required to replicate these associations. Moreover, there were other socio-demographic characteristics, such as having children that were significantly associated with gambling treatment outcomes, but were not explored in a sufficient number of studies to allow valid conclusions to be drawn. Additional studies are required to explore the role of these socio-

demographic characteristics in the prediction of outcomes following psychological interventions for disordered gambling.

3.8.2. Gambling-related client characteristics

While a number of gambling-related client characteristics were identified in the current review, only pre-treatment gambling symptom severity, pre-treatment gambling behaviours, gambling debt, preferred gambling activity and problem gambling duration were examined in a sufficient number of studies to draw valid conclusions. Of these, only pre-treatment gambling symptom severity, pre-treatment gambling behaviours and gambling debt displayed at least one significant association with treatment outcomes across the evaluation periods. The results suggest that lower levels of pre-treatment gambling symptom severity were consistently related to positive treatment outcomes at multiple time-points (post-treatment and medium-term), but pre-treatment gambling symptom severity did not affect short-term treatment outcomes. Closer inspection of these results suggests that significant associations were consistently identified between pre-treatment gambling symptom severity and measures of gambling symptom severity treatment outcomes, with fewer significant associations identified when other types of treatment outcomes, such as, expenditure and frequency, were examined. With the exception of one study, pre-treatment gambling behaviours were consistently associated with positive treatment outcomes across multiple time-points (post-treatment and medium-term), irrelevant of the type of treatment outcome (i.e., severity, expenditure or frequency). In addition, not having a gambling debt was associated with positive treatment outcomes at a single time point (post-treatment). In contrast, this review identified that preferred gambling activity was not associated with treatment outcomes at multiple evaluation periods (post-treatment and medium-term) and problem gambling duration was not associated with treatment outcomes at a singe evaluation period (medium-term).

This review provides preliminary support for the role of pre-treatment gambling symptom severity and pre-treatment gambling behaviours in the effectiveness of psychological interventions for disordered gambling. Further research, however, is required to examine their predictive ability given that only a small number of studies examined these characteristics across time-points. Furthermore, numerous gambling-related client characteristics displayed significant associations with treatment outcomes in a limited number of studies across the time-points and therefore warrant further investigation. These include cognitive distortions, dissociative gambling, gambling abstinence self-efficacy, negative consequences due to gambling and the presence of gambling-related illegal behaviours.

3.8.3. Psychological/psychosocial client characteristics

Several psychological/psychosocial client characteristics were examined in a sufficient number of studies to draw valid conclusions. These include depression, stage of change, alcohol use, personality traits, anxiety, psychological distress, substance use and any psychiatric comorbidity. Of these, depression, stage of change, alcohol use and personality traits displayed at least one significant finding across the evaluation periods. The results suggest that, with the exception of one study, lower levels of depression were consistently associated with better treatment outcome across multiple outcome assessment time points (post-treatment, short-term and medium-term). Lower levels of alcohol use were also consistently associated with positive treatment outcomes at multiple time points (post-treatment and medium-term), as was being in the action stage of change at post-treatment. Similarly, personality traits such as low levels of novelty seeking, neuroticism and sensation seeking were associated with positive treatment outcomes at post-treatment or medium-term, although these results should be interpreted with caution as the personality traits were grouped together for the purpose of this review, with no individual personality trait examined in more than three studies. The findings of the review also suggest that psychiatric comorbidity and psychological

Table 3
Predictors of short-term outcomes.

Predictor	Study ID	Short-term outcomes (3–6 months)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Socio-demographic client characteristics							
Age	Aragay et al. (2015)				x	4	0%
	Dowling (2009)				x		
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
Education level	Aragay et al. (2015)				x	4	0%
	Dowling (2009)				x		
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
Employment status	Aragay et al. (2015)				x	3	0%
	Dowling (2009)				x		
	Stinchfield et al. (2008)			x			
Ethnicity (cultural minority)	Odlaug et al. (2013)			−		2	50%
	Stinchfield et al. (2008)			x			
Gender (male)	Aragay et al. (2015)				x	5	20%
	Hodgins et al. (2001)		x	x			
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
	Toneatto and Wang (2009)	+	x	+			
Having children	Stinchfield et al. (2008)			+		1	100%
Income	Stinchfield et al. (2008)			x		1	0%
Living situation	Dowling (2009)				x	2	0%
	Stinchfield et al. (2008)			x			
Marital status	Aragay et al. (2015)				+	4	25%
	Dowling (2009)				x		
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
Gambling-related client characteristics							
Age of disordered gambling onset	Aragay et al. (2015)				x	2	0%
	Odlaug et al. (2013)			x			
Family history of gambling	Aragay et al. (2015)				x	1	0%
Gambling behaviours	Aragay et al. (2015)				+ (spend) − (active gambling)	2	100%
	Dowling (2009)				−		
Gambling symptom severity	Aragay et al. (2015)				x	5	0%
	Dowling (2009)				x		
	Hodgins et al. (2001)		x	x			
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
Legal problems	Aragay et al. (2015)				x	1	0%
Longest abstinence period	Dowling (2009)				x	1	0%
Preferred gambling activity	Aragay et al. (2015)				x	2	0%
	Stinchfield et al. (2008)			x			
Problem gambling duration	Aragay et al. (2015)				x	2	0%
	Dowling (2009)				x		
Psychological/psychosocial client characteristics							
Alcohol use	Aragay et al. (2015)				x	2	0%
	Stinchfield et al. (2005)	x		x			
Anxiety	Aragay et al. (2015)				x	3	0%
	Dowling (2009)				x		
	Grant et al. (2011)	x					
Depression	Aragay et al. (2015)				x	4	25%
	Dowling (2009)				x		
	Marceaux and Melville (2011)				−		
	Grant et al. (2011)	x					
Eating disorder	Grant et al. (2011)	x				1	0%
Impulse control disorder	Grant et al. (2011)	x				1	0%
Mental health status	Odlaug et al. (2013)			x		2	50%
	Stinchfield et al. (2008)			−			
Other personality traits and dimensions	Aragay et al. (2015)				x	1	0%
Personality disorders	Aragay et al. (2015)				x	1	0%
Psychiatric comorbidities (any)	Aragay et al. (2015)				x	2	0%
	Stinchfield et al. (2008)			x			
Psychiatric symptoms	Stinchfield et al. (2008)			x		1	0%
Stage of change	Stinchfield et al. (2008)			+		1	100%
Substance use (inc. tobacco)	Aragay et al. (2015)				x	3	0%
	Dowling (2009)				x		
	Odlaug et al. (2013)			x			
Other client-related characteristics							
Previous treatment for gambling	Aragay et al. (2015)				x	4	0%
	Dowling (2009)				x		

Table 3 (continued)

Predictor	Study ID	Short-term outcomes (3–6 months)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
	Odlaug et al. (2013)			x			
	Stinchfield et al. (2008)			x			
Treatment for other mental health disorders	Odlaug et al. (2013)			x		2	0%
	Stinchfield et al. (2005)	x		x			
Treatment and therapist-related characteristics							
Effort at recovery	Stinchfield et al. (2008)			+		1	100%
Number of treatment sessions attended	Stinchfield et al. (2008)			+		2	100%
	Toneatto and Dragonetti (2008)		+	+			
Treatment completed	Stinchfield et al. (2008)			+		1	100%
Treatment goal	Dowling et al. (2009)/Dowling (2009)	x	x	x	x	1	0%
Treatment modality (group vs individual)	Dowling (2009)				x	1	0%
Treatment satisfaction	Monnat et al. (2012)	+		+		1	100%
Treatment setting	Monnat et al. (2012)	x				2	0%
	Stinchfield et al. (2008)	x		x			

Note: + positive significant relationship where increase in predictor is associated with better treatment outcomes; − negative significant relationship where increase in predictor is associated with poorer treatment outcomes; x no significant relationship between predictor and treatment outcome.

distress were not associated with treatment outcomes at single time-points (post-treatment and medium-term, respectively). In addition, substance use and anxiety were not associated with treatment outcomes at multiple evaluation periods.

Due to the small number of studies examining each of the aforementioned psychological/psychosocial variables, further research is still required to examine their predictive ability across multiple time-points. Additionally, there were several psychological/psychosocial client characteristics that were significantly associated with treatment outcomes in at least one evaluation period, but were examined in a limited number of studies. These characteristics, which include impulsivity, mental health status, readiness to change, self-efficacy, social support, suicidal intent and gambling subtypes, also require further research.

3.8.4. Other client-related characteristics

There were also other client-related characteristics identified in this review that did not fit within the previous categories. Medication use and previous gambling treatment were examined in a sufficient number of studies to draw valid conclusions. Both of these characteristics were consistently not associated with treatment outcomes across multiple evaluation periods.

In contrast, probability discounting, having medical issues and having sought treatment for mental health or other addiction problems were significantly associated with treatment outcomes in at least one evaluation period but were examined in a limited number of studies. These characteristics may warrant future research.

3.8.5. Treatment and therapist-related characteristics

Overall, few treatment-related characteristics and no therapist-related characteristics were identified in the included studies. Only two treatment-related characteristics were examined in a sufficient number of studies to draw valid conclusions, including treatment goal and number of treatment sessions attended. Both treatment goal and number of treatment sessions attended displayed at least one significant finding across the evaluation periods. The results for treatment goal were mixed, with one study (Ladouceur et al., 2009) suggesting that controlled gambling was associated with more successful post-treatment outcomes and another study (Toneatto & Dragonetti, 2008) indicating that an abstinence goal was associated with more successful post-treatment and medium-term treatment outcomes. In contrast, a higher number of treatment sessions attended was consistently related to positive post-treatment and medium-term treatment outcomes.

In addition to further research needed for treatment goal and number of treatment sessions as predictors of treatment outcomes across multiple time periods, there were several treatment characteristics that displayed significant associations with treatment outcomes, but were examined in a limited number of studies. These characteristics, which include effort at recovery, engaging in homework, motivation for treatment, the participation of a significant other in treatment, treatment setting (outpatient vs. inpatient), treatment completion and treatment satisfaction, are therefore worthy of additional research to determine the consistency of their association with gambling treatment outcomes.

3.8.6. Comparison with wider literature

This systematic review is the first to critically review the available evidence on predictors of gambling-related treatment outcomes. To date, the only available systematic review of predictors of treatment outcomes from psychological treatment for disordered gambling has reviewed predictors of dropout (Melville et al., 2007). While this and the current review differed in the types of treatment outcomes examined, there were some consistencies in the variables identified as potential predictors of treatment outcomes. These include gambling behaviours, alcohol use, employment status, and personality traits (i.e., impulsive sensation seeking). Both reviews identified that higher levels of pre-treatment gambling behaviours and alcohol use, and lack of employment were associated with poorer gambling-related treatment outcomes (i.e., dropout and gambling severity). Additionally, while the present review examined several personality traits, both reviews identified that increased impulsivity, or related traits, are predictors of poorer treatment outcomes. Education level was not associated with treatment outcomes in both reviews.

There were, however, several inconsistencies between Melville et al. (2007)'s findings and those identified in this review. Melville et al. (2007) identified no significant association between dropout and gender, marital status, pre-treatment gambling symptom severity and depression. In contrast, this review identified significant associations between the aforementioned variables and gambling treatment outcomes. Interestingly, Melville et al. (2007) identified that older age was associated with treatment dropout, while the results of the current review suggest that older age was associated with positive treatment outcomes. Moreover, Melville et al. (2007) noted that lower gambling debts were associated with dropout, whereas the results of this review indicate that when compared to lower gambling debt, no gambling debt was associated with positive treatment outcomes. Further discrepancies between the two reviews include the results relating to longer duration of gambling behaviour and higher anxiety levels which were not associated with treatment outcomes in this review, but were found to be potential predictors of treatment dropout (Melville et al., 2007).

Taken together, these findings suggest that older age, longer duration of gambling behaviour, higher anxiety levels, experiencing stressful life events, lack of social support, younger age of gambling onset and lower gambling debt are associated with dropping out of psychological

Table 4
Predictors of medium-term outcomes.

Predictor	Study ID	Medium-term outcomes (9-12 months)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Socio-demographic client characteristics							
Age	Abbott et al. (2013)	x		x		7	14%
	Ladouceur et al. (2009)	+					
	Petry et al. (2008)				x		
	Petry et al. (2006)/Weinstock et al. (2007)/Petry (2012)	x	x		x		
	Ramos-Grille et al. (2015)				x		
	Smith et al. (2011)	x					
	Stinchfield et al. (2008)			x			
Area of residence	Abbott et al. (2013)	x		x		1	0%
Education level	Abbott et al. (2013)	x		x		5	0%
	Ladouceur et al. (2009)	x					
	Smith et al. (2011)	x					
	Stinchfield et al. (2008)			x			
	Weinstock et al. (2007)	x					
Employment status	Abbott et al. (2013)	+		x		5	20%
	Ladouceur et al. (2009)	x					
	Smith et al. (2011)	x					
	Stinchfield et al. (2008)			x			
	Weinstock et al. (2007)	x					
Ethnicity (cultural minority)	Abbott et al. (2013)	x		x		3	0%
	Petry et al. (2006)/Petry (2012)/Weinstock et al. (2007)	x	x		x		
	Stinchfield et al. (2008)			x			
Gender (male)	Abbott et al. (2013)	x		x		9	11%
	Hodgins et al. (2001)		x	x			
	Ladouceur et al. (2009)	x					
	Petry et al. (2008)				x		
	Petry et al. (2009)		x				
	Petry et al. (2006)/Petry (2012)/Weinstock et al. (2007)	x	x		+		
	Ramos-Grille et al. (2015)				x		
	Smith et al. (2011)	x					
	Stinchfield et al. (2008)			x			
Having children	Stinchfield et al. (2008)			+		1	100%
Income	Abbott et al. (2013)	x		x		4	0%
	Ladouceur et al. (2009)	x					
	Stinchfield et al. (2008)			x			
	Weinstock et al. (2007)	x					
Living arrangements	Smith et al. (2011)	x				2	0%
	Stinchfield et al. (2008)			x			
Marital status	Abbott et al. (2013)	–		x		5	20%
	Ladouceur et al. (2009)	x					
	Smith et al. (2011)	x					
	Stinchfield et al. (2008)			x			
	Weinstock et al. (2007)	x					
Gambling-related client characteristics							
Age of disordered gambling onset	Ramos-Grille et al. (2015)				x	1	0%
Cognitive distortions	Toneatto and Gunaratne (2009)	–		x		1	100%
Control over gambling	Abbott et al. (2013)	x	x	x		1	0%
Gambling behaviours	Abbott et al. (2013)	x	x	x		4	50%
	Hodgins et al. (2009)				x		
	Ladouceur et al. (2009)	–					
	Petry et al. (2007)/Weinstock et al. (2007)/Petry (2012)	x	x	x	–		
Gambling symptom severity	Abbott et al. (2013)		–	x		7	43%
	Echeburua et al. (2001)				x		
	Hodgins et al. (2001)		x	x			
	Petry et al. (2006)/Petry et al. (2007)/Petry and Weiss (2009)	–	x				
	Petry et al. (2008)				–		
	Petry et al. (2009)		x				
	Stinchfield et al. (2008)			x			
Legal problems	Abbott et al. (2013)	x	x	x		1	0%
Motivation to overcome gambling	Abbott et al. (2013)	x	x	x		1	0%
Negative consequences due to gambling	Abbott et al. (2013)	x	x	x		2	0%
	Ladouceur et al. (2009)	x					
Number of days abstinent	Abbott et al. (2013)	+		x		1	100%

Table 4 (continued)

Predictor	Study ID	Medium-term outcomes (9-12 months)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
Perceived difficulty in overcoming gambling	Abbott et al. (2013)	x	x	x		1	0%
Preferred gambling activity (EGM)	Abbott et al. (2013)	x	x	x		3	0%
	Petry and Gonzalez-Ibanez (2015)	x					
	Stinchfield et al. (2008)			x			
Problem gambling duration	Abbott et al. (2013)	x	x	x		4	0%
	Milton et al. (2002)	x	x				
	Ramos-Grille et al. (2015)				x		
	Smith et al. (2011)	x					
Self-efficacy (gambling abstinence)	Hodgins et al. (2009)				+	1	100%
Psychological/psychosocial client characteristics							
Alcohol use	Abbott et al. (2013)	x	x	x		6	33%
	Echeburua et al. (2001)				–		
	Milton et al. (2002)	x	–				
	Petry et al. (2008)				x		
	Petry et al. (2009)		x				
	Smith et al. (2011)	x					
Anxiety	Echeburua et al. (2001)				x	4	0%
	Ladouceur et al. (2009)	x					
	Milton et al. (2002)	x	x				
	Smith et al. (2011)	x					
Coping skills	Petry et al. (2007)	x	x	x		1	0%
Depression	Abbott et al. (2013)	– (major depressive disorder) + (minor depressive disorder)	– (major depressive disorder)	x		4	50%
	Ladouceur et al. (2009)	x					
	Milton et al. (2002)	x	x				
	Smith et al. (2011)	–					
Deprivation	Abbott et al. (2013)	–	x	x		1	0%
Mental health status	Stinchfield et al. (2008)			–		1	100%
Personality traits	Echeburua et al. (2001)				– (neuroticism)	3	67%
	Ramos-Grille et al. (2015)				– (impulsive sensation seeking)		
	Smith et al. (2011)	x (sensation seeking)					
Psychiatric comorbidities (any)	Ramos-Grille et al. (2015)				x	2	0%
	Stinchfield et al. (2008)			x			
Psychiatric symptoms	Stinchfield et al. (2008)			x		1	0%
Psychological distress/Stress	Abbott et al. (2013)	x	x	x		5	0%
	Petry et al. (2006)		x				
	Petry et al. (2008)				x		
	Sander and Peters (2009)			x			
	Smith et al. (2011)	x					
Quality of life	Abbott et al. (2013)	x	x	x		1	0%
Readiness to change	Milton et al. (2002)	x	x			1	0%
Stage of change	Ladouceur et al. (2009)	x				2	50%
	Stinchfield et al. (2008)		+				
Substance use (inc. tobacco)	Abbott et al. (2013)	x	x	x		5	0%
	Milton et al. (2002)	x	x				
	Petry et al. (2008)				x		
	Ramos-Grille et al. (2015)				x		
	Toneatto et al. (2002)	x		x			
Subtypes - behaviourally conditioned	Ledgerwood and Petry (2010)	+				1	100%
Suicidal intent/ideation	Abbott et al. (2013)	x	x	x		2	0%
	Ladouceur et al. (2009)	x					
Other client-related characteristics							
Current or previous medication use (psychiatric and other conditions)	Abbott et al. (2013)	x	x	x		3	0%
	Ramos-Grille et al. (2015)				x		
	Toneatto et al. (2002)	x		x			
Delay discounting	Petry (2012)		x		x	1	0%
Medical issues	Petry et al. (2008)				+	1	100%
Previous or other current treatment for gambling	Abbott et al. (2013)	x	x	+		2	50%
	Stinchfield et al. (2008)			x			
Previous mental health or addiction	Abbott et al. (2013)	–	x	x		1	100%

Table 4 (*continued*)

Predictor	Study ID	Medium-term outcomes (9-12 months)				Total studies	Percentage of significant results
		Severity	Expenditure	Frequency	Combined		
treatment							
Probability discounting	Petry (2012)		x		–	1	100%
Treatment and therapist-related characteristics							
Belief in treatment success	Abbott et al. (2013)	x	x	x		1	0%
Effort at recovery	Stinchfield et al. (2008)			x		1	0%
Number of treatment sessions attended	Morefield et al. (2014)	x				4	50%
	Petry et al. (2006)		+				
	Stinchfield et al. (2008)			x			
	Toneatto and Dragonetti (2008)		+	+			
Treatment completed	Stinchfield et al. (2008)			+		1	100%
Treatment goal (abstinence)	Abbott et al. (2013)	x	x	x		3	33%
	Ladouceur et al. (2009)	x					
	Toneatto and Dragonetti (2008)			+			
Treatment satisfaction	Echeburua et al. (2001)				+	1	100%

Note: + positive significant relationship where increase in predictor is associated with better treatment outcomes; − negative significant relationship where increase in predictor is associated with poorer treatment outcomes; x no significant relationship between predictor and treatment outcome.

gambling treatments, but that female gender, younger age, not having a significant other, higher pre-treatment gambling symptom severity, higher levels of depression and not being in the action stage of change, are associated with a less positive response to these treatments. These findings highlight the importance of differentiating between treatment dropout and treatment response in studies exploring the influence of different client and treatment characteristics in the success of psychological gambling interventions. They must, however, be interpreted with caution due to the small number of studies examining each predictor variable and the methodological variations across the included studies. Further research exploring the influence of the factors influencing both indices of treatment effectiveness is clearly warranted.

3.8.7. Implications for clinical practice

While further research is still required to determine consistent predictors of treatment outcomes, the findings of this review have some implications for clinical practice. Many of the pre-treatment client characteristics that were consistently associated with poor treatment outcomes are amenable to change, such as gambling behaviours, gambling symptom severity, depression and alcohol use.

Identification of these factors, through brief screens, at the commencement of treatment is important. This will allow for early identification and will assist with treatment planning by modifying treatment to meet individual needs. Generally, this will include setting clear treatment goals, including a discussion of the client's goals in relation to abstinence and controlled gambling. Additional monitoring throughout treatment and spending additional time on relapse prevention techniques will also be required, especially in the case of factors associated with poor outcomes at the longer-term follow-ups (e.g. short and medium-term).

Where psychiatric comorbidity risk factors are identified, such as high levels of depression and alcohol use, treatment planning becomes more complex. Research to date is still unclear as to the best method for treating gamblers with comorbid psychiatric disorders. It has been questioned whether comorbid gambling and psychiatric disorders should be treated simultaneously using integrated treatments, or whether sequential treatment should be utilised, and if so, what criteria are used to determine the order of treatment (Winters & Kushner, 2003). This was further supported in a recent mini-review that examined the efficacy of interventions for comorbid disordered gambling and psychiatric disorders (Dowling et al., 2016). This review identified a limited number of studies that directly examined the efficacy of targeted interventions for these subgroups, with preliminary evidence available only for a small number of psychiatric comorbidities, including the use of naltrexone and CBT in the treatment of alcohol use disorders. Overall, this review recommended further research to identify effective treatments and explore the effectiveness of sequential and integrated interventions (Dowling et al., 2016).

Table 5
Predictors of long-term outcomes.

Predictor	Study ID	Long-term outcomes (>24 months)	Total studies	Percentage of significant results
		Combined		
Socio-demographic client characteristics				
Income	Carlbring et al. (2012)	x	1	0%
Gambling-related client characteristics				
Debt (having debt)	Carlbring et al. (2012)	+	1	100%
Dissociative gambling	Carlbring et al. (2012)	x	1	0%
Preferred gambling activity	Carlbring et al. (2012)	x	1	0%
Psychological/psychosocial client characteristics				
Alcohol use	Carlbring et al. (2012)	x	1	0%
Anxiety	Blaszczynski et al. (1991a)/Blaszczynski et al. (1991b)	x	1	0%
Personality traits[a]	Blaszczynski et al. (1991a)/Blaszczynski et al. (1991b)	+ (experience seeking)	1	100%
Quality of life	Carlbring et al. (2012)	x	1	0%
Social support	Carlbring et al. (2012)	x	1	0%
Stage of change	Carlbring et al. (2012)	x	1	0%

Note: + positive significant relationship where increase in predictor is associated with better treatment outcomes; − negative significant relationship where increase in predictor is associated with poorer treatment outcomes; x no significant relationship between predictor and treatment outcome.

[a] Various personality traits measured using the Eysenck Personality Questionnaire and the Zuckerman's Sensation Seeking Scale. The only significant finding was for the experience seeking subscales in Zuckerman's Sensation Seeking Scale.

Table 6
Quality assessment.

Study ID	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Criteria 7	Criteria 8	Criteria 9	Criteria 10
Abbott et al. (2013)	Y	Y	Y	Y	NA	NR	N	Y	NR	N
Aragay et al. (2015)	Y	Y	N	Y	NA	NR	NR	NR	NA	Y
Blaszczynski et al. (1991a)[a]	Y	Y	N	Y	NR	N	Y	N	NA	Y
Blaszczynski et al. (1991b)[a]	N	Y	N	Y	NR	N	NR	NR	NA	Y
Breen et al. (2001)	Y	Y	Y	Y	NA	N	Y	N	NR	Y
Carlbring et al. (2012)	Y	Y	Y	NR	NA	N	NR	Y	NA	N
Dowling (2009)[b]	Y	Y	N	Y	NR	N	Y	N	NA	Y
Dowling et al. (2009)[b]	Y	Y	Y	Y	N	Y	Y	N	NR	Y
Echeburua et al. (2001)	Y	Y	N	Y	NA	NA	NA	N	NA	Y
Grant et al. (2009)[c]	Y	Y	Y	NA	Y	Y	NR	NR	NR	NA
Grant et al. (2011)[c]	Y	Y	Y	Y	Y	NR	NR	NR	NA	NR
Hodgins et al. (2001)	Y	Y	Y	Y	N	Y	Y	N	Y	Y
Hodgins et al. (2009)	Y	Y	Y	Y	NR	Y	NR	Y	Y	Y
Ingle et al. (2008)	Y	N	N	NA	NA	N	N	N	NA	N
Jimenez-Murcia et al. (2007)[d]	Y	Y	N	Y	NA	N	N	N	NA	Y
Jimenez-Murcia et al. (2010)[d]	Y	Y	N	Y	NA	N	NR	N	NA	Y
Alvarez-Moya et al. (2011)[d]	N	Y	N	Y	NA	NR	Y	N	NA	Y
Jimenez-Murcia et al. (2012)[d]	Y	Y	Y	Y	NR	NR	NR	NR	NR	Y
Gómez-Peña et al. (2012)[d]	Y	Y	Y	Y	NR	NR	NR	NR	NR	Y
Jiménez-Murcia et al. (2015)	Y	Y	Y	Y	NA	NR	NR	NR	NR	Y
Ladouceur et al. (2006)	Y	Y	Y	NA	NA	NR	NR	NR	NR	NA
Ladouceur et al. (2009)	Y	Y	Y	Y	NA	Y	N	N	NA	Y
Marceaux and Melville (2011)	Y	Y	Y	Y	NR	N	N	N	NR	N
Milton et al. (2002)	Y	Y	Y	Y	NR	Y	NR	N	N	N
Monnat et al. (2012)	Y	NR	NR	Y	NA	NA	NA	NA	NR	Y
Odlaug et al. (2013)	Y	Y	Y	Y	NA	NR	Y	N	N	Y
Petry et al. (2006)[e]	Y	Y	Y	Y	NR	N	NR	Y	NA	Y
Petry (2005)[e]	Y	Y	Y	Y	NR	N	Y	N	Y	Y
Ledgerwood et al. (2007)[e]	Y	Y	Y	Y	NR	N	N	N	Y	Y
Petry et al. (2007)[e]	Y	Y	Y	Y	NR	N	Y	N	Y	Y
Weinstock et al. (2007)[e]	Y	Y	Y	Y	NR	N	Y	NR	NR	Y
Petry and Weiss (2009)[e]	Y	Y	Y	Y	NR	NR	NR	NR	Y	Y
Champine and Petry (2010)[e]	Y	Y	Y	NA	NR	N	Y	N	NR	NA
Ledgerwood and Petry (2010)[e]	Y	Y	Y	Y	NR	N	N	N	Y	N
Petry (2012)[e]	Y	Y	Y	NR	NR	Y	Y	N	Y	Y
Petry et al. (2008)	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Petry et al. (2009)[g]	Y	Y	Y	Y	Y	Y	NR	NR	Y	Y
Petry and Gonzalez-Ibanez (2015)[g]	Y	Y	Y	Y	Y	NR	NR	NR	Y	NA
Ramos-Grille et al. (2015)	N	Y	N	Y	NA	N	NR	N	NA	Y
Riley (2015)	Y	Y	Y	Y	NA	N	Y	N	Y	Y
Sander and Peters (2009)	Y	Y	N	Y	NA	N	N	N	NA	Y
Smith et al. (2011)[f]	Y	Y	Y	Y	NA	N	NR	Y	NA	Y
Morefield et al. (2014)[f]	Y	Y	Y	NA	NA	N	Y	Y	NR	Y
Stinchfield et al. (2005)	Y	Y	Y	NR	NA	NR	Y	NR	NR	NA
Stinchfield et al. (2008)	Y	Y	Y	Y	NA	N	NR	NR	NR	Y
Toneatto et al. (2002)	Y	Y	Y	NA	NA	NR	NR	NR	NR	NA
Toneatto and Dragonetti (2008)	Y	Y	Y	NA	NA	N	Y	N	Y	Y
Toneatto and Gunaratne (2009)	Y	Y	NR	Y	NR	Y	Y	N	Y	Y
Toneatto and Wang (2009)	Y	Y	Y	NA	NA	N	N	N	NR	NA
Winfree et al. (2015)	Y	Y	Y	Y	NA	N	Y	N	NR	Y

[a–f]Articles based on same sample or subsample.
Y = yes; N = no; NA = not applicable; NR = not reported.

This review also identified that younger clients and females were at risk of poor treatment outcomes. While these factors are not amenable to change, additional time and effort during treatment is may be required for these clients to achieve their treatment goals and needs. Overall, the choice of management and treatment strategies may differ depending on the characteristics of the individual seeking treatment. Further research, however, is required to ascertain which individuals will benefit most from treatment and if there are specific treatments that work best for certain clients. This will allow for improved treatment outcomes, higher engagement and retention in treatment, and cost effective treatments (Dowling et al., 2016; Grant, Williams, & Kim, 2006).

3.8.8. Strengths and limitations of the current evidence base

This review is the first to systematically identify and examine the relationship between client, treatment and therapist-related variables and gambling-related treatment outcomes across time points. Rigorous approaches at each stage of the review were employed to ensure the accuracy of the results. A further strength of this review was the use of the Banff consensus-reporting framework to structure our understanding of the role of client and treatment characteristics on treatment outcomes. This framework increased the ability to meaningfully synthesise the results across studies.

The small number of studies that examined most of the predictor variables, however, limited the conclusions of this review. Future research is warranted for most of the predictor variables explored in this review, with priority given to examining client characteristics that are malleable and therefore amenable to change. Identifying these characteristics will allow for the development of targeted treatment interventions. Several variables have shown promising results in this review, but did not have a sufficient number of studies to provide a valid cross-study comparison. These include alcohol use, anxiety, debt, dissociative gambling, gambling abstinence self-efficacy, gambling-related cognitive distortions, general psychological distress, impulsivity, income, living arrangements, negative consequences due to gambling, personality disorders and traits, presence of gambling-related illegal behaviours, readiness to change, social support and suicidal intent. Many of these variables have also displayed promising

results in the addiction field more broadly (Adamson et al., 2009; McKay & Weiss, 2001).

Further research should also investigate treatment and therapist-related characteristics. In this review, promising results were found for the number of treatment sessions attended and treatment goal. Alongside these characteristics, several treatment characteristics displayed significant associations with treatment outcomes but did not have enough studies to provide valid conclusions. These variables, which include motivation for treatment, the participation of a significant other in treatment, treatment setting (outpatient vs. inpatient) and treatment satisfaction, warrant attention in future research. Despite the importance of the therapeutic relationship to treatment outcomes being well established in the general psychotherapeutic literature (Luborsky, McLellan, Woody, O'Brien, & Auerbach, 1985) and the addiction field more broadly (Connors, Carroll, DiClement, Longabaugh, & Donovan, 1997; Meier, Barrowclough, & Donmall, 2005), none of the studies included in this review examined the therapeutic relationship as a predictor variable. A limited number of studies, not eligible for inclusion in this review due to timing or type of outcomes assessed, however, have examined the role of the therapeutic relationship and found that client-rated therapeutic alliance was predictive of gambling outcomes (Dowling & Cosic, 2011; Smith, Thomas, & Jackson, 2004), but therapist-rated therapeutic alliance was not (Dowling & Cosic, 2011). Additionally, research on therapist qualities has received little attention in the gambling field (Dowling & Cosic, 2011), despite promising results in the substance use literature (Najavits, Crits-Christoph, & Dierberger, 2000; Vuoristo-Myllys, 2014). To date, Dowling and Cosic (2011) have examined the relationship between therapist qualities, including years of counselling experience, years of problem gambling experience, therapist age and therapist gender. This study noted that the therapist's years of problem gambling counselling experience was associated with positive treatment outcomes. Taken together, these findings suggest the importance of examining the role of the therapeutic relationship, as rated by the client and therapist, and other therapist qualities, in influencing treatment outcomes.

While the gambling field is not yet enough advanced to differentiate between pre-treatment, during treatment and post-treatment predictors of treatment outcomes, there have been interesting findings in the substance abuse literature. A review on the predictors of substance abuse treatment outcomes with long-term follow-ups found that pre-treatment characteristics were not the best predictors of treatment outcomes (McKay & Weiss, 2001). During treatment and post-treatment variables were better predictors of longer-term outcomes (e.g. better coping responses after treatment and self-help involvement during and after treatment). These findings have implications for future research, whereby studies need to examine, not only pre-treatment predictors of long-term treatment outcomes, but also during- and post-treatment predictors. While not directly examined in this review, there are several studies that examine the influence of post-treatment client characteristics on follow-up treatment outcomes (Dowling, 2009; Petry & Weiss, 2009; Sander & Peters, 2009). Each of these studies found promising results consistent with the substance abuse literature, with post-treatment gambling frequency (Dowling, 2009), post-treatment social support (Petry & Weiss, 2009) and post-treatment psychological distress and quality of life (Sander & Peters, 2009) significantly associated with treatment outcomes at follow-up evaluations.

This review also highlighted that the majority of treatment outcomes examined in the included studies were based on measures of statistical significance. It has been argued, however, that this method alone is insufficient in evaluating treatment efficacy as it fails to take in to consideration the clinical significance of any effect (i.e., meaningful changes in the client's life; Jacobson & Traux, 1991). Furthermore, research examining predictors of clinically significant change in other areas, such as anxiety disorders, has shown that using clinically significant change as indicator of successful outcome may actually lead to more consistent findings (Kyrios, Hordern, & Fassnacht, 2015). Therefore, future research

should also explore predictors of gambling-related treatment outcomes based on measures of clinically significant change.

Additionally, the conclusions of this review were restricted by the methodological limitations of the current evidence base, which precluded the use of meta-analytic techniques. While a box-score approach was utilised to synthesise the results, this method is limited by the lack of consideration given to the magnitude of the effect (Green & Hall, 1984; Knopp et al., 2013). Additionally, a box-score approach does not facilitate more nuanced analyses, such as subgroup analyses, which can explore the degree to which methodological differences in the studies influence the results (e.g. differences in treatment type or length of treatment). One of the most notable limitations of the evidence base was the variability in defining and measuring treatment outcomes, even within the Banff consensus-reporting framework. The identified studies used a range of measures, including standardised self-report measures and structured interviews, and non-standardised measures that were replicable (e.g. self-report measures of controlled gambling). Moreover, this review was limited by the lack of consistent reporting in the current evidence base. As exemplified by the quality assessment of the included studies, several studies provided limited information on the predictor variables, the type of analysis conducted, how missing data was handled, whether the appropriate outcome distribution checks were conducted and the reporting of quantitative results for non-significant findings. In order to advance this immature research field and allow for meta-analytic techniques to be used in the future, research needs to take the following issues into consideration. Firstly, future research should employ prospective study designs, with a priori hypotheses relating to the outcome-predictor relationship, appropriate statistical analyses and adequate reporting of results. Secondly, a more consistent approach to defining and measuring treatment outcomes is required. While the Banff consensus provides such a framework (Walker et al., 2005), this review demonstrated that, since its release in 2005, it has not been well implemented by treatment outcome studies. As such, an update of the minimal reporting requirements in gambling treatment research is required, possibly with the use of a Delphi study, as well as research to determine ways to increase the implementation of such a framework.

3.9. Concluding statement

Overall, there is a growing interest in understanding the relationship between client and treatment characteristics and treatment outcomes in the gambling field. Based on the current available evidence, however, limited conclusions can be drawn. The results suggest that being male and lower levels of depression are the most consistent predictors of successful treatment outcomes, with significant findings identified across multiple evaluation periods. Other likely predictors of treatment success (at post-treatment and medium-term) include older age, having a significant other, less severe pre-treatment gambling severity, lower levels of gambling behaviours, less alcohol use and greater number of sessions attended. Furthermore, potential predictors of treatment success, with significant findings identified at a single time-point only include employment status, ethnicity, no gambling debt, personality traits (i.e, neuroticism and impulsive sensation seeking), being in the action stage of change and a higher number of treatment sessions attended. In contrast, mixed results were identified for treatment goal. Moreover, education, income, preferred gambling activity, problem gambling duration, anxiety, any psychiatric comorbidity, psychological distress, substance use, prior gambling treatment and medication use were not significantly associated with treatment outcomes at any time-point. Importantly, this review highlights the need for further research that employs consistent reporting frameworks and the examination of client, treatment and therapist predictor variables across long follow-up periods. The findings of this review have important implications for gambling treatment providers and researchers alike as new treatments are developed or personalised to meet individual needs. This is particularly relevant where characteristics are malleable and amenable to change.

Appendix A. Search strategy

Ovid PsycInfo and Ovid Medline

1. exp Pathological Gambling/or exp Gambling/
2. (psychological or intervention or therap$ or treatment).mp.
3. (predict$ or influen$ or associate$ or respon$ or relat$ or relationship).mp.
4. outcome.mp. or exp Treatment Outcomes/
5. #1 AND #2 AND #3 AND #4
6. Limit #5 to (human and yr = "1990-Current")

EMBASE

1. gambling NEAR/10 (problem OR pathological OR disordered)
2. outcome OR 'treatment outcome'/exp
3. psychological OR intervention OR therap* OR treatment
4. predict* OR influen* OR associate* OR respon* OR relat* OR relationship
5. #1 AND #2 AND #3 AND #4
6. #5 AND [humans]/lim AND [1990-2015]/py

CENTRAL

1. (gambling or gamble* or betting or wagering).mp.
2. psychological or intervention or therap* or treatment).mp.
3. #1 AND #2
4. Limit #3 to yr = "1990 -Current" and english language

CINAHL

1. gambl* N10 (problem OR pathological OR disordered)
2. outcome* OR 'treatment outcome*'
3. psychological OR intervention OR therap* OR treatment
4. predict* OR influen* OR associate* OR respon* OR relat* OR relationship
5. #1 AND #2 AND #3 AND #4
6. #5 AND lim to 1990-2016, AND lim to English

Appendix B. PRISMA flow diagram
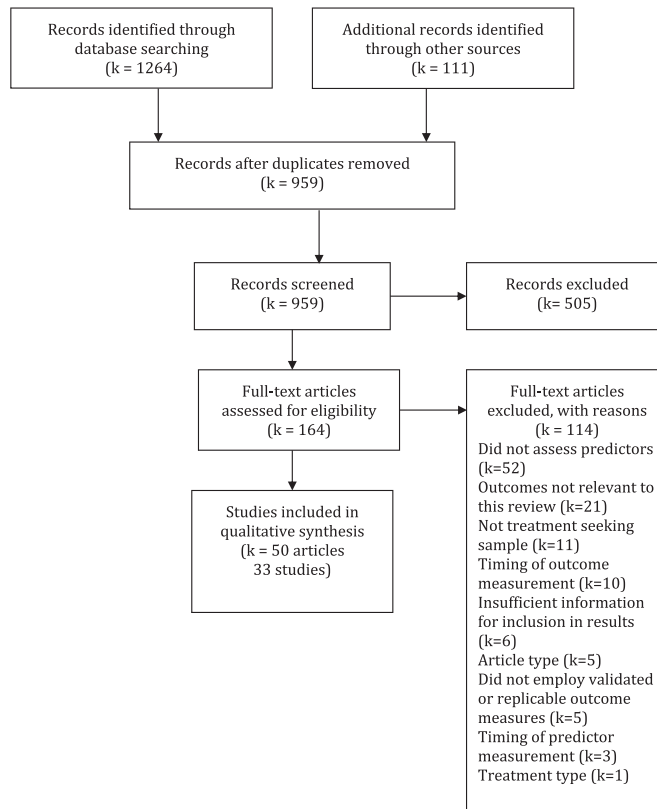
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