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ORIGINAL ARTICLE

# Dropout or Early Treatment Response Among Gamblers with Depressive Symptoms

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## Abstract

Many individuals who start psychotherapy for gambling disorder leave treatment within the first five sessions. Researchers have viewed early dropouts as treatment failures, but some may be early responders. This study examined dropout and early treatment response among those with probable depression in the first six therapy sessions of a gambling problem treatment program. The percentage of individuals who dropped out of treatment was 37%. Dropout was highest after the intake session and decreased at each subsequent session. We identified a group of early treatment responders who showed reduced depressive symptoms and improvement on gambling-related variables. This group made up about 12% of the total sample and about half of those traditionally viewed as in-treatment dropouts. Demographic and gambling history/behavior variables were not associated with early treatment response. Baseline depression severity, number of sessions attended, change scores for gambling's interference with normal activities, and overall life satisfaction, as well as meeting one's intake gambling-related treatment goal, were associated with early treatment response. Study findings suggest that some may be early treatment responders, even those who leave psychotherapy after the first few sessions.

**Keywords** Gambling disorder · Depressive symptoms · Early treatment response · Predictors of change · Reliable change index

Talk-based psychotherapy for gambling disorder (GD) is characterized by a high rate of dropout. Recent publications, which include both a literature review and empirical studies, have concluded that dropout rates are anywhere between 14 and 58% (Alvarez-Moya et al., 2011; Aragay, et al., 2015; Jimenez-Murcia, et al., 2007; McCallum et al., 2007; Melville et al., 2007; Pelletier et al., 2008). The bulk of those who leave psychotherapy for GD do so by week five of treatment (Jimenez-Murcia et al., 2007; Pfund et al., 2018).

Existing research into the phenomenon of dropout from psychotherapy for GD has examined predictors including demographic variables (e.g., age, marital status, gender, race), impulsivity, urges to gamble, gambling-related cognitions, gambling problem

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severity, cluster B personality disorders, and substance use. For those studies that examined demographic factors, most found no relationship between demographics and dropout (Alvarez-Moya et al., 2011; Leblond et al., 2010; Smith et al., 2010); however, in at least one study, single marital status and age at intake were associated with dropout (Aragay et al., 2015). Impulsivity has been shown to be related to dropout in at least three studies (Aragay et al., 2015; Mallorqui-Bague et al., 2018; McCallum et al., 2007). In one study, impulsivity was unrelated to treatment dropout (Jimenez-Murcia et al., 2007). Pelletier and colleagues found that the presence of cluster B personality disorders predicted dropout from psychotherapy among those meeting criteria for pathological gambling (Pelletier et al., 2008). Some research findings indicate no relationship between alcohol use and dropout (McCallum et al., 2007) or substance use and dropout (Aragay et al., 2015). Those dropping out had higher levels of gambling-related cognitions and urges in one study (Smith et al., 2010). In addition to the findings described above, results from at least one study found no relationship between hypothesized predictors and dropout in an entirely female sample (Dowling, 2009). Given the wide range of conclusions drawn from recent publications, it is clear that research concerning GD psychotherapy dropout has yielded few replicated findings.

Two factors contributing to discrepancies in research results are inconsistent definitions of dropout and inconsistent timeframes employed across different studies. Melville et al. (2007) describe two different, routinely employed definitions of dropout: either (a) attending fewer than a specific and arbitrary number of sessions (e.g., attending five or fewer sessions) or (b) the therapist's judgment of inappropriate termination (e.g., the patient unilaterally terminates without consultation). Melville et al. (2007) also note variation in timeframes employed across studies. Some studies only report on in-treatment dropout (Echeburua et al., 2001; Ladouceur et al., 2003; Leblond et al., 2010; Milton et al., 2002; Wulfert et al., 2006), while others report pre- and in-treatment dropout (Ladouceur et al., 2001; Sylvan et al., 1997), and even combinations of pre-, in-, and follow-up dropout (Echeburua et al., 1996; Hodgins et al., 2001; Petry et al., 2006; Robson et al., 2002). This is concerning as a recent study found that pre-treatment and in-treatment dropout were associated with higher levels of depression relative to treatment completers in bivariate analyses (Ronzitti et al., 2017). These findings support conceptualizing and studying pre-treatment, in-treatment, and follow-up dropout separately. Inconsistent study methodologies reveal the importance of standardizing both a definition of dropout and timeframes in current and future studies.

In general, most studies of psychotherapy dropout assume that individuals who leave are treatment failures; however, recent research concerning GD and depression comorbidity suggests that this assumption may not be accurate. Multiple researchers have found that individuals with GD commonly report comorbid depression (Kim et al., 2006; Lorains et al., 2011). Pfund et al. (2018), recognizing the importance of depression in treatment retention, incorporated it into their study of treatment dropout and outcomes. These authors used a novel definition of dropout that incorporated psychiatric distress as assessed using the Beck Depression Inventory–II (Beck et al., 1996). Individuals who achieved a clinically significant reduction in depressive symptoms prior to dropout were "successful completers," while those who did not were "true dropouts." Pfund et al. (2018) identified a notable number of individuals that were successful completers; however, the conclusions of their study are limited. Whereas they were able to identify GD treatment dropouts with significant reductions in depressive symptoms, they were unable to evaluate whether these reductions were associated with changes in gambling-related variables.

In summary, the existing literature is muddled by inconsistent methodology making general conclusions from it difficult. There is a need to determine both the rate and reasons behind GD psychotherapy dropout for specific types of dropout (i.e., pre-treatment, in-treatment, and follow-up). Additionally, these studies view the dropout population as a homogeneous group of treatment failures. Recent empirical research supports that some dropouts are actually early responders; however, more work is needed to determine the size of this group relative to the dropout population, if there is any way to identify them at the beginning of treatment, and if these responses are meaningful and permanent.

The goals of the present study were to: (a) determine the rate of GD psychotherapy in-treatment dropout using a logical, non-arbitrary definition and specific timeframe; (b) determine whether a group of patients were early responders who achieved reliable reduction in depressive symptoms and reductions for gambling-problem-related variables by the time they left treatment; and (c) identify variables associated with early response to psychotherapy for GD. Findings from this work may help to nuance the conceptualization of GD psychotherapy dropout, support the concept of early responders to GD psychotherapy, and identify factors associated with early treatment response.

## Methods

### Participants and Procedures

Our sample came from the outpatient arm of a large, state-funded GD psychotherapy treatment program. Eligibility for outpatient services required: (a) being age 18 years or older; (b) being a resident of state of California; and (c) endorsing at least one of ten possible criteria on a modified screener for gambling disorder. Because it was possible for individuals to have had more than one admission during the timeframe of the study, we used an algorithm to select only first admissions for inclusion. We identified 689 gamblers admitted to outpatient GD treatment between July 1, 2015, and April 1, 2017, who had met criteria at intake for probable depression as assessed by a screening instrument (i.e., a score of ten or higher on the Patient Health Questionnaire–9; Kroenke & Spitzer, 2002). The cutoff of ten or higher was based on previous validation work (Beard et al., 2016; Kroenke & Spitzer, 2002) that recommends this cutoff for detecting probable major depressive episodes. Whereas the initial total number for the study was 689 individuals, 84 (12.2%) were excluded from our analyses of predictors of early response because they left immediately after intake, resulting in a total number of 605 individuals who attended the intake and at least one additional session (Fig. 1). For the logistic regression analysis, we excluded cases using a list-wise approach. Eleven (1.8%) individuals were missing at least one variable; thus, our total sample for the main analysis was 594 individuals.

Licensed mental health professionals provided GD-focused psychotherapy services to all patients. The program was funded by the state, so those receiving services incurred no costs for treatment. All treatment providers held at least a master's degree, and all received 40 h of GD-specific training prior to contracting with the state to deliver outpatient services. Although the training included treatment strategies that were primarily cognitive-behavioral in nature, there was no program requirement regarding treatment approach. Nor was there a set schedule for session frequency. A survey of treatment providers in the program indicated that most reported using cognitive-behavioral methods to treat patients, and based on session dates, the median time between sessions for all patients was 7 days.

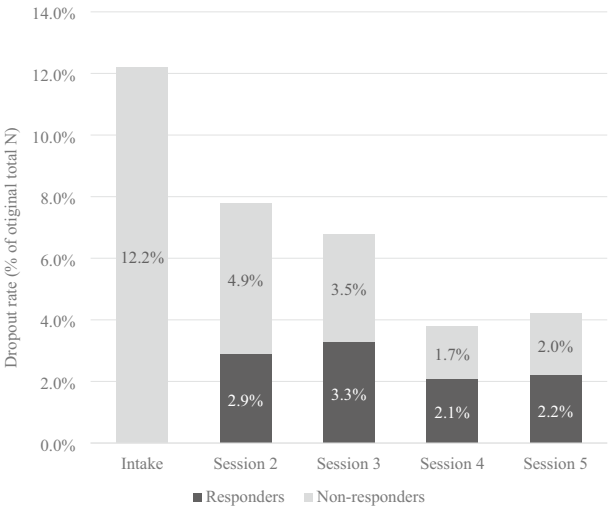



**Fig. 1** Percentage of patients leaving treatment after each of the first five treatment sessions

As part of routine practices in the state program, providers assessed patients using standard questionnaires at intake, at each subsequent treatment session, and at end of treatment. Providers entered data from each patient into an Internet-based, real-time data management system. At treatment intake, all participants provided consent for their data to be gathered and stored in the state-data-management system, with the understanding that the information would be used for program research and quality assurance purposes. The work reported herein was part of activities approved by our institutional review board.

## Measures

Study variables were created using information obtained from patients using the intake and in-treatment forms. The intake form includes questions about demographics, gambling behavior, urges to gamble, problem severity and consequences (e.g., debt, legal problems), co-occurring issues (e.g., physical and mental health, substance use), prior self-help or professional treatment experience, depression (PHQ-9), and gambling-related therapy goals (e.g., cutting down on time or money spent, or abstinence from gambling). The in-treatment form includes questions about gambling behavior, self-help utilization, quality of life, depression (PHQ-9), and urges to gamble. The key data domains used in this study were demographics, gambling severity, gambling history, depressive symptoms, number of GD treatment visits, and gambling-related outcomes (i.e., urges to gamble, gambling-related interference with normal activities, and gambling behavior).

The variables measuring gambling-related outcomes were visual analog scales designed to track outcomes in the state treatment program; however, their psychometric properties have not been documented. They were constructed with brevity and ease of use for treating clinicians in mind.

## Variables

Demographics. Demographic information at intake included age at admission, gender, race/ethnicity, education, marital status, employment, and annual income. Education levels were dichotomized as high school or less versus some college or more, as was employment using full- or part-time employment versus unemployed. Annual income was dichotomized at the median of $32,000 a year.

Gambling history variables. These variables included age first gambled, age of first gambling problem, and duration of gambling problems. We computed duration of gambling problems (in years) by subtracting age of first gambling problem from age at admission.

Gambling problem severity. The number of DSM-5 criteria endorsed at intake was the indicator for gambling problem severity.

Number of treatment visits. The number of visits attended was created by counting session dates. The total number of visits ranged anywhere from one to six for the study sample and began with the intake session. In determining timeframe in which to examine dropout, we decided on looking at dropout and early response over the first six sessions of treatment. Not only does our first "block" of treatment end at session six, it is also known that nearly all dropout happens in the earliest stages of treatment (Jimenez-Murcia et al., 2007; Pfund et al., 2018), ensuring that we analyzed the most dropouts in the least amount of time.

Depressive symptoms. The Patient Health Questionnaire–9 (PHQ-9; Kroenke & Spitzer, 2002) was used to assess depressive symptoms. Each of the nine items is scored on a four-point scale ranging from 0 (not at all) to 3 (nearly every day). Scores range from 0 to 27, with higher scores indicating greater depression severity. Patients were asked to respond to PHQ-9 items each session based on their experiences in the past week. Examples of the PHQ-9 items include: little interest or pleasure in doing things; feeling tired or having little energy; and having trouble concentrating on things. Literature supporting the reliability and validity of the PHQ-9 as a diagnostic and severity measure has been published previously (Kroenke et al., 2001).

Reliable change index scores for depressive symptoms. We assessed reductions in depressive symptoms from intake to last attended session using a reliable change index (RCI) (Jacobson & Truax, 1991). The formula used to compute the RCI was: $RCI = (x_2 - x_1)/S_{diff}$, where $S\ diff = \sqrt{2(S_E)^2}$ and $S_E = s_1\sqrt{1 - r_{xx}}$. See Table 1 for variable definitions (with relevant values) for this formula. The test–retest reliability ($r_{xx} = 0.84$) for the PHQ-9 was taken from the literature (Spitzer et al., 2014). RCI scores greater than $+/-1.96$ represent clinically significant change. The absolute value of the difference between intake and final session PHQ-9 scores indicating clinically significant change was 4.82 points. Our calculations were consistent with existing literature on the PHQ-9; scores that differ by an absolute value of five points or more represent clinically significant change (Lowe et al., 2004; McMillan et al., 2010). Similar to the methodology of Pfund et al. (2018), if patients' PHQ-9 scores increased more than five points than their baseline during treatment, that new value was used as the reference point to assess reliable reduction in depressive symptoms at last treatment visit.

Urges to gamble. Using a visual analog scale ranging from 0 (no urges) to 100 (strongest urges possible), patients rated the strength of their urges at each session. Change scores were constructed by subtracting the final available session score from the intake score.

Gambling-related interference with normal activities. Using a visual analog scale ranging from 0 (no interference) to 100 (most interference possible), patients rated the degree to which gambling interfered with normal activities at intake and at each treatment visit.

**Table 1** Data used for the reliable change index calculation for depression scores at intake and last treatment contact

| Symbol | Definition | Value |
|---|---|---|
| $x_1$ | Intake PHQ-9 score | - |
| $x_2$ | Last treatment contact PHQ-9 score | - |
| $s_1$ | Standard deviation of PHQ-9 scores at intake (pretreatment) | 4.35 |
| $r_{xx}$ | Test–retest reliability for the PHQ-9 | 0.84 |
| $S_E$ | Standard error of measurement | 1.74 |
| $S_{diff}$ | Standard error of difference between two test scores | 2.46 |

Change scores were constructed by subtracting the final available session score from the intake score.

Overall life satisfaction. Using a visual analog scale ranging from 0 (least satisfied) to 100 (most satisfied), patients rated their overall life satisfaction at intake and at each treatment visit. Change scores were constructed by subtracting the intake score from the final available session score.

Met treatment goal. We created a dichotomous variable to reflect whether patients met their intake treatment goal (either abstinence or reducing gambling). Each session, patients reported the average number of hours gambled in a typical gambling day. Gambling sessions longer than 24 h were recoded as 24 h. This variable, coupled with reported treatment goal, was used to assess whether a patient met their goal. Patients who had set abstinence as their goal and reported no gambling at last visit were coded as a one, as were those who wanted to cut down on gambling and reported fewer hours gambled in a typical gambling day at last visit relative to intake. All others were coded as a zero.

## Data Analyses

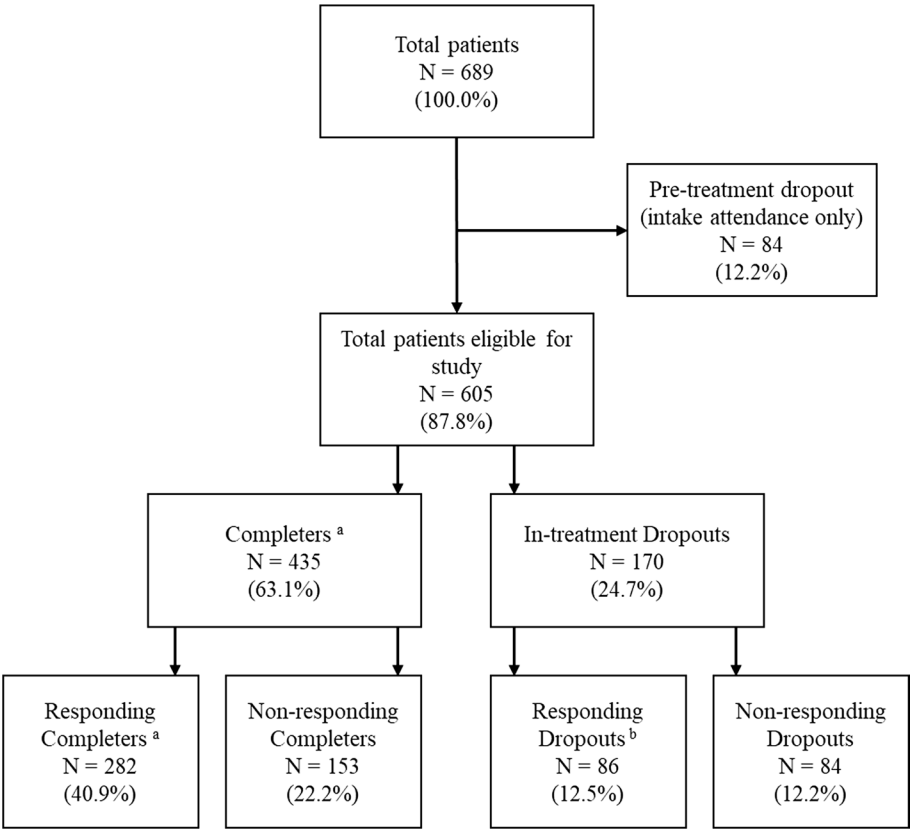
All analyses were conducted using SPSS v.25. We conducted preliminary bivariate analyses to identify any demographic or gambling history variables associated with patients who showed reliable change in depressive symptoms. Age at admission was tested using an independent samples *t* test. We used $X^2$ tests for categorical variables (gender, race/ethnicity, education, marital status, employment, income). We did not adjust the *p*-values for the bivariate analyses. Using a logistic regression that controlled for demographics, we examined the association between achieving a reduction in depressive symptoms at last treatment visit and those variables that were significantly different on bivariate analyses between depression outcome groups. We used contrast coding for two variables: race/ethnicity and intake depression severity. For the former, the reference group was non-Hispanic Caucasian, and for the latter, it was moderate depression. We used 99% confidence intervals when reporting odds ratios for the variables included in the logistic regression.

## Results

### Treatment Dropout and Significant Reduction in Depressive Symptoms

For our sample, 435 (63.1%) completed all six treatment sessions, indicating a 36.9% dropout rate (Fig. 1). Concerning rates of dropout over the course of the treatment, 84 attended only the intake session, 54 attended two, 47 attended three, 33 attended four, and 36 attended five sessions. Figure 2 illustrates the rate of treatment discontinuation after each subsequent session of treatment, differentiating those who exhibited significant changes in depressive symptoms prior to stopping treatment and those who did not. Treatment dropout rates after each subsequent session were 12%, 8%, 7%, 4%, and 4% without considering change in depressive symptoms.

Fifty-three percent of all patients showed a clinically significant reduction in depressive symptoms within the first six sessions of treatment. Of those who attended all six




[a] Where completion is defined as having attended all six treatment sessions

[b] Where response is defined as clinically significant reduction in depressive symptoms by last attended session

**Fig. 2** Study flowchart

sessions, about 65% showed a significant reduction in depressive symptoms. For those patients who left treatment before session six, about 50% achieved significant reductions in depressive symptoms by their last session, 12% of the total treatment population. Whereas the rate of treatment dropout decreased after each subsequent session, the rate of those leaving treatment who showed a significant reduction in depressive symptoms was consistently 2–3%.

**Table 2** Demographic variables and PHQ-9 depression category by change group for all patients with two or more visits

| Variable | No reduction in Depression (N = 237) | Reliable Reduction in Depression (N = 368) | $X^2$ or t-test | *p*-value |
|---|---|---|---|---|
| Mean (SD) age | 45.9 (12.6) | 46.7 (12.9) | -0.74 | 0.459 |
| Gender N (%) | | | 0.29 | 0.588 |
| Male | 152 (64.1) | 228 (62.0) | | |
| Female | 85 (35.9) | 140 (38.0) | | |
| Race/ethnicity N (%) | | | 1.24 | 0.871 |
| Non-Hispanic Caucasian | 108 (46.6) | 164 (45.3) | | |
| African-American | 8 (3.4) | 16 (4.4) | | |
| Hispanic | 31 (13.4) | 57 (15.7) | | |
| Asian/Pacific Islander | 44 (19.0) | 68 (18.8) | | |
| Other/multi-ethnic | 41 (17.7) | 57 (15.7) | | |
| Education N (%) | | | 5.22 | 0.074 |
| High school or less | 54 (23.1) | 99 (27.2) | | |
| Some college | 82 (35.0) | 146 (40.1) | | |
| College degree or more | 98 (41.9) | 119 (32.7) | | |
| Relationship status N (%) | | | 2.10 | 0.351 |
| Married/living as married | 105 (44.9) | 156 (42.9) | | |
| Div./Sep./widowed | 54 (23.1) | 103 (28.3) | | |
| Single, never married | 75 (32.1) | 105 (28.8) | | |
| Any employment N (%) | | | 0.15 | 0.701 |
| Yes | 116 (48.9) | 186 (50.5) | | |
| No | 121 (51.1) | 182 (49.5) | | |
| Annual income (N%) | | | 0.60 | 0.438 |
| $32,000 or Less | 116 (48.9) | 192 (52.2) | | |
| More than $32,000 | 121 (51.1) | 176 (47.8) | | |
| PHQ-9 depression category[a] | | | 21.15 | 0.001 |
| Moderate | 134 (56.5) | 140 (38.0) | | |
| Moderately severe | 68 (28.7) | 135 (36.7) | | |
| Severe | 35 (14.8) | 93 (25.3) | | |

*Ns* may differ due to missing data

[a]Effect size using Cramer's V = 0.187

**Table 3** Means (SD) for gambling- and treatment-related variables by change group

| Variable | No reduction in Depression (N = 237) | Reliable Reduction in Depression (N = 368) | $X^2$ or t-test | *p*-value |
|---|---|---|---|---|
| GD severity | 8.0 (1.3) | 7.9 (1.4) | 0.48 | 0.629 |
| Age first gambled | 21.9 (9.6) | 23.1 (10.9) | − 1.42 | 0.146 |
| Age first problem | 33.7 (12.5) | 34.8 (13.9) | − 0.92 | 0.357 |
| Problem duration | 12.2 (10.9) | 12.1 (10.3) | 0.05 | 0.961 |
| N games played | 3.6 (3.0) | 3.5 (3.4) | 0.32 | 0.746 |
| N (%) types of gambling activities | | | | |
| Slot machines | 135 (57.0) | 209 (56.8) | 0.02 | 0.967 |
| Black Jack | 92 (38.8) | 139 (37.8) | 0.07 | 0.796 |
| Poker | 76 (32.1) | 113 (30.7) | 0.12 | 0.724 |
| Sports betting | 33 (13.9) | 61 (16.6) | 0.77 | 0.379 |
| Horse/dog races | 15 (6.3) | 24 (6.5) | 0.01 | 0.925 |
| Lottery | 61 (25.7) | 91 (24.7) | 0.08 | 0.780 |
| N (%) playing at gambling venues | | | | |
| Casinos[a] | 113 (47.7) | 145 (39.4) | 4.04 | 0.044 |
| Tribal casinos | 177 (74.7) | 261 (70.9) | 1.02 | 0.313 |
| Card rooms | 69 (29.1) | 128 (34.8) | 2.11 | 0.146 |
| Internet | 45 (19.0) | 71 (19.3) | 0.01 | 0.926 |
| Intake | | | | |
| Craving | 66.7 (30.5) | 66.5 (30.7) | 0.10 | 0.919 |
| Interference | 64.7 (32.4) | 67.1 (30.9) | − 0.91 | 0.356 |
| Life satisfaction | 39.6 (22.2) | 38.4 (22.8) | 0.66 | 0.513 |
| Change scores[b] | | | | |
| Craving | 16.3 (34.8) | 32.9 (33.4) | − 5.89 | 0.001 |
| Interference | 15.1 (34.9) | 41.3 (38.8) | − 8.61 | 0.001 |
| Life satisfaction | 4.1 (23.4) | 23.2 (24.4) | − 9.55 | 0.001 |
| Number of sessions[b] | 5.0 (1.6) | 5.4 (1.2) | − 3.89 | 0.001 |
| N (%) met goal[a] | 142 (32.5) | 295 (67.5) | 29.47 | 0.001 |

Unless noted, values reported are M (SD). Ns may differ due to missing data

[a]Effect size using Cramer's V: casinos = 0.082; met goal = 0.221

[b]Effect sizes using Cohen's d: craving = 0.490; interference = 0.701; life satisfaction = 0.795; number of sessions = 0.344

## Preliminary Bivariate Analyses

Results indicated neither demographic (Table 2), gambling behavior, nor gambling history variables (Table 3) were significantly associated with reliable reductions in depressive symptoms (all *p*-values > 0.05). A higher percentage of those who showed reliable reduction in depressive symptoms was categorized as having moderately severe or severe depression at intake ($X^2_{[2]} = 21.15$, $p < 0.01$). The change scores for urges to gamble, gambling's interference with normal activities, and overall life satisfaction were all significantly different between early and non-responders (all *p*-values < 0.01; Table 3). Relative to individuals without a significant reduction in depression, those who showed

significant reduction in depressive symptoms also showed greater improvement on each of the change scores calculated. Those who achieved reliable reduction in depression attended more treatment sessions on average than those who did not (5.4 vs. 5.0, respectively)($t_{[397.1]} = -3.84$, $p < 0.01$). Finally, a larger percentage of those showing reduction in depressive symptoms met their intake treatment goal at last visit ($X^2_{[2]} = 31.02$, $p < 0.01$).

### Variables Associated with Significant Reduction in Depressive Symptoms

Using logistic regression with simultaneous entry that included standard demographic control variables, we examined the association of depression severity category at intake, the change scores (urges to gamble, gambling's interference with normal activities, and overall life satisfaction), number of sessions attended, and meeting intake treatment goal with reliable reduction in depressive symptoms. Because no differences were found on demographic variables between those who chose abstinence as their intake treatment goal and those who chose a controlled gambling goal (analysis not shown; available from the authors), we combined abstinence and controlled gambling outcomes into a single variable.

The omnibus chi-square for the model was significant ($X^2_{[17]} = 169.38$, $p < 0.001$), and model fit was acceptable (Hosmer and Lemeshow $X^2_{[8]} = 10.24$, $p = 0.249$) (Table 4). The model accounted for 34% of the variance in reliable change in depressive symptoms. No demographic variables showed significant associations with outcomes. Intake depression-severity category, interference change score, overall life satisfaction change score, the number of sessions attended, and having met one's intake goal for gambling behavior were all significant predictors of reliable reduction in depressive symptoms. Compared to those with moderate depressive symptoms at intake, those with moderately severe depressive symptoms were over two times as likely, and those with severe depressive symptoms were two and one half times as likely, to show reliable reduction in depressive symptoms. For each one unit increase on the gambling's

**Table 4** Logistic regression for variables associated with reduction in depressive symptoms

| Variable | O.R. | 99% C.I. |
|---|---|---|
| Intake PHQ-9 depression category[a] | | |
| Moderately severe | 2.14 | 1.19 to 3.86 |
| Severe | 2.72 | 1.33 to 5.53 |
| Number of Tx visits | 1.21 | 1.00 to 1.46 |
| Change scores | | |
| Craving | 1.01 | 1.00 to 1.01 |
| Interference | 1.01 | 1.01 to 1.02 |
| Life satisfaction | 1.02 | 1.01 to 1.04 |
| Met intake Tx goal | 2.03 | 1.14 to 3.60 |

A total of 11 (1.8%) cases were excluded due to missing data; the total number of cases analyzed was 594. Non-significant control variables were age, gender, race/ethnicity, marital status, education, employment, and income. Model $X^2_{[17]} = 165.25$, $p < 0.001$. Nagelkerke R square = 0.33, Hosmer and Lemeshow $X^2_{[8]} = 9.27$, p = 0.32

[a]The reference group for intake PHQ-9 depression category was moderate depression

interference with normal activities change score, there was a 1% increase in the odds of achieving reliable depressive symptom reduction. For each one unit increase on the life satisfaction change score, there was a 2% increase in the odds of achieving reliable depressive symptom reduction. For each additional session attended, there was a 23% increase in the odds of showing a reduction in depressive symptoms. Additionally, patients achieving their treatment goal were twice as likely to show reduced depressive symptoms.

## Discussion

The current study examined early dropout from, and early response to, GD psychotherapy. We used the methodology from Pfund et al. (2018) to define treatment response: those who showed clinically significant reductions in depressive symptoms prior to treatment departure were classified as early responders. Those who left treatment immediately after intake or without showing significant reductions in depressive symptoms were classified as non-responding dropouts. We extended the findings of Pfund et al. (2018) by examining changes in gambling-related variables between early responders and non-responders. We used a large sample from a "real-world" treatment setting with minimal barriers to treatment entry. Thus, our findings may be more ecologically valid and applicable to non-academic clinic settings. The study focused on the early phase of treatment because previous work showed that most dropout from GD psychotherapy occurs early in treatment (Jimenez-Murcia et al., 2007; Pfund et al., 2018), and because retention in the early phase of treatment is critical for ensuring longer treatment stays.

For our sample, a total of 36.9% left treatment prior to session six. This is consistent with the existing range of reported dropout rates (14% and 58%) (Alvarez-Moya et al., 2011; Aragay et al., 2015; Jimenez-Murcia et al., 2007; McCallum et al., 2007; Melville et al., 2007; Pelletier et al., 2008). As reported previously (Jimenez-Murcia et al., 2007; Pfund et al., 2018), we found that treatment dropout rates were highest early in treatment. When we examined these rates over time, we noticed a steady decline. Dropout rates began as high as 12% after the intake session and fell to as low as 4% by the fourth and fifth sessions. Explanations for high early treatment dropout rates are speculative. Some may change their minds about participation after their initial experience with psychotherapy, others may be ambivalent about participating in psychotherapy to begin with, and some may decide to return to gambling in an effort to recover financial losses when they have access to money. Anecdotally, therapists working in the state-funded program commented that some may be overwhelmed when they face the consequences of their gambling behavior for the first time; they may prefer to leave treatment rather than begin the work to address the consequences of their gambling behavior.

Perhaps the key finding of this study was that 53% of our sample showed reliable reduction in depressive symptoms *and* corresponding improvement on gambling-related assessments within the first six sessions of treatment. Specifically, those who showed reliable reductions in depression also showed reduced urges to gamble, less interference of gambling in normal activities, and were more likely to have achieved their initial treatment goal for gambling. Of these early responders, 23% left treatment prior to session six, which totaled 12% of the entire sample. Whereas the overall percentage of individuals leaving treatment decreased across the course of treatment, early response percentages remained stable at 2 to 3%. Pfund et al. (2018) also identified a group

of GD therapy patients who, before leaving treatment, achieved clinically significant reductions in depression. Our work extends these findings by examining the relationship between reliable reduction in depressive symptoms and gambling outcomes. Our findings are consistent with Pfund et al.'s (2018) assertion that changes in depressive symptoms are related to changes in gambling behavior and go against the notion that early treatment departure is synonymous with treatment failure. Additionally, these findings nuance the discussion of high dropout rates in GD psychotherapy and suggest a potential need to differentiate early responders and non-responders in future studies.

Only intake depression severity, changes in life satisfaction, changes in gambling's interference with normal activities, number of treatment sessions attended, and meeting intake treatment goals with regard to gambling were predictive of achieving an early response. Demographic variables, age of first gambling, age of first gambling problem, gambling problem duration, and gambling problem severity at intake were not predictive of such change. Many dropout studies conclude that there are no variables predictive of dropout. We now add to the existing literature that there are some variables predictive of early response.

The primary limitation of our study was that we did not have follow-up data to assess the durability of changes in depressive symptoms or gambling behavior for those who left treatment early. Most who enter treatment for gambling disorder do so when in crisis. They may face possible divorce, ultimatums from family members, mounting debt, legal problems, or other such immediate external motivators that drive them into therapy. These patients may be "good starters" who show early reductions in gambling and reduced depressive symptoms as their crises resolve. Without longer-term follow-up, we cannot distinguish between those who truly benefited from a short course of therapy and who had a strong start but later returned to gambling. In fact, one study of the longitudinal course of depression in treatment for gambling disorder, albeit in residential treatment, shows that those entering treatment with moderate or high levels of depression show early reductions in depressive symptoms, but a spike in such symptoms as treatment progresses before continued reductions (Moghaddam et al., 2015). This pattern may suggest that taking steps to address gambling disorder provides some sense of hope or optimism and improves mood, but the long-term work of therapy may require recognizing and taking responsibility for the damage they have caused to themselves and others. Such recognition may result in short-term increases in negative mood that are resolved with continued engagement in treatment. For those who do stay in treatment, however, data suggest that individuals with an early, positive response to psychotherapy had better end-of-treatment outcomes and were more likely to show maintenance of treatment gains (Haas et al., 2002).

Other limitations include our reliance on self-report data and the use of single-item, visual analog scales to assess key gambling-related outcome domains. The assessment of depressive symptoms we used, the PHQ-9, has established reliability and validity. There is some support for self-reported gambling behavior in the literature (Hodgins & Makarchuk, 2003) and for the use of visual analog scales to assess psychological constructs as well as gambling-related outcomes. Previous authors have reported good psychometric properties for visual analog scales measuring state anxiety (Abend et al., 2014). Other published research has shown utility for the visual analog scale format in studying gambling-related phenomena. For example, gambling urges as assessed using a visual analog scale were higher after watching a video of a gambling activity among individuals with Parkinson's disease and DSM-IV pathological gambling as compared to those with Parkinson's disease only (Frosini et al., 2010). Additionally, visual analog scales have been used to assess

enjoyment of, excitement from, and involvement in a slot machine game used in an examination of the effects of a D2 antagonist in gamblers (Zack & Poulus, 2007).

A number of future directions are apparent given the current findings. Future work should include long-term follow-up assessment of the durability of any gains made by early responders. Additionally, future studies of early response to GD treatment should employ weekly measures of both gambling behavior and depressive symptoms. Such an approach could provide more information about the relationship between depressive symptoms and gambling behavior than we could provide using just two time points (intake and last treatment visit). Given that dropout is highest just after initiating treatment, researchers should test methods for early patient engagement to increase retention in the early phase of treatment. Because meeting treatment goals was a powerful predictor of reduction in depressive symptoms, there is a need for more systematic research on how to set, track, and provide feedback about these goals. This research should also try to understand the barriers to achieving the goals established early in treatment.

This study provides evidence that some individuals reporting a possible depressive episode at GD treatment entry can experience notable reductions in these symptoms within the first six sessions of treatment. Additionally, these reductions are associated with increases in overall life satisfaction and reductions in gambling interference with normal activities. This is consistent with the concept of early responders in GD psychotherapy treatment. What we could not establish was the durability of such changes after leaving treatment. We found that neither demographic nor most gambling behavior variables were associated with reliable reduction in depression. However, intake depression severity, changes in gambling-related interference with normal activities, changes in overall life satisfaction, number of treatment visits, and meeting intake treatment goals were significant predictors of reliable reduction in depression. As in other studies, we found that dropout was highest in the early stages of treatment. More work is necessary to shed light on variables predictive of retention, related to reliable reduction in depressive symptoms, and associated with those who may benefit from a brief course of therapy versus those requiring a lengthier course of treatment.

## Declarations

**Ethics Approval** Collection of data used in this study was approved by the University of California at Los Angeles Institutional Review Board (UCLA IRB #: 11-000764) under the title "Assessing the Quality and Effectiveness of the California Problem Gambling Treatment System". Data collection was performed in accordance with the ethical standards of the UCLA IRB and with the 1964 Helsinki Declaration and its later amendments.

**Informed Consent** Data for this study came from the California Gambling Education and Treatment Services (CalGETS) program. All CalGETS patients had the option to allow their data to be used for research and quality assurance purposes. Treatment providers obtained voluntary informed consent at CalGETS intake, and the decision to allow use of data had no bearing on service eligibility.

**Conflict of Interest** The authors declare no competing interests.

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