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Does group cognitive behavioral therapy module type moderate depression symptom changes in substance abuse treatment clients?

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Abstract

Little is known about the effect of group therapy treatment modules on symptom change during treatment and on outcomes post-treatment. Secondary analyses of depressive symptoms collected from two group therapy studies conducted in substance use treatment settings were examined ($n = 132$ and $n = 44$). Change in PHQ-9 scores was modeled using longitudinal growth modeling combined with random effects modeling of session effects, with time-in-treatment interacted with module theme to test moderation. In both studies, depressive symptoms significantly decreased during the active treatment phase. Symptom reductions were not significantly moderated by module theme in the larger study. However, the smaller pilot study's results suggest future examination of module effects is warranted, given the data are compatible with differential reductions in reported symptoms being associated with attending People-themed module sessions versus Thoughts-themed sessions.

1. INTRODUCTION

Co-occurring depression is common among substance use treatment clients (Flynn & Brown, 2008; Watkins et al., 2004) and is associated with poorer treatment outcomes (Compton, Thomas, Stinson, & Grant, 2007; Hasin et al., 2002; McGovern, Xie, Segal, Siembab, & Drake, 2006) and higher treatment costs (Dickey & Azeni, 1996; Hoff & Rosenheck, 1998). Providing depression care to alcohol and other drug (AOD) treatment clients with co-occurring disorders (COD) improves outcomes (Grella & Stein, 2006). To improve access to mental health care, interventions to address depressive symptoms among the AOD treatment population have received increasing attention. Many of these efforts have adapted individual-based behavioral interventions for delivery in the group setting, given the widespread use of group therapy in AOD treatment programs (Substance Abuse and Mental Health Services Administration, 2010) and its practical advantages including cost considerations (Bright, Baker, & Neimeyer, 1999; Jacobs & Goodman, 1989; Monti, 2002). Examples include an adaptation of Project MATCH's Cognitive-Behavioral Coping Skills to the group setting and incorporating depression treatment into it (Brown et al.,

2006); developing a manualized group CBT (GCBT) intervention to address depressive symptoms for substance use treatment counselors to deliver (Watkins et al., 2011); and adapting a manualized GCBT intervention to integrate AOD and depression treatment in an outpatient setting (IGCBT) that can also be delivered by paraprofessionals (Hunter et al., 2012).

While group therapy is practical for AOD treatment settings, assessing how features of the group therapy experience are related to client outcomes is an ongoing area of research. One key example is the content of the material delivered in group therapy. The aforementioned examples of group therapy interventions targeting COD clients were delivered in modules, or thematically similar sets of sessions. A modularized format has the practical benefits of ease of delivery and increasing the number of entry points by allowing clients to enroll on an open- or semi-open basis. Lengthy waits could also be undesirable in populations with AOD disorders, as clients are oftentimes mandated to attend treatment within a specific timeframe. While modular treatments maximize the number of clients who benefit from treatment, their use raises questions about whether certain modules are associated with greater improvements in client outcomes (Drapkin, Tate, McQuaid, & Brown, 2008). For example, there is evidence to suggest that the behavioral activation component of CBT may be the most effective aspect and other components are less needed to derive changes (Daughters, Magidson, Schuster, & Safren, 2010; Ekers, Richards, & Gilbody, 2008).

Few studies have examined the impact of modularized treatment in AOD treatment settings. As behavioral treatment protocols become more standardized and modular in format, understanding the effect of particular treatment modules becomes paramount. In exception, Witkiewitz and colleagues (Witkiewitz, Bowen, & Donovan, 2011; Witkiewitz, Donovan, & Hartzler, 2012) examined how exposure to different treatment modules, based on therapists' evaluation of client needs, was associated with changes in negative mood (Witkiewitz et al., 2011) or self-efficacy (Witkiewitz et al., 2012) and drinking among alcohol dependent patients receiving individualized behavioral treatment as part of the multisite randomized COMBINE study (Combine Study Research Group, 2003). In these studies, exposure to a particular treatment module was associated with changes in the relationships between negative mood (for the 'Coping with Craving and Urges' module) or self-efficacy (for the 'Drinking Refusal Skills' module) and drinking during and following treatment. More specifically, Witkiewitz et al. (2011) study demonstrated that exposure to the 'Coping with Craving and Urges' module which incorporated cognitive behavioral strategies for addressing alcohol craving and urges, was related to reductions in the association between negative mood (as measured by the Profile of Mood Status (McNair, Lorr, & Droppleman, 1992) and drinking reported both during treatment and 1-year following treatment. In other words, exposure to the Coping module was associated with a weaker relationship between negative mood states and drinking. In Witkiewitz et al. (2012), the investigators' found that exposure to the 'Drinking Refusal Skills' module was related to improvements in self-efficacy post-treatment and reductions in drinking both during and following treatment. The study also demonstrated that self-efficacy partially mediated the impact of the module on drinking. Moreover, these studies found a dose-response effect, such that individuals who received the module more times had a stronger response to it. These studies, although conducted within an individualized behavioral treatment format where exposure was not

randomized, suggest the relevance of examining behavioral treatment module exposure on symptom reporting and outcomes in AOD treatment settings.

A previous study using data from an integrated group cognitive behavioral therapy examined the effect of initial treatment focus (i.e., the module theme upon client entry into the therapy group) on depressive symptoms post-treatment, and significant differences with respect to initial treatment focus were not found (Drapkin et al., 2008). However, the relationship between depressive symptoms and module theme during the active treatment phase has yet to be examined. Data collected during the active treatment phase would allow for an analysis of whether there is a relationship between not just initial module but rather module theme more generally and depressive symptoms. When feasible, enrolling clients into the group when a relatively more effective module theme is offered might be preferable to maximize the benefit to the client, particularly if there is a risk of the client leaving treatment early. Also unknown is whether the change in client symptoms is moderated by module theme, which has implications for the ordering of modules – e.g., module themes associated with greater change for clients who have participated for longer periods of time in the intervention would be more beneficially delivered toward the end of a client's tenure in group therapy.

Also previously unexamined in the analyses of group treatment module effects is whether the results are sensitive to modeling the correlation (i.e., clustering) of client symptom scores due to clients' common attendance of the same open-enrollment therapy group. Since ignoring such clustering generates a risk of under-estimating the standard errors and may lead to falsely statistically significant claims, we use a statistical approach that takes into account clustering (Paddock, Hunter, Watkins, & McCaffrey, 2011; Paddock & Savitsky, 2013). In the reported results, we note whether differences emerge due to clustering.

In this paper, we examine module theme in relationship to depressive symptoms reported during and post-treatment among clients receiving concurrent substance abuse treatment in either a residential or outpatient setting. Given the previous literature regarding the effectiveness of the behavioral activation component of CBT, we hypothesized that the treatment modules that emphasized behavioral change (i.e., the "Activities" and "People" modules over the "Thoughts" module) would be more effective in reducing depressive symptoms during the active treatment phase. To put our findings into context given Drapkin et al.'s (2008) analyses of module theme's effect on depressive symptoms, we also examine the relationship between initial treatment focus and post-treatment depressive symptoms. Given Drapkin et al.'s (2008) findings, we hypothesized that the first module that participants were exposed to during their treatment would not be associated with post-treatment depressive symptom reporting.

2. MATERIALS AND METHODS

2.1 Settings

The settings for the two studies were publicly-funded AOD use treatment programs located in Los Angeles County, with one study of GCBT for depression conducted in four residential treatment settings (GCBT) and the other of integrated GCBT for depression and

substance use disorders in a single outpatient setting (IGCBT). In both studies, the group intervention was delivered alongside treatment as usual. All programs were part of a large AOD use treatment organization that included outpatient, residential and detoxification services at different locations across the county. Both studies included clients with depressive symptoms who were asked to assess their depressive symptoms regularly during the active treatment phase.

2.2 Study Designs

2.2.1 GCBT—The GCBT study was a hybrid efficacy/effectiveness (Stage 2/3) trial (Carroll & Rounsaville, 2003) to examine whether cognitive behavioral therapy for depression presented as a group treatment by AOD treatment counselors would reduce depressive symptoms (Watkins et al., 2011). One hundred and thirty-two study participants attended at least one GCBT session. GCBT consists of 16 two-hour sessions delivered twice weekly over the span of eight weeks, with sessions divided into four-session modules, each of which is focused on one of four themes: Thoughts, Activities, People and Substance Abuse. For example, the Thoughts module consisted of lessons that helped participants identify harmful thoughts and feelings, understand the link between their thoughts and feelings, and find replacements for harmful thoughts and feelings. The Activities module included information about how pleasant activities can help one's mood, how participants' can identify pleasant activities, and how to overcome obstacles to participating in activities. In this module, participants were asked to try to engage in pleasant activities as their 'homework' between sessions and report on them during the group sessions. The People module focused on interpersonal relationships and covered information about forming healthy relationships, assertive communication skills, and practicing newly acquired skills to improve relationships and mood. The Substance Abuse module was a summary of previous modules that incorporated its relation to substance use. It consisted of four lessons about the relationship between substance use and mood, how harmful thoughts could lead to both depression and substance use, how activities can support or hinder recovery, and how interactions with people can help or harm recovery. The intervention material was adapted from Lewinsohn, Muñoz, Youngren, and Zeiss (1986) and Muñoz, Ippen, Rao, Le, and Dywer (2000). The adaptation sought to improve the intervention's appropriateness for clients in residential AOD treatment and to increase the likelihood that AOD treatment counselors could successfully implement the intervention. Enrollment into the group was semi-open, as new clients could enter the group at the beginning of each of the four modules (i.e., every two weeks).

2.2.2 IGCBT—The IGCBT study was a Stage 1a/b study to develop and test an integrated GCBT for treating co-occurring depression and substance use disorders (Hunter et al., 2012) in outpatient AOD treatment settings. Forty-four study participants attended at least one IGCBT session. IGCBT consists of 18 two-hour sessions delivered twice weekly over nine weeks that are divided into six-session modules, where each module focused on one of three themes: Thoughts, Activities, and People (Hepner, Miranda, et al., 2011a; Hepner, Miranda, et al., 2011b; Hepner, Muñoz, et al., 2011a; Hepner, Muñoz, et al., 2011b). The three treatment modules contained similar content as that described in GCBT; however, the relationship between substance use and each module theme (i.e., Thoughts, Activities,

People) was incorporated within each of the three modules rather than discussed as a separate module as in GCBT. Similar to GCBT, enrollment into the group was semi-open, as new clients could enter the group at the beginning of each module (i.e., every three weeks). While the GCBT intervention delivered information about substance abuse in a distinct module, IGCBT was a more integrated approach incorporating AOD-relevant material throughout all three modules.

2.3 Participants and recruitment

The study protocols for both GCBT and IGCBT were approved by the research organization's Institutional Review Board, and both studies received NIH Certificates of Confidentiality to protect the privacy of study participants.

2.3.1 GCBT—Study recruitment began in August 2006 and ended in January 2009. During that period a total of 1,262 clients were screened for eligibility and 299 clients with persistent depressive symptoms were enrolled two to four weeks after admission to residential treatment. We defined persistent symptoms as symptoms that were measured on two separate occasions after at least two weeks of sobriety. Clients were first screened by residential staff using the Patient Health Questionnaire (PHQ-8) (Spitzer, Kroenke, & Williams, 1999) 14 days after entering treatment. Fifty-nine percent of the clients screened at two weeks scored five or greater on the PHQ-8, corresponding to at least mild depression symptoms. The research team conducted a second screening to determine eligibility. Inclusion criteria at the second stage were 1) Beck Depression Inventory-II (BDI-II) scores >17, indicative of moderate to severe depressive symptoms (Beck, Steer, & Brown, 1996; Buckley, Parker, & Heggie, 2001) the ability to speak and understand English, and 3) receiving residential AOD treatment. Exclusion criteria included a positive screen for a self-reported bipolar disorder (Sloan, Kivlahan, & Saxon, 2000) schizophrenia (one item from the Healthcare for Communities Psychoticism screener (Wells, Sturm, Sherbourne, & Meredith, 1996) and cognitive impairment (Dennis, White, Titus, & Unsicker, 2006). Clients who were taking antidepressant medication were enrolled so long as they were experiencing symptoms. We did not enroll clients on federal probation or parole, as we were unable to obtain permission from the Federal Parole Board.

Assignment of clients to GCBT occurred under a non-randomized, quasi-experimental design. Cohorts of clients at each of the four participating residential study sites received either residential treatment as usual or residential treatment enhanced with the GCBT intervention. Clients were assigned to receive GCBT using an alternating assignment process. During the first four-month period, all eligible clients from the largest site were assigned to receive GCBT, while all eligible clients from the other three smaller sites were assigned to the comparison condition. After four months this assignment pattern alternated and all clients from the three smaller sites were assigned to the experimental condition, while clients from the largest site were assigned to the comparison condition. This alternating pattern continued over a two-and-a-half-year enrollment period. In the last year of the study for logistical reasons the delivery of the intervention was centralized to a single site. In total, four distinct open-enrollment groups (OEGs) resulted. OEGs were considered distinct if they were attended by unique sets of clients. One hundred and fifty-nine of the

299 clients enrolled in the study were assigned to treatment as usual and 140 to GCBT, the latter of whom are the focus of the GCBT analyses presented here.

2.3.2 IGCBT—Between August 2007 and January 2009, 230 clients were screened for current depressive symptoms using the Beck Depression Inventory-II (BDI-II) (Beck et al., 1996) about two to four weeks after entering outpatient treatment. Study eligibility was based on BDI-II scores greater than 13, indicative of the presence of depressive symptoms. Clients were screened for the presence of a probable alcohol or drug disorder using the AUDIT-C to screen for an alcohol disorder using the criteria of a score > 4 for men and > 3 for women (Dawson, Grant, Stinson, & Zhou, 2005) and the DAST to screen for other substance disorder using the criteria of a score greater than 2 (Cocco & Carey, 1998; Maisto, Carey, Carey, Gordon, & Gleason, 2000; Skinner, 1982). Exclusion criteria included a positive screen for a self-reported bipolar disorder (using four items from (Sloan et al., 2000), schizophrenia (using one item from the Healthcare for Communities (HCC) psychoticism screener, (Wells et al., 1996), or cognitive impairment (as assessed by the Short Blessed Scale Exam, (Dennis et al., 2006). Clients who were taking antidepressant medication were enrolled so long as they were experiencing symptoms.

Next, research staff explained to eligible clients ($n = 104$) that they would be randomly assigned to treatment condition. Clients were informed that depending on assignment, study participation would entail attendance at group sessions offered twice weekly for nine weeks at specific times (i.e., the intervention condition). Seventy-three clients agreed to be randomly assigned and were enrolled in the study. Clients were randomized to receive IGCBT or treatment as usual using a block-randomization design method to maintain at least three clients in the group CBT intervention at any one time. Forty-seven clients were randomly assigned to receive the integrated CBT (IGCBT) and 26 to usual care. Of the 47 assigned to IGCBT, 44 attended at least one IGCBT session.

2.4 Assessments

In both studies, client characteristics data on age, gender, and race/ethnicity were collected at screening. The PHQ-9 (Kroenke & Spitzer, 2002) was completed by GCBT and IGCBT intervention clients at every other session, starting with the first session of each module, as well as at the last scheduled session for each client. The PHQ-9 data from active treatment was a self-administered survey completed at regular time intervals (e.g., every other session and the last scheduled session) and collected by the AOD treatment counselors. Physical and mental health status using the Short Form-12 version 2 (SF-12v2) (Ware, Kosinski, Turner-Bowker, & Gandek, 2002) and the BDI-II were collected from clients at a baseline interview that occurred within two weeks of the first screening. BDI-II scores at 3- and 6-months post-baseline interview were collected at follow-up interviews. The screening and follow-up interview data were collected by trained field interviewing (nonclinical) staff. Data on AOD use outcomes were not collected during the active treatment phase, under the expectation that clients would refrain from AOD use.

2.5 Analytic Approach

Our two main sets of analyses focus on two data sources. For the first set of analyses, we analyze data collected from clients during the active treatment phases of GCBT (n=132; 94% of the 140 clients assigned to GCBT) or IGCBT (n=44; 94% of the 47 clients assigned to IGCBT). About three-fourths of intervention clients in both studies attended at least half of the sessions (73% in GCBT and 77% in IGCBT), with the mean number of sessions attended per client of 11.2 of 16 sessions in GCBT and 12.8 of 18 sessions in IGCBT. A linear longitudinal growth model was fitted to the active treatment phase PHQ-9 score data to estimate the mean rate of change in PHQ-9 scores during the active treatment phase. The time term in the growth model reflected the length of time the client had been attending the therapy group when the corresponding PHQ-9 score was recorded. Client-specific random intercept and slope terms (growth parameters) modeled the correlation due to repeated PHQ-9 measurements within client and allowed for heterogeneity in client PHQ-9 score trajectories among clients. Client-level covariates that were included as adjustment variables were age, gender, race/ethnicity (categorized as White, Black, Hispanic, and Other in GCBT and as White/Non-White in IGCBT), and SF-12v2 physical and mental health status at baseline. Session module theme dummy variables were included as a right-hand side variable for both GCBT and IGCBT analyses, with the 'Thoughts' module type as the reference category. This model was fit to the data to estimate the main effect of module type on depressive symptoms. The strength of the association of module theme with depressive symptoms was tested using a Wald chi-squared (χ^2) test. Another analysis was conducted by augmenting this model with an interaction term for time and module as a right-hand side variable. The test of whether module type moderates depressive symptoms change over time was conducted by using a Wald chi-squared (χ^2) test. Unlike the client-level covariates, session module theme varied over time. This allows us to examine whether the reduction in depressive symptoms over time is altered by the module themes of the sessions attended by participants.

Random therapy group session effects were included in both analytic models to allow for PHQ-9 scores among clients to be correlated given their common participation in OEG therapy sessions. Session random session effects are modeled using conditional autoregression to allow for them to be non-independent, given the overlapping client attendance across sessions (Paddock et al., 2011; Paddock & Savitsky, 2013). Under this model, each session's random effect is conditionally normally distributed with its mean equal to an average of its neighboring session's random effects. We defined a session's neighbors as those sessions that are offered at adjacent time points within the same OEG. Active treatment phase data were collected after every other session, starting with the first session (i.e., odd-numbered sessions) and then collected at a client's final scheduled session. Given that previous analyses of module effects in OEGs did not account for the correlation in client outcomes, we comment on whether our results differ based on whether random therapy group session effects are included in the analytic model.

The second set analyses are of depressive symptoms data collected post-treatment, which will allow for a comparison of our findings to those of previous analyses (Drapkin et al., 2008). Here we focus on examining the relationship between module theme and post-

treatment depressive symptoms for clients participating in GCBT or IGCBT. We regressed 3- and 6-month post-treatment BDI-II depressive symptoms scores on the aforementioned covariates, baseline BDI-II score, and initial treatment focus to understand whether there is a relationship between post-treatment outcomes and initial treatment focus in the GCBT or IGCBT studies. Similarly to the active treatment phase analyses, random session effects were included in the model. Analyses of the post-treatment outcomes data required the additional step of modeling the session random effects using a multiple membership approach to connect each client's post-treatment outcome to his/her attendance of particular OEG sessions (Paddock et al., 2011; Paddock & Savitsky, 2013).

The analyses presented in this paper were conducted using Bayesian hierarchical modeling. The Bayesian approach is well-suited for modeling complex multilevel data and addressing the associated computational challenges, particularly for the analysis of cross-classified (non-nested multilevel) data (Browne, Goldstein, & Rasbash, 2001). Such data arise in the GCBT and IGCBT studies in the form of clustering due to OEG participation and repeated measurement of client depression symptoms scores. Modeling the correlation due to common client OEG participation is challenging due to the anticipated correlation of session effects and to the relatively small numbers of clients per session that is typical in group therapy. The Bayesian CAR model allows one to model each session's random effect by borrowing information from neighboring sessions. This is desirable under the assumption that session for OEG sessions that are closer to one another than others should be more closely related than to others. The Bayesian approach offers flexibility to accommodate additional features of importance that might arise in the analysis of OEG data.

All models were fitted in WinBUGS 1.4.3 software (Lunn, Thomas, Best, & Spiegelhalter, 2000), which is freely available software that implements Bayesian model fitting and includes a CAR modeling capability (Thomas, Best, Lunn, Arnold, & Spiegelhalter, 2004). Prior distributions are specified for all unknown model parameters as described in (Paddock et al., 2011). Markov Chain Monte Carlo (MCMC) computation was then implemented to draw random samples from the posterior distributions of all unknown model parameters. Since the study design allowed for the collection of PHQ-9 scores from every other session, PHQ-9 scores for the remaining sessions were missing by study design and thus assumed to be missing at random under the analysis model (Schafer & Graham, 2002). These missing PHQ-9 scores were multiply imputed as draws from their posterior predictive distributions, as implemented in WinBUGS. All inferences were based upon summarizing these posterior samples to obtain posterior means and standard deviations (SDs) of model coefficients, 95% credible intervals (CIs), and Bayesian analogs of Wald and *z* test statistics and their *p*-values (Weiss, Jia, & Suchard, 2011).

3. RESULTS

Descriptive statistics for the GCBT and IGCBT study samples are provided in Table 1. The composition of the study samples is similar by gender, age, and SF-12 physical health score. The number of sessions attended is greater for IGCBT, but given the different number of sessions in each therapy, the percentage of all possible sessions attended by each client is comparable (69% GCBT, 72% IGCBT). Greater percentages of the GCBT sample are White

and non-Hispanic, and the GCBT sample has lower SF-12 mental health scores and BDI-II scores. These results are consistent with the idea that outpatient settings are likely to treat less severe patients and that we enrolled clients with less severe depressive symptoms in the IGCBT study.

3.1 GCBT Study

3.1.1 Active Treatment—One hundred thirty-two of the 140 GCBT clients attended at least one session and are the focus of the GCBT active treatment data analyses. Table 2 summarizes the results of the GCBT data analysis. PHQ-9 scores decreased on average 0.907 points per week in the main effects analysis shown in Table 2a ($p < 0.0001$). There was no significant variation in PHQ-9 scores by module theme ($\chi^2(3 \text{ df}) = 1.093$, $p = 0.779$). The test of whether changes in PHQ-9 scores are moderated by module type (Table 2b) was also not significant ($\chi^2(3 \text{ df}) = 1.207$, $p = 0.751$).

3.1.2. Post-Treatment—One hundred and thirteen (86%) of the 132 GCBT clients who attended sessions completed the 3- and 6-month post-treatment assessments. No significant relationships were found between GCBT initial treatment focus and BDI-II depressive symptoms at 3- and 6-month follow-ups (Table 3). Analyses that ignore the clustering of clients in OEG groups yield consistent results to those shown in Tables 2–3 and are thus not presented here.

3.2 IGCBT Study

3.2.1 Active Treatment—Table 4 summarizes the results of the IGCBT active treatment phase data analysis. PHQ-9 scores significantly decreased on average 0.526 points per week ($p < 0.0001$). We examine whether average PHQ-9 scores vary by module theme (Table 4a). Reported depression symptoms (Table 4b) do not significantly vary by GCBT module type ($\chi^2(2 \text{ df}) = 2.175$, $p = 0.377$).

We also examine whether the degree of reduction in reported depressive symptoms during the active treatment phase is moderated by module type (Table 4b) – that is, whether the rate of change in depressive symptoms differs for participants who attend sessions of one module type versus another. The overall statistical test of moderation is not significant ($\chi^2(2 \text{ df}) = 4.500$, $p = 0.105$). However, the reduction in PHQ-9 scores is significantly greater for participants who attend People-themed sessions versus Thoughts-themed sessions (estimate = -0.383 , $p = 0.044$). Considering the small sample size of the IGCBT pilot study, we consider whether the IGCBT study data are statistically compatible with a moderation effect (Goodman & Berlin, 1994), given the result shown in Table 4b that depressive symptoms scores may decrease more when participants attend People- versus Activities-themed sessions (estimate = -0.289 , $p = 0.133$). The posterior probability that People-themed sessions are associated with larger decreases in reported depressive symptoms than Activities-themed sessions is 0.067, and the 95% CI for this contrast is $(-0.667, 0.091)$, which is compatible with meaningfully large enough effects that a moderation effect cannot be ruled out by this analysis. Analyses that ignore the clustering of clients in OEG groups yield consistent results to those shown in Table 4 and are thus not presented here.

3.2.2. Post-Treatment—Forty (91%) and 42 (95%) of the 44 GCBT clients completed the 3- and 6-month post-treatment assessments, respectively. No significant relationships were found between the IGCBT initial treatment focus and BDI-II depressive symptoms at 3- and 6-month follow-ups ($p=0.992$ and $p=0.592$, respectively) (Table 5). However, the findings are consistent with initial treatment focus of the Activities module being associated with lower 6-month BDI-II scores than initial treatment focus of the People module (estimate = -9.479 (SD 5.256), $p=0.071$), with the posterior probability of the regression coefficient being greater than 0 of 0.966 (Table 5). In comparison to the previous analyses, the naïve model that ignores clustering in client depressive symptoms scores due to OEG participation yields results that are more statistically compatible with a relationship between initial treatment focus and 6-month depressive symptoms. Initial attendance of the Activities module was significantly associated with lower BDI-II scores at 6-months post-baseline than the Thoughts module (estimate = -10.296 (SE=4.447), $p=.0277$), but the relationship between initial attendance of the Activities versus People modules was similar (estimate = -8.851 (standard error=5.523), $p=.100$), with the Wald chi-squared test of an overall module type effect of $\chi^2(2)=5.580$ ($p=0.061$).

4. DISCUSSION

4.1 Study Findings and Clinical Implications

GCBT and IGCBT are characteristic of group therapy interventions delivered in many AOD treatment settings, given their open enrollment and modularized delivery. The analyses presented herein are the first, to our knowledge, to examine whether treatment module type is associated with changes in depressive symptoms during treatment and replicates past work (Drapkin et al., 2008) that has examined module type and post-treatment outcomes. In the larger GCBT study, we did not find significant relationships between module type and changes in depressive symptoms in the active treatment phase or a relationship between initial treatment focus on changes in post-treatment depressive symptoms. A significant module effect would suggest that some modules should be given greater priority than others but the analysis does not support such a finding.

IGCBT was a Stage 1b pilot study with a smaller sample size, which limits how definitive conclusions drawn from these analyses might be. The IGCBT results are compatible with meaningful differences in depressive symptoms scores between modules, and suggest further study is warranted. Future Stage 2 or 3 studies of IGCBT or adaptations could be designed to confirm whether module type moderates reductions in depressive symptoms and to better understand whether moderation effects are attributable to unique aspects of each module or to other factors, such as the ordering of the module theme delivery. Such findings would have implications for whether certain module themes should be prioritized over other themes for future developments of IGCBT. This also has implications for the open enrollment of clients into group CBT in terms of which module clients should initially enter; if early departure of participants from group therapy is a concern, one might prioritize delivering modules that are associated with larger reductions in depressive symptoms as the initial treatment module. Our findings support future work into confirming whether significantly greater reductions over time in depressive symptoms are associated with

attendance of People versus Activities modules in IGCBT, given the contrast with previous literature about the importance of behavioral activation (Daughters et al., 2010; Ekers et al., 2008).

Like Drapkin et al. (2008), we did not find a significant relationship in either the GCBT or IGCBT post-treatment depressive symptoms scores analyses, though the IGCBT results provide support for future study of this question. Overall, the GCBT and IGCBT results provide conflicting findings. Future studies might explore whether such findings are due to the differing sample sizes of the studies, differences in the residential and outpatient treatment populations, or to differences in the interventions. More specifically, residential treatment populations typically have higher substance use severity than outpatient treatment populations. Moreover, the level of depression symptom reporting used for study eligibility was more severe in the residential GCBT study (i.e., a BDI II score of 18 or greater as compared to a BDI II score of 13 or greater in the IGCBT study). Finally, the GCBT intervention focused specifically on depression and substance use was addressed in a specific module of the GCBT treatment whereas IGCBT incorporated depression and substance use as part of every module. Therefore the differences between the two studies could be related to a number of different factors (i.e., sample size, client substance use and/or mental health severity, or intervention complexity) that we were unable to tease apart in our analyses. We also found that the use of conditional autoregression modeling of random session effects resulted in more conservative results in the analysis of 6-month outcomes following the start of IGCBT. These findings confirm the need for future analyses of module effects should account for the correlations among client outcomes for those attending the same OEG.

Similar to Witkiewitz et al (2011, 2012), we examined module effects on symptom reporting during and following treatment. We found that symptom reporting decreased with increased exposure to the cognitive behavioral treatment similar to this previous work. Unlike these previous studies, the analyses presented herein examined depressive symptom reporting rather than drinking during and post-treatment. Also, the clients in the GCBT and IGCBT studies were only able to attend modules once and the modules were not selected based on client need as in these previous studies. Together the past and present research demonstrates the importance of examining exposure to CBT and the various components of CBT to better understand the aspects that are most effective in reducing symptoms.

4.2. Study Strengths and Limitations

A strength of our study is the examination of module effects in two group CBT studies. The external validity of our findings is strengthened by analyzing all clients who participated in group CBT, versus restricting to those who attended a minimum pre-specified number of sessions. Other analytic strengths include the analysis of both active treatment phase and post-treatment outcomes data and the use of random effects to model the correlation in depressive symptoms among clients attending the same therapy group. Study limitations are that it is a secondary analysis of trials that were not designed to test for module effects and thus results are associational rather than causal. The module ordering is fixed throughout the GCBT and IGCBT studies, and not all possible orders are reflected in the study. For

example, the Thoughts module never directly precedes the People module, and the Activities module never directly precedes the Thoughts module. These limitations are shared by Drapkin et al. (2008) and other studies of modularized group therapies. Future research is required to understand whether module differences are due to the modules themselves, to the order in which modules are delivered, or due to the combinations of modules attended by clients.

4.3 Conclusions

Group cognitive behavioral therapy interventions have been developed to address the gap between treatment need and access to mental health care for the AOD treatment population. The relative effectiveness of modules under this format continues to be an area of investigation, which has implications for the delivery of group CBT and future adaptation and dissemination efforts of group CBT interventions. Our analysis of active treatment phase data provides a new perspective for assessing the relative importance of module themes. Our study findings are mixed with respect to module effects and our findings suggest future directions for research.

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Table 1

Characteristics of the GCBT and IGCBT study samples

GCBT Study			IGCBT Study		
	%	N		%	N
Full Sample	100	132	Full Sample	100	44
Gender (Female)	48.5	64	Gender (Female)	52.3	23
Race/Ethnicity			Race/Ethnicity		
White	37.1	49	White (versus Non-White)	25.0	11
Black	28.8	38			
Hispanic	23.5	31			
Other	10.6	14			
	<i>Mean</i>	<i>SD</i>		<i>Mean</i>	<i>SD</i>
Age (years)	34.9	9.9	Age (years)	36.2	11.3
SF-12 Mental Health	31.9	10.9	SF-12 Mental Health	41.6	14.8
SF-12 Physical Health	49.6	12.4	12 Physical Health	50.2	12.0
Number of Sessions Attended (Target=16)	11.2	5.0	Number of Sessions Attended (Target=18)	13.0	5.2
BDI-II	32.8	8.9	BDI-II	27.5	9.5

Table 2

Results of the longitudinal growth models of depressive symptoms scores during the active treatment phase of GCBT. Regression coefficient estimates with their standard deviations (SDs), test statistics, and p-values are presented in the Table.

	Estimate	SD	z-stat	$\chi^2(3 \text{ df})$	p
(a) Main Effects Model:					
<i>Time (weeks)</i>	-0.907	0.068	-8.697		<0.0001
<i>Module Type (versus Thoughts):</i>				1.093	0.779
Activities	-0.321	0.354	-0.907		0.364
People	-0.354	0.398	-0.889		0.374
Substance Abuse	-0.183	0.380	-0.481		0.630
<i>Other Module Types Contrasts:</i>					
Activities vs. People	0.032	0.381	0.085		0.932
Activities vs. Substance Abuse	-0.138	0.401	-0.355		0.730
People vs. Substance Abuse	-0.171	0.375	-0.456		0.649
(b) Test of Moderation:					
<i>Module Type*Time (versus Thoughts*Time):</i>				1.207	0.751
Activities*Time	0.087	0.149	0.583		0.560
People*Time	0.158	0.176	0.899		0.369
Substance Abuse*Time	0.019	0.157	0.119		0.905
<i>Other Module Types Contrasts:</i>					
(Activities vs. People)*Time	-0.071	0.176	-0.402		0.688
(Activities vs. Substance Abuse)*Time	0.068	0.175	0.389		0.697
(People vs. Substance Abuse)*Time	0.139	0.146	0.949		0.343

Table 3

Regression analysis of the relationship between post-treatment depressive symptoms scores and initial treatment focus at 3- and 6- months post-baseline in the GCBT study. Regression coefficient estimates with their standard deviations (SDs), test statistics, and p-values are presented in the Table.

	3-month BDI-II score					6-month BDI-II score				
	Estimate	SD	z-stat	$\chi^2(3\text{ df})$	p	Estimate	SD	z-stat	$\chi^2(3\text{ df})$	p
Initial										
Treatment Focus (versus Thoughts):				0.945	0.815				3.313	0.346
Activities	1.687	2.988	0.565		0.572	-2.672	2.935	-0.910		0.363
People	2.712	3.001	0.904		0.366	-0.633	2.743	-0.231		0.818
Substance Abuse	2.102	3.500	0.601		0.548	-4.789	3.389	-1.413		0.158
Other Initial Treatment Focus Contrasts:										
Activities vs. People	-1.025	3.412	0.300		0.764	-2.039	3.255	-0.626		0.531
Activities vs. Substance Abuse	-0.415	3.817	0.109		0.913	2.118	3.846	0.551		0.582
People vs. Substance Abuse	0.610	3.693	0.165		0.869	4.156	3.537	1.175		0.240

Results of the longitudinal growth model of depressive symptoms scores during the active treatment phase of IGBT. Regression coefficient estimates with their standard deviations (SDs), test statistics, and p-values are presented in the Table.

Table 4

	Estimate	SD	z-stat	$\chi^2(2\text{ df})$	p
(a) Main Effects Model:					
Time (weeks)	-0.526	0.087	-6.074		<0.0001
<i>Module Type (versus Thoughts):</i>					
People	-0.037	0.503	0.303	2.175	0.337
Activities	-0.651	0.508	-0.311		0.948
<i>Other Module Contrasts:</i>					
People vs. Activities	0.614	0.486	1.264		0.343
(b) Test of Moderation:					
<i>Module Type*Time (versus Thoughts*Time):</i>					
People*Time	-0.383	0.190	-2.018	4.500	0.105
Activities*Time	-0.094	0.199	-0.472		0.044
<i>Other Module Types Contrasts:</i>					
(People vs. Activities)*Time	-0.289	0.192	-1.502		0.637
					0.133

Table 5

Regression analysis of the relationship between post-treatment depressive symptoms scores and initial treatment focus at 3- and 6- months post-baseline in the IGCBT study. Regression coefficient estimates with their standard deviations (SDs), test statistics, and p-values are presented in the Table.

	3-month BDI-II score					6-month BDI-II score				
	Estimate	SD	z-stat	$\chi^2(2 \text{ df})$	p	Estimate	SD	z-stat	$\chi^2(2 \text{ df})$	p
Initial										
Treatment Focus (versus Thoughts):				0.170	0.918				3.705	0.157
Activities	1.735	4.551	0.381		0.703	-6.856	4.558	-1.504		0.133
People	-0.044	4.558	-0.010		0.992	2.622	4.898	0.535		0.592
Other Initial Treatment Focus Contrast:										
Activities vs. People	1.778	5.142	0.346		0.729	-9.479	5.256	-1.803		0.071