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Specificity of Effects of Cognitive Behavior Therapy on Coping, Acceptance, and Distress Tolerance in a Randomized Controlled Trial for Smoking Cessation

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Abstract

Objective: Although there is extensive evidence of the efficacy of cognitive-behavioral therapy (CBT), it is less certain what potential mechanisms of change are specifically affected by CBT interventions. This study was intended to test the specific effects of CBT on compensatory coping skills, acceptance, and distress tolerance or persistence.

Method: Using data from a randomized controlled trial of 8-session group CBT and a time-matched comparison condition for cigarette smokers, we evaluated CBT effects on compensatory coping skills, self-rated acceptance and behavioral markers of persistence and distress tolerance. Because depression proneness had moderated treatment response in the parent clinical trial (Kapson & Haaga, 2010), we tested not only main effects (CBT vs. comparison condition) but also moderated effects (treatment condition X depression proneness).

Results: CBT significantly improved compensatory coping skills only among the *less* depression-prone participants, who were the subset of smokers who did not benefit from CBT in terms of smoking cessation outcomes. There were no specific effects of CBT on acceptance or behavioral persistence.

Conclusions: To the extent that CBT had specific effects on compensatory coping skills, it was for the participants who did not benefit clinically from the intervention. Much more theory-driven research on multiple candidate change mechanisms is needed to clarify how effective and specific treatments have their effects, for either patients in general or subsets of patients as in moderated effects.

Keywords

smoking cessation; cognitive behavior therapy; depression proneness; specificity; compensatory coping; acceptance; distress tolerance

Vulnerability to experiencing depression can be inferred from a history of depressive episodes (Coyne, Pepper, & Flynn, 1999) or from explicit self-ratings of depression proneness (Alloy, Hartlage, Metalsky, & Abramson, 1987). As would be expected, depression-prone cigarette smokers are more likely than their less depression-prone

counterparts to experience depression after quitting smoking (Covey, Glassman, & Stetner, 1997). Experiencing depressive symptoms after quitting, in turn, predicts relapse (Burgess et al., 2002). Based on the premise that smoking serves a self-medication function for depression-prone smokers, researchers have tested the hypothesis that adaptations of cognitive-behavioral depression treatments would be particularly helpful for smoking cessation in this subgroup, with mixed results (Haaga, Hall, & Haas, 2006). A recent clinical trial showed the predicted moderator effect in that cognitive-behavioral therapy (CBT) was more effective than a comparison treatment only for depression-prone smokers (Kapson & Haaga, 2010).

There is little empirical evidence concerning what change mechanisms are specific to CBT for depression-prone smokers, which is a necessary, though not sufficient, step in establishing a variable as a mediator of CBT effects (Kazdin, 2009). Drawing on the depression literature, it is plausible that one key change mechanism is learning cognitive skills for coping with negative thoughts and feelings (Barber & DeRubeis, 1989). In other words, the successfully treated patient is not immune from negative thinking but is able to identify biased negative thinking and entertain alternate perspectives. This compensatory skills hypothesis is consistent with evidence that (a) CBT is equally effective as antidepressant medication in the short term in relieving depressive symptoms but may have a more durable effect (DeRubeis & Crits-Christoph, 1998), and (b) depressed people rated at posttreatment as highly skilled in responding to their own negative automatic thoughts were better able to maintain symptom reductions through 6-month follow-up (Neimeyer & Feixas, 1990).

Barber and DeRubeis (1992) developed a thought-listing task for measuring compensatory coping skills, the Ways of Responding test (WOR; Barber & DeRubeis, 1992). Depressed patients receiving cognitive therapy showed significant improvement on the WOR, and these changes correlated with reduction in depressive symptoms (Barber & DeRubeis, 2001). It is not clear, however, that changes in compensatory skills are specific to CBT (Gibbons et al., 2009), nor whether such changes occur in CBT for smoking cessation. Recovered-depressed smokers scored more poorly on the WOR than did never-depressed smokers (Haaga, Thorndike, Friedman-Wheeler, Pearlman, & Wernicke, 2004). There is as yet no evidence, though, that CBT smoking cessation programs improve compensatory coping skills (Thorndike, Friedman-Wheeler, & Haaga, 2006).

The research reported in this article is a secondary analysis of Kapson and Haaga (2010). We took advantage of a larger sample to provide a more adequate test than in Thorndike et al. (2006) of whether CBT specifically affects WOR responses relative to a comparison group with no cognitive restructuring component. We also broadened the search for specific effects of CBT for depression prone smokers to include acceptance and distress tolerance. An alternate explanation of CBT effects proposes that what is crucial is not reevaluating one's negative automatic thoughts but rather defusing their effect (Hayes, 2004). That is, traditional CBT may achieve most of its therapeutic effect early in treatment (Ilardi & Craighead, 1994) precisely because this early phase emphasizes learning to distance oneself from negative automatic thoughts rather than believe in their validity just because they occur. Therefore, although the focus in standard CBT ultimately is on questioning the validity of

negative or inhibitory thoughts, the initial approach of identifying, observing, and accepting the presence of these thoughts before evaluating them actually has a great deal in common with newer methods such as acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999). Patients using ACT learn to behave in accordance with their values and goals in spite of negative feelings or inhibitory thoughts that might occur. We therefore sought to test Hayes' (2004) conjecture that traditional CBT may increase acceptance of the presence of negative automatic thoughts.

Studies of task persistence and distress tolerance converge in suggesting that acceptance may be highly relevant to smoking cessation. Smokers who persisted longer in working on a difficult mirror-tracing task before treatment were more likely to sustain abstinence for 12 months (Brandon et al., 2003). Similarly, smokers who had never previously sustained a quit attempt beyond 24 hours were not able to hold their breath as long as smokers with at least one past quit attempt of at least 3 months (Brown, Lejuez, Kahler, & Strong, 2002). These results are consistent with the possibility that success in smoking cessation may be a function of tolerating discomfort at least as much as it is a function of minimizing discomfort. In our baseline data (Schloss & Haaga, 2011), self-reported acceptance was uncorrelated with behavioral measures of distress tolerance, so these measures were examined separately.

In summary, we used data from a randomized controlled trial of CBT for cigarette smokers to measure the specificity to CBT of changes in compensatory coping skills, self-rated acceptance, and behavioral markers of persistence and distress tolerance. Because depression proneness had moderated treatment response in the parent clinical trial (Kapson & Haaga, 2010), we tested not only main effects of CBT but also moderated effects (treatment condition X depression proneness).

Method

Participants

Smokers interested in quitting were recruited from the Washington DC area via newspaper and online advertisements, as well as fliers placed on hospital and other community bulletin boards. Prospective participants were enrolled in the study if they smoked at least one cigarette per day for the past 4 weeks, wanted to quit smoking, and were fluent in English, willing to be treated in a group setting, and at least 18 years old. Even light smoking (one to four cigarettes/day) is associated with death from heart disease and all-cause mortality (Bjartveit & Tverdal, 2005), so we did not require a high minimum rate of smoking. Actively suicidal participants were excluded.

One hundred participants (49 male, 51 female) were randomized to a treatment condition. Four other potential participants enrolled in the program but dropped out before randomization and were excluded from analyses. The average age was 42.85 years (standard deviation [*SD*] = 12.80), and education levels were high (mean [*M*] = 15.84 years, *SD* = 2.46). About two thirds of participants were Caucasian (65%), with the remainder being African American (29%), Asian American (2%), or other races (3%). Hispanic ethnicity was reported by 9% of the sample.

Pretreatment daily smoking rates averaged almost a pack a day ($M = 17.76$ cigarettes/day, $SD = 8.34$), and participants reported for the most part long smoking histories ($M = 23.49$ years, $SD = 13.33$). Participants reported a median of three previous quit attempts, with the longest one lasting a median of 90 days.

Measures

Nicotine dependence.—Nicotine dependence was measured with the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). This 6-item self-report has moderate internal consistency and correlates positively with levels of cotinine, a metabolite of nicotine, and with self-reports of “addiction” as a reason to smoke (Pomerleau, Carton, Lutzke, Flessland, & Pomerleau, 1994). Our sample showed on average moderate levels of dependence ($M = 4.66$, $SD = 2.34$).

Depression proneness.—Depression proneness was measured with the Depression Proneness Inventory (DPI; Alloy et al., 1987). The DPI is a 10-item self-report measure of vulnerability to depressive reactions to stress. A sample item is “Would your friends who know you best rate you as a person who easily becomes very depressed, sad, blue, or down in the dumps?” Each item is rated on a 1 to 7 Likert-type scale, yielding a total score of 10–70. The DPI shows high internal consistency and retest reliability (Alloy et al., 1987). DPI scores correlated positively with a history of depression but not anxiety or substance abuse (Alloy et al., 1987).

Those scoring 32 or higher at baseline on the DPI (above sample median) were considered high in depression proneness, while those scoring 31 or lower were labeled low in depression proneness. This categorical measure moderated response to CBT vs. the comparison condition with respect to smoking cessation in the clinical trial on which our study is based (Kapson & Haaga, 2010). Use of a discrete classification rather than a continuous variable for analyses involving the DPI is also consistent with taxometric research suggesting that the DPI validly measures a taxonic construct (Strong, Brown, Kahler, Lloyd-Richardson, & Niaura, 2004). Strong et al. (2004) obtained an estimated base rate of 19% for the depression-prone taxon, which would imply that our characterization of those participants above the DPI sample median as highly depression-prone is overly liberal. However, their sample was less depression-prone than ours. Strong et al. (2004) reported a mean total DPI score of 23.18 ($SD = 8.12$), compared to a mean of 31.71 ($SD = 11.32$) in our study. Our high-DPI subsample (32 and higher) thus were at least one standard deviation above the mean of the Strong et al. (2004) sample. Accordingly, those above the median in our sample should be quite similar to the smokers identified by Strong et al. (2004) as being members of the depression-prone taxon.

Compensatory coping.—Coping skills were indexed by the WOR (Barber & DeRubeis, 1992) test. For each of eight scenarios included in the WOR, the participant is asked to imagine an upsetting event, and in six of the scenarios an accompanying negative automatic thought. The participant rates on 0 to 100 scales how well she or he can imagine the event and the negative thought. Then the participant identifies his or her emotional response and rates its intensity (also on a 0 to 100 scale). Next, the participant writes down additional

thoughts and possible plans for thinking or acting in such a way as to manage the negative situation; this written content forms the basis for the main use of WOR data. Finally, the intensity of the emotional response is rated again.

Participants' open-ended thoughts listed in response to WOR stimuli underwent content analysis by two trained raters, who were masked to treatment condition. The thoughts were unitized and then assigned independently by each rater to one of 25 possible coding categories. Category assignments resulting from this procedure were then recorded as Positive, Negative, or Neutral according to definitions devised by Barber and DeRubeis (1992). These were based on expert cognitive therapists' ratings regarding which thoughts would be dysfunctional (Negative) or functional (Positive) in coping with negative events and automatic thoughts. Neutral thoughts played no further role in the analysis. To correct for differences based on verbosity of participants, we divided Negative and Positive responses by total number of thought units. For instance, a participant whom a rater considered to have made 12 Positive responses, four Negative, and four Neutral would receive from that rater scores of .60 for WOR-Positive and .20 for WOR-Negative. These proportion scores were then averaged across raters.

Both raters also made subjective 1 to 7 Quality judgments concerning each response in its entirety (not individual thought units), with 1 reflecting coping thoughts least likely to improve one's mood and meet the demands of the situation, and 7 meaning most likely to improve mood and manage the situation effectively. For analyses involving this WOR-Quality variable, scores were averaged across the eight scenarios and across the two raters.

In earlier research on the WOR, 3-month retest reliability correlations ranged from .45 (WOR-Negative) to .72 (WOR-Quality), and positive correlations with subjective well-being were obtained concurrently and prospectively, supporting criterion-related validity (Barber & DeRubeis, 1992). Convergent validity was evident in a significant correlation ($r = .46$) between WOR-Quality scores and a measure of learned resourcefulness (Barber & DeRubeis, 1992). In the current study, adequate single-rater reliability was evident in Pearson correlations of Rater 1 scores with Rater 2 scores at pretreatment (WOR-P $r = .88$, WOR-N $r = .85$, and WOR-Q $r = .65$) and posttreatment (WOR-P $r = .77$, WOR-N $r = .74$, and WOR-Q $r = .72$).

Acceptance.—Acceptance was measured with the 9-item version of the Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004). Participants rate each item on a scale of 1 (*never true*) to 7 (*always true*) as applied to themselves, and item scores are summed to create a total score. We scored the AAQ such that higher scores represented greater acceptance and willingness. Concurrent validity studies of the AAQ have yielded favorable results, in that acceptance is associated with lower fear of emotions, better job performance, better general mental health, and lower likelihood of being diagnosed with depression or an anxiety disorder (for review, see Bond & Bunce, 2003).

Distress tolerance and task persistence.—Distress tolerance and task persistence were measured using two computerized behavioral tasks. In the Paced Auditory Serial Addition Task (PASAT-C; Lejuez et al., 2003), the participant performs serial addition of

numbers presented one at a time on a monitor. A point is awarded for every correct answer, and an aversive “explosion” sound effect plays in response to every incorrect answer. The task includes three rounds of increasing difficulty (i.e., the latencies between numbers presented decreases, and the length of the round increases). The participant is given the option to “quit” the task at any time during level three. Similar to previous research using this task, a modest monetary incentive was offered at the beginning of the task (\$2 for each round in which the participant obtained a score of 30 or higher).

Participants were told to try their best on each round since their score would determine if they earned this monetary incentive, although the specific score they needed to attain was not divulged prior to the start of the task. The time (in seconds) it took for the participant to quit the task in round three was the behavioral index of persistence. The maximum possible score is 420 seconds; participants are not told of this time limit in advance. Consistent with the view that persisting on the PASAT-C reflects distress tolerance, scores on a self-report indicator of state negative affect significantly increased from before the PASAT-C to after completing two rounds of it (Schloss & Haaga, 2011). In previous research, PASAT-C scores have been related to borderline personality disorder diagnosis (Gratz, Rosenthal, Tull, Lejuez, & Gunderson, 2006) and to the length of time smokers had remained abstinent during prior quit attempts (Brown et al., 2002).

The computerized Mirror Tracing Persistence Task (MTPT-C; Strong et al., 2003), administered after the PASAT-C, likewise measures tolerance of distress. Participants were asked to trace three figures presented on the computer screen in sequential order using the computer mouse. The participants were told that the cursor on the screen moves in the opposite direction of the mouse. For example, to move the cursor up, the participant must move the mouse down. If the participant moved the mouse too slow, stopped moving the mouse, or moved the mouse off of the figure presented, a loud buzzer sounded and the cursor brought the participant back to the beginning of the figure to start over. The program moved onto the next figure once the participant correctly traced it or after 60 seconds had passed without a successful tracing. The figures became progressively more difficult over the course of the three rounds.

Similar to the PASAT-C, the participant had the option to quit on the third figure (unlike the first two) by hitting any button on the keyboard. The time (in seconds) it took for the participant to quit the task in round three was the behavioral index of distress tolerance. Unlike the PASAT-C, there was no time limit for round three. As with the PASAT-C, participants were informed of a modest monetary incentive for good performance but were not told in advance the specific standard required. As with the PASAT-C, state self-reported negative affect significantly increased from before to after completion of the MTPT-C in our sample (Schloss & Haaga, 2011). In earlier research, scores on the MTPT-C were significantly lower in a substance abuse treatment sample among those with diagnoses of borderline personality disorder (Bornovalova et al., 2008). An earlier version of this task showed a positive correlation between task persistence and subsequent success in maintaining abstinence from smoking (Brandon et al, 2003).

The MTPT-C and PASAT-C indicators of persistence were positively correlated at pretreatment ($r = .29, p < .05$) and at posttreatment ($r = .43, p < .05$), and we standardized each and then summed them to create a general persistence variable for our main analyses (cf. Brown et al., 2009 with a different set of persistence measures).

Procedure

Design overview, research setting, and therapists.—For full details on the parent clinical trial, with more detail on the treatment conditions as well as data on therapist adherence, please see Kapson and Haaga (2010). Briefly, we randomized participants to one of two group cessation therapies: (a) comparison condition: scheduled reduced smoking plus health education; and (b) CBT condition: scheduled reduced smoking plus health education plus mood management techniques. Each condition consisted of eight sessions of about 90 minutes each, conducted over a 7-week period (session five was held 2 days after session four, which was on the target quit date; with that exception, sessions were held weekly). Each group was about three to five participants working with one of seven clinical psychology Ph.D. student therapists. Therapists were crossed with treatment condition. They were trained and then supervised weekly by David Haaga, Ph.D., a licensed clinical psychologist with more than 20 years of experience in CBT and in clinical training, as well as experience training therapists in the use of the same treatment approaches for the purposes of an earlier pilot study (Thorndike, Friedman-Wheeler, & Haaga, 2006).

Assessment sequence.—Ad respondents were screened by phone and then, if seemingly eligible for the study, invited for an in-person pretreatment assessment. Each participant was also asked to complete a posttreatment assessment involving the same measures, one week after the end of treatment. Finally, a three-month posttreatment follow-up assessment of smoking status was conducted. The study was approved by the American University Institutional Review Board.

Treatments.—Each treatment was manualized and included as common components psychoeducation as well as scheduled reduced smoking to prepare for quit date (Cinciripini, Wetter, & McClure, 1997). The psychoeducation component addressed nicotine dependence, withdrawal symptoms, personalization of negative consequences of smoking, benefits of cessation, physical exercise, social support for nonsmoking, and self-reinforcement. Methods of staying abstinent in common temptation situations were discussed, as were strategies for limiting weight gain after cessation. Finally, all groups discussed the option of using nicotine replacement and received information about the nicotine patch. Nicotine replacement was not required and was not provided as part of the study treatment. Approximately one third of participants (34%) used nicotine replacement, and use was not significantly associated with depression proneness or with abstinence outcomes (Kapson & Haaga, 2010).

The CBT mood management component, which was the unique aspect of the CBT condition, was based on treatments described by Muñoz, Organista, and Hall (1993) and by Brandon and colleagues (e.g., Herzog et al., 2002). CBT therapists worked with smokers on identifying and evaluating negative cognitions and their effect on mood. Participants were

asked to self-monitor negative automatic thoughts and to evaluate the evidence regarding validity and utility of these thoughts. Therapists taught participants to identify more adaptive, alternative thoughts when minimal evidence for the automatic thought existed.

Data analysis.—Specificity of CBT effects was evaluated using repeated measures analyses of variance: depression proneness (high vs. low) and treatment condition (CBT vs. comparison condition) were the between subjects factors, and there were repeated measures on time (pre-treatment, posttreatment). The effects of interest were as follows: (a) time main effect, reflecting whether across treatment conditions smokers showed change in the relevant variable (coping, acceptance, or distress tolerance); (b) treatment condition X time interaction, testing whether CBT had a greater effect on these variables over time than did the comparison condition; and (c) treatment condition X depression proneness X time interaction, testing whether CBT affected variables over time more than did the comparison condition for the highly depression prone in particular, in parallel with the smoking cessation outcomes of the trial (Kapson & Haaga, 2010). We used an intent-to-treat approach to these analyses, with last observation carried forward for participants with missing data at posttreatment on a particular measure. All analyses were conducted using SPSS version 17.0.

Results

Baseline Characteristics

Demographics, depression proneness, and cigarette smoking variables from the pretreatment assessment are described in Table 1.

Attrition

About three fourths (71%) of participants completed the smoking status 1-month postquit-date assessment, and 82% completed the 3-month smoking status assessment. Of the 71 who completed posttreatment (1-month postquit date) assessment of smoking status, 65 completed the additional psychosocial assessments.

A series of comparisons were made (chi-squared for categorical variables, *t* tests for continuous measures) between those who were randomized yet failed to complete posttreatment psychosocial measures ($n = 35$) and those who did complete them ($n = 65$), on treatment allocation and on all variables listed in Tables 1 and 2. The only significant difference was that those who completed posttreatment measures had smoked daily for longer ($M = 26.19$ years, $SD = 12.71$) than had those who failed to complete posttreatment measures ($M = 18.32$, $SD = 13.13$), $t(97) = 2.89$, $p < .01$.

Specificity Analysis

Compensatory coping.—Participants significantly increased over time their use of functional strategies for coping with negative thoughts and feelings (WOR-Positive subscale; see Table 2). The time X condition interaction was significant, such that CBT participants showed more of an increase in WOR-P scores. However, this effect was qualified by a significant time X condition X depression proneness interaction, $F(1, 94) =$

4.83, $p < .05$, partial eta squared = .05. As can be seen in Table 2, this interaction was not in the expected direction. CBT increased WOR-P scores more among the *less* depression-prone participants, who are the ones who did not benefit from the treatment in regard to smoking cessation.

On the WOR-Negative subscale, there was a significant time effect in that average scores declined after treatment, and this was qualified by a significant time X condition X depression proneness interaction, $F(1, 94) = 6.13$, $p < .05$, partial eta squared .06. However, again this effect was inconsistent with the overall outcome findings of the trial. The comparison condition participants showed little change in WOR-N, whereas CBT lowered WOR-N scores more among the *less* depression-prone (.39 to .31) than among the more depression-prone (.38 to .37).

Finally, WOR overall quality ratings (WOR-Q) showed a nonsignificant effect for time. The time X condition interaction was significant (see Table 2), such that CBT enhanced WOR-Q scores more than did the comparison condition, but this effect was qualified by a significant time X condition X depression proneness interaction, $F(1, 94) = 12.44$, $p < .05$, partial eta squared = .12. As with the other WOR indicators, this interaction was contrary to the overall outcome findings of the clinical trial. Whereas the Comparison condition had, if anything, more favorable impact on more depression-prone (means changed from 3.96 to 4.11) than on less depression-prone (4.71 to 4.54) smokers, the CBT condition led to increased WOR-Q scores among the less depression-prone (4.05 to 4.58), not the more depression-prone smokers (4.13 to 4.11).

Acceptance:

AAQ.—There was no significant effect of time on self-reported acceptance, no time X condition interaction, and no time X condition X depression proneness interaction, all p 's $> .15$ (see Table 2 for descriptive statistics).

Persistence (PASAT-C and MTPT-C).—There were also no significant changes in persistence, as measured by the composite of scores on two behavioral tasks (Table 2).

Discussion

We conducted a secondary analysis of a randomized controlled trial for cigarette smoking cessation, in which a CBT condition was more helpful than a comparison condition specifically for smokers reporting high baseline depression proneness (Kapson & Haaga, 2010). Smokers showed significant increases on average from pretreatment to posttreatment in the frequency of functional responses to negative thoughts and feelings (WOR-Positive), as well as decreases in dysfunctional responses (WOR-Negative). There were no significant changes in self-reported acceptance or in behavioral persistence in the face of distress or frustration.

The increase in functional responses to negative thinking, as well as an improvement in the rated overall quality of participants' compensatory coping (WOR-Quality) were specific to the CBT condition. However, these effects, as well as the decrease in dysfunctional

responses (WOR-Negative), were evident mainly among the less depression-prone, which is the very group for whom CBT was *not* effective with respect to the main treatment goal of smoking cessation. For example, 7-day point prevalence abstinence (self-report, corroborated by expired air CO readings of ≤ 8 ppm) at 3-month follow-up was achieved for just 10% of low-depression-proneness participants assigned to CBT, compared with 33% of low-depression-proneness smokers in the comparison treatment or 35% of highly depression-prone smokers in CBT (Kapson & Haaga, 2010).

Future research should test whether this finding is replicable, as well as whether it is obtained in studies of individual therapy. It is possible that more depression-prone participants need more intensive, tailored CBT work to enhance their compensatory coping skills than was possible in our small group intervention. Nevertheless, such an effect would not explain why the group CBT *was* helpful to highly depression-prone participants in terms of helping them quit smoking (Kapson & Haaga, 2010).

Methodological Issues

The results reported in this manuscript should be interpreted in light of method limitations of the study. Most importantly, sample size was modest, which sets constraints on statistical power, particularly for the interaction analyses. Also, approximately one third of participants failed to complete posttreatment psychological assessments. Nonetheless, with the exception of smoking history, there were no significant baseline differences between those who completed versus those who did not complete posttreatment mechanism measures. Finally, there was no measure of therapist competence, leaving open the question of how well CBT was executed.

Conclusion

Whereas the findings of Kapson and Haaga (2010) helped to clarify the moderating role of depression proneness in predicting response to CBT in smoking cessation, the present results clarify how much still needs to be learned about specificity of effects of CBT. As discussed by Kazdin (2009) and Murphy, Cooper, Hollon, and Fairburn (2009), this state of affairs is typical of psychotherapy in general, not just CBT, depression-focused treatment, or smoking cessation treatment. Much more theory-driven research on multiple candidate change mechanisms is needed to clarify how effective and specific treatments have their effects, for either patients in general or subsets of patients as in moderated effects.

References

- Alloy LB, Hartlage S, Metalsky GI, & Abramson LY (1987). The Depression Proneness Inventory: A brief, face-valid scale of vulnerability to depressive reactions in response to stress Unpublished manuscript. Philadelphia, PA: Temple University.
- Barber JP, & DeRubeis RJ (1989). On second thought: Where the action is in cognitive therapy for depression. *Cognitive Therapy and Research*, 13, 441–457.
- Barber JP, & DeRubeis RJ (1992). The Ways of Responding: A scale to assess compensatory skills taught in cognitive therapy. *Behavioral Assessment*, 14, 93–115.
- Barber JP, & DeRubeis RJ (2001). Change in compensatory skills in cognitive therapy for depression. *Journal of Psychotherapy Practice & Research*, 10, 8–13. [PubMed: 11121002]

- Bjartveit K, & Tverdal A (2005). Health consequences of smoking 1–4 cigarettes per day. *Tobacco Control*, 14, 315–320. [PubMed: 16183982]
- Bond FW, & Bunce D (2003). The role of acceptance and job control in mental health, job satisfaction, and work performance. *Journal of Applied Psychology*, 88, 1057–1067. [PubMed: 14640816]
- Bornoalova MB, Gratz KL, Daughters SB, Nick B, Delaney-Brumsey A, Lynch TR, Kosson D, & Lejuez CW (2008). A multimodal assessment of the relationship between emotion dysregulation and borderline personality disorder among inner-city substance users in residential treatment. *Journal of Psychiatry Research*, 42, 717–726.
- Brandon TH, Herzog TA, Juliano LM, Irvin JE, Lazev AB, & Simmons VN (2003). Pretreatment task persistence predicts smoking cessation outcome. *Journal of Abnormal Psychology*, 112, 448–456. [PubMed: 12943023]
- Brown RA, Lejuez CW, Kahler CW, & Strong DR (2002). Distress tolerance and duration of past smoking cessation attempts. *Journal of Abnormal Psychology*, 111, 180–185. [PubMed: 11866171]
- Brown RA, Lejuez CW, Strong DR, Kahler CW, Zvolensky MJ, Carpenter LL, ... Price LH (2009). A prospective examination of distress tolerance and early smoking lapse in adult self-quitters. *Nicotine & Tobacco Research*, 11, 493–502. [PubMed: 19372572]
- Burgess ES, Kahler CW, Niaura R, Abrams DB, Goldstein MG, & Miller IW (2002). Patterns of change in depressive symptoms during smoking cessation: Who's at risk for relapse? *Journal of Consulting and Clinical Psychology*, 70, 356–361. [PubMed: 11952193]
- Cinciripini PM, Wetter DW, & McClure JB (1997). Scheduled reduced smoking: Effects on smoking abstinence and potential mechanisms of action. *Addictive Behaviors*, 19, 13–22.
- Covey LS, Glassman AH, & Stetner F (1997). Major depression following smoking cessation. *American Journal of Psychiatry*, 154, 263–265. [PubMed: 9016279]
- Coyne JC, Pepper CM, & Flynn H (1999). Significance of prior episodes of depression in two patient populations. *Journal of Consulting and Clinical Psychology*, 67, 76–81. [PubMed: 10028211]
- DeRubeis RJ, & Crits-Christoph P (1998). Empirically supported individual and group psychological treatments for adult mental disorders. *Journal of Consulting and Clinical Psychology*, 66, 37–52. [PubMed: 9489261]
- Gibbons MBC, Crits-Christoph P, Barber JP, Stirman SW, Gallop R, Goldstein LA, ... Ring-Kurtz S (2009). Unique and common mechanisms of change across cognitive and dynamic psychotherapies. *Journal of Consulting and Clinical Psychology*, 77, 801–813. [PubMed: 19803561]
- Gratz KL, Rosenthal MZ, Tull MT, Lejuez CW, & Gunderson JG (2006). An experimental investigation of emotion dysregulation in borderline personality disorder. *Journal of Abnormal Psychology*, 115, 850–855. [PubMed: 17100543]
- Haaga DAF, Hall SM, & Haas A (2006). Participant factors in treating substance use disorders In Castonguay LG & Beutler LE (Eds.), *Principles of therapeutic change that work* (pp. 275–292). New York, NY: Oxford University Press.
- Haaga DAF, Thorndike FP, Friedman-Wheeler DG, Pearlman MY, & Wernicke RA (2004). Cognitive coping skills and depression vulnerability among cigarette smokers. *Addictive Behaviors*, 29, 1109–1122. [PubMed: 15236811]
- Hayes SC (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy*, 35, 639–665.
- Hayes SC, Strosahl KD, & Wilson KG (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York, NY: Guilford Press.
- Hayes SC, Strosahl K, Wilson KG, Bissett RT, Pistorello J, Toarmino D, ... McCurry SM (2004). Measuring experiential avoidance: A preliminary test of a working model. *The Psychological Record*, 54, 553–578.
- Heatherston T, Kozlowski L, Frecker R, & Fagerström K (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction*, 86, 1119–1127. [PubMed: 1932883]
- Herzog TA, Lazev AB, Irvin JE, Juliano LM, Greenbaum PE, & Brandon TH (2002). Testing for group membership effects during and after treatment: The example of group therapy for smoking cessation. *Behavior Therapy*, 33, 29–43.

- Ilardi SS, & Craighead WE (1994). The role of nonspecific factors in cognitive-behavior therapy for depression. *Clinical Psychology: Science & Practice*, 1, 138–156.
- Kapson HS, & Haaga DAF (2010). Depression vulnerability moderates the effects of cognitive behavior therapy in a randomized controlled trial for smoking cessation. *Behavior Therapy*, 41, 447–460. [PubMed: 21035610]
- Kazdin AE (2009). Understanding how and why psychotherapy leads to change. *Psychotherapy Research*, 19, 418–428. [PubMed: 19034715]
- Lejuez CW, Kahler CW, & Brown RA (2003). A modified computer version of the Paced Auditory Serial Addition Task (PASAT) as a laboratory-based stressor. *The Behavior Therapist*, 26, 290–293.
- Muñoz R, Organista K, & Hall S (1993). *Mood management training to prevent smoking relapse: A cognitive-behavioral treatment manual*. San Francisco, CA: University of California, San Francisco.
- Murphy R, Cooper Z, Hollon SD, & Fairburn CG (2009). How do psychological treatments work? Investigating mediators of change. *Behaviour Research and Therapy*, 47, 1–5. [PubMed: 19010459]
- Neimeyer RA, & Feixas G (1990). The role of homework and skill acquisition in the outcome of group cognitive therapy for depression. *Behavior Therapy*, 21, 281–292.
- Pomerleau C, Carton S, Lutzke M, Flessland K, & Pomerleau O (1994). Reliability of the Fagerström Tolerance Questionnaire and the Fagerström Test for Nicotine Dependence. *Addictive Behaviors*, 19, 33–39. [PubMed: 8197891]
- Schloss HM, & Haaga DAF (2011). Interrelating behavioral measures of distress tolerance with self-reported experiential avoidance. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 29, 53–63. [PubMed: 21448252]
- Strong DR, Brown RA, Kahler CW, Lloyd-Richardson EE, & Niaura R (2004). Depression proneness in treatment-seeking smokers: A taxometric analysis. *Personality and Individual Differences*, 36, 1155–1170.
- Strong DR, Lejuez CW, Daughters S, Marinello M, Kahler CW, & Brown RA (2003). *The computerized mirror tracing task, version 1*. Unpublished manual.
- Thorndike FP, Friedman-Wheeler DG, & Haaga DAF (2006). Effect of cognitive behavior therapy on smokers' compensatory coping skills. *Addictive Behaviors*, 31, 1705–1710. [PubMed: 16427745]
- United States Department of Health and Human Services. (2008, 5). *Clinical Practice Guideline: Treating tobacco use and dependence*. Rockville, MD USDHHS: Public Health Service.

Table 1

Pretreatment Characteristics of Comparison Condition and CBT Participants

	Comparison (<i>n</i> = 52)		CBT (<i>n</i> = 48)	
Mean (SD) Years of Age	42.73	(12.88)	42.98	(12.85)
% Female	48		54	
Race: % Caucasian	60		71	
% African American or Black	32		25	
% Asian American	2		2	
% Other or declined to answer	6		2	
Ethnicity: % Hispanic	12		6	
Employment: % employed fulltime	52		60	
Mean (SD) cigarettes per day	17.48	(9.88)	18.06	(6.35)
Nicotine dependence (FTND Mean (SD))	4.67	(2.38)	4.65	(2.32)
Mean (SD) years of smoking	23.09	(13.21)	23.92	(13.58)
Median (25 %ile, 75%ile) prior quit attempts	3	(1.5, 5)	2	(1,5)
Median (25 %ile, 75%ile) days longest prior quit	60	(18, 240)	105	(21,292)
Depression Proneness: Mean (SD) DPI total	31.54	(11.98)	31.90	(10.71)
Ever Taken Antidepressant medication (%)	50		48	

Note. SD = standard deviation; CBT = cognitive-behavioral therapy; FTND = Fagerstrom Test for Nicotine Dependence; DPI = Depression Proneness Inventory.

Table 2

Pretreatment and Posttreatment scores on Potential Change Mechanism Measures by Treatment Condition and Baseline Depression Proneness

		WOR-P	WOR-N	WOR-Q	AAQ	Persistence
Low-DPI	CBT pre	.56 (.15)	.39 (.13)	4.05 (0.75)	41.39 (5.44)	0.11 (1.69)
	CBT post	.65 (.15)	.31 (.13)	4.58 (0.79)	40.13 (5.61)	−0.32 (1.33)
	Comparison pre	.70 (.13)	.26 (.10)	4.71 (0.62)	38.88 (6.29)	−0.01 (1.56)
	Comparison Post	.68 (.13)	.28 (.10)	4.54 (0.62)	39.40 (5.38)	0.17 (2.13)
High-DPI	CBT pre	.58 (.17)	.38 (.16)	4.13 (0.91)	36.52 (5.97)	0.11 (1.69)
	CBT post	.60 (.19)	.37 (.18)	4.11 (0.88)	36.84 (6.61)	−0.32 (1.33)
	Comparison pre	.55 (.19)	.40 (.18)	3.96 (0.90)	32.48 (5.28)	−0.46 (1.64)
	Comparison post	.58 (.16)	.38 (.16)	4.11 (.0.91)	33.52 (5.85)	−0.17 (1.54)
Time	F (1,94)	5.05 ^a	5.35 ^a	3.78	0.12	0.09
	Partial eta squared	.05	.05	.04	.001	.001
Time X condition	F (1,94)	4.07 ^a	3.73	4.50 ^a	1.96	1.74
	Partial eta squared	.04	.03	.05	.02	.02
Time X condition X DPI	F (1, 94)	4.83 ^a	6.13 ^a	12.44 ^a	0.35	0.64
	Partial eta squared	.05	.06	.12	.004	.007

Note. WOR-P = Ways of Responding Test, Positive subscale; WOR-N = Ways of Responding Test, Negative subscale; WOR-Q = Ways of Responding Test, average Quality rating; AAQ = Acceptance and Action Questionnaire; Persistence = sum of z-scores for PASAT-C (Paced Auditory Serial Addition Test – Computerized) and MTPT-C (Mirror Tracing Persistence Task – Computerized); CBT = cognitive-behavioral therapy condition; DPI = Depression Proneness Inventory (high ≥ 32 at pretreatment, low <32 at pretreatment).

All cell values are means (SD's). Posttreatment scores used Last Observation Carried Forward for participants with missing data.

^a $p < .05$.