Published in final edited form as:

Behav Res Ther. 2009 May ; 47(5): 444–448. doi:10.1016/j.brat.2009.02.005.

Effects of Cognitive Therapy for Depression on Daily Stress-Related Variables

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Abstract

This study used a daily diary design to evaluate depressed patients' changes on daily stress-related variables during cognitive therapy (CT). Patients completed daily diaries on two week-long occasions: after the intake interview and again after the sixth session of CT. Patients also completed a measure of depressive symptoms before every treatment session. After six sessions of CT, patients reported a significant reduction in: (a) depressive symptoms; (b) daily sad affect (SA); (c) daily negative thoughts associated with the day's most stressful event; and (d) SA reactivity to daily stressors. In addition, patients reported a significant increase in: (e) daily positive affect (PA); and (f) SA reactivity to daily negative thoughts. The results suggest that CT has its intended effects on the daily lives of depressed adults, and highlight the value of a daily diary methodology for research on CT.

Keywords

Cognitive Therapy; Daily Stress

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Cognitive therapy (CT) for depression teaches patients to reduce their negative affect (NA) by using adaptive cognitive and behavioral strategies to deal with stressful situations, modify negative automatic thoughts, increase their engagement in positive activities, and ultimately modify their core beliefs (Beck, Rush, Shaw, & Emery, 1979). Several studies have investigated the mechanisms of change in CT for depression, with a focus on cognitive variables such as automatic negative thoughts, as measured, for example, by the Automatic Thoughts Questionnaire (Hollon & Kendall, 1980), and dysfunctional attitudes, as measured by the Dysfunctional Attitude Scale (DAS; Weissman & Beck, 1978). This research has shown that CT reduces the frequency of patients' negative thoughts and the severity of their dysfunctional attitudes, and that these changes are associated with depression-reduction over the course of treatment (see the recent review by Garratt, Ingram, Rand, & Sawalani, 2007).

Although the aforementioned literature has advanced our understanding of CT, it also has some limitations, including its reliance on single-administration questionnaires, such as the ATQ (Hollon & Kendall, 1980) and the DAS (Weissman & Beck, 1978). CT is designed, in part, to influence the frequency of automatic thoughts and the regulation of NA, both in response to daily stress. Compared to single-administration questionnaires, a daily diary methodology is better suited to measure these constructs, which reflect cognitive and emotional processes in the context of everyday stressful experiences. Specifically, this type of methodology, which involves repeated assessment over days and sometimes weeks, reduces retrospective biases usually found in cross-sectional studies, and allows the capture of daily processes involving stressors, automatic thoughts, and mood that are thought to underlie stress-related reactivity (Bolger & Zuckerman, 1995).

To our knowledge, only two studies to date, both from our research group, have used a daily diary methodology with CT patients. Both evaluated patient predictors of CT outcome, and not the process of change in CT, but their findings suggest the heuristic value of this type of methodology in the study of therapeutic change (Cohen et al., 2008; Gunthert, Cohen, Butler, & Beck, 2005). In both studies, CT outpatients completed nightly surveys indicating their daily stress and daily NA, and in both studies, patients' initial NA reactivity to daily stress predicted their response to CT. Specifically, patients who were less emotionally reactive to daily stress at the beginning of treatment, that is, had relative strengths in daily affect regulation, evidenced faster rates of change over the course of therapy. Because the data reported in the current paper were obtained from patients who participated in Cohen et al., it is important to note that these authors operationalized NA reactivity as the within-person index of the linear relationship between number of daily stressors and daily NA. Therefore, a highly reactive patient would have a strong positive within-person relationship between these two variables.

Although one of the major goals of CT is to improve patients' ability to regulate NA in the face of daily and major stressful events, to our knowledge, no research to date has evaluated the effects of CT on patients' daily affective reactivity. With this treatment goal in mind, we used a daily diary methodology in the current study, in which depressed patients completed nightly surveys for one week prior to treatment (time 1) and again for one week after the sixth session of treatment (time 2). The DAS was also administered at both times. The nightly diaries included items for daily negative and positive events, daily NA and positive affect (PA), and the frequency of negative thoughts associated with the day's most stressful event. Based on the diary measures, the major variables included: (a) patients' mean daily sad affect (SA); (b) patients' mean daily PA; (c) the frequency of patients' negative thoughts associated with the day's most stressful event; (d) patients' SA reactivity to daily stress, involving both same-day and next-day affect (i.e., affective spillover; Cohen et al., 2008); and (e) patients' PA reactivity

to daily positive events. The reactivity-based indices were computed to evaluate possible predictors of change in CT involving daily stress-related processes.

Most psychotherapy researchers suggest the assessment of patients' symptoms repeatedly, to model the recovery trajectory during therapy (Laurenceau, Hayes, & Feldman, 2007). Therefore, in this study, we assessed depression before every treatment session. Research has shown that a significant proportion of total change in CT for depression occurs before session six (Ilardi & Craighead, 1994). Therefore, in the study of the effects of CT, and the mechanisms responsible for those effects, it is especially important to evaluate change during the early sessions of treatment. Thus, we evaluated patients' depressive symptoms at every session during the first six sessions of treatment.

We predicted that after six sessions of treatment, patients would show a reduction in their: (a) depressive symptoms; (b) DAS scores; (c) average daily SA; (d) daily negative thoughts associated with the day's most stressful event; and (e) SA reactivity to daily negative events. We also predicted that patients would show an increase in their: (f) average daily PA; and (g) PA reactivity to daily positive events. This last prediction was based on studies that have shown that depressed patients, compared to healthy controls, have blunted PA responses to positive stimuli (Bylsma, Morris, & Rottenberg, 2008). We also predicted that changes b-g above would be associated with a decrease in depression during treatment.

For exploratory purposes, we also examined change in patients' SA reactivity to their daily negative thoughts in response to the worst event of the day. Final exploratory analyses examined whether changes in these stress-related variables influenced symptom reduction, or vice versa.

Method

Participants

Participants were 54 adult outpatients (≥ 21 years) receiving CT at the Beck Institute for Cognitive Therapy and Research (Bala Cynwyd, PA) who met *Diagnostic and Statistical Manual* (DSM-IV; American Psychiatric Association, 1994) criteria for major depressive disorder (MDD). All of these patients also served as participants in Cohen et al. (2008). Ninety-five patients met study criteria, 77 agreed to participate, and of those, 54 completed the study.

Many participants had comorbid diagnoses. Specifically, 24 patients (44%) had an additional anxiety disorder diagnosis and fifteen patients (28%) were also diagnosed with Axis II disorders. Thirty-four (63%) participants were women. The average age was 42.54 years ($SD = 13.28$; range = 21 to 83). The sample was predominantly Caucasian (87%) and well-educated. See Cohen et al. (2008) for a description of exclusionary criteria, how diagnoses were determined, and more complete demographic information.

The average length of treatment was 13.72 sessions ($SD = 10.98$); 85% of the participants attended at least eight treatment sessions. Fifty-seven percent of the participants also received concurrent psychopharmacological treatment during the study.

Procedure

The overall design of the project was: (a) after the intake session, but before the first therapy session, patients completed a battery of questionnaires, including the DAS (Weissman & Beck, 1978), and seven consecutive nightly diaries (time 1); (b) immediately after the sixth therapy session, patients again completed the questionnaire battery and seven consecutive nightly diaries (time 2); and (c) immediately before each therapy session, patients completed the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996). The diaries were completed via

an interactive voice response (IVR) system, in which patients participated in nightly automated phone interviews. See Cohen et al. (2008) for a description of the IVR procedure. The study was conducted in compliance with the Institutional Review Board of the first author's university.

Treatment was provided weekly by two male and one female doctoral-level licensed psychologists. The two male psychologists provided treatment to all but three of the participants ($n = 29$ and 22 patients, respectively). At the time of the study, they had 13, 10, and 23 years of experience with CT, respectively.

Cohen et al.'s (2008) findings are based on the time 1 diary data and patients' depression scores assessed over 12 sessions of treatment. Cohen et al. focused on patient predictors of CT outcome, whereas this study focused on CT's effects on daily stress-related variables after six sessions of treatment.

Questionnaires

Dysfunctional attitudes—The 40-item DAS (Weissman & Beck, 1978) measures the maladaptive attitudes of depressed and depression-prone individuals. Participants rated items on a 1 to 5 scale in which 1 = *totally agree* and 5 = *totally disagree*. At both time 1 and time 2, Cronbach's alpha was .95 for the current sample.

Depression—Depressive symptoms were assessed at intake and immediately before each therapy session using the 21-item BDI-II (Beck et al., 1996). Participants rated items for symptom severity on a 4-point scale. At intake, the mean BDI-II score was 32.00 ($SD = 9.16$).

Diary Measures

Affect—End-of-day affect items were based primarily on the Positive and Negative Affect Scale (PANAS-X; Watson & Clark, 1994). The negative affect items included the five PANAS-X Sadness (SA) items. The positive affect (PA) items included the five highest loading items from the 10-item PANAS-X Positive Affect Scale (Watson & Clark, 1994). Each night, patients were instructed to “tell us how much you feel this way at this moment, right now” (1 = *very slightly or not at all*; 3 = *somewhat*; 5 = *a lot*). Within-person reliability was computed by transforming item scores into z-scores within each participant. Using these values, Cronbach's alphas at time 1 were .83 and .68 for SA and PA, respectively. At time 2, they were .81 and .73, respectively.

Daily events—Daily events were measured using a 15-item checklist (11 negative events and 4 positive events). Event valence was researcher-defined. Each item was scored as 0 = *the event did not occur today* or 1 = *the event occurred today*. Scores were summed to form a separate daily total for number of negative events and number of positive events. See Cohen et al. (2008) for a description of the events on the daily events checklist.

Worst daily event—Patients verbally described their most stressful event of the day and these descriptions were reliably classified using 10 event categories (e.g., financial, interpersonal with spouse/partner).

Negative thoughts—We assessed negative thoughts in response to the day's most stressful event using five items from the Cognition Checklist (CCL; Beck, Brown, Steer, Eidelson, & Riskind, 1987). We chose the five highest loading items on the CCL-D (depressive cognition) scale which were applicable to any situation (and not linked to a specific situation such as a social interaction). Each item was rated on a five-point scale (1 = *not at all* to 5 = *a lot*). These item ratings were then summed for each day. Within-person reliability estimates were

computed by transforming item scores into z -scores within each participant. Cronbach's alphas were then computed using these values, yielding reliability values of .77 and .73 for time 1 and time 2, respectively.

Data Analytic Strategy

Daily affective reactivity—We defined affective reactivity as the within-person index of the linear relationship between a daily predictor variable (e.g., number of negative events) and daily affect. Specifically, affective reactivity was computed using the equation below to evaluate the daily within-subject relationship between, for example, number of negative events and daily SA (Bolger & Zuckerman, 1995).

$$SA_{ti} = \pi_{0i} + \pi_{1i} (\text{Negative Events}_{ti}) + e_{ti}$$

SA represents sad affect at the end of day t for participant i . π_{0i} is the intercept representing the level of SA at average number of negative events for that person (group mean centered). π_{1i} is the slope coefficient for negative events (that is, the number of units higher the SA score is for every additional negative event on day t). The within-person error term is represented by e_{ti} . Using Hierarchical Linear Modeling (HLM; Raudenbush, Bryk, A. & Congdon, 2006), this equation served as a model to compute: (a) SA reactivity to number of daily negative events; (b) SA reactivity to the frequency of daily negative thoughts; and (c) PA reactivity to number of daily positive events. For example, a person with high SA reactivity to negative events would evidence a strong positive within-subject relationship between number of daily negative events and daily SA. Based on the aforementioned equation, we also computed next-day SA reactivity to daily negative events, controlling for same-day SA (i.e., affective spillover). We computed SA spillover because Cohen et al. (2008) found that pre-treatment NA spillover predicted depressed patients' early response to CT. HLM uses a maximum likelihood estimation procedure for missing data.

Time 1- time 2 changes—Paired sample t -tests were conducted to evaluate time 1 to time 2 changes on the BDI-II and DAS, as well as on the following diary variables: daily SA, daily PA, number of daily negative events, type of worst daily event, number of daily positive events, and frequency of daily negative thoughts (associated with the day's most stressful event). The diary variables were averaged across each seven-day period so that each participant had a single average score for each variable at time 1 and time 2, respectively.

To test whether there was a time 1- time 2 change in the reactivity scores, the data were structured so that the diary data (indexed by $t = 1$ to 7) were nested within time (indexed by $j = 0$ or 1), which was then nested within person (indexed by $i = 1$ to N). A three-level multilevel model was then specified to test if the level 2 variable, time, moderated the daily relationship between the level-1 variables (such as daily SA and number of daily negative events) using the SAS PROC MIXED Procedure (Littell, 1996), which uses maximum likelihood estimation for missing values. For example, to examine how the daily relationship between SA and negative events changed from time 1 to time 2 (controlling for average negative events at both times), we specified the following level-1 equation:

$$SA_{tji} = \pi_{0ji} + \pi_{1ji} (\text{Negative Events}_{tji}) + e_{tji}$$

SA represents sad affect at the end of day t at time j for participant i . The level 2-model for examining the effect of time on SA reactivity to negative events is:

$$\pi_{1ji} = \beta_{10i} + \beta_{11i} (\text{Average Negative Events}_{ji}) + \beta_{12i} (\text{Time}_{ji})$$

Each participant's slope for SA reactivity, π_{1ji} , is predicted by an intercept, β_{10i} ; average negative events, β_{11i} ; and time, β_{12i} . The level-3 model accounts for between-subject variance in daily SA; however, no predictors were entered at this level. All level-1 predictor variables were centered at the person level, and the level-2 variable, average negative events, was centered around each time period's mean. Time was coded zero for time 1 and one for time 2; thus, β_{10i} represents average SA reactivity at time 1. The coefficient, β_{12i} , represents the moderating effect of time (or change from time 1 to time 2) on the relationship between daily SA and daily number of negative events (i.e., SA reactivity). At level 2, individual differences in intercepts were modeled in a similar manner but are not detailed here because of the focus on reactivity slopes. We then adapted these equations to evaluate time 1-time 2 change on: PA reactivity to daily positive events; SA reactivity to daily negative thoughts; and next-day SA reactivity to daily negative events.

Time 1-time 2 changes associated with symptom reduction

Next, we predicted change in depression (BDI-II scores) over the first six treatment sessions as a function of the changes in those variables (reported above) that demonstrated significant time 1-time 2 change. We also evaluated time 1-time 2 changes on the DAS and the daily variables as a function of changes in depression over the first six treatment sessions. These analyses were conducted to evaluate whether changes in the stress-related variables influenced symptom reduction, or vice versa. However, structural equation modeling (SEM) revealed a poor fit for the weekly BDI-II data likely because of the degree of intraindividual variability in BDI scores across session, regardless of whether we tested a linear, quadratic, or cubic pattern. (Cohen et al. [2008] focused primarily on the first four sessions of treatment, which did show a good fit for a linear change in BDI-II scores.) The poor model fit for the growth modeling of BDI-II scores precluded evaluation of the relationship between the time 1-time 2 changes on the diary variables and depression-reduction during treatment, and thus the current paper focuses on time 1-time 2 changes only.¹

Results

Descriptive Statistics

Time 1 and time 2 *Ms* and *SDs* are listed in Table 1

Participants versus non-participants: Participants did not differ from those who declined participation on intake depression scores, gender, marital status, and education. Further, there were no differences on the measures of interest between those who remained in the study and those who dropped out of the study.

Compliance with diary procedure: At time 1, patients completed, on average, 6.22 phone calls out of a possible 7 ($SD = .84$). At time 2, they completed, on average, 5.57 phone calls out of a possible 7 ($SD = 1.04$). This compliance rate compares favorably to that of Peeters, Nicolson, Berkhof, Delespaul, and deVries (2003), who used an experience sampling procedure with individuals with MDD.

¹Contact the second author for a detailed description of these SEM findings.

Time 1 to Time 2 Changes

At intake, patients' mean BDI-II score was 32.00 ($SD = 9.16$). At time 2 (right before session 7), their mean BDI-II score was 18.50 ($SD = 13.25$), $t(52) = 8.86$, $p < .01$.

At time 2, compared to time 1, participants had higher scores on average daily PA, $t(53) = 2.76$, $p < .01$, and marginally higher scores on average number of daily positive events, $t(53) = 1.90$, $p < .06$. At time 2, participants had lower scores on the DAS, $t(51) = -3.70$, $p < .01$, average daily negative thoughts, $t(53) = -5.17$, $p < .01$, and average daily SA, $t(53) = -4.13$, $p < .01$ (see Table 1). Participants did not evidence significant time 1 to time 2 change on average number of daily negative events.

From the three-level analyses testing for changes in reactivity over time, results showed that participants had a time 1 to time 2 decrease in their SA reactivity to number of daily negative events ($M = .15$ vs. $.12$), $\beta = -.65$, $t(578) = -2.84$, $p < .01$. Participants had a time 1 to time 2 increase in their SA reactivity to daily negative thoughts ($M = .07$ vs. $.11$), $\beta = .17$, $t(576) = 1.96$, $p < .05$. Participants had a nonsignificant change in their PA reactivity to daily positive events, as well as their next-day SA reactivity to daily negative events.²

Discussion

The major goal of this study was to evaluate the effects of CT (six sessions) on depressed patients' regulation of SA in the context of daily stress. Using electronic daily diaries, we assessed patients' daily mood, the frequency of their negative thoughts associated with their most stressful daily events, and their SA reactivity to daily negative events. We also evaluated the effects of CT on patients' SA reactivity to daily negative thoughts, as well as their PA reactivity to daily positive events. The DAS was measured at the two time points, and depressive symptoms were measured before every treatment session.

As expected, CT was effective in reducing patients' depressive symptoms, even after only six sessions. Specifically, BDI-II scores dropped 42% from intake to right before session 7 ($M_s = 32$ and 18.5 , respectively). Thus, the treatment interval that we studied was associated with a significant decrease in patients' depressive symptoms.

In addition, as expected, patients' scores on the DAS decreased from time 1 (intake) to time 2 (in between sessions 6 and 7). As predicted, patients also reported a time 1 to time 2 decrease in the frequency of their negative thoughts associated with their most stressful daily events. This finding is consistent with previous research that relied on single-administration questionnaires of negative thoughts (Garratt et al., 2007). It is interesting that both assessment methods (single-administration questionnaires and daily assessment) produced comparable findings regarding the reduction of negative thoughts during CT. Our failure to include the ATQ precluded our ability to evaluate the relationship between this measure of negative thoughts and our daily assessment of negative thoughts. Finally, the daily affect variables also evidenced significant change in the expected direction: After six sessions of CT, patients reported a decrease in their daily SA and an increase in their daily PA.

Changes in Affective Reactivity

As predicted, patients' SA reactivity to daily negative events decreased during CT: From time 1 to time 2, patients' within-subject relations between number of daily negative events and

²We repeated all analyses that evaluated time 1-time 2 changes (e.g., on number of negative events, SA reactivity to negative events, etc.), this time controlling for medication status (yes, no). All findings with respect to time 1-time 2 changes were comparable to those previously reported.

daily SA became weaker (less strongly positive). This suggests that during CT, patients improved in their ability to regulate SA in the face of daily stress.

This study represents the first attempt to evaluate CT's effects on NA regulation in response to variations in number of daily stressors. Our finding that SA reactivity decreased during CT is consistent with the goals of this treatment and suggests the potential value of this diary-based index for future research on CT for depression. More generally, this finding suggests the heuristic value of a daily diary methodology for research on psychotherapy efficacy (Cohen et al., 2008). Moreover, as reported in Cohen et al. (2008), this index of affective reactivity to daily stress is a unique construct: It is not related to the DAS or daily negative thoughts, at either time 1 or time 2, and thus is not redundant with variables that are commonly measured in CT outcome studies (Garratt et al., 2007). Future research is needed to better understand the mechanisms underlying affective reactivity to daily stress. Our construct of SA reactivity is most likely a reflection, in part, of patients' appraisals of daily stress and their choice and implementation of specific coping strategies.

Cohen et al. (2008) found that time 1 next-day SA reactivity to daily stressors (i.e., affective spillover) was a significant predictor of treatment response during the early sessions of CT; patients who showed a relative ability to bounce back the next day from daily stressors had greater early depression-reduction. In the current study, patients' SA spillover did not change from time 1 to time 2. It is unclear why six sessions of CT did not improve patients' next-day affective recovery from daily stress. Perhaps additional treatment sessions are required to produce such a change.

We also found that patients' SA reactivity to daily negative thoughts increased (became more strongly positive) from time 1 to time 2. Thus, after six sessions of CT, patients were reacting more negatively to daily increases in the frequency of their negative thoughts associated with the day's most stressful event. It should also be recalled that from time 1 to time 2, patients reported a decrease in the frequency of their negative thoughts. Therefore, at time 2, they were experiencing fewer event-related negative thoughts, but when they occurred, they were reacting with stronger SA.

This increase in patients' SA reactivity to daily negative thoughts might be due to their greater attention to these thoughts as they engaged in CT. During the early sessions of CT, patients become more aware of the connection between their thoughts and their mood. This learning could initially increase SA reactivity to daily negative thoughts, but perhaps lower it later in treatment. It is also possible that unmeasured third variables influenced patients' SA reactivity to negative thoughts at both time periods.

Patients' PA reactivity to positive events did not change after six sessions of treatment, although they did report slightly more positive events. Given that CT includes some attention to behavioral activation, especially during the early sessions of treatment, it is reassuring to see this time 1 to time 2 (nearly significant) increase in number of daily positive events. The most likely reason for the nonsignificant change in PA reactivity to daily positive events is the low number of positive events included in the daily events checklist. There were only four positive events on the checklist (compared to 11 negative events), and it is possible that this restricted range precluded our ability to detect changes in patients' PA reactions to daily variations in number of positive events.

Limitations

Our findings should be considered in light of some methodological limitations. First, there was no control group, and therefore it cannot be determined if the pattern of results would be found in other treatments for depression. An obvious weakness is our inability to adequately test,

statistically, the relationship between time 1-time 2 changes on the daily variables and depression-reduction during treatment. As mentioned previously, SEM showed poor model fit for the growth modeling of the BDI-II scores over the first six sessions of treatment.

Although our electronic daily diary design has many methodological advantages compared to a more typical cross-sectional assessment of stress and mood variables, it has its own set of limitations that should be acknowledged. End-of-day assessment of stress and mood is potentially vulnerable to a retrospective bias (mood influencing the reporting of events) and the possibility that daily mood influenced the occurrence of daily events (and not vice versa, as is usually assumed). Compliance with study procedure is often an issue in daily diary research, which requires participants to complete measures for several days in a row. In the current study, patients completed 89% of the time 1 diaries and 80% of the time 2 diaries. These completion rates are comparable to that obtained by Peeters et al. (2003).

Finally, most of the participants were well educated and Caucasian. This limits our ability to generalize the findings to more diverse populations.

Conclusions

Our findings suggest that after six sessions of CT, depressed patients experienced many expected improvements in their daily lives. They reported less daily SA and more daily PA, and fewer event-related negative thoughts. They also reported weaker SA reactions to their daily stress, an outcome that is consistent with the goals of CT. Although we could not adequately test whether this change was associated with symptom reduction during treatment, it is a provocative change nevertheless, and suggests the potential value of this index of affective reactivity for research on CT for depression and psychotherapy more generally.

Acknowledgements

This study was funded by NIMH grant R21MH067825 awarded to the second author.

References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. Vol. 4th. Washington DC: American Psychiatric Association; 1994.
- Beck AT, Brown GW, Steer RA, Eidelson J, Riskind J. Differentiating anxiety and depression: A test of the cognitive content-specificity hypothesis. *Journal of Abnormal Psychology* 1987;96:179–183. [PubMed: 3680754]
- Beck, AT.; Rush, AJ.; Shaw, BF.; Emery, G. *Cognitive therapy of depression*. New York: Guilford Press; 1979.
- Beck, AT.; Steer, RA.; Brown, GK. *Beck Depression Inventory - 2nd Edition (BDI-II)*. Vol. 2nd. San Antonio, TX: Psychological Corporation; 1996.
- Bolger N, Zuckerman A. A framework for studying personality in the stress process. *Journal of Personality and Social Psychology* 1995;69:890–902. [PubMed: 7473036]
- Bylsma L, Morris B, Rottenberg J. A meta-analysis of emotional reactivity in major depressive disorder. *Clinical Psychology Review*. 2008
- Cohen L, Gunthert K, Butler A, Parrish B, Wenz S, Beck J. Negative affective spillover from daily events predicts early response to cognitive therapy for depression. *Journal of Consulting and Clinical Psychology*. 2008
- Garratt G, Ingram RE, Rand KL, Sawalani G. Cognitive processes in cognitive therapy: Evaluation of the mechanisms of change in the treatment of depression. *Clinical Psychology: Science and Practice* 2007;14:224–239.

- Gunthert KC, Cohen L, Butler AC, Beck JS. Predictive role of daily coping and affective reactivity in cognitive therapy outcome: Application of a daily process design to psychotherapy research. *Behavior Therapy* 2005;36:77–88.
- Hollon S, Kendall P. Cognitive self-statements in depression: Development of an automatic thoughts questionnaire. *Cognitive Therapy and Research* 1980;4:383–395.
- Ilardi SS, Craighead WE. The role of nonspecific factors in cognitive-behavior therapy for depression. *Clinical Psychology: Science and Practice* 1994;1:138–156.
- Laurenceau JP, Hayes AM, Feldman GC. Some methodological and statistical issues in the study of change processes in psychotherapy. *Clinical Psychology Review* 2007;27:682–695. [PubMed: 17328996]
- Littell, RC. SAS system for mixed models. Ramon C, Littell; George A, Milliken; Walter W, Stroup; Russell D, Wolfinger, editors. Cary, N.C.: SAS Institute, Inc.; 1996.
- Peeters F, Nicolson NA, Berkhof J, Delespaul P, deVries M. Effects of daily events on mood states in major depressive disorder. *Journal of Abnormal Psychology* 2003;112:203–211. [PubMed: 12784829]
- Raudenbush S, Bryk A, Congdon R. HLM 6 Hierarchical linear and nonlinear. 2006
- Watson, D.; Clark, LA. The PANAS-X: Manual for the Positive and Negative Affect Schedule - Expanded Form. Iowa City: University of Iowa; 1994.
- Weissman, A.; Beck, AT. Development and validation of the Dysfunctional Attitude Scale: A preliminary Investigation. Paper presented at the Education Research Association; Toronto, Ontario, Canada. 1978.

Table 1
Means and Standard Deviations of Time 1 and Time 2 Variables

	Measure	Time 1 <i>M (SD)</i>	Time 2 <i>M (SD)</i>
Questionnaire Data	DAS	147.31 (37.71)	132.60 (36.58) [*]
	BDI-II	32.00 (9.16)	18.50 (13.25) [*]
Daily Events ^a	# Negative Events	2.10 (1.01)	2.08 (1.26)
	# Positive Events	1.33 (0.67)	1.52 (0.86) ^t
Daily Outcomes ^a	Sad Affect	2.94 (0.86)	2.41 (0.91) [*]
	Positive Affect	2.02 (0.75)	2.29 (0.81) [*]
	Negative Thoughts	12.87 (4.52)	10.16 (4.50) [*]

^a All daily variables were aggregated across the seven days of diary data collection.

^t
 $p < .10$.

^{*}
 $p < .01$.