Goal Achievement and Goal-related Cognitions in Behavioral Activation Treatment for Depression

Knittle, Keegan Phillip

2019-09

Knittle , K P , Gellert , P , Moore , C , Bourke , N & Hull , V 2019 , ' Goal Achievement and Goal-related Cognitions in Behavioral Activation Treatment for Depression ' , Behavior Therapy , vol. 50 , no. 5 , pp. 898-909 . https://doi.org/10.1016/j.beth.2019.01.005

http://hdl.handle.net/10138/305484
https://doi.org/10.1016/j.beth.2019.01.005

This is the accepted version of a manuscript accepted for publication in Behavior Therapy.
The published article is available from Elsevier at https://doi.org/10.1016/j.beth.2019.01.005

Goal Achievement and Goal-related Cognitions in Behavioral Activation Treatment for Depression

Keegan Knittle[1]*, Paul Gellert[2], Clair Moore[3], Natalie Bourke[3] & Victoria Hull[3]

[1] Faculty of Social Sciences; University of Helsinki; Helsinki, Finland

[2] Institute of Medical Sociology; Charité – Universitätsmedizin Berlin; Berlin, Germany

[3] Sunderland Psychological Wellbeing Service; Monkwearmouth Hospital; Sunderland, UK

* Corresponding Author:

Dr Keegan Knittle

Faculty of Social Sciences

University of Helsinki, PO Box 54;

00014 Helsinki, Finland

email: keegan.knittle@helsinki.fi

phone: +358 442354203

Declarations of interest: none

***Highlights*:**

- Response to behavioral activation (BA) treatments for depression is not uniform.
- Depressive symptoms improve during treatment following a quadratic trend.
- Goal achievement is not the primary driver of depressive symptom improvement in BA.
- Readiness, planning and action control predict greater goal achievement.
- Motivation and positive outcome expectancy predict subsequent depressive symptoms.

The published version of this article is available from Elsevier at https://doi.org/10.1016/j.beth.2019.01.005

Abstract

This study investigates the extent to which achieving goals during behavioral activation (BA) treatment predicts depressive symptom improvement, and whether goal-related cognitions predict goal achievement or treatment response. Patients (n=110, mean age 37.6, 54% female) received low-intensity cognitive behavioral therapy for depression, which included setting up to three behavioral goals in each of three BA-focused sessions (i.e. 9 goals per patient). Patients completed items from the Self-Regulation Skills Battery to assess goal-related cognitions and goal achievement for these goals, and depressive symptoms were assessed weekly with the PHQ-9. Multi-level models investigated the relationships between goal-related cognitions, goal achievement and depressive symptoms. Depressive symptoms improved curve-linearly during treatment (B=0.12, p<.001), but were not predicted by contemporaneous or time-lagged goal achievement. While cumulative goal achievement predicted end-of-treatment levels of depressive symptoms (r=-.23; p<.01), this relationship became nonsignificant after controlling for baseline values. Readiness, planning and action control predicted greater goal achievement, whereas greater goal ownership predicted less goal achievement (all p<.05). Motivation and outcome expectancy were related to subsequent, but not contemporaneous, improvements in depressive symptoms (all p<.05). This study indicates the importance of goal-related cognitions in BA treatments, and future research should investigate potential moderators of the relationships between goal-related cognitions, goal achievement and improvements in depressive symptoms.

Keywords: Behavioral activation, depression, goal achievement, self-regulation

Declarations of interest: none

Introduction

Major depressive disorder (MDD) affects around 6% of people in the United Kingdom at some point during their lives (Smith et al., 2013), and is hallmarked by depressed mood, loss of interest and enjoyment of usual activities, reduced energy and decreased activity (American Psychiatric Association, 2013). A person with depression may also commonly experience feelings of guilt, hopelessness, worthlessness, problems with sleep, concentration and memory, irritability, tiredness, changes in appetite, and suicidal thoughts (American Psychiatric Association, 2013). These depressive symptoms are also present at lower levels among individuals in the general population not meeting the criteria for MDD (Castro-Costa et al., 2007). Depressive symptoms can influence individuals' abilities to work and engage in family life, and thus present a societal cost of around £9 billion annually in the UK alone (Thomas & Morris, 2003). Identifying and optimizing cost-effective treatments for depression can help to conserve healthcare resources allocated to treating psychological conditions and improve public health.

Multiple treatment options exist for MDD and depressive symptoms, including both psychological and pharmacological therapies recommended by the UK National Institute for Health and Care Excellence (NICE; Pilling et al., 2009). In the UK, the economic need to treat depression by increasing access to evidenced-based psychological treatments has been recognized and specified by the National Health Service (NHS) via the Improving Access to Psychological Therapies (IAPT) program (UK Department of Health, 2008). Over 900,000 people now access IAPT services in England each year, and treatments for depression are being continually optimized to improve cost-effectiveness.

The IAPT program includes several treatments for depression, including Low-Intensity Cognitive Behavioral Therapy (LICBT); a short-term talking treatment which utilizes the principles and interventions of Cognitive Behavioral Therapy (CBT). Within

LICBT, behavioral activation (BA) techniques often play a key role. BA is itself a recommended treatment for mild to moderate depression, and its basic conceptual foundation can be traced back to the 1970s (Lewinsohn, 1974; Lewinsohn & Graf, 1973). Briefly described, BA involves setting routine, pleasurable and necessary goals to help individuals (re-)establish adaptive behavioral routines, receive positive reinforcement for their behavioral efforts, and to maintain control over their own personal affairs. Pursuing such goals increases the chance that an individual will encounter sources of positive reinforcement from the environment, and lead to sustained patterns of behavior (Jacobson, Martell & Dimidjian, 2001). Lovell and Richards (2008) describe BA as a way for patients to 'act their way out of depression.'

Within BA treatments, goal setting should be collaborative, and both short- and long-term goals should be delineated. Goals should also be formulated such that they are consistent with patients' values (Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014). Vague goals such as 'feel better' or 'get back to being myself' need to be worked through to identify concrete, short-term behavioral goals which can be concretely planned to help achieve these longer-term aims. This differs from other CBT components in that the focus is on action and concrete behaviors, as opposed to cognitions or mood.

Cumulatively, BA interventions have large effects on depressive symptoms (Ekers et al., 2014), and in individual trials, the effects of BA are comparable to those of cognitive therapy and antidepressant medications (Dimidjian et al., 2006; Dobson et al., 2008). Although BA is effective, not all individuals respond to BA treatment uniformly. While some individuals make sudden gains early in treatment, which have been linked to better treatment outcomes overall (Lewis, et al., 2012), other individuals receiving BA treatment do not achieve remission (Ekers et al., 2014). Several potential moderators of BA treatment effectiveness have been hypothesized, including pre-treatment levels of depressive

symptoms, cognitions related to participation and treatment 'buy-in' (Jacobson et al., 1996), and dysfunctional cognitive styles (Hunnicutt-Ferguson et al., 2012). While there is some evidence that cognitive changes precede improvement in depressive symptoms temporally (Ryan, 2013), cognitive changes have not been demonstrated to moderate improvements in depressive symptoms over the course of BA treatment (Andrusyna, 2007; Hunnicutt-Ferguson et al., 2012). Additionally, improvements in depressive symptoms have been suggested to occur within BA due to relative increases in reinforcement for adaptive versus depressive behaviors (Hopko, Lejuez, Ruggiero & Eifert, 2003). As such, it may be necessary to look beyond cognitive variables to identify moderators of the effectiveness of BA which could contribute to more-targeted and more effective BA interventions for depression.

Although BA treatment focuses on behavioral initiation and goal striving, no studies have yet investigated the impact of numerous variables described in behavioral theories which could potentially moderate BA effectiveness. Behavioral theories such as self-regulation theory (Maes & Karoly, 2006) and control theory (Carver & Scheier, 1982) propose that all behavior is goal directed, and that individuals' perceptions of their own goal pursuit can influence well-being. The hallmark of successful goal pursuit is the extent to which individuals perceive that they have achieved their goals. In a previous longitudinal study, individuals' self-rated goal achievement was shown to predict lower levels of pain and greater levels of physical and mental quality of life, even after accounting for the effects of behavior (Knittle et al., 2011). As BA assumes that re-engaging in behavior is often accompanied by improvements in depressive symptoms, goal achievement seems worthy of investigation as an addition to models predicting BA treatment response. Indeed, previous research indicates that homework completion (Busch, Uebelacker, Kalibatseva & Miller, 2010) and treatment compliance (Ryba, Lejuez & Hopko, 2014), constructs similar to goal achievement, are related to outcomes in behavioral activation treatments for depression,

although these studies were conducted among very small samples of 12 and 23 patients respectively.

Beyond goal achievement, self-regulation theory posits other variables that are related to the goal striving process. Goal ownership (i.e., the extent to which one sets his or her goals autonomously as opposed to having them come from an external source) is proposed to have positive effects on outcomes, and lead to changes in behavior that are better maintained over time (Deci & Ryan, 2008). Outcome expectancies, or what an individual expects will happen if a goal is achieved, are positively associated with goal striving and behavioral outcomes, and are present other behavioral theories (e.g. the theory of planned behavior (Ajzen, 1991) and the health action process approach (Schwarzer, 2008)). As these goal-related cognitions each predict behavior and goal achievement, adding treatment elements to BA to target these could increase goal achievement and, potentially, BA treatment efficacy. The contributions of goal-related cognitions to goal achievement and improvements in depressive symptoms have not previously been investigated among patients with depressive symptoms however.

To address these gaps in the literature, this study sought to model the course of improvement in depressive symptoms over the course of BA treatment, examine the relationship between self-rated goal achievement and improvement in depressive symptoms, and examine how goal-related cognitions derived from self-regulation theory relate to goal achievement and improvement in depressive symptoms.

Methods

This longitudinal study was embedded in standard care, and investigated goal achievement and goal cognitions related to the goals patients set during the BA portion of LICBT treatment for depression. This study was granted a favorable decision by the NHS Wearside Ethical Review Board, and study data were collected between 2013 and 2015.

Participants

Study participants were recruited from individuals who attended the Sunderland Psychological Wellbeing Service at Monkwearmouth Hospital with a primary complaint of at least mild levels of depressive symptoms as assessed by the patient health questionnaire (PHQ-9; Kroenke & Spitzer, 2002) (PHQ-9 score of >= 10). Additionally, to be eligible for inclusion, patients had to be at least 18 years of age and have been judged to not be at imminent risk of self-harm during the standard triage procedure.

Procedures

Sample size calculations were conducted a priori using GPower 3 software (Faul, Erdfelder, Lang, & Buchner, 2007). Based on an expected effect size of r = 0.31 for the relationship between goal achievement and improvements in depressive symptoms (Knittle et al., 2011), specifying a linear regression model with eight predictors (i.e., goal achievement, goal-efficacy, planning, self-monitoring, importance, motivation, outcome expectancies, attention and emotion control), 80% power and accounting for a dropout rate of 10%, a sample size of 109 participants was indicated.

All patients who attended the Sunderland Psychological Wellbeing Service, who elected for LICBT treatment (which includes BA), and who met the inclusion criteria were approached about participation in the study after completing a telephone triage session. Patients were mailed an information sheet fully detailing the study procedures. Upon arriving for their first treatment session, patients were asked whether they were interested in participating in the study and could ask questions about the research. Patients who wished to participate then provided written informed consent and enrolled in the study. Enrolled patients followed usual care LICBT treatment for their depressive symptoms (Richards & Whyte, 2009; Bennett-Levy et al., 2010).

Once patients began the BA portion of LICBT treatment (most commonly in session 1 or 2), clinicians assisted patients in setting (up to) three routine, necessary and/or pleasurable goals which were in line with participants' values (Lejuez, Hopko, Acierno, Daughters & Pagoto, 2011). Patients wrote these goals on a goal sheet that they could take home after the session. After each BA session, patients filled out questionnaires assessing their cognitions related to the goals they had set in the session (i.e. importance, readiness, motivation, outcome expectancies, goal efficacy, goal importance, and whether it was a new goal or a restructured goal from a previous session).

Upon arriving for the next session, patients filled in a questionnaire about the goals they had set in the previous session, this time assessing progress toward those goals and actions they took when pursuing them (i.e., goal progress/achievement, effort expended toward the goal, satisfaction with goal progress, gains made as a result of pursuing the goal, satisfaction with those gains, the extent to which they made plans to achieve the goal, the extent to which they monitored their progress toward the goal, and the extent to which the participant was able to control their attention and emotions when pursuing the goal).

This procedure was repeated for up to three treatment sessions, with participants filling in questionnaires about up to nine goals in total. After these three study-related BA sessions, participants continued to follow LICBT treatment as usual until a clinical decision was made to end treatment, typically after five to eight sessions in total. Patients were free to withdraw from the study at any time without affecting their treatment. The goal sheet and subsequent questionnaires assessing goal achievement and goal-related cognitions were the only portions of the study which were not part of usual care. Treating clinicians had no access to patients' questionnaire responses.

Measures

Depressive symptoms were assessed using the nine-item PHQ-9 (Kroenke & Spitzer, 2002) in the initial triage session, before the start of all treatment sessions (usually weekly), and at treatment discharge. The PHQ-9 is a standard validated measure of depressive symptom severity within NHS IAPT care (Clark, 2011), and is responsive to change over the course of treatments for depression (Titov et al., 2011).

After each BA session, participants rated (for each goal) their readiness for working on the goal, their motivation for working on the goal, and their expectations about how much achieving the goal would contribute to achieving their treatment goals and improving general mood (outcome expectancies). Each construct was assessed with a single item to which participants responded by placing a vertical line on a 100mm visual analog scale (VAS) with anchors of 'not at all' and 'completely' or 'extremely.' Single VAS items measuring motivation offer good within-subject reliability (Stubbs et al., 2000), and were utilized here to reduce participant response burden (Bergkvist & Rossiter, 2007).

Participants then rated their self-efficacy for achieving each goal (goal efficacy) and the extent to which each goal was their own (goal ownership) using subscales from the self-regulation skills battery (SRSB; Maes & De Gucht, 2008). The four goal efficacy items and three goal ownership items were answered on a 5-point Likert scale with anchors of "strongly disagree" and "strongly agree," and the mean of each scale was taken to represent the construct. These scales have shown good internal consistency in previous research (Maes & De Gucht, 2008; Huisman, Maes, De Gucht, Chatrou & Haak, 2010; Knittle et al., 2011)

Upon arriving for their next BA session, participants completed a questionnaire assessing their progress toward the goals they had set in the last session, which were listed at the top of the questionnaire. Goal achievement was assessed with a single item from the SRSB which read "How much progress have you made toward this goal?" Participants

responded by placing a vertical line on a 100mm VAS with anchors of 'I have not begun pursuing this goal' and 'I have achieved this goal' (Knittle et al., 2011).

The extent to which participants made plans to achieve each goal (goal planning), controlled their attention and emotions toward achieving each goal (action control), and monitored progress toward each goal (goal monitoring) were assessed with two-, three-, and one-item scales from the SRSB respectively. Each item answered on a 5-point Likert scale with anchors of "strongly disagree" and "strongly agree," and the mean of items was used to represent each construct. These scales have reliably assessed these self-regulation skills and shown good internal consistency in previous research (Knittle, De Gucht, Hurkmans, Vliet Vlieland & Maes, 2016).

At the end of treatment, participants completed the 12-item scale to assess therapeutic relationships in community mental health care settings (STAR-P; Mcguire-Snieckus, McCabe, Catty, Hansson & Priebe, 2007). Scores on the STAR-P measure were summed to create a total score.

Statistical Analyses

To examine time trends in goal achievement (Table 2, Model 1), time-varying goal achievement (level-1 variable; three goals per time point nested in each individual) was regressed on linear and quadratic time trends (level-2 variables) and covariates (age, gender, baseline PHQ-score; level-3 variables). Then, to examine the extents to which goal-related cognitions predicted goal achievement (Table 2, Model 2), goal achievement was additionally regressed on goal-related cognitions (readiness, motivation, outcome expectancies, goal efficacy, goal ownership, planning, and action control for each goal; level-1 variables) and type of goal (modified or same; level-1 variable). In total, 683 goals across three time points, nested within 110 individuals, were included in these analyses, and non-significant time trends were excluded from the final models.

To examine time trends in depressive symptoms (Table 3, Model 1), PHQ-9 scores (level-1) were regressed on linear and quadratic time trends (level-1 variables) and covariates (age, gender; level-2 variables). In these analyses, time was centered at the end of treatment and was coded -7 (baseline), -5 (week 2), -4 (week 3), -3 (week 4), and 0 (end of treatment). To examine the extents to which goal achievement and goal-related cognitions predicted contemporaneous improvements in depressive symptoms (Table 3, Model 2), time-varying PHQ-9 scores (level-1 variable) were additionally regressed on the sum of goal achievement scores at each time point (level-1 variable), goal cognitions (readiness, motivation, outcome expectancies, goal efficacy, goal ownership, planning, and action control; level-1 variables) and type of goal (modified, same; the value of the goal with highest priority has been used; level-1 variables). Finally, to examine the extents to which goal achievement and goal-related cognitions predicted subsequent improvements in depressive symptoms (Table 3, Model 3), Model 2 was re-specified, but with independent variables lagged to a factor of -1. Analyses predicting depressive symptoms included 230 PHQ-observations across five time points nested in 110 individuals. In these analyses, level-1 variables refer to time-varying cognitions and depression scores, whereas level-2 variables refer to individual level variables. This level structure differs from that used in the models predicting goal achievement.

Random-effects models were specified in investigating all research questions, and all data analyses were conducted with MIXED procedure in SPSS v22 (IBM, 2013) using REstricted Maximum Likelihood estimator, which accommodates for study drop out by considering all assessed observations when estimating the model. Unrestricted (UN) variance-covariance matrices have been used to allow for correlation of intercept and slope. Random intercepts, random linear and quadratic slopes were specified, and non-significant linear time trends were not included in the final models. For models not including time trends, the covariance structure was changed to identity (ID). All dichotomous variables

were coded as present = 1; absent = 0. Effect sizes (β) and confidence intervals were estimated in a consecutive step by z-standardizing (mean = 0; SD = 1) all predictor and outcome variables. These standardized values have a theoretical range from -1 to 1, where 0 denotes no effect.

Results

Patient Characteristics and Clinical Outcomes

In total, 180 patients from the Sunderland Psychological Wellbeing Service were approached about participation in the study during triage sessions, and 113 met the inclusion criteria and provided informed consent to participate. Three of those 113 individuals did not provide any data related to goal pursuit or achievement and were excluded from the analyses, leaving a final sample of 110 (Figure 1). The final sample was 53.6% female, 98% white British, and had a mean age of 37.6 (SD = 13.6) years. At treatment intake, the mean score on the PHQ-9 was 17.0 (SD = 4.5), falling in the category of 'moderately severe' depressive symptoms. Most patients (n = 64; 58.2%) presented with a depressive episode, 31 (28.2%) presented with mixed anxiety and depressive disorder, while 15 (13.6%) presented with recurrent depressive disorder. Twenty-two patients reported comorbidities, including musculoskeletal conditions (n = 7), gastrointestinal conditions (n = 6), chronic pain (n = 4), diabetes (n = 4) and asthma (n = 3). Sixty-three patients (50.9%) were taking antidepressant medications, and eight (7.2%) reported concurrent substance abuse (alcohol and/or cannabis).

Over the course of treatment, 15 participants dropped out of the study, but where permission was granted from participants, data already collected remained in the analyses. Reasons given for dropping out of the study included early withdrawal from treatment (n = 10), switching to phone-based, workplace-based or self-help treatment (n = 3), referral to crisis team (n = 1), and found the study distracted from their treatment (n = 1). There were no significant differences between dropouts and treatment completers on baseline PHQ score,

gender or age (all p >.05). Participants in the study set a total of 697 goals out of a possible 990, indicating a rate of 70.4% compliance with goal setting.

At the end of LICBT treatment, the mean PHQ-9 score was 8.54 (SD = 5.44), which falls in the 'mild' depressive symptoms category. In total, 66 patients (60.0%) had PHQ scores below 10 at the end of treatment, and 50 (45.5%) met the criteria for clinical improvement in depressive symptoms (i.e., end of treatment score below 10 and PHQ improvement of at least 5 points; McMillan, Gilbody & Richards, 2010). Furthermore, the therapeutic relationship was very good, with a mean STAR-P value of 45.11 (SD = 3.66).

Models Predicting Goal Achievement

Goal achievement remained relatively stable across the three weeks of BA treatment (linear trend: β = -.17 CI [-.58, .24]; *p* =.418) when controlling for age, gender and PHQ-score at baseline (Table 2, Model 1). Random variation of the level of goal achievement across individuals was non-significant (*Intercept Var* = 157.76; *p* = .101). Age was negatively related to goal achievement (β = -.14 CI [-.27, -.00]; *p* =.045).

When adding goal cognitions to the model (Table 2; Model 2), readiness (β = .10 CI [-.06, .27]; *p* = 0.015), planning (β = .05 CI [-.08, .18]; *p* = 0.023), and action control (β = .71 CI [56, .87]; *p* < 0.001) were positively associated with goal achievement. Conversely, goal ownership was negatively related to goal achievement (β = -.10 CI [-.21, .02]; *p* <.001). No other goal-related cognitions were significantly associated with goal achievement.

Models Predicting Depressive Symptoms

When examining improvement in depressive symptoms over the seven-week course of treatment, a significant quadratic trend emerged (β = .81 CI [.24, 1.38]; *p* <.001) (see Table 3, Model 1 and Figure 2).

There was a significant random intercept (*Var* = 22.15; *p* <.001) and quadratic time trend (*Slope Var* = 0.04; *p* <.05) variation across individuals, with intercept and time being

negatively correlated (*Cov quadratic time and intercept* = -0.64; p <.01). When summed across the three goals set within each time point, goal achievement did not predict concurrent or subsequent depressive symptoms (Table 3, Models 2 and 3). However, when examining bivariate associations, greater total goal achievement (summed across all goals and time points) was significantly associated with level of depressive symptoms at the end of treatment (β = -.23, CI [-.46, .00]; p <.05), although this relationship became nonsignificant after controlling for baseline depressive symptoms.

Contrary to our expectations, in a model examining concurrent associations of cognitions and depression (Table 3, Model 2), no goal-related cognitions significantly predicted improvements in depressive symptoms. Only a trend for outcome expectancy emerged (β = -.11, CI [-.23, .01]; p < .10). However, in a time-lagged model (Table 3, Model 3), motivation (β = -.18, CI [-.36, -.01]; p =.042) and outcome expectancy (β = -.20, CI [-.34, -.07]; p =.004) significantly predicted depressive symptoms one time point later, and a trend between self-monitoring and subsequent improvements in depressive symptoms also emerged (β = -.16, CI [-.33, .01]; p =.078).

Discussion

Goal Achievement and Depressive Symptom Improvements

This study is the first to quantitatively examine the extent to which achieving goals set over the course of BA treatment for depression predicts improvements in depressive symptoms. When modeled over the course of LICBT treatment, no significant concurrent or time-lagged relationships were shown between goal achievement and depressive symptoms. While greater total goal achievement over the first three weeks of BA treatment was associated with lower levels of depressive symptoms at the end of treatment, this relationship became non-significant after controlling for baseline levels of depressive symptoms. This could hint at the possibility of a threshold for goal achievement which corresponds with the

likelihood of depressive symptom reductions over the course of treatment. However, it could also indicate that individual factors (e.g., existing level of depressive symptoms when setting goals), non-specific treatment factors (e.g., social contact in treatment session) or congruence between behavioral goals and patient values may better explain week-on-week improvements in depressive symptoms than achievement itself (Ilardi & Craighead, 1994; Lam, 2012). The possibility that pre-existing depressive symptoms limit an individual's ability to set achievable goals should also be considered. These findings lend only limited support to the hypothesized importance of goal achievement in BA segments of low-intensity CBT treatments, and further research is needed to untangle the relationships between goal pursuit, achievement, sources of reinforcement (Jacobson et al., 2001) and treatment outcomes.

This study also showed that depressive symptoms within this sample improved over the course of BA treatment following a quadratic trend, with the greatest improvements in depressive symptoms occurring early in treatment. This corroborates findings from an internet-based CBT program for depression, which also demonstrated quadratic improvement in depressive symptoms over the course of treatment (Sunderland, Wong, Hilvert-Bruce & Andrews, 2012). Furthermore, the negative intercept-time covariances in this model indicate that individuals who began treatment with higher levels of depressive symptoms improved more rapidly at the start of treatment, potentially due to regression to the mean. As previous studies have successfully classified patients' improvement trajectories over the course of treatment (i.e., non-responders, early responders and late responders) (Uher et al., 2010), future studies may therefore wish to investigate differences in goal setting, goal striving and goal achievement across these different classes of individuals at different time points over the course of treatment.

In summary, goal achievement is likely not a primary explanatory factor of treatment response in BA treatments for depression, and the act of goal pursuit itself might instead be a

mechanism within BA treatments for depression. While clinicians should continue to foster goal achievement during treatment, other treatment-related factors not addressed in this study may also play roles in alleviating depressive symptoms or moderate the relationship between goal achievement and treatment response.

Goal-Related Cognitions

In this sample, several characteristics of goal pursuit derived from self-regulation theory (Maes & Karoly, 2006) were associated with greater levels of goal achievement or improvements in depressive symptoms, including action planning, action control and self-monitoring. Numerous meta-analyses and empirical studies have highlighted the relationship between these self-regulation techniques and actualizing health behaviors in various domains (Michie, Abraham, Whittington, McAteer & Gupta, 2009). Additionally, interventions utilizing more of these self-regulation techniques have been shown to produce greater improvements in depressive symptoms, anxiety and well-being outcomes than interventions utilizing fewer (Henrich et al., 2015; Knittle, Maes & DeGucht, 2010). As such, action control, action planning and self-monitoring should continue to be emphasized within LICBT treatments involving goal setting and goal striving processes.

An individuals' readiness to begin working on a goal also predicted the extent to which said goal was achieved. This is in line with research relating readiness to change to behavioral enactment of health (Bock, Marcus, Rossi & Redding, 1998) and learning behaviors (Cheon, Lee, Crooks & Song, 2012). However, this somewhat contrasts with our finding that personal ownership of a goal was inversely related to its achievement. In other words, the goals patients assessed as having been set in a more autonomous way were less likely to be achieved. Although autonomous goal selection is beneficial among healthy individuals (Deci & Ryan, 2008), it may be harmful among individuals with depressive symptoms who may select goals that are aversive, difficult, or misaligned with values and

sources of reinforcement (Lejuez et al., 2011). Taken together, these findings are congruent with BA treatment manuals, and indicate that patients' eagerness to work on goals in a particular domain should be encouraged, but that the specific content of goals should be set in collaboration with therapists so that goals remain realistic with respect to a patient's current level of functioning.

As the goal-related cognitions assessed in this study were nested within goals, we did not have any *a priori* hypotheses about which might be most strongly associated with depressive symptom improvements. Our analyses indicated that an individuals' outcome expectancies about achieving their goals and their motivation for working on their goals were both associated with subsequent (time-lagged) improvements in depressive symptoms. These findings corroborate previous research which indicates that expectations about treatment outcomes lead to both greater engagement with treatments (i.e. motivation) and greater depressive symptom reduction (Meyer et al., 2002). However, as depressive symptoms are strongly associated with catastrophic thinking (i.e., the equivalent of lowered outcome expectations)(Martin & Dahlen, 2005), the reciprocal of this finding should also be considered. Future research should investigate the extent to which current levels of depressive symptoms affect goal setting, goal-related cognitions and goal pursuit, and whether they moderate the associations between goal-related cognitions and goal achievement.

Goal Characteristics

All goals investigated in this study were set collaboratively between patients and therapists following the same BA protocol, but the specifics of these goals nonetheless varied considerably. Goals ranged from concrete behavioral goals such as "walk the dog twice this week" and "get started on housework," to social goals such as "have coffee with a friend," to cognitive, treatment-related goals such as "feel better" or "stop being so hard on myself."

Such variations in goal content could have affected the likelihood of goal achievement, as well as the strength of the relationship between goal achievement and improvement in depressive symptoms. Existing literature has highlighted several domains of goal setting and goal achievement that could be considered as potential moderators of the achievement-depressive symptoms relationship.

First, high-level, abstract goals that are nonspecific, difficult to measure progress toward, and not necessarily achievable within a limited time frame (e.g. "Be a better person") have been found to be related to psychological distress and depressive symptoms (Emmons, 1992; Street, 2002). This could be because the inability to measure progress toward such abstract goals reduces opportunities for positive reinforcement related to goal progress. Additionally, even when an individual does take concrete steps toward 'being a better person' (e.g. by making a charitable donation), the impact of such one-time acts may be minimized or played down by the individual, despite such acts indicating progress to an outside observer. This discounting of goal progress might more often occur among depressed individuals with biases toward mood-congruent information (Dalgleish & Watts, 1990), and may have led to under-reporting of goal progress and achievement in this study.

Second, the value an individual has placed on his or her set goals may also moderate the link between goal achievement and depressive symptoms. Goals upon which an individual has placed an overly high value can result in problems with disengagement and an increased risk of depressive symptoms. This is especially so if an individual has constructed a goal hierarchy in which their happiness and well-being are contingent upon achieving some single specific goal that is currently not possible for an individual (Street, 2002). Furthermore, individuals with fewer important goals (i.e., goals related to one's ideal sense of self) are more prone to developing depression than individuals with more numerous important goals (Champion & Power, 1995). Clinicians should therefore work with

individuals to identify a multitude of important goals, and to ensure that these are balanced in terms of their relative importance to the individual.

Finally, the domain and framing of a goal may also affect the impact of goal achievement on depressive symptoms. Selecting and achieving goals related to intimacy and friendship may be more beneficial for well-being than achieving goals related to career progression or achievement (Emmons, 1992); and similarly, pursuing approach goals seems more beneficial for well-being than pursuing avoidance goals (Coats, Janoff-Bulman & Alpert, 1996). Framing goals in terms of achieving desired states, as opposed to avoiding undesired states, and encouraging goals with a social element may therefore help foster improvement and depressive symptoms and alleviate discouragement in the case of goal non-achievement.

Limitations

Several limitations of this study should be considered when interpreting the results. First, several factors, including problem-solving ability (D'Zurilla & Nezu, 2010), enhanced assertiveness, and improved social skills (McCullough, 2000), have been proposed to explain the working action of BA, but were not assessed in this study. These should be assessed as explanatory variables in future models investigating treatment factors associated with outcomes. Additionally, goal achievement in this study was measured with a single self-reported item, which was not checked against actual behavior. As depressed individuals are often biased toward mood-congruent information, their ratings of goal achievement may underestimate goal achievement compared to how that same progress would be assessed by an outside observer (Dalgleish & Watts, 1990). Future studies may therefore wish to utilize objective measures of goal achievement, or compare self-rated goal achievement to some objective behavioral measure. Finally, variation in goal content across individuals in the study may have affected treatment response, the likelihood of goal achievement and/or the

relationship between the two. Assessing fidelity within standard LICBT treatments for depression may therefore reveal additional reasons for patient nonresponse or non-achievement of goals (Godfrey, Chalder, Ridsdale, Seed & Ogden, 2007).

Clinical Implications

Clinicians utilizing BA treatments for depressed individuals should continue to work with patients to foster goal achievement. This should include techniques derived from behavioral theories, including concrete goal setting and action planning, self-monitoring of progress, and action control techniques designed to focus individuals' attention on achieving their behavioral goals. To further foster goal achievement, individuals' preferred domains of goal pursuit should be accounted for during goal setting, and clinicians should work with patients to ensure that set goals correspond with individuals' capabilities.

Conclusions

Self-assessed goal achievement during BA treatments for depression seems unrelated to concurrent or time-lagged symptom improvements. However, several goal-related cognitions (outcome expectancies, motivation and readiness) and goal pursuit strategies (action control, action planning and self-monitoring) seem to predict goal achievement and depressive symptom improvement. While fostering goal achievement is still an important aim of BA treatments, other factors related to goal pursuit likely contribute more substantially to treatment response. Further studies involving experimental designs or objective measures of goal achievement could lead to different conclusions regarding the hypothesized relationship between goal achievement and outcomes in BA treatments for depression.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179-211. doi: 10.1016/0749-5978(91)90020-T.

Andrusyna T.P. (2007). The mechanism and time course of sudden gains in behavioral activation treatment for depression (Unpublished doctoral dissertation). Northwestern University, Evanston, IL, USA.

Bennett-Levy, J., Richards, D., Farrand, P., Christensen, H., Griffiths, K., Kavanagh, D., ... & White, J. (Eds.). (2010). *Oxford guide to low intensity CBT interventions*. Oxford, UK: Oxford University Press.

Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of Marketing Research*, *44*(2), 175-184. doi:10.1509/jmkr.44.2.175.

Bock, B. C., Marcus, B. H., Rossi, J. S., & Redding, C. A. (1998). Motivational readiness for change: Diet, exercise, and smoking. *American Journal of Health Behavior*, *22*(4), 248-258.

Busch, A. M., Uebelacker, L. A., Kalibatseva, Z., & Miller, I. W. (2010). Measuring homework completion in behavioral activation. *Behavior Modification*, *34*(4), 310-329. doi: 10.1177/0145445510373384.

Carver, C. S., & Scheier, M. F. (1982). Control theory: A useful conceptual framework for personality–social, clinical, and health psychology. *Psychological Bulletin*, *92*(1), 111-135.

Castro-Costa, E., Dewey, M., Stewart, R., Banerjee, S., Huppert, F., Mendonca-Lima, C., ... & Tsolaki, M. (2007). Prevalence of depressive symptoms and syndromes in later life in

ten European countries. *The British Journal of Psychiatry*, *191*(5), 393-401. doi: 10.1192/bjp.bp.107.036772.

Champion, L. A., & Power, M. J. (1995). Social and cognitive approaches to depression: Towards a new synthesis. *British Journal of Clinical Psychology*, 34(4), 485-503. doi: 10.1111/j.2044-8260.1995.tb01484.x.

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers & Education*, *59*(3), 1054-1064. doi: 10.1016/j.compedu.2012.04.015.

Clark, D. M. (2011). Implementing NICE guidelines for the psychological treatment of depression and anxiety disorders: the IAPT experience. *International Review of Psychiatry*, *23*(4), 318-327. doi: 10.3109/09540261.2011.606803.

Coats, E. J., Janoff-Bulman, R., & Alpert, N. (1996). Approach versus avoidance goals: Differences in self-evaluation and well-being. *Personality and Social Psychology Bulletin*, *22*(10), 1057-1067. doi: 10.1177/01461672962210009.

Dalgleish, T. and Watts, F.N., 1990. Biases of attention and memory in disorders of anxiety and depression. *Clinical Psychology Review*, *10*(5), 589-604. doi: 10.1016/0272-7358(90)90098-U.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne*, *49*(3), 182-185. doi: 10.1037/a0012801.

Dimidjian, S., Hollon, S. D., Dobson, K. S., Schmaling, K. B., Kohlenberg, R. J., Addis, M. E., ... & Atkins, D. C. (2006). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the acute treatment of adults with major depression. *Journal of Consulting and Clinical Psychology*, *74*(4), 658-670. doi: 10.1037/0022-006X.74.4.658.

Dobson, K. S., Hollon, S. D., Dimidjian, S., Schmaling, K. B., Kohlenberg, R. J., Gallop, R. J., ... & Jacobson, N. S. (2008). Randomized trial of behavioral activation, cognitive therapy, and antidepressant medication in the prevention of relapse and recurrence in major depression. *Journal of Consulting and Clinical Psychology*, *76*(3), 468-477. doi: 10.1037/0022-006X.76.3.468.

D'Zurilla, T. J., & Nezu, A. M. (2010). Problem-solving therapy. In K.S. Dobson (Ed.), *Handbook of cognitive-behavioral therapies* (pp. 197-225). New York, NY: Guilford.

Ekers, D., Webster, L., Van Straten, A., Cuijpers, P., Richards, D., & Gilbody, S. (2014). Behavioural activation for depression; an update of meta-analysis of effectiveness and sub group analysis. *PLoS One*, *9*(6), e100100. doi: 10.1371/journal.pone.0100100.

Emmons, R. A. (1992). Abstract versus concrete goals: personal striving level, physical illness, and psychological well-being. *Journal of Personality and Social Psychology*, *62*(2), 292-300. doi: 10.1037//0022-3514.62.2.292.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175-191. doi: 10.3758/BF03193146.

Godfrey, E., Chalder, T., Ridsdale, L., Seed, P., & Ogden, J. (2007). Investigating the active ingredients of cognitive behaviour therapy and counselling for patients with chronic fatigue in primary care: developing a new process measure to assess treatment fidelity and predict outcome. *British Journal of Clinical Psychology*, *46*(3), 253-272. doi: 10.1348/014466506X147420.

Henrich, J. F., Knittle, K., De Gucht, V., Warren, S., Dombrowski, S. U., & Maes, S. (2015). Identifying effective techniques within psychological treatments for irritable bowel syndrome: a meta-analysis. *Journal of Psychosomatic Research*, *78*(3), 205-222. doi: 10.1016/j.jpsychores.2014.12.009.

Hopko, D. R., Lejuez, C. W., Ruggiero, K. J., & Eifert, G. H. (2003). Contemporary behavioral activation treatments for depression: Procedures, principles, and progress. *Clinical Psychology Review, 23*(5), 699-717. doi: 10.1016/S0272-7358(03)00070-9.

Huisman, S., Maes, S., De Gucht, V. J., Chatrou, M., & Haak, H. R. (2010). Low goal ownership predicts drop-out from a weight intervention study in overweight patients with type 2 diabetes. *International Journal of Behavioral Medicine, 17*(3), 176-181. doi: 10.1007/s12529-009-9071-3.

Hunnicutt-Ferguson, K., Hoxha, D., & Gollan, J. (2012). Exploring sudden gains in behavioral activation therapy for major depressive disorder. *Behaviour Research and Therapy, 50*(3), 223-230. doi: 10.1016/j.brat.2012.01.005.

Ilardi, S. S., & Craighead, W. E. (1994). The role of nonspecific factors in cognitive- behavior therapy for depression. *Clinical Psychology: Science and Practice, 1*(2), 138-155. doi: 10.1111/j.1468-2850.1994.tb00016.x.

Jacobson, N. S., Dobson, K. S., Truax, P. A., Addis, M. E., Koerner, K., Gollan, J. K., ... & Prince, S. E. (1996). A component analysis of cognitive-behavioral treatment for depression. *Journal of Consulting and Clinical Psychology*, *64*(2), 295-304. doi: 10.1037//0022-006X.64.2.295.

Jacobson, N. S., Martell, C. R., & Dimidjian, S. (2001). Behavioral activation treatment for depression: Returning to contextual roots. *Clinical Psychology: Science and Practice*, *8*(3), 255-270. doi: 10.1093/clipsy.8.3.255.

Knittle, K., Maes, S., & De Gucht, V. (2010). Psychological interventions for rheumatoid arthritis: Examining the role of self-regulation with a systematic review and meta- analysis of randomized controlled trials. *Arthritis Care & Research*, *62*(10), 1460-1472. doi: 10.1002/acr.20251.

Knittle, K., De Gucht, V., Hurkmans, E. J., Vlieland, T. P., Peeters, A. J., Ronday, H. K., &

Maes, S. (2011). Effect of self-efficacy and physical activity goal achievement on arthritis pain and quality of life in patients with rheumatoid arthritis. *Arthritis Care & Research, 63*(11), 1613-1619. doi: 10.1002/acr.20587.

Knittle, K., De Gucht, V., Hurkmans, E., Vliet Vlieland, T.P.M., & Maes, S. (2016). Explaining physical activity maintenance after a theory- based intervention among patients with rheumatoid arthritis: Process evaluation of a randomized controlled trial. *Arthritis Care & Research*, *68*(2), 203-210. doi: 10.1002/acr.22647.

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*, *32*(9), 1-7. doi: 10.3928/0048-5713-20020901-06.

Lam, R. W. (2012). Onset, time course and trajectories of improvement with antidepressants. *European Neuropsychopharmacology*, *22*(Supp. 3), S492-S498. doi: 10.1016/j.euroneuro.2012.07.005.

Lejuez, C. W., Hopko, D. R., Acierno, R., Daughters, S. B., & Pagoto, S. L. (2011). Ten year revision of the brief behavioral activation treatment for depression: revised treatment manual. *Behavior Modification*, *35*(2), 111-161. doi: 10.1177/0145445510390929.

Lewinsohn, P. M. (1974). A behavioral approach to depression. In R. J. Friedman & M. M. Katz (Eds.), *The psychology of depression: Contemporary theory and research.* Oxford, England: John Wiley.

Lewinsohn, P. M., & Graf, M. (1973). Pleasant activities and depression. *Journal of Consulting and Clinical Psychology*, *41*(2), 261-268. doi: 10.1037/h0035142.

Lewis, C. C., Simons, A. D., & Kim, H. K. (2012). The role of early symptom trajectories and pretreatment variables in predicting treatment response to cognitive behavioral therapy. *Journal of Consulting and Clinical Psychology*, *80*(4), 525-534. doi:10.1037/a0029131.

Lovell, K., & Richards, D. (2008). *A recovery programme for depression*. Manchester, UK: Rethink Mental Illness.

Maes, S., & De Gucht, V. (2008). Reliability and validity of the Self-regulation Skills Battery. *International Journal of Psychology, 43*(3), 710. doi: 10.1080/00207594.2008.10108487.

Maes, S., & Karoly, P. (2005). Self- Regulation assessment and intervention in physical health and illness: A review. *Applied Psychology*, *54*(2), 267-299. doi: 10.1111/j.1464-0597.2005.00210.x.

Magidson, J. F., Roberts, B. W., Collado-Rodriguez, A., & Lejuez, C. W. (2014). Theory-driven intervention for changing personality: Expectancy value theory, behavioral activation, and conscientiousness. *Developmental Psychology*, *50*(5), 1442-1450. doi: 10.1037/a0030583.

Martin, R. C., & Dahlen, E. R. (2005). Cognitive emotion regulation in the prediction of depression, anxiety, stress, and anger. *Personality and Individual Differences, 39*(7), 1249-1260. doi: 10.1016/j.paid.2005.06.004.

McCullough, J. P. (2000). The case of Katrina: Skating on thin ice. *Cognitive and Behavioral Practice, 7*(4), 510-514. doi: 10.1016/S1077-7229(00)80067-X.

Mcguire-Snieckus, R., McCabe, R., Catty, J., Hansson, L., & Priebe, S. (2007). A new scale to assess the therapeutic relationship in community mental health care: STAR. *Psychological Medicine*, *37*(01), 85-95. doi: 10.1017/S0033291706009299.

McMillan, D., Gilbody, S., & Richards, D. (2010). Defining successful treatment outcome in depression using the PHQ-9: a comparison of methods. *Journal of Affective Disorders, 127*(1), 122-129. doi: 10.1016/j.jad.2010.04.030.

Meyer, B., Pilkonis, P. A., Krupnick, J. L., Egan, M. K., Simmens, S. J., & Sotsky, S. M. (2002). Treatment expectancies, patient alliance, and outcome: further analyses from the National Institute of Mental Health Treatment of Depression Collaborative Research Program. *Journal of Consulting and Clinical Psychology*, *70*(4), 1051-1055. doi:

10.1037/0022-006X.70.4.1051.

Michie, S., Abraham, C., Whittington, C., McAteer, J., & Gupta, S. (2009). Effective techniques in healthy eating and physical activity interventions: a meta-regression. *Health Psychology*, *28*(6), 690-701. doi: 10.1037/a0016136.

Pilling, S., Anderson, I., Goldberg, D., Meader, N., Taylor, C., & Two Guideline Development Groups. (2009). Depression in adults, including those with a chronic physical health problem: summary of NICE guidance. *BMJ*, *339*, 1025-1027. doi: 10.1136/bmj.b4108.

Richards, D., & Whyte, M. (2009). *Reach out: National programme student materials to support the delivery of training for psychological wellbeing practitioners delivering low intensity interventions* (2nd ed.). London, UK: Mental Health Development Unit.

Ryan, E. T. (2013). Sudden gains and sudden losses in cognitive therapy for major depressive disorder (Unpublished doctoral dissertation). The Ohio State University, Columbus, OH, USA.

Ryba, M. M., Lejuez, C. W., & Hopko, D. R. (2014). Behavioral activation for depressed breast cancer patients: The impact of therapeutic compliance and quantity of activities completed on symptom reduction. *Journal of Consulting and Clinical Psychology*, *82*(2), 325-335. doi: 10.1037/a0035363.

Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology*, *57*(1), 1-29. doi: 10.1111/j.1464-0597.2007.00325.x.

Smith, D. J., Nicholl, B. I., Cullen, B., Martin, D., Ul-Haq, Z., Evans, J., ... & Hotopf, M. (2013). Prevalence and characteristics of probable major depression and bipolar disorder within UK Biobank: cross-sectional study of 172,751 participants. *PLoS One*, *8*(11), e75362. doi: 10.1371/journal.pone.0075362.

Street, H. (2002). Exploring relationships between goal setting, goal pursuit and depression: A review. *Australian Psychologist, 37*(2), 95-103. doi: 10.1080/00050060210001706736.

Stubbs, R. J., Hughes, D. A., Johnstone, A. M., Rowley, E., Reid, C., Elia, M., ... & Blundell, J. E. (2000). The use of visual analogue scales to assess motivation to eat in human subjects: a review of their reliability and validity with an evaluation of new hand-held computerized systems for temporal tracking of appetite ratings. *British Journal of Nutrition*, *84*(4), 405-415. doi: 10.1017/S0007114500001719.

Sunderland, M., Wong, N., Hilvert-Bruce, Z., & Andrews, G. (2012). Investigating trajectories of change in psychological distress amongst patients with depression and generalised anxiety disorder treated with internet cognitive behavioural therapy. *Behaviour Research and Therapy*, *50*(6), 374-380. doi: 10.1016/j.brat.2012.03.005.

Thomas, C. M., & Morris, S. (2003). Cost of depression among adults in England in 2000. *The British Journal of Psychiatry*, *183*(6), 514-519. doi: 10.1192/bjp.183.6.514.

Titov, N., Dear, B. F., McMillan, D., Anderson, T., Zou, J., & Sunderland, M. (2011). Psychometric comparison of the PHQ-9 and BDI-II for measuring response during treatment of depression. *Cognitive Behaviour Therapy*, *40*(2), 126-136. doi: 10.1080/16506073.2010.550059.

Uher, R., Muthén, B., Souery, D., Mors, O., Jaracz, J., Placentino, A., ... & Aitchison, K. J. (2010). Trajectories of change in depression severity during treatment with antidepressants. *Psychological Medicine*, *40*(8), 1367-1377. doi: 10.1017/S0033291709991528.

UK Department of Health. (2008). *Improving access to psychological therapies implementation plan: National guidelines for regional delivery.* London, UK: Crown.

Table 1. *Descriptive Statistics of the Sample over the Course of the Study*

	Baseline	Week 1	Week 2	Week 3	Week 4	End of Treatment
STAR-P	-	-	-	-	-	45.11 (3.66)
Outcomes						
PHQ-9	17.04 (4.51)	16.70 (5.03)	13.97 (5.62)	10.96 (5.71)	9.85 (5.89)	8.54 (5.44)
Goal Achievement [b]	-	-	58.03 (35.54)	61.02 (34.95)	62.86 (34.54)	
Goal cognitions						
Readiness [a]	-	-	60.86 (26.36)	71.56 (23.79)	73.72 (22.85)	-
Motivation [a]	-	-	58.64 (28.56)	71.33 (23.89)	73.53 (23.76)	-
Outcome Expectancies [a]	-	-	62.20 (24.94)	72.49 (20.43)	75.64 (20.92)	-
Goal Efficacy [a]	-	-	15.67 (3.01)	16.52 (2.49)	16.20 (2.15)	-
Goal Ownership [a]	-	-	12.73 (2.22)	12.92 (1.99)	12.67 (1.71)	-
Goal Planning [b]	-	-	7.35 (1.77)	7.55 (1.73)	7.68 (1.57)	-
Action Control [b]	-	-	3.11 (1.07)	3.30 (1.16)	3.36 (1.07)	-
Self-monitoring [b]	-	-	3.10 (1.10)	3.33 (1.18)	3.38 (1.05)	-

Note. All values are M(SD) unless otherwise indicated. [a] = Value measured before goal pursuit began (i.e. goals set in week 2 sessions were pursued between week 2 and week 3 measurements, and responses for these variables were coded as time = week 3 to correspond with the assessment of goal achievement in the analyses); [b] = Value measured after one week of goal pursuit (i.e. for goals set in week 2 sessions, values were assessed in the week 3 measurements and were coded as time = week 3).

Table 2
Regression Models Predicting Goal Achievement

	Model 1 - Time trend		*Model 2 - Prediction by goal cognitions*	
	B (SE)	*β (95%CI)*	*B (SE)*	*β (95%CI)*
Fixed effects				
Covariates				
Intercept	**59.31 (12.77)*** **	**.03 (-.11, .17)**	4.07 (16.1)	.05 (-.04, .14)
Time (linear)	-[a]	-[a]	-[a]	-[a]
Time (quadratic)	-[a]	-[a]	-[a]	-[a]
Age	**-0.36 (0.18)***	**-.14 (-.27, -.00)**	**-0.22 (0.93)***	**-.08 (-.17, .01)**
Gender (men)	-9.27 (5.04)	-.13 (-.27, .01)	-3.79 (2.69)	-.05 (-.15, .05)
PHQ-9 (baseline)	1.03 (0.57)‡	.13 (-.01, .28)	0.49 (0.30)	.07 (-.03, .16)
Goal cognitions				
Goal Priority			-0.32 (0.97)	-[b]
Readiness			**0.16 (0.07)***	**.10 (-.06, .27)**
Motivation			-0.11 (0.06)‡	-.10 (-.25, .06)
Outcome expectancy			-0.08 (0.06)	-.05 (-.17, .06)
Goal efficacy			0.60 (0.42)	.02 (-.09, .13)

Goal ownership			**-1.75 (0.54)*** **	**-.10 (-.20, .01)**
Goal planning			**1.64 (0.72)***	**.04 (-.07, .18)**
Action control			**20.92 (1.45)*** **	**.71 (.56, .87)**
Self-monitoring			1.60 (1.38)	-.02 (-.17, .14)
Type of goal				
Modified goal	12.13 (6.70)‡	.12 (-.01, .25)	0.56 (2.49)	.02 (-.08, .11)
Same goal	4.02 (5.74)	.04 (-.07, .14)	-0.51 (2.46)	-.03 (-.11, .05)
Random effects				
-2 RLL	2292.99		6135.07	
AIC	2296.99		6139.07	
Intercept variance	157.76		**99.27*** **	
Residual variance	**1031.30*** **		**419.32*** **	

Note. Unrestricted variance-covariance matrices have been used. For time trend, weeks 2, 3, and 4 were used. Included observations in the final longitudinal analyses: model 1 = 691; model 2 = 683. Two-sided test ‡ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. [a] non-significant linear and quadratic time trends were not included in the final models, and the covariance structure has been changed to identity (ID). [b] was not estimated by the model due to redundancy. -2RLL=-2 Restricted Log Likelihood. AIC Akaike's Information Criterion.

Table 3
Regression Models Predicting Depressive Symptoms

	Model 1 - Time trend		*Model 2 - Concurrent associations*		*Model 3 - Time-lagged associations*	
	B (SE)	*β (95%CI)*	*B (SE)*	*β (95%CI)*	*B (SE)*	*β (95%CI)*
Covariates						
Intercept	**8.87 (1.26)*** **	**-.49 (-.69, -.30)**	**20.28 (6.93)** **	**-.46 (-.66, -.25)**	**16.35 (3.77)*** **	**-.49 (-.69, -.28)**
Time (linear)	**-0.49 (0.22)***	**-.39 (-.70, -.08)**	5.63 (3.38)	-.31 (-.68, .07)	-[a]	-[a]
Time (quadratic)	**0.12 (0.03)*** **	**.81 (.24, 1.38)**	**0.92 (0.43)***	**.77 (.06, 1.48)**		
Age	-0.01 (0.77)	-.01 (-19, .15)	-0.00 (0.04)	-.00 (-.17, .16)	0.05 (0.04)	.11 (-.08, .30)
Gender (men)	0.06 (0.03)	.03 (-.15, .20)	0.18 (1.09)	.01 (-.15, .18)	0.51 (1.30)	.04 (-.17, .25)
Goal achievement						
Goal achievement			-0.00 (0.00)	-.00 (-.11, .10)	0.01 (0.00)	.07 (-.04, .18)
Goal cognitions						
Readiness			0.01 (0.02)	.03 (-.13, .19)	0.01 (0.02)	.05 (-.15, .26)
Motivation			-0.00 (0.02)	-.00 (-.15, .15)	**-0.04 (0.02)***	**-.18 (-.36, -.01)**
Outcome expectancy			-0.03 (0.02)‡	-.11 (-.23, .01)	**-0.05 (0.02)** **	**-.20 (-.34, -.07)**
Goal efficacy			0.04 (0.13)	.02 (-.09, .12)	-0.16 (0.016)	-.07 (-.20, .07)
Goal ownership			0.12 (0.17)	.04 (-.07, .15)	0.05 (0.22)	.01 (-.12, .15)
Goal planning			-0.17 (0.23)	-.05 (-.17, .08)	-0.13 (0.26)	-.03 (-.17, .10)

Action control		-0.14 (0.44)	-.03 (-.18, .13)	0.75 (0.48)	.13 (-.03, .30)
Self-monitoring		-0.04 (0.40)	-.01 (-.15, .13)	-0.89 (0.50)‡	-.16 (-.33, .01)
Type of goal					
Modified goal		-0.31 (0.80)	-.02 (-.10, .07)	-0.05 (0.88)	-.00 (-.10, .09)
Same goal		0.08 (0.74)	.00 (-.07, .08)	0.66 (0.79)	.04 (-.06, .13)
Random effects					
-2 RLL	3126.79	1339.59		787.89	
AIC	3140.79	1347.59		791.89	
Intercept variance	**22.15*** **	50.29‡		**26.41*** **	
Time variance	**1.70***	1.26		-[b]	
Time (qdr) variance	**0.04***	-[b]		-[b]	
Residual variance	**8.59*** **	**6.89*** **		**5.01*** **	
Intercept time covariance	-2.25‡	5.78		-[b]	
Intercept time (qdr) covariance	**-0.64****	-[b]		-[b]	

Note. Unrestricted variance-covariance matrices have been used. Time trends were centered at end of treatment, such that baseline = -7, week 2 = -5, week 3 = -4, week 4 = -3, and end of treatment = 0. Included observations in the final longitudinal analyses: model 1=551; model 2= 229; model 3=134. Two-sided test ‡ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. [a] non-significant linear time trend not included in the final model, thus, covariance structure has been changed to identity (ID). [b] fixed to zero. -2RLL=-2 Restricted Log Likelihood. AIC Akaike's Information Criterion.

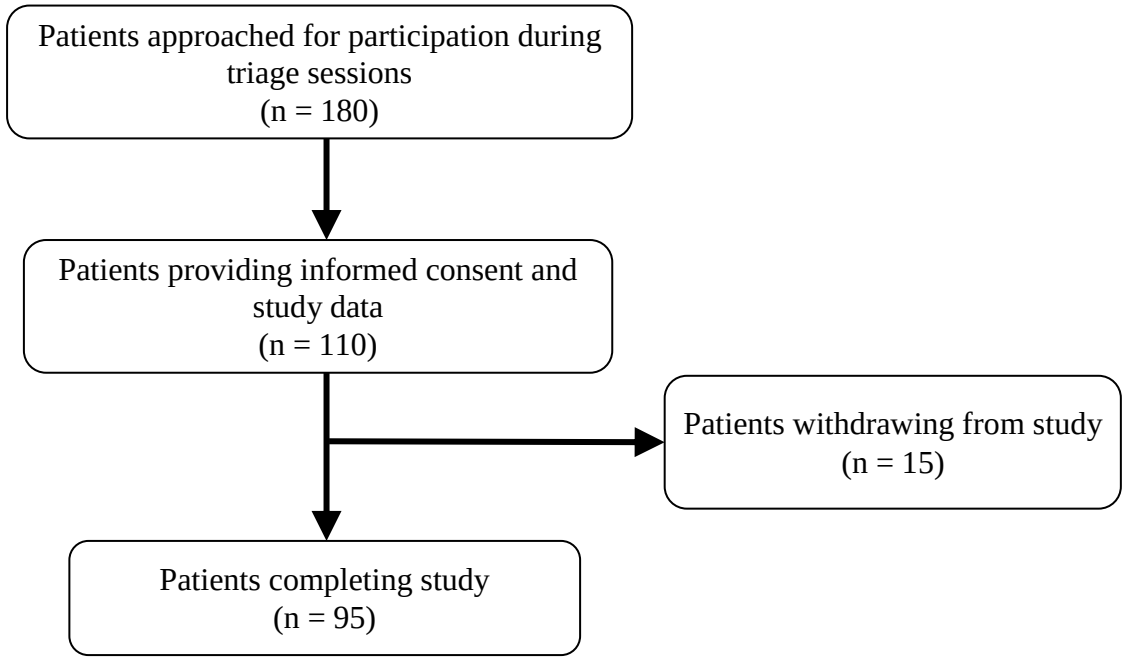

Figure 1. Flow of participants through the study.

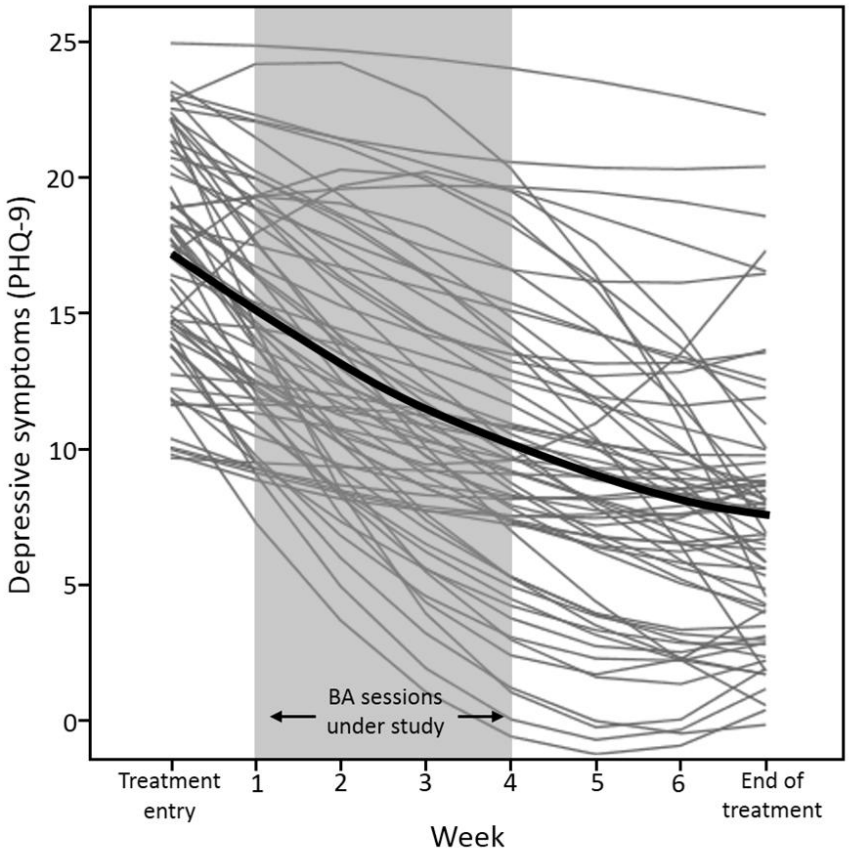

Figure 2. Trajectory of depressive symptoms over the course of BA treatment. In the analyses, treatment entry was coded as -7 and end of treatment was coded as 0, allowing for the models to have intercepts which relate to depressive symptom scores at the end of treatment.