1-24-2017

Increasing Valued Behaviors Precedes Reduction in Suffering: Findings from a Randomized Controlled Trial Using ACT

Andrew T. Gloster
University of Basel

Jens Klotsche
German Rheumatism Research Centre Berlin

Joseph Ciarrochi
Australian Catholic University

Georg Eifert
Chapman University, geifert@chapman.edu

Rainer Sonntag
Private Practice

See next page for additional authors

Recommended Citation

Gloster, A. T., Klotsche, J., Ciarrochi, J., Eifert, G., Sonntag, R., Wittchen, H.-U., & Hoyer, J. (2017). Increasing valued behaviors precedes reduction in suffering: Findings from a randomized controlled trial using ACT. *Behaviour Research and Therapy, 91*, 64–71. doi: 10.1016/j.brat.2017.01.013

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Accepted Manuscript

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PII: S0005-7967(17)30021-9

DOI: 10.1016/j.brat.2017.01.013

Reference: BRT 3090

To appear in: *Behaviour Research and Therapy*

Received Date: 18 July 2016

Revised Date: 16 January 2017

Accepted Date: 23 January 2017

Please cite this article as: Gloster, A.T., Klotsche, J., Ciarrochi, J., Eifert, G., Sonntag, R., Wittchen, H.-U., Hoyer, J., Increasing valued behaviors precedes reduction in suffering: Findings from a randomized controlled trial using ACT, *Behaviour Research and Therapy* (2017), doi: 10.1016/j.brat.2017.01.013.

Increasing Valued Behaviors Precedes Reduction in Suffering: Findings from a Randomized Controlled Trial using ACT

Andrew T. Gloster[1,2] Jens Klotsche[3,4], Joseph Ciarrochi[5], Georg Eifert[6], Rainer Sonntag[7], Hans-Ulrich Wittchen[2], Jürgen Hoyer[2]

[1]University of Basel, Department of Psychology, Division of Clinical Psychology and Intervention Science, Missionsstrasse 62A, CH-4055 Basel, Switzerland

[2]Technische Universität Dresden, Department of Psychology, Institute for Clinical Psychology and Psychotherapy, Chemnitzer Straße 46, 01187 Dresden, Germany

[3] German Rheumatism Research Centre Berlin, Leibniz Institute, Epidemiology Unit, Charitéplatz 1, 10117 Berlin, Germany

[4] Charité Universitätsmedizin Berlin; Institute for Social Medicine, Epidemiology and Health Economics, Luisenstraße 57, 10117 Berlin, Germany

[5]Institute of Positive Psychology and Education, Australian Catholic University, 25A Barker Road, Strathfield NSW 2135, Australia

[6]Chapman University, 1 University Dr, Orange, CA 92866, USA

[7]Private Practice, In der Wüste 18, 7462 Olpe, Germany

Correspondence concerning this article should be addressed to:
Andrew T. Gloster
University of Basel
Department of Psychology
Division of Clinical Psychology and Intervention Science
Missionsstrasse 62A
CH-4055 Basel
Switzerland
Tel: +41-61-267-0275
Email: andrew.gloster@unibas.ch

Abstract

Background: Psychological flexibility theory (PFT) suggests three key processes of change: increases in value-directed behaviors, reduction in struggle with symptoms, and reduction in suffering. We hypothesized that Acceptance and Commitment Therapy (ACT) would change these processes and that increases in valued action and decreases in struggle would precede change in suffering.

Method: Data were derived from a randomized clinical trial testing ACT (vs. waitlist) for treatment-resistant patients with primary panic disorder with/without agoraphobia (n= 41). Valued behavior, struggle, and suffering were assessed at each of eight sessions.

Results: Valued actions, struggle, and suffering all changed over the course of therapy. Overall changes in struggle and suffering were *inter*dependent whereas changes in valued behavior were largely *in*dependent. Levels of valued behaviors influenced subsequent suffering, but the other two variables did not influence subsequent levels of valued action.

Discussion: This finding supports a central tenet of PFT that increased (re-)engagement in valued behaviors *precedes* reductions in suffering. Possible implications for a better understanding of response and non-response to psychotherapy are discussed.

Keywords: psychological Flexibility; ACT; valued behavior; suffering; process; treatment resistance

Changes in Valued Behaviors Precede Reduction in Suffering: Findings from a Randomized Controlled ACT Trial

Implicitly or explicitly, all forms of psychotherapy aim to reduce suffering. The methods used to achieve this differ, however, as a function of the processes hypothesized to maintain patients' suffering. Example processes that have been targeted include deficits in inhibitory learning (Craske et al., 2008; Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014), maladaptive schemata (Hoffart et al., 2005), personality structure (Wallerstein, 2002), or psychological inflexibility (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Inherent in these theories are assumptions about the temporal sequence of therapeutic procedures necessary for change. Empirical testing of these temporal sequences within a therapy is relatively rare, yet the identification of such patterns can immediately inform clinical procedures and advance clinical theory.

Antecedent Models for the Reduction of Suffering

Psychological flexibility theory (PFT), a comparatively recent development within the literature on human change processes, is a transdiagnostic approach to therapy that focuses on valued-action and acceptance in order to reduce suffering. Within PFT, suffering is defined as a negative *reaction* to symptoms, but not the diagnostic symptoms themselves. This may include such things as being upset, distraught, worried, or concerned about the occurrence, implication, or justice of one's presenting symptoms. According to PFT, avoidance of internal states such as anxiety and fear maintains suffering; conversely increasing psychological flexibility decreases suffering (Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011; Hayes et al., 2006; Hayes, Strosahl, & Wilson, 2012; Kashdan & Rottenberg, 2010).

Specific temporal predications about the mechanisms of change can be derived from PFT. First, it is believed that increased valued activity is antecedent to reductions in suffering (Antecedent Model 1). Values are personally and freely chosen areas of importance in one's

life. Engaging with the things that one holds important is seen as the ultimate treatment goal and frustration of such engagement is a frequent preceptor of treatment seeking. For example, it has been found that patients presenting for treatment engage in less valued actions than controls (Michelson, Lee, Orsillo, & Roemer, 2011). Further, 75% of patients indicated their central treatment goal was about interpersonal issues and nearly half (46%) indicated personal growth as one of the most important treatment goals (Grosse & Grawe, 2002). Approximately 60% of these patients also indicated working on specific symptoms as one of their primary treatment goals. Thus, values frustration, in combination with distressing symptoms, appears to be a salient theme for a large majority of patients.

PFT suggests that by (re)-engaging in valued actions, the subjective meaning of symptoms will change and suffering will decrease. In other words, by engaging in valued behaviors despite the presence of symptoms, the symptoms no longer need to be viewed as necessary barriers and suffering begins to recede. This suggests it is possible to act in ways consistent with one's values even when symptoms remain and doing so becomes an integral step to reducing suffering. Research is lacking, however, that directly tests whether changes in valued behaviors temporally precede changes in suffering, as suggested by PFT.

A second prediction derived from PFT is that struggling with unwanted internal states such as thoughts, emotions, or memories by attempting to suppress, diminish, or remove them is believed to in fact maintain or even amplify the unwanted internal states. Technically speaking, the avoidance of aversive stimuli is negatively reinforced, as indicated by numerous laboratory studies (e.g., Levin & Hildebrandt, 2012; Levitt, Brown, Orsillo, & Barlow, 2004; Wenzlaff & Wegner, 2000). Clinically speaking, struggling with symptoms contributes to the maintenance of the patients' presenting problem and acceptance (e.g., developing the willingness to experience these things) can be part of an answer to break the avoidance-negative reinforcement-increased distress cycle. Thus, the degree to which struggle is reduced

is hypothesized to lead to reductions in suffering (Antecedent Model 2). Whereas numerous laboratory studies have documented positive effects of promoting acceptance on varied outcomes such as task perseverance, willingness to reengage in difficult tasks, or resisting the urge to smoke (for a meta-analysis of laboratory component studies see Levin et al. 2012), direct tests within therapy are lacking.

Consequence Model for the Reduction of Suffering

An opposing model based on most implicit and some explicit theories of psychopathology posits that increases in valued behaviors are possible only *after* symptoms/ struggling with symptoms have been removed or reduced (Consequence Model) (Ciarrochi, Robb, & Godsell, 2005). This suggests that the manifest symptoms are barriers to engaging in valued behaviors and removing those symptoms – and the suffering they promote – enables a patient to then freely choose these behaviors again. Likewise, this model logically suggests that struggle with symptoms would recede once the symptoms and the suffering they entail abate.

Timing

Research questions about the antecedents and consequences of change can be further specified with respect to timing within a course of treatment. That is, changes in valued behavior, struggle and suffering may occur more at the beginning, middle, or end of treatment. Knowing this again can help clinicians understand when to concentrate on which process in the course of behavior therapy. However, predictions about timing must be considered exploratory given the paucity of work on this in the area of PFT. Information derived from typical ACT intervention manual would suggest that although values are initially touched on in the early part of therapy, a heavier dose of acceptance occurs early in treatment with more emphasis on values later (Eifert & Forsyth, 2005; Eifert & Gloster, 2016; Hayes, Strosahl, & Wilson, 1999). Indirect evidence can be derived from the behavior

activation literature, which demonstrates that increases in activity lead to decreases in depression and addressing the relationship between values and activities occurs at the beginning of therapy (Dimidjian et al., 2006; Lejuez, Hopko, Acierno, Daughters, & Pagoto, 2011).

The purpose of the present study was to investigate the association and temporal order between valued behavior, struggling with symptoms, and suffering, during a standardized ACT intervention for patients with treatment-resistant cases with primary panic disorder. The research questions of this study thus examined which of the temporal models best fit the data. We evaluated three types of temporal models. First, we examined the antecedence models based on psychological flexibility theory, (equivalent to ACT theory; cf., Hayes et al., 2012), which posits that changes in valued action *temporally precede* changes in suffering (Antecedent Model 1) and that changes in struggle *temporally precede* changes in suffering (Antecedent Model 2). Second, we examined the consequence model, which in contrast posited that changes in suffering precede changes in the other variables (Consequence Model). Finally, we explored the timing of these processes in order to determine at what point in the standardized therapy the processes unfolded.

Method

Design

Details of the randomized controlled trail and its outcomes are described in detail elsewhere (Gloster et al., 2015). Patients (n = 43) diagnosed with panic disorder and/or agoraphobia (PD/ A) who were resistant to previous therapies (i.e., did not responded at all or not responded as expected to ≥ 25 sessions of empirically supported psychotherapy or approved pharmacological interventions at recommended dose and length) were randomized to immediate treatment (n = 33) or wait-list (n = 10). Eight participants from the waitlist were re-allocated to the ACT treatment following the waiting period. These patients did not differ

from patients in the immediate treatment condition on primary outcomes at the baseline. The current study thus included all patients who began treatment (n = 41), irrespective of whether they had immediate treatment (n = 33) or delayed treatment (n = 8). Independent raters diagnosed patients. The local internal review board approved the study.

Participants

Participants were largely female (68.3%), with an average age of 37.1 (*SD* = 9.1). In addition to PD/A, patients endorsed 2.0 comorbid disorders on average. The most common co-morbidities were social phobia (36.4%), specific phobia (36.4%), major depression (24.2%), pain disorder (21.2%), obsessive-compulsive disorder (18.2%), dysthymia (15.2%), and generalized anxiety disorder (15.2%). Previous therapy experience was substantial: mean = 42.4/ median = 25.0 psychotherapy sessions and 2.1 valid psychopharmacological agents (for more details see Gloster et al., 2015).

Additional inclusion criteria included age (18-65); primary diagnosis of panic disorder and/or agoraphobia; scored 1 SD above the mean of non-clinical sample (i.e., ≥ 1.5) on a scale of agoraphobic avoidance Mobility Inventory-Unaccompanied Subscale (MI; Chambless, Caputo, Jasin, Gracely, & Williams, 1985); ≥ "moderate" on clinician-rated functioning Clinical Global Impression (CGI; Guy, 1976); were not currently in another psychotherapy. Exclusion criteria included alcohol dependence; benzodiazepine or drug dependence; bipolar disorder; psychotic or eating disorders; or were actively suicidal. Participants were not permitted to initiate additional treatment during the study protocol.

Intervention

A manual of Acceptance and Commitment Therapy (ACT) for anxiety disorders (Eifert & Forsyth, 2005) was adapted for this trial (Eifert & Gloster, 2016; Gloster et al., 2015). This manual was already successfully employed in a randomized clinical trial comparing ACT with CBT (Arch et al., 2012). Treatment consisted of eight sessions (91-120

minutes) administered twice weekly over four weeks. The treatment targeted all core processes of the ACT model including changing the way one interacts with troubling thoughts/ feelings by reducing the unhelpful functions derived from treating the thoughts/ feelings literarily; increasing skills that allow one to non-judgmentally be aware of the present moment and awareness of a stable sense of self; and promoting patterns of action that are consistent with their values while reducing barriers that are perceived to impede such action. Valued behaviors were explicitly introduced in the first session with exercises and discussions about what the patients want their life to stand for and what they are currently doing in that regard. This theme became part of the treatment goal and was reviewed in each session.

Therapists

Therapists were advanced-level graduate students in a psychotherapy training program. All therapists passed competency tests and received weekly supervision. Expert ratings of the therapy sessions indicated very good adherence and competence of the therapists (see Gloster et al., 2015 for details).

Assessment

The process measures examined in this paper (i.e., valued behaviors, struggling, and suffering) were assessed at every session during treatment. With the goal of capturing session-by-session change, we selected items designed for repeated measurement across therapy sessions that are sensitive to change. The items were taken from the manual used in this study (Eifert & Forsyth, 2005; Eifert & Gloster, 2016). Patients rated the items in an online format without the therapist present. Items assessed the past 24 hours in order to minimize recall bias and because therapy sessions occurred twice weekly. The exact wording was as follows. *Suffering*: “In the last 24 hours, how upset and distressed over anxiety were you?”; *Struggle*: “In the last 24 hours, how much effort did you put into making anxiety-related feelings or

thoughts go away (i.e., by suppressing them; distracting yourself; reassuring yourself or seeking reassurance from someone else)?"; and *Valued Action*: "How much have you engaged in behaviors that are in accord with your values and life goals?". Each variable was assessed on a 0 – 10 scale with the anchors "none/not at all" to "extreme amount". The average test-re-test reliability of the items suffering, struggle and valued action across all sessions was: .50, .55, and .49 respectively.

A full assessment battery was also administered, but not included in these analyses (for more details see Gloster et al., 2015).

Statistical Analysis

Preliminary analysis. Means and standard deviations were calculated for the suffering, struggle and valued action across participants at each session. The standardized mean gain (ESsg) was estimated for examining the effect of session-by-session and cumulative change in suffering, struggle and valued behavior. The effect size measure ESsg is an appropriate measure for examining intra-individual change (Lipsey & Wilson, 2001). Univariate and parallel latent growth curve modeling (Duncan, Duncan, & Strycker, 2006) were used to assess the change in each process variable, irrespective of the timing of change. Latent growth curve analyses model the linear intraindividual change in the three variables across time while incorporating patients' initial values. These models were used to test whether (i) change occurs in the three variables and (ii) whether the change in one variable is associated with the change in the other one, irrespective of timing. Preliminary analyses showed that parallel latent growth curve models with freely estimated slope factors and freely estimated associations between intercept and slope factors resulted in best model fit. The loading of the first session score was fixed to 0 and for the eighth session fixed to 1.0 for reasons of model identification for the two latent growth curves.

Antecedent/consequence models. We examined the temporal dynamics between change in valued behavior, struggle, and suffering by latent difference score models (LDS; McArdle, 2001, 2009; Selig & Preacher, 2009). LDS models provide a general framework for the study of intraindividual change over time (McArdle, 2009). The hypotheses, whether the effect of one process variable on *subsequent* change in the other process variable differs between the eight sessions, can be addressed by LDS. The LDS model includes autoregressive effects in which the intraindividual changes in a variable over time is a function of the level of that variable at the previous time point. In a first step, univariate LDS models were evaluated for the three variables to assess the functional form of change. We evaluated a series of different univariate LDS models for the change of valued behavior, struggle, and suffering. These univariate analyses included the no change model, the constant change model, and the dual change model for the most appropriate modeling of change in each process variable). Finally, bivariate latent difference score models were estimated to determine the dynamics of change between two process variables. Bivariate LDS models provide an appealing feature for investigating whether change in a variable at each time-point is a function of prior level on the other variable, adjusting for autoregressive effects and non-stationarity.

A coupling parameter γ is included into the equations of two univariate LDS models representing the effect of one variable on the subsequent change in the other. The coupling parameter γ was included for both process variables examining a bidirectional dependency between the two process variables. LDS provide the possibility to study multivariate change processes and time-dependencies between two simultaneously processes with intraindividual changes over time that are not possible with other approaches such as random effect modeling.

Timing. We investigated different patterns of coupling between the two univariate LDS models by restricting the path coefficients in the models. In more detail, the coupling parameter γ may be constant or may vary over treatment sessions. The decision about the most appropriate model was based on model fit indices. All path coefficients are reported as unstandardized coefficients.

Model fit for competing parallel latent growth curve models, univariate and bivariate LDS models were evaluated by the Bayesian information criteria, root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI) and Tucker-Lewis index (TLI).

We used the full-information maximum likelihood estimator due to missing data in some cases. This approach ensures the use of all available data for parameter estimation. Thus, also patients who started the treatment could be included in analyses, even if some sessions were incomplete. The specification of parallel latent growth curve models and univariate/ bivariate LDS models was evaluated in Mplus Version 6.1 (Muthén & Muthén, 2011).

Results

Preliminary Analyses

Each of the three process variables changed significantly during treatment. The mean and standard deviations for each session and the session-by-session and cumulative effect sizes for the three process variables are reported in Table 1 and Figure 1. Over the course of treatment, each of the three process variables suffering, struggle, and valued action changed with medium cumulative effects (suffering *ESsg* = .67; struggle *ESsg* = .76; valued action *ESsg* = .64). Suffering and struggle were highly correlated (Table 2) at each session, whereas suffering and valued action and struggle and valued action were not correlated more than moderately. Analyses derived from univariate latent growth curve modeling confirmed that

each of the process measures changed significantly across the eight sessions (mean growth slope estimates: *suffering:* -1.57 (*SE* = .56; 95% *CI* -2.66 , -.48); *struggle:* -2.39 (*SE* = .58; 95% *CI* -3.52 , -1.25); and *valued action:* 1.17 (*SE* = .57; 95% *CI* .05 , 2.29). The session-by-session effect sizes were determined for investigating whether the change in the three process variables occurred at different times during treatment.

As a second preparatory step, we examined whether change in one process variable was associated with change in another irrespective of the timing of the change. This was examined using parallel latent growth curve modeling. Change in suffering and the change of struggle were significantly associated over all sessions (beta = 0.99 [0.12], $p < 0.001$) and change in valued action and the change of suffering were also significantly associated (beta = -0.64 [0.16], $p = .014$). This indicates that less change in suffering was associated with less change in struggle and to a lesser degree, a less change in valued action during treatment. We did not find a significant association across the entire treatment between changes in valued action and struggle.

Antecedent & Consequence Models

Having established the overall relationship between struggle and suffering, and values and suffering, we then examined whether change in one process variable was associated with *subsequent* change in the other process variables by using latent difference score models. Two sets of models were tested: one in which the coupling parameters were set to be equal across all 8 sessions and one in which they were allowed to be time varying. The final models with time-varying coupling coefficients provided most appropriate model fit suggesting that change in the variables was not uniform across the treatment (see supplementary section). A series of univariate latent difference score models were examined in preliminary analyses to determine the most appropriate model for change. Bivariate latent difference score models were specified after identifying the most appropriate univariate latent difference score model.

The parameters of primary interest in bivariate latent difference score models are the coupling parameters (γ). The coupling parameter γ represents the association of one variable on *subsequent* change in the other variable by adjusting for autoregressive effects (see Figure 2 for an example of the model). The variance of suffering, struggle and valued action is partitioned into the true score and the measurement error in LDS as shown in Figure 2. Figure 2 presents a path diagram as an example for the bivariate LDS model of suffering and valued action. The squares including the capital letters represent the observed scores, and the circles in the highest and lowest line their measurement errors. The latent true scores are presented by the circles including the lowercase letters (under/above the observed scores) for each session. The detailed indices for model-fit of the latent difference score models are reported in the supplementary table. In summary, the models with time-varying coupling coefficients provided an acceptable model fit indicated by a SRMR equal to or lower than .1.

Table 3 displays the results of the LDS models. The relation between valued action and suffering (Antecedent Model 1) was clearly one-directional. The level of valued action significantly influenced the change in subsequent suffering, but the level of suffering did not significantly predict subsequent change in valued action (Consequence Model). That is, the more participants engaged in valued action, the less suffering was reported at the next session.

The relationship between struggle and suffering appeared to be reciprocal in nature. Level of struggle was closely linked to the change in suffering at the following session (Antecedent Model 2). Although the relation was weaker, the level of suffering also predicted subsequent struggle (Consequence Model).

In order to be thorough, we also examined the relationship between struggle and valued action. These two variables were did not significantly predict the change in each other throughout the course of the treatment.

Timing

The magnitude of the effect of values on subsequent reduction in suffering seemed to be salient at the beginning of therapy then grew over the rest of the course of the therapy. Higher levels of valued action significantly predicted subsequent latent decrease in suffering for the second half of the treatment interval. Importantly, the relationship between values and subsequent suffering was two to four times greater than any other relationship observed.

It is also striking that at the beginning of the treatment it was the level of struggle that influenced the change in subsequent suffering. At the middle of the treatment, the two variables appeared to be dynamically interrelated although the magnitude of the effect of struggle on subsequent suffering was always greater than the magnitude of the effect of suffering on subsequent struggle.

Discussion

This study examined the temporal process of change occurring during a standardized ACT treatment. To our knowledge, this study was the first to examine the temporal order of core processes of Psychological Flexibility Theory (i.e., valued behavior, struggle, and suffering) across the sessions of a standardized treatment and how each variable influenced each other during the treatment. The antecedent models showed that change in values and struggle occurred before change in suffering. The magnitude of the relationship between values and subsequent change in suffering was greater than any other observed relationship. In contrast, the consequence model, namely that suffering changes before values can change, was not supported by these analyses. With respect to our exploration of the timing of changes within the course of treatment, these data suggested that the importance of values was initiated at the beginning of therapy and renewed in the second half of therapy. The first half of therapy appeared to be more influenced by changes in struggle, which suggests the importance of acceptance work.

All three variables changed during treatment in a desired direction. Changes in valued action were independent of struggling, while there was a trend toward a negative association between valued action and suffering. Conversely, changes in suffering and struggling were bi-directionally interdependent. This is important because valued actions affected subsequent change in suffering, but neither suffering nor struggling affected subsequent change in valued action.

These analyses showed that increased valued action preceded decreases in suffering. The level of change in valued action significantly influenced the change in subsequent suffering, and the magnitude of this effect grew over the course of the therapy and was two to four times greater than any other relationship observed. The importance of this finding lies in the fact that it runs contrary to the expectation of many theories of psychotherapy, psychopathology, and arguably most patients who firmly believe reductions in suffering is a prerequisite to positive changes in valued behaviors. Indeed, this assumption is readily accepted in Western society in general (Hayes et al., 2012). Our data show that it is not necessary to first reduce suffering in order to increase engagement in what matters to an individual. Rather, engaging in what matters precedes reductions in suffering, at least as tested in this ACT trial. It is possible that when participants made judgments about suffering they also included some dimension of symptom severity in their judgment. The degree to which that is true would suggest that increases in valued behavior preceded change in this dimension as well.

We observed a consistently strong relationship between struggling (attempts to control symptoms) and suffering across the treatment. Less change in struggle during treatment was associated with less change in suffering. Thus, the more people continued to struggle with their symptoms, the more they continued to suffer. Similarly, higher levels of struggle predicted greater subsequent increase in suffering. Although causality cannot be determined

in any of these observations, and alternate interpretations are possible such as people who suffer more may have a stronger desire to struggle, these results are consistent with the underlying theory (Hayes, Barnes-Holmes, & Roche, 2001). That is, as long as a patient follows inflexible internal rules stipulating that they "should" or "must" have control of their feelings and they mobilize efforts to achieve this, then the absence of control is associated with further suffering in the form of feelings such as insecurity, anxiety, or irritability. This suggests that a reduction in attempts to control anxiety (indicating growing psychological flexibility) should lead to reductions in suffering. It is important to note, however, that this line of reasoning does not imply that attempting to control symptoms is always a bad thing. Indeed it can be helpful as long as greater control is achievable. As indicated by many studies (Barlow, Gorman, Shear, & Woods, 2000; Craske & Barlow, 2007), increases in perceptions of control over symptoms are associated with positive outcomes. The crucial difference is between having control and trying to have control when this is not attainable. This differentiation between having control and striving for control when it is unattainable should be directly examined in future studies.

These data were collected from the often-neglected population of treatment-resistant patients (Schlaepfer et al., 2012). The results suggest that concentrating on values is an important option to consider for these patients. Whereas we agree that reducing avoidance behaviors is ultimately an integral component of treatment for these patients (Taylor, Abramowitz, & McKay, 2012), starting with values work before such attempts may help facilitate change. For example, a treatment-resistant patient has by definition struggled with symptoms for some time and all their attempts to deal with the problem has been unsuccessful. Initiating the topic of values in this context while conveying the attitude that action in this area is both possible and important may expand their perspective beyond symptom reduction long enough to try out new things that in turn help build adaptive

repertoires. Towards this end, it is often necessary to collaboratively clarify patients' values, particularly when dealing with patients with vague or seemingly conflicting values (Michalak, Heidenreich, & Hoyer, 2011).

This study is limited in several ways. First, the sample size in a specific treatment-resistant sample may limit generalizability. Second, although the assessment strategy was designed to examine these questions, the participants were not randomized across the hypotheses in this study and appropriate caution is needed given the post-hoc nature of these analyses. Third, the sequencing examined in this study was tested only on this manualized ACT therapy. Thus, the specificity vs. generalizability of these findings is not known. Future studies testing this sequencing in other therapies are required. Fourth, the items used in this study were developed within a previously tested manual with emphasis on clinical utility, appropriateness for repeated measurement (minimization in participant burden), face validity, and as demonstrated here are clearly sensitive to treatment changes. Nonetheless, further psychometric information is lacking and appropriate caution is needed. Future studies should consider including longer scales that are also practical for use in repeated session-by-session assessments. Finally, this study did not include other competing mediator constructs that measure alternative processes such as inhibitory learning or maladaptive schema. Thus, the specificity beyond the measured variables is not known. Future studies should include additional competing mediator constructs.

These limitations notwithstanding, these results have important practical clinical as well as theoretical implications. Clinically, our results suggest that therapists should pay attention to valued actions from the very beginning of treatment and do all they can to help people get moving in directions that bring them closer to their chosen values. The results also support the key ACT strategy to reduce patients' struggle with symptoms by pointing out that they do not work in the long run and may actually serve to increase suffering. Theoretically,

models that address value-related behaviors and functioning should test the degree that changes in value-related behaviors is a necessary condition for positive outcomes and to which degree value-related behaviors function as a cause or consequence of other psychological changes. Optimistically, PFT appears promising for the treatment resistant population (Clarke, 2014; Gloster et al., 2015). Nevertheless, these results clearly need to be replicated in other samples and with other interventions that directly or indirectly promote these processes (Gloster et al., 2014).

Disclosure Statement

None of the authors have any conflict of interest to report.

Acknowledgments

This work was supported in part by grants from the German Federal Ministry of Education and Research (BMBF: project no. 01GV0615), Swiss National Science Foundation (SNF: PP00P1_163716/1 and IZKOZ1_150427/1), and the Australian Research Council (DP140103874

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Table 1

Mean, standard deviation, and change scores across participants for suffering, struggle, &valued action at each session

		Estimates		Weekly Change	Cumulative Change
	Session	*Mean*	*SD*	*ESsg*	*ESsg*
Suffering	1	5.41	2.81	-	-
	2	4.82	2.98	.20	.20
	3	5.00	3.21	.06	.14
	4	4.97	2.74	.01	.16
	5	4.85	2.71	.05	.20
	6	3.58	2.29	.50	.71
	7	4.26	2.79	.27	.41
	8	3.59	2.64	.25	.67
Struggle	1	5.04	3.53	-	-
	2	5.01	3.03	.01	.01
	3	4.47	2.70	.19	.18
	4	4.12	2.66	.13	.29
	5	3.62	2.68	.19	.45
	6	2.83	2.37	.31	.73
	7	3.46	2.44	.26	.52
	8	2.81	2.21	.28	.76
Valued Action	1	4.88	2.64	-	-
	2	5.22	2.21	.14	.14
	3	5.86	2.33	.28	.39
	4	6.02	1.98	.08	.49
	5	5.83	2.67	.08	.36
	6	5.77	2.52	.02	.35
	7	6.54	2.02	.34	.71
	8	6.55	2.59	.01	.64

Note. ESsg = Standardized mean gain (effect size).

Table 2

Correlations between process variables at each session

	Suffering and Struggle		Suffering and Valued Action		Struggle and Valued Action	
Session	*r*	*p*	*r*	*p*	*r*	*p*
1	**.90**	<.001	-.10	.550	-.06	.726
2	**.86**	<.001	.16	.345	.04	.812
3	**.77**	<.001	**-.44**	.008	**-.34**	.045
4	**.82**	<.001	**-.38**	.025	**-.33**	.049
5	**.73**	<.001	-.32	.065	**-.38**	.024
6	**.88**	<.001	-.14	.431	-.12	.492
7	**.66**	<.001	-.24	.167	-.30	.077
8	**.81**	<.001	-.23	.192	-.11	.532

Note. Significant correlations are in boldface.

Table 3

Results of Bivariate Latent Difference Score Models

	Suffering and Struggle		Suffering and Valued Action		Struggle and Valued Action	
	Suffering (Consequence Model)	Struggle (Antecedent Model 2)	Suffering (Consequence Model)	Valued Action (Antecedent Model 1)	Struggle	Valued Action
Initial Status						
Mean (SE); p value	**5.47 (.44); <.001**	**5.03 (.57); <.001**	**5.32 (.42); <.001**	**4.81 (.37); <.001**	**5.02 (.54); <.001**	**5.25 (.43); <.001**
Variance (SE)	3.29 (1.69)	8.58 (2.74)	3.18 (1.43)	2.17 (.93)	7.05 (2.05)	3.77 (1.47)
Constant Change (α)						
Mean (SE); p value	**3.92 (1.12); <.001**	**2.76 (.79); <.001**	.55 (2.14); .797	-1.86 (1.33); .163	-.95 (.84); .255	7.78 (4.51); .085
Variance (SE)	2.70 (1.54)	1.58 (.92)	3.29 (1.92)	1.77 (1.54)	.10 (.16)	9.51 (12.08)
Bivariate Coupling (γ)	$Suffering_{t-1}$ -> $\Delta Struggle_t$	$Struggle_{t-1}$ -> $\Delta Suffering_t$	$Suffering_{t-1}$ -> $\Delta Valued\ Action_t$	$Valued\ Action_{t-1}$ -> $\Delta Suffering_t$	$Struggle_{t-1}$ -> $\Delta Valued\ Action_t$	$Valued\ Action_{t-1}$ -> $\Delta Struggle_t$
γ_1 (SE); p value	-.31 (.22); .156	**1.02 (.34); .003**	-.22 (.27); .421	**-2.12 (1.07); .040**	-1.08 (.76); .156	.21 (.11); .056
γ_2 (SE); p value	-.42 (.25); .095	**.98 (.35); .005**	.25 (.29); .399	-2.41 (1.47); .101	-1.12 (.76); .142	.12 (.13); .350
γ_3 (SE); p value	-.42 (.23); .071	**1.07 (.37); .004**	.27 (.33); .413	-2.51 (1.61); .120	-1.28 (.87); .139	.11 (.14); .433
γ_4 (SE); p value	**-.45 (.22); .038**	**1.10 (.41); .008**	.30 (.30); .322	-2.62 (1.59); .100	-1.41 (1.01); .161	.17 (.15); .259
γ_5 (SE); p value	**-.58 (.22); .007**	.85 (.45); .056	-.25 (.33); .450	**-2.98 (1.51); .038**	-1.58 (1.07); .141	.17 (.15); .242
γ_6 (SE); p value	-.44 (.24); .071	**1.03 (.51); .044**	.29 (.37); .434	**-3.44 (1.75); .031**	-1.93 (1.11); .082	.31 (.20); .131
γ_7 (SE); p value	**-.61 (.23); .008**	.81 (.46); .073	.23 (.40); .560	**-3.74 (1.90); .041**	-1.80 (1.28); .159	.14 (.17); .408
Model Fit[1]						
SRMR	.08		.10		.09	

Note. SRMR = Standardized Root Mean Square Residual; [1] Detailed information on model-fit can be found in the supplementary table.

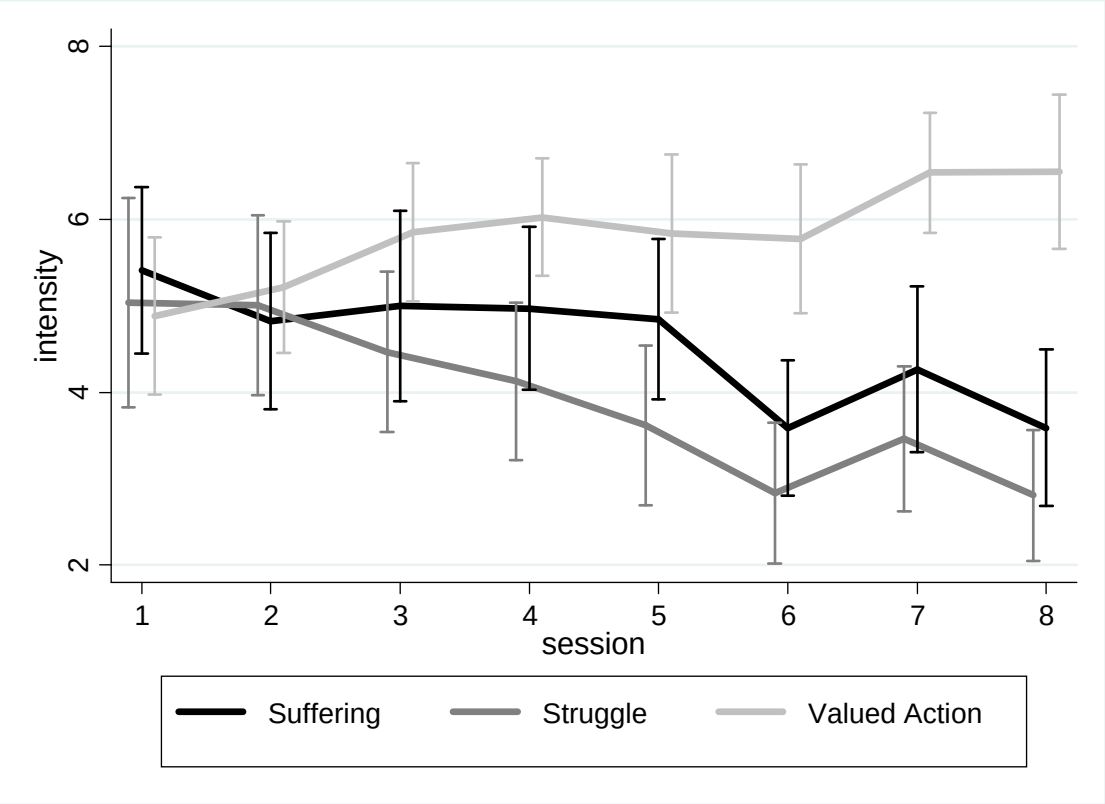

Figure 1. Absolute values of suffering, struggle, and valued action across sessions (spikes = 95% confidence intervals of the mean for each session).

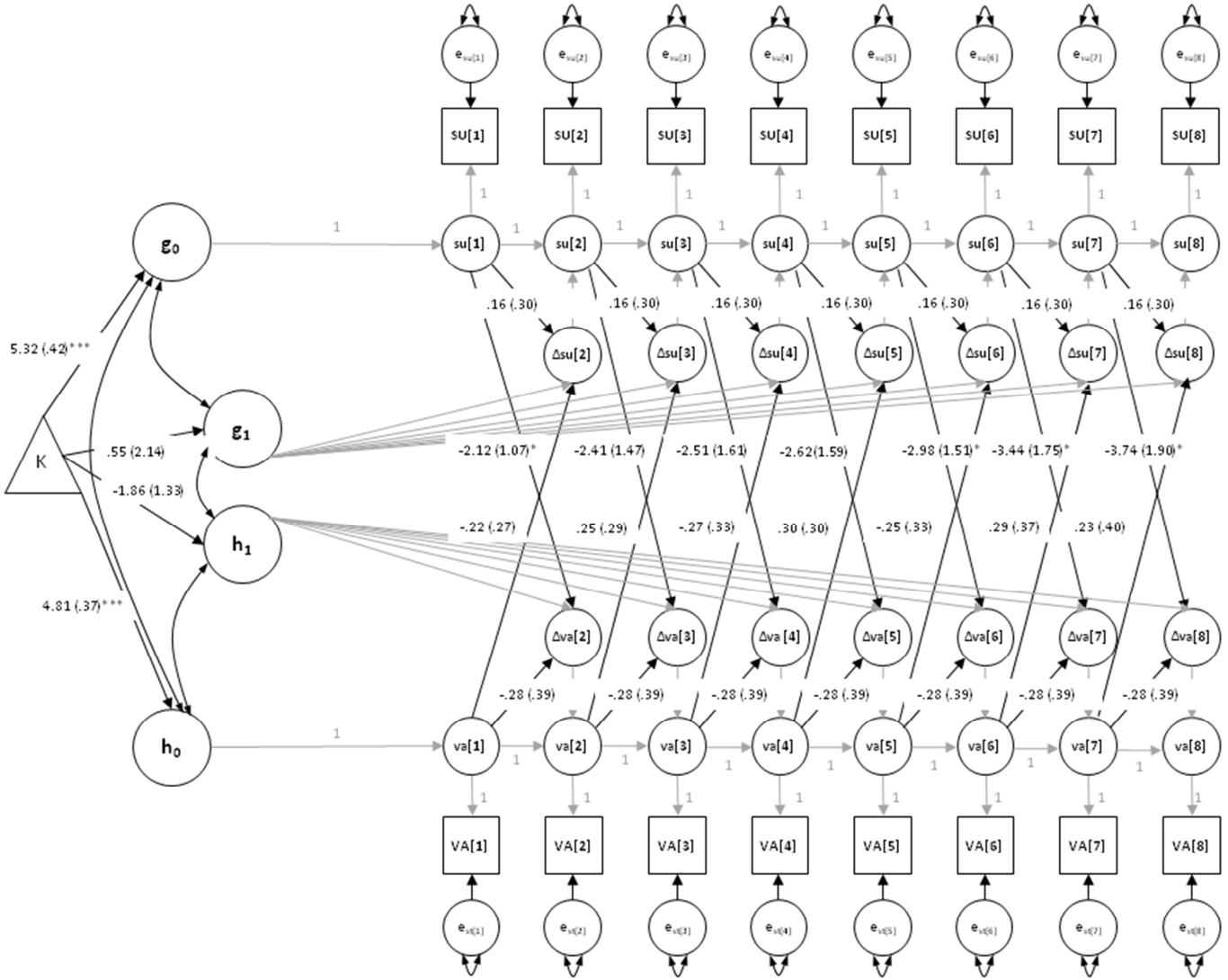

Figure 2. Example of a Bivariate Latent Difference Score Model to examine the effect of suffering (SU) on subsequent change in valued action (VA) and visa versa (*** $p < .001$; ** $p < .01$; * $p < .05$). Capitalized letters in squares represent the observed scores, lowercase letters in the circles

represent the latent variables, straight lines with single-headed arrows between two boxes represent the relation between two variables, line with double-headed arrows between two boxes represent an unexplained relation, line with double-headed arrows at one box represent residual variance.

Highlights

- Increased (re-)engagement in valued behaviors *precedes* reductions in suffering.
- Working on valued behaviors should commence at the beginning of treatment.
- Suffering, struggle, and values all change in therapeutically desired directions.