Measuring values and committed action with the Engaged Living Scale (ELS):

Psychometric evaluation in populations with minor depression and chronic pain.

Masterthesis

by

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‘Vision without action is a daydream; action without vision is a nightmare.’

Chinese proverb

Table of Contents

Abstract (English)

Objective. Two studies evaluate the psychometric properties of two Engaged Living Scale (ELS) versions (ELS-trait & ELS-state), which were developed to serve as a process specific scale for one of the three response styles of the Acceptance and Commitment Therapy (ACT), the engaged response style. The first study evaluates the sensitivity to change of the ELS-trait and the reproducibility of its outcomes. The second study is a pilot study that concerns the factorial structure of the ELS-trait successor, the ELS-state.

Method. The first study used data from a randomized controlled trail with a sample of 238 chronic pain patients with mean age 53 years (*SD*= 12,4). We assessed the test-retest reliability of the ELS-trait scores with intervals of three and six months. Furthermore, the study examined the ELS-traits sensitivity to change by the use of external standards: the MHC-SF subscales psychological and emotional well-being. The second study tested the fit of a correlated two-factor model on the ELS-state and further explored the factor-structure with an exploratory factor analysis.

Results. The results yield preliminary evidence for the ELS-trait's sensitivity to measure change in the engaged response style. The ELS-trait has shown to yield stable, yet modifiable results. Outcomes from the pilot indicate a more sophisticated factor-structure underlying the ELS-state, which is in accordance with the ACT-model.

Conclusion. The ELS-trait may be used to study mechanisms of therapeutic change and to validate the ACT-model. The temporal references of the ELS-state could lead to more process-specific and detailed results. Further research is needed to confirm these results.

Abstract (Dutch)

Doelstelling. In twee studies worden de psychometrische eigenschappen van twee versies van de Engaged Living Scale (ELS) geëvalueerd (ELS-trait & ELS-state). Deze schalen werden als proces-specifieke schalen voor de engaged response style van de Acceptance and Commitment Therapy (ACT) ontwikkeld. De eerste studie evalueert de sensitiviteit voor verandering van de ELS-trait en de reproduceerbaarheid van diens uitkomsten. De tweede studie is een pilot studie omtrent de factor structuur van de ELS-state.

Methode. De eerste studie gebruikte data van een randomized-controlled trial met een sample van 238 chronische pijn patienten met een gemiddelde leeftijd van 53 jaar (*SD*= 12,4). We evalueerden de test-retest reliabiliteit van de ELS-trait scores met intervallen van drie en zes maanden. Verder onderzoekt de studie de sensitiviteit voor verandering van de ELS-trait. Hiervoor worden de MHC-SF subschalen psychologisch en emotioneel welbevinden als externe standards gebruikt. De tweede studie heeft de factor structuur van de ELS-state getest.

Resultaten. De resultaten geven preliminaire indicatie van de sensitiviteit voor verandering in engaged response style van de ELS-trait. De ELS-trait leverde stabiele, maar toch modificeerbare resultaten. Uitkomsten van de pilot studie lieten zien dat de ELS-state mogelijkerwijs een gedifferentiëerdere factor structuur heeft, die overeenstemt met het ACT-model.

Conclusie. De ELS-trait zou gebruikt kunnen worden om de mechanismen van therapeutische verandering te onderzoeken en het ACT-model te valideren. De temporele referenties van de ELS-state zouden tot een meer proces-specifieke en gedetailleerde meeting kunnen leiden. Meer onderzoek is nodig om deze resultaten te bevestigen.

Over the last 15-20 years a new wave of cognitive behavioural treatments (CBT) has emerged. These so-called 'third generation of cognitive behaviour therapies' do not focus on symptom elimination by changing psychological events (thoughts, feelings and behaviour) in their form, function or content. Instead, the aim is to alter the function of psychological events by changing the way the client relates to them (Teasdale, Segal, & Williams, 2003).

Acceptance and Commitment Therapy or ACT (pronounced as the verb 'act') has become a central example for this approach (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Brown, Gaudiano, & Miller, 2011; Hofmann & Asmundson, 2008; Hofmann, Sawyer & Fang, 2010; Öst, 2008; Hayes, Masuda, Bissett, Luoma, & Guerrero, 2005; Hayes, 2004). ACT's goal is to improve psychological flexibility, the ability to recognize and adapt to changing circumstances of life. Scientific research supports this approach. A study from Fledderus, Bohlmeijer, Smit and Westerhof (2010) showed that psychological flexibility is a precursor for mental health. It is related to better quality of life, emotional and psychological well-being and job satisfaction (Bond & Bunce, 2003; Butler & Ciarrochi, 2007; Fledderus et al., 2010). More specifically, psychological flexibility is a mediator for the effects of ACT on psychological distress (Fledderus, Bohlmeijer, Fox, Schreurs, Spinhoven, 2013).

People with psychopathology are often unable to adapt to various situational demands (Kashdan & Rottenberg, 2010). The reasons for their psychological inflexibility are supposed to be maladaptive response styles, which are tendencies to act in a certain way over time and situations (Robinson, & Strosahl, 2008). One of the most common maladaptive response styles is experiential avoidance. Experiential avoidance can be described as avoiding, denying or suppressing aversive private experiences, such as thoughts feelings, memories or bodily sensations (Hayes, Strosahl & Wilson, 2011). It can lead to restrictions in the behavioral repertoire and psychological functioning (Hayes et al., 2006). Moreover, experiential avoidance is associated with various psychological functions, such as handling of pain (McCracken, Vowles & Eccleston, 2004) or quality of life (Hayes et al., 2004). Another maladaptive strategy is excessively basing behavior on rigid rules (Hayes et al., 2006).

ACT counteracts rigid rules and experiential avoidance through the implementation of more flexible response styles. The treatment is based on an elaborated theoretical model, which describes six coherently related processes that contribute to psychological flexibility (Hayes et al., 2011). These processes are paired together in response styles. Figure 1

illustrates the so-called Hexaflex of psychological flexibility, which shows the conjunctions between the response styles and their underlying processes.

Figure 1. *ACT intervention model*

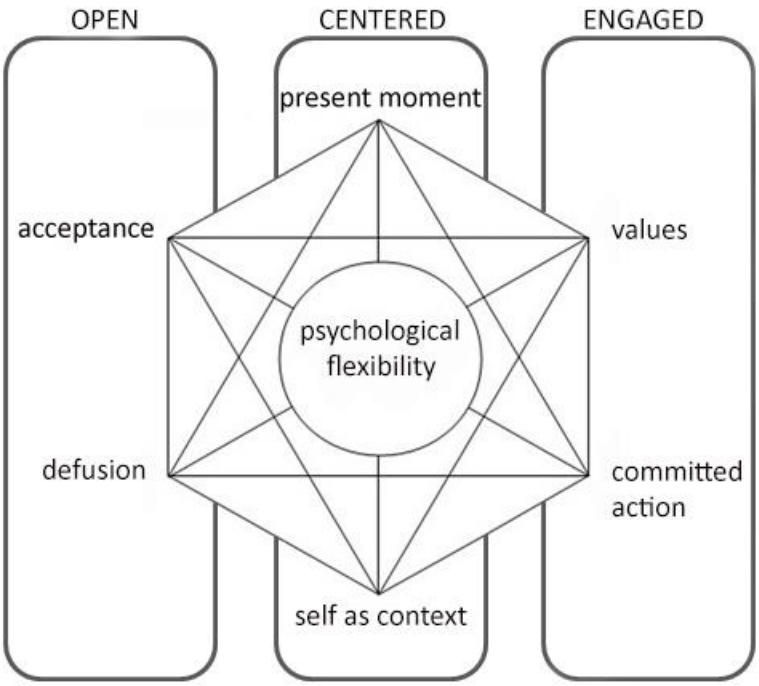


***Figure* 1.** ACT intervention model shows the open, centered and engaged response style with their associated processes, which contribute to psychological flexibility (Hayes et al. 2013, p.25).

The open response style is divided into the processes *defusion* and *acceptance*. Defusion creates an open and nonjudgmental attitude towards thinking, feeling, behaving or other personal activities. Acceptance is about confidentially confronting ourselves with our private experiences (such as feelings, thoughts or memories). It counteracts the unwillingness to accept negative experiences (experiential avoidance).

The engaged response style consists of the components *values* and *committed action*. ACT defines values as freely chosen and verbally formulated guidelines. Values differ from simple goals, since they can only be followed but not be achieved (Hayes, 2006). As an example: 'caring about own health' is a value that cannot be accomplished, but it is possible to derive goals from this value, such as 'three hours physical exercise per week'. The elaboration of values is a necessary step to engage in life; it is the basis for committed action. Commitment or committed actions concern the identification of maladaptive strategies and particularly the perseverance to follow one's own goals – goals that are based on values. The preoccupation with values answers multiple purposes. Establishing own

values can prevent basing choices on rigid rules (figure 1: Hayes, Levin, Plumb-Vilardaga, Villatte, Pistorello, 2013). It also prevents a preoccupation with psychopathology, which could lead to reinforcing the negative self-image of a patient. Furthermore, behaviour that is based on values has an intrinsically reinforcing effect. That alleviates the orientation on long-term consequences (Hayes, Wilson, Gifford, Follette & Strosahl, 1996). At last, it prevents a fixation on goals, which are not based on values and therefore not intrinsically valuable (Wengenroth, 2012).

The centered response style is the link to the conscious awareness of the present moment. It is a prerequisite for interacting with the social, physical and psychological present from one's own perspective (Hayes, Strosahl, & Wilson, 2011). These processes are supposed to be the mediating processes of ACT's effects on clinical change (Fledderus et al., 2013).

Outcome studies showed that ACT is indeed effective in a broad range of psychopathological disorders. In several studies, ACT improved functioning in people with chronic pain (McCracken, Vowles, & Eccleston, 2005; Wicksell, Ahlquist, Bring, Melin, & Olsson, 2008), subclinical depressive symptomatology (Bohlmeijer, Fledderus, Rokx and Pieterse, 2011) and depression (Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2012; Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Roemer, Orsillo, & Salters-Peneault, 2008; Twohig, Hayes, & Masuda, 2006). Findings on chronic pain are supported by a meta-analysis from Veehof, Oskam, Schreurs and Bohlmeijer published in 2011. A review on the effectiveness of ACT can be found in Öst (2008).

However, most researches are outcome studies that focus on ACT's effectiveness in treating psychopathology (Veehof, Oskam, Schreurs, & Bohlmeijer, 2011; Bohlmeijer, Fledderus, Rokx, & Pieterse, 2011; Fledderus, Bohlmeijer, Pieterse, & Schreurs, 2012). These studies give a firm basis for stating that ACT can improve psychopathology, but they provide no empirical basis for stating *how* clinical change occurs.

The study of therapeutic change is mostly neglected in contemporary research, which limits improvement in clinical practice and patient care (Kazdin & Nock, 2003). Studying the processes of change introduces the possibility to analyze what happens between baseline and post-treatment assessment. It may help to ensure that critical features of ACT are implemented in clinical practice (Kazdin & Nock, 2003). By knowing which processes lead to clinical change in certain disorders, it is possible to adjust the

treatment to different disorders or patient profiles, e.g. by eliminating redundant treatment processes or emphasizing particular processes. From a scientific perspective, researching ACT's working mechanisms may help to collate statistical outcomes with the theoretical ACT-model. It may enable making a clear cut between CBTs' and the 3rd wave CBTs' working mechanisms. In a broader sense, the knowledge about causal relationships between treatment processes and clinical improvements not only contributes to psychotherapy by maximizing treatment effects, but also to psychological science. It helps to understand human functioning in general (Kazdin & Nock, 2003).

To investigate the ACT intervention and model, a more process-specific approach is needed. Simply measuring symptom reduction as an outcome would not show which process results in clinical improvements. Scientific research has already shown that psychological flexibility is closely related to improvements in psychological distress (Fledderus et al., 2013). To further investigate the underlying processes of psychological flexibility, process-specific questionnaires are needed which can measure change in specific response styles.

Such questionnaires already exist for the open and centered response style process. The centered response style can be measured with several questionnaires such as: Mindful Attention Awareness Scale (MAAS; Jermann, Billieux, Larøi, et al., 2009), Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), Toronto Mindfulness Scale (TMS; Lau, Bishop, Segal, et al., 2006) and Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004). Acceptance and cognitive defusion are mostly measured with the Acceptance and Action Questionnaire (AAQ) (Bond, & Bunce, 2003). To measure the engaged response style, the Bull's Eye Values Survey (BEVS; Lundgren, Luoma, Dahl, Strosahl, & Melin, 2012), the Valued Living Questionnaire (VLQ; Wilson, Sandoz, Kitchens, & Roberts, 2010) and the Chronic Pain Values Inventory (CPVI; McCracken& Yang, 2006) are used. However, these questionnaires have some restrictions, making them less usable to test the process of engaged living.

The BEVS is a questionnaire in the form of a dartboard which is divided into four areas: 'work/education', 'leisure', 'personal growth' and 'relationships'. First, users identify their values in each of these areas. Secondly, they analyze which obstacles prevent them from living in accordance to their values. Finally, they draw up a valued action plan to enhance valued based living. The setup of this questionnaire reveals that BEVS is initially

developed as a clinical intervention (Wilson et al., 2010). Although a psychometric evaluation of BEVS provided preliminary support for the use of BEVS as a process and outcome measure for values-based interventions (Lundgren et al., 2012), it has several limitations. First, its intervention-character makes it difficult to evaluate and second, it makes it a very time consuming questionnaire, which is unpractical in clinical research. Thirdly, the intervention character is itself a variable that could influence the measurement.

The VLQ and the CPVI both make use of predefined life domains such as 'spirituality', 'social relations' or 'employment'. In the VLQ patients are asked to rate these domains according to their own personal sense of importance. After that, they estimate how consistent they followed their values during the past week (Wilson et al., 2010). The CPVI is a tool that is used for people with chronic pain. Its setup is similar to the VLQ setup, but instead of rating the *consistency* the values are followed with, it measures the *success* in following values (McCracken, & Yang, 2006). Both questionnaires have the disadvantage that the scores between different patients cannot be compared. This is because there is no standard on how the various participants rate the importance of life domains. In addition, the number of important life domains differs from participant to participant. Furthermore, the predefined life domains restrict the scope of answers and consequently lowers content validity of these questionnaires.

In 2013, a new instrument was developed: the Engaged Living Scale (ELS; Trompetter, ten Klooster, Schreurs, Fledderus, Westerhof, Bohlmeijer; 2013). Compared to the questionnaires presented in the previous section the ELS focuses on the *process* of engaged living instead of concentrating on the *content* of engaged living. The scale consists of 16 items, which can be divided into the two subscales: *Valued Living* and *Life Fulfillment*. Trompetter et al. (2013) evaluated the psychometric properties of the ELS. The internal consistency of the two subscales and the total scale were good (Valued Living, α = .89, Life Fulfillment, α = .87, total score ELS, α = .91), which indicates that the items of the specific subscales measure the same construct. With regard to the construct validity, the ELS-trait scale correlated as expected with related constructs, such as acceptance, mindfulness, psychological well-being, anxiety and depression, pain interference in daily life and personality. Analysis of the incremental validity showed that the ELS-trait was able to explain additional variance in outcomes on mental well-being, beyond the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) and the Psychological Inflexibility in Pain Scale (PIPS;

Wicksell, Lekander, Sorjonen, & Olsson, 2010). Altogether, the psychometric properties indicate that the ELS-trait is a valid and reliable instrument to assess engaged response style (Trompetter et al., 2013).

To investigate the use of the ELS in the determination of changes in engaged response style for research and clinical application, this thesis analyzes two versions of the ELS: the ELS-trait and ELS-state. The ELS-trait differs from the ELS-state with respect to the item formulation. The ELS-state's items refer to a period of one week, whereas the ELS-trait does not include a temporal reference. Therefore, the ELS-trait is supposed to deliver generic answers on engaged living and to measure engaged living as a stable quality. In contrast, the ELS-state is supposed to be more sensitive to changes in the engaged response style. It is expected that patients give a more process-specific rating when items contain temporal references.

The first study investigates the sensitivity to change of the ELS-trait with the Mental Health Continuum-Short Form as external standard (MHC-SF; Lamers, Glas, Westerhof, & Bohlmeijer, 2012). Future research can use the results of this study as a base for the comparison of the two scale's sensitivities. Furthermore, the stability of ELS-trait test scores is assessed by calculating the test-retest reliability.

The second study is a pilot study regarding the factor-structure of the ELS-state. Based on earlier results from Trompetter et al. (2013), it is hypothesized that a correlated two-factor model fits the ELS-state. This hypothesis is tested with a confirmative factor analysis. If the correlated two-factor model does not fit the ELS-state, an exploratory factor analysis will be conducted. Furthermore, we analyze the ELS-state's internal consistency and we examine whether items supposed to measure Life Fulfillment or respectively Valued Living indeed produce related scores. In a nutshell, our study is supposed to give an answer on the following research-questions:

Study 1: ELS-trait

- ***a.*** How consistent is the ELS-trait over a period of time?
- ***b.*** To what extent does the ELS-trait measure change in emotional and psychological well-being? To what extent is the ELS-trait sensitive to change?

Study 2: ELS-state

- ***a.*** Does a correlated two-factor model fit the ELS-state data?
- ***b.*** Which factor structure fits the ELS-state? How internally consistent are the found factors?

Study 1: ELS-trait

Method

Participants. In study 1, we used data of a randomized controlled trial (Fledderus et al., 2012). The sample consisted of 57 male and 181 female clients with chronic pain (*N*=238). Mean age was 53 years (*SD*= 12.4; range= 20-84). Duration of pain complaints exceeded more than 5 years for 63% of the sample. Recruitment took place in February 2012 through advertisements in Dutch newspapers and online patient platforms.

Inclusion criteria. One inclusion criterion was the experience of chronic pain on a daily basis on at least three days per week for a period of six months minimum. People younger than 18 years were excluded from the study. Participants requiring an intensive treatment because of severe psychological distress and high psychological inflexibility were excluded from the study as well. In detail, participants´ scores were compared to a reference score derived from a population of clients with chronic pain, who admitted to receive intramural multidisciplinary pain treatment in a rehabilitation center. Psychological distress was measured by the Hospital Anxiety Depression Scale (HADS; Zigmond & Snaith, 1983). People with a total score more than 1 standard-deviation above the external reference mean score were excluded from the study and advised to seek help from a general practitioner. Psychological inflexibility was measured with the Psychological Inflexibility in Pain Scale (PIPS; Wicksell et al., 2010). People with a score below two standard-deviations of the mean score were likewise excluded from the study. Finally, participants were excluded on the basis of self-ratings, if a) they had no internet or e-mail address, b) they had insufficient Dutch language skills or illiteracy or if c) they anticipated a lack of time to participate (approximately 30 minutes per day).

Research design. Study 1 is a randomized controlled trial, with participants randomly allocated to the experimental group (*N*=82), a minimal-intervention group (*N*=79) or a waiting list (*N*=77). In the experimental condition (duration nine to twelve weeks), subjects participated in a web-based ACT-intervention called ´Leven met pijn online´ (engl. ´Living with pain online´), whereas the minimal-intervention group followed an intervention based on expressive writing techniques. The control group was set on a waiting list for six months, after the study they could start an intervention of their choice. The ELS-trait and the MHC-SF

scale were administered at several points in time: T_0 (baseline measurement) took place approximately one month after registration for the study, T_1 was three months post-intervention and T_2 was set at six months after registration to assess long-term effects.

Instruments: ELS-trait. The ELS-trait is a process-specific questionnaire to assess the engaged response style from the ACT-model. The scale consists of sixteen items measuring *Valued Living* (items 1-10) and *Life Fulfillment* (items 11-16). Each item is rated on a five-point Likert-scale ranging from 1 (='*totally disagree*') to 5 (='*totally agree*'). The scores of the ELS-trait can be calculated for each subscale or for the total scale. Reversed scoring of items is not necessary. A higher score indicates a more developed engaged response style. The scores on the subscale 'Valued Living' range from 11 to 55, and scores on 'Life Fulfillment' range from 6 to 30. The total scores range from 16 to 80. It is proposed to assess both subscale scores and total score (Trompetter et al., 2013).

MHC-SF. The Mental Health Continuum-Short Form (MHC-SF) is a 14-item self-report questionnaire measuring three aspects of positive mental health: emotional, psychological and social well-being (Lamers, Westerhof, Bohlmeijer, ten Klooster, Keyes, 2011). The first three items measure emotional well-being in terms of positive affect and satisfaction with life. Items 4 to 8 measure social well-being. One aspect of social well-being is assessed per item: social contribution, integration, actualization, acceptance and coherence. Item 9 to 14 estimate psychological well-being. Each question responds to one of the following themes: self-acceptance, environmental-mastery, positive relation with others, personal growth, autonomy and goal in life. The user completes the questionnaire by rating the frequency with which they have experienced feelings described in the questionnaire in the last month. The answer is given on a Likert-scale ranging from 0 (='*never*') to 5 ('*every day*'). The higher the score the better participants´ positive mental health. In this study, the Dutch version of the MHC-SF was used (Lamers, Glas, Westerhof, & Bohlmeijer, 2012; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). A psychometric evaluation of the MHC-SF suggests that the questionnaire is sensitivity to changes in positive mental health and yet stable over time (Lamers, 2012).

Analysis

Test-retest reliability. The degree to which the ELS-trait outcomes are consistent over time was tested with data collected from the waiting list respondents. The control group was expected to yield relatively stable results, since they did not follow an intervention. To get a more detailed insight, the test-retest reliability was calculated for two time spans. For this purpose the results from T_0 and T_1 were correlated as well as the results from T_0 and T_2. It is expected that the reliability is affected by the period of time that passes between the two measurements. The closer the time-gap the closer the correlation between the scores should be (Cohen, & Swerdlik, 2010).

Rousson, Gasser and Seifert (2002) suggested that the correlation between repeated measures can be assessed with product-moment correlation. Therefore, the test-retest reliability is examined with Pearson's product-moment correlation coefficient. Pearson's r coefficient displays the direction and the strengths of the correlation between the scores from T_0, T_1 and T_2. For group comparisons, coefficients of 0.70 are typically considered as minimal standards (Aaronsson et al., 2002)

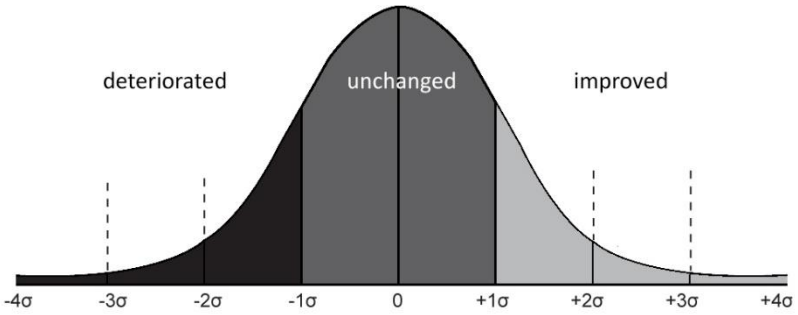
Sensitivity to change. The sensitivity to change is the instrument's ability to accurately detect changes. Depending on the study design, different approaches are used to evaluate the sensitivity. In a review from 2005, Stratford and Riddle differentiate between three assumptions concerning the sample composition: 1) patient compositions that are homogenous with respect to change, 2) patient subgroups that are heterogeneous with respect to change and 3) individual patients, who are heterogeneous with respect to change. According to Stratford and Riddle, this differentiation enables choosing the appropriate change coefficient.

Based on the participant's change characteristics the third option was chosen. In a design with a heterogeneous patient composition an external standard is applied to measure the sensitivity to change. The change score of the external standard is compared to the change scores of measure under investigation, in this case the ELS-trait. The subscales emotional and psychological well-being from the MHC-SF served as external standards.

First of all, in two simple linear regression analyses the ability of the ELS-trait change scores to predict the change scores on the MHC-SF subscales are examined. Moreover, to get a more detailed insight another approach was applied which is theoretically based on a study by Löwe, Kroenke, Herzog and Gräfe (2004). Likewise, we divided the patients into six

subgroups, based on the change in the MHC-subscales psychological and emotional well-being from baseline (T_0) to follow-up (T_1): improved, unchanged and deteriorated in emotional well-being as well as improved, unchanged and deteriorated in psychological well-being. More specifically, those patients that had a change score within +/- 1 standard-deviation from mean were classified into the *unchanged* group, those patients with a change-score above 1 standard-deviation were classified as *improved,* or *deteriorated* when their change-score decreased below 1 standard-deviation from the mean on the specific subscale. Assuming that the scores from the MHC-SF subscales approximate normal distribution, it is expected that the percentage of people in the unchanged groups is close to 68,3%, whereas the percentage of people in the improved respectively deteriorated group approximates 15,8%. Figure 2 illustrates the division of the groups.

Figure 2. *Sample-division into deteriorated, unchanged and improved group*



Note. This figure shows the Gaussian distribution. σ = standard deviation; 0 = mean

Results

Test-retest reliability. Pearson's product-moment correlation coefficients were computed to assess the degree to which repeated measures in the waiting-list control group provide similar results. The correlations between the scores were statistically significant, but the reproducibility coefficients did not reach the minimal standard (r=0.7) for group comparisons (Aaronsson et al., 2002). The correlation coefficient between the total scores from T_0 and T_1 was r=.66 (p< .0001). For Life Fulfillment, correlation coefficient between scores from T_0 and T_1 was r=.63 (p< .0001) and for Valued Living r=.66 (p< .0001). For the longer interval (six months), the test-retest reliability was smaller for all scales. For the total scale, the correlation coefficient was r=.58 (p< .0001), for Life Fulfillment r=.51 (p< .0001) and r=.54 for Valued Living (p< .0001).

Sensitivity to change. With the help of the linear regression the sensitivity of the ELS trait and its ability to predict the scores from the MHC-SF-subscales for psychological and emotional well-being was examined. The correlation between the ELS-trait change score and the MHC-SF-subscale psychological well-being indicates that changes measured by both scales are related to each other. The correlation coefficient is r=.45 (p<.0001). The linear regression analysis showed that the ELS-trait's intercept is not significantly different from zero (β_0= 0.20) with a standard error of 0.4. The proportion of variance shared between predictor and dependent variable is 20% ($F_{(1,170)}$= 42.75, p<.001). The correlation between the ELS-trait change score and the MHC-subscale emotional well-being indicates that changes measured by both scales are also related to each other. In accordance with the previous regression analysis, the results showed that the ELS-trait's intercept is not significantly different from zero. The correlation coefficient is r=.39 (p<.0001). The proportion of variance shared between predictor and dependent variable is 15% ($F_{(1,170)}$= 30.23, p<.001). In accordance with expectations, the intercept of predictor ELS-trait were close to zero in both regression analysis. In other words, when the change score of the MHC-subscales were zero, the ELS-trait's change score also varied around zero. But, the standard error shows that the intercept has a high variability.

Effect Size Calculation. When the ELS-trait is sensitive to change, the effect sizes should be positive in the *improved* group, close to zero in the *unchanged* and negative in the *deteriorated* patients group. Those who improved according to the MHC-SF-subscale psychological well-being had an effect size of 1.21, and those who improved on subscale emotional well-being had an effect size of 1.56. Participants who remained unchanged had effect sizes of .32 (subscale psychological well-being) and .40 (subscale emotional well-being). The group of participants who deteriorated had effect sizes of -.19 (psychological well-being) and -.33 (emotional well-being). Furthermore, differences between the means of the ELS-trait at T_1 and T_0 were significant in the improved as well as in the unchanged group (all p<.0001). The means of the ELS-trait were not significantly different in the deteriorated group (p=.35 and p=.11). The results also showed that people in the improved group had lower means at baseline. Furthermore, the percentage of people in the improved, unchanged and deteriorated groups approximated the normal distribution.

Tabel 1. *Sensitivity to change of ELS-trait*

	T_0	T_1	ELS-trait Change score	Significance of difference [a]	Sensitivity to change
	M_1 (SD_1)	M_2 (SD_2)	M_{diff} (SD_{diff})	p-value	ES [b]
Improvements in emotional well-being (n=23; 13,4%)	45,35 (5,56)	54,04 (8,3)	8,7 (8,33)	0,000	1,56
Improvements in psychological well-being (n=24; 13,9%)	47,63 (8,77)	58,25 (7,81)	10,63 (9,38)	0,000	1,21
Unchanged emotional well-being (n=130; 75,6 %)	52,15 (9,52)	55,92 (11,39)	3,76 (8,27)	0,000	0,40
Unchanged psychological well-being (n=126; 73,3%)	52,25 (9,76)	55,37 (11,02)	3,12 (8,3)	0,000	0,32
Deterioration of emotional well-being (n=19; 11 %)	52,63 (13,15)	48,26 (9,38)	-4,37 (11,45)	0,114	-0,33
Deterioration of psychological well-being (n=22; 12,8%)	49,86 (10,38)	47,91 (11,65)	-1,95 (9,76)	0,358	-0,19

Note. [a] Significance of difference between ELS-trait at T_1 and T_0. Paired t-test was used to test significance of the difference. [b] ES, effect size were calculated as follows: M_2-M_1/SD_1 (M_2 = mean at T_1, M_1 = mean at T_0, SD_1 = standard deviation at baseline.

Study 2: ELS-state

Method

Participants. In study 2, four male and 35 female clients with minor depression (N=39) participated in a pilot effect-study of a group training called 'Voluit leven' (engl. 'Living to the fullest'). Eleven mental health clinics who carried out this training agreed to participate in this study. Participants were recruited via these clinics. People younger than 18 years were excluded from participation. Target group were people with minor depression, defined as depressive symptomatology that does not meet the DSM-IV criteria for depression. The target group was described as people who often experience negative, unpleasant thoughts and distressing, painful emotions. Participants´ mean age was 45 years (SD= 13.23; range= 19-70). Most participant were married (59%), 33% were unmarried and the rest was divorced (7,7%). Participants mostly lived together with their partners (42%) or

with partners and children (26%). From the remaining 32%, 13% lived alone, 5% lived together with their children, and 13% lived in other housing situations.

Instruments: ELS-state. In contrast to the ELS-trait, the ELS-state items (Trompetter et al., 2013) have an explicit temporal reference to the past week. Table 2 gives an example of this reformulation. Each item is rated on a 5-point Likert-scale ranging from 1 (='*completely disagree'*) to 5 (='*completely agree'*).

Tabel 2. *Comparison between ELS-trait and ELS-state items 3 and 15*

	ELS-trait	ELS-state
Item 3	Ik heb belangrijke waarden om naar te leven. (*I believe that I've found important values to live according to*)	In de afgelopen week wist ik welke waarden voor mij belangrijk waren. (*Last week I believe that I've found important values to live according to*)
Item 15	Ik kom toe aan dingen die belangrijk voor me zijn. (*I make time for the things that I consider important*)	In de afgelopen week maakte ik veel tijd voor de dingen die ik belangrijk vond. (*Last week I made time for things that I consider important*)

Research design. Participants followed the 'Voluit leven'-course, which composes of nine weekly meetings of two hours duration. The meetings group size ranged between 6 to 12 people. Prior to the course, a baseline measurement took place where participants answered a multiple questionnaires including the ELS-state. After following the course, the participants were asked to fill in the same questionnaires again.

Analysis

The factorial structure is analyzed to derive latent variables from the ELS-state items. These variables are compared with the theoretical structure of the engaged response style. It is expected that latent variables reflect the two subscales *Life Fulfillment* and *Valued Living*. To probe whether the sample size is big enough to perform a factor analysis, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-test) is used, where a KMO-value greater than 0.5 indicates an adequate sample size.

Based on the results of a confirmative factor analysis from an earlier evaluation of the ELS-trait (Trompetter et al., 2013), a correlated two-factor model is tested. In this earlier

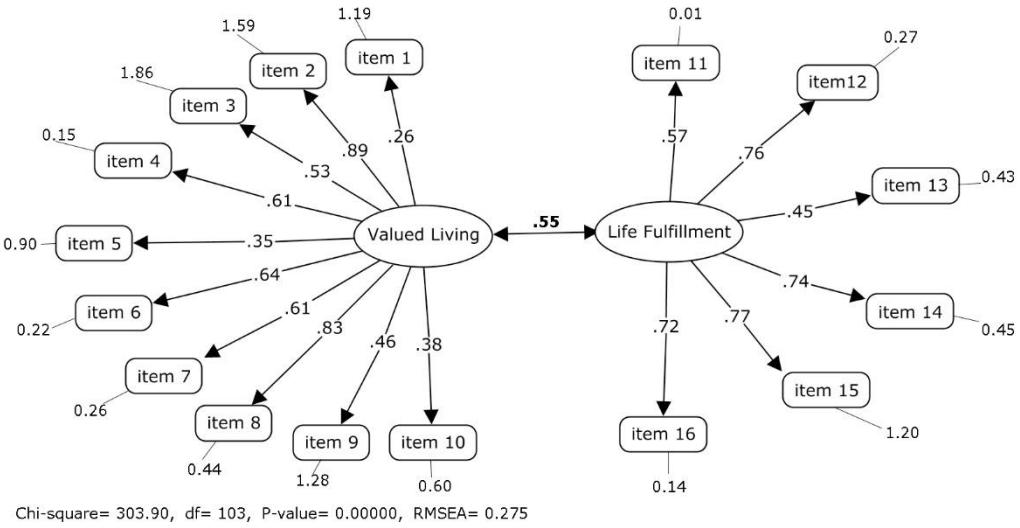
factor analysis, the first ten items of the ELS-state loaded on the factor 'Valued Living'. Items 11 to 16 loaded on the factor 'Life Fulfillment'. The variance of these two factors was fixed to one and the factors were free to correlate with each other. The error terms were uncorrelated in this model. In accordance with the study from Trompetter et al. (2013), the Sattora-Bentler-scaled chi-square (SB-χ^2), the root-mean-square error of approximation (RMSEA), the standardized root-mean-square residual (SRMR), the non-normed fit index (NNFI) and the comparative fit index (CFI) were used as indices of model fit. In the case of SB-χ^2, zero would indicate a perfect fit (the higher the score, the poorer the model-fit). RMSEA- and SRMR-values below .08 are considered to signal an acceptable model fit; values below .05 would indicate a good fit. NNFI- and CFI- indices above .90 would signal acceptable model fit and values above .95 would be indicators for a good fit (Bandalos & Finney, 2010; Browne & Cudeck, 1993; Hu & Bentler, 1999). The confirmatory factor analysis was conducted using the student edition of LISREL 9.1 for Windows.

If the CFA-outcomes do not support the correlated two-factor model an exploratory factor analysis is used to bring inter-correlated items together under more general underlying subscales. The analysis will then be conducted using IBM SPSS Statistics 20 (IBM Corp., Armonk NY). The calculations are done with data from the baseline measurements of this study.

Results

Confirmatory factor analysis. Outcomes from the KMO-test showed a value that indicated an adequate sample size (KMO-value= .721) for conducting a confirmatory factor analysis. The model fit indices signaled little or no fit of the correlated two-factor model. The SB-χ^2 was 303.90, where lower scores indicate a better fit. The RMSEA and SRMR outcomes were above the cut-off score of .08 which would indicate a good and acceptable model-fit (RMSEA .275; SRMR .163). The non-normed and the comparative fit indices did not reach the threshold of above .90 (NNFI .582; CFI .609) (Bandalos & Finney, 2010; Browne & Cudeck, 1993; Hu & Bentler, 1999). An investigation of the factor loadings showed that item 1, 5 and 10 loaded low on the factor 'Valued Living'. The factors Valued Living and Life Fulfillment had a correlation of 0.55. The detailed output is shown in figure 1.

Figure 1. Confirmative factor analysis testing a correlated two-factor model



Exploratory factor analysis. All sixteen items were subject to an exploratory maximum likelihood factor analysis with direct oblimin rotation. The scree plot indicated four underlying factors. Four factors had an initial eigenvalue >1. Factor one explained 38,17% of the variance and factor two explained 13,12%. In combination, these two factors explained 51,29% of the cumulative variance of the dataset. By including a third or fourth factor, 62,94% or 71,34% of the cumulative variance could be explained. Table 3 illustrates which items loaded on the same factor. Item 11 to 16 loaded on one factor, which is already known as Life Fulfillment. The internal consistency of this factor were good (α = 0.88) and could not be improved by deleting an item. Items one to ten were divided over three factors. Item 4, 6 and 7 loaded on one factor, which has a good internal consistency (α = 0.88). The third factor consists of item 1, 2, 3 and 5 and had an acceptable internal reliability (α = 0.73). The fourth factor included items 8, 9 and 10. Cronbach's alpha was acceptable (α = 0.78). None of the alphas could be improved by deleting an item. After analyzing the content of the items and corresponding factors, it turns out that factor one measures Life Fulfillment, factor two measures the knowledge of plans in life, factor three concerns the elaboration and possession of values and the fourth factor relates to committed action.

Table 3. *Item Component loadings*

#	Item Component	1	2	3	4
1	I have values that give my life more meaning. (VL)			,72	
2	I know what motivates me in life. (*VL*)	,47	,34	,71	
3	I believe that I've found important values to live according to. (*VL*)			,82	
4	I know exactly what I want to do with my life. (*VL*)	,44	,84	,37	,31
5	I make choices based on my values, even if it is stressful. (*VL*)		,41	,71	
6	I know how I want to live my life. (*VL*)	,34	,88		,41
7	I know what I want to do with my life. (*VL*)		,89		
8	I believe that my values are really reflected in my behaviour. (*VL*)		,66		,76
9	I believe that how I behave fits in with my personal wants and desires. (*VL*)	,43			,80
10	My emotions don't hold me back from doing what's important to me. (*VL*)				,90
11	I live the way I always intended to live. (*LF*)	,88			
12	I am satisfied with how I live my life. (*LF*)	,84			
13	Nothing can stop me from doing something that's important to me. (*LF*)	,64			,32
14	I believe that I am living life to the full right now. (*LF*)	,76	,48		,35
15	I make time for the things that I consider important. (*LF*)	,65	,37		,42
16	I feel that I am living a full life. (*LF*)	,87		,44	
	Eigenvalues	6.1	2,09	1,86	1,34
	Percentage of explained variance	38.17	13.12	11.64	8.40
	Cronbach's Alpha	.88	.88	.73	.78

Notes.* Loading => .30; Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.
Values below .30 are not displayed.

General Discussion

Study 1: ELS-trait

Test-retest Reliability. We examined the consistency of the ELS-scores for an interval of three and six months. As expected, the correlation between the scores was lower for the six months interval, than for the three months interval. The results also showed that the ELS-outcomes in the control group at baseline and follow up did not remain entirely stable.

There are several potential sources of error, which could have led to these results. At first the *test construction* can be a source of error. Because the ELS-trait contains no temporal reference, the test-taker misses a timespan the answers should refer to. As a result, test-taker could relate answers to different time spans. This could lead to unstable

results, i.e. answers that are based on experiences from last week may be more fluctuating than answer given on the basis of experiences from the last three months. Furthermore, the *test-taker* can pose a source of error. Variables such as changes of mental state or mood and casual life experiences influence the test-taker's answers. Additionally, the anticipation of improvement in health through the impending treatment could influence the ELS-trait's outcome. In addition to this, the answers can be influenced by the *test environment*. The seasons, for example, can lead to a temporal fluctuation of the scores. It is likely that this is what happened in our sample, since the baseline took part in winter, whereas the follow up took part in summer. Consequently, there is only insufficient evidence of stability of the group regarding engaged living (Cohen & Swerdlik, 2010). Finally, it may be that the *construct* measured (*engaged living*) is less stable than assumed beforehand. Values and meaning in life are closely related to social-cultural environment, which change over time. Moreover, values and valued action are geared to everyday experiences (Dittmann-Kohli & Westerhof, 2000). Since a test-retest with fluctuating data does not yield sound results, it is possible that the results are based on an inappropriate test-application.

Summarized, we can assume that the engaged response style is partly modifiable and partly stable. Greater intervals between measurements enable external influences affecting the ELS-trait scores. This is in accordance with earlier research from Dittmann-Kohli & Westerhof (2000), who state that meaning in life is closely related to external circumstances. Although relative long intervals (three and six months) were used to test the reproducibility, there were some agreements between the scores, which show that the scores remained relatively stable. Taking into account that the scores from the control condition were possibly not as stable as expected and that the intervals between the two measurements were relatively long, the outcomes are satisfying in general.

In future research, the test-retest reliability could be analyzed for closer time intervals to get a more detailed insight in the ELS's consistency over time. In addition, the challenge will be to create a control condition that remains stable with respect to engaged living.

Sensitivity to change. The second aim was to examine the ELS's sensitivity to measure change in engaged living. The results showed that data from the MHC-SF approximated a normal distribution. Changes measured by the ELS-trait correlated moderately with changes measured in the MHC-subscale psychological and emotional well-

being. The ELS-trait was able to predict 15 to 20 % of the proportion of variance in the change scores of psychological respectively emotional MHC-SF subscale.

To further investigate the ELS-trait's ability to measure change, an effect size calculation was conducted based on a study from Löwe, Kroenke, Herzog, and Gräfe from 2004. The Dutch version of the MHC-SF were used as external standard. As expected the ELS-trait's effect sizes were negative in the deteriorated, positive in the improved and close to zero in the unchanged groups. Although there is some evidence that ELS-trait is less sensitive to deterioration in emotional and psychological well-being, it can be concluded that the ELS-trait is sensitive to changes in emotional and psychological well-being.

These findings are supported by earlier research from Ryff (1989) and Ryff & Keyes (1995), where moderate to high correlations were found between psychological well-being (measured with Psychological Well-Being Scales) and variables closely related to engaged living, such as happiness and satisfaction with life. The results confirm the suggestion of a substantial relationship between these concepts (Trompetter et al., 2013). The moderate correlations found between engaged living and emotional well-being are in accordance with scientific research. Satisfaction with life and positive affect (emotional well-being) are concepts that emerge through psychological flexibility which is enhanced by engaged living (Fledderus et al., 2010). Other researchers hypothesize that positive emotions emerge through acting in accordance with personal relevant values (Eifert & Forsyth, 2005), which would fit the results. Since there are many other aspects that influence psychological flexibility, the moderate relationship between MHC-SF-subscales and ELS-trait is in accordance with earlier research and theory (Hayes et al., 2013). Seen from this perspective, the results are reasonable and therefore provide preliminary evidence for the sensitivity to measure change in longitudinal studies over three months.

Nevertheless, the outcomes must be treated with care. Some restrictions made it impossible to use a perfectly suitable statistical method to examine the ELS-trait's sensitivity to change. The study design and change characteristics of the population investigated are decisive in choosing the appropriate measurement (Stratford & Riddle, 2005). The data used, originated from a RCT on the effectiveness of a web-based self-help ACT-intervention (called 'Leven met pijn online') in decreasing pain interference in a population with chronic pain. There are several indications for the effectiveness of this intervention. At first, ACT has been proven to be effective for treating chronic pain (Veehof, Oskam, Schreurs, & Bohlmeijer,

2011). Furthermore, online self-help cognitive behavioral therapies for treating anxiety and depression have shown to be equally effective as face-to-face CBT. Adherence and acceptability of web-based CBT were good as well (Andrews, Cuijpers, Craske, McEvoy, & Titov, 2010).

However, since the online self-help intervention used in this design was not yet tested for its effectiveness, there was no certainty that patients from different conditions would truly differ with respect to their improvements in engaged living. Moreover, several studies address the problem of non-adherence to web-based interventions (Kelders, Van Gemert-Pijnen, Werkman, Nijland, Seydel, 2011; Christensen, Griffiths, Farrer, 2009; Wangberg, Bergmo, Johnsen, 2008). Non-adherence means that people do not use or continue to use the program, so that intended effects cannot be achieved.

As a consequence it was not possible to give an a priori rating of the sample's change characteristics based on their condition (experimental condition, minimal intervention condition and control condition), and to compare it with changes in engaged living measured by the ELS. Furthermore, there were no known prognostic variables or ratings from clinicians, which could had served as a priori declarations of the sample change characteristics (Stratford & Riddle, 2005).

Eventually, the conditions were treated as one sample in which individuals are heterogeneous regarding their improvements in engaged living and a external standards were used to test the sensitivity to change. Optimally, an external standard is a sensitive measure for the construct in question, in this case engaged living. However, questionnaires which focus on engaged living such as VLQ, CPVI and BEVS are either unstandardized (Wilson et al., 2010; McCracken & Yang, 2006) or have an intervention character (Lundgren et al., 2012) (as explained in the introduction). Therefore, it was not possible to use these questionnaires as external rating of engaged living. Alternatively, the emotional and psychological well-being subscales from the Dutch version of the MHC-SF were used as external standards (Lamers et al., 2011).

This certainly is a limitation of the study, because the MHC-SF-subscales measure constructs which have an indirect relationship with the construct measured by the ELS-trait (Fledderus et al., 2010). The relationship is mediated through psychological flexibility: enhancement in psychological flexibility leads to improvements in emotional and psychological well-being, whereas engaged living enhances psychological flexibility (Kashdan,

Barrios, Forsyth, & Steger, 2006). Thus, the results must be interpreted while keeping in mind that engaged living and psychological respectively emotional well-being are distinct but related concepts.

On the basis of these results, there are preliminary indications that the ELS-trait is sensitive to change when compared to the MHC-SF subscales psychological and emotional well-being. For further research it is recommended to measure the sensitivity of change in a population where the change characteristics are known in advance. Based on the review from Stratford and Riddle (2005) it is advised to choose a study design with subgroups that truly change in different amounts. Prerequisite for this approach is an effective treatment that significantly improves the engaged response style, a treatment with little influence on engaged living and a control condition that does not change the engaged response style.

Study 2: ELS-state

Factor analyses. The second study was a pilot study concerning the factorial structure of the ELS-state. A two factor solution was tested with a confirmatory factor analysis. Afterwards, an exploratory factor analysis further investigated the factorial structure of the ELS-state. The findings can only give preliminary indication of the ELS-states factor structure, since a low sample size (*N*=38) was used.

Although a small sample size was used, the CFA revealed accordances with the correlated two factor model. The preassigned factors were distinct but related, which shows that they measure different aspects of an underlying factor. In accordance with earlier research on the ELS-factor structure, the CFA revealed high loadings on the factor 'Life Fulfillment'. This factor is supposed to measure a feeling of integrity and satisfaction, that emerges through living in accordance with own values. In contrast, items that were supposed to load on the factor 'Valued Living' did not seem to have the same underlying factor. To further explore the factorial structure of the ELS-state, an exploratory factor analysis was conducted. In accordance with the CFA, the EFA also confirmed the factor 'Life Fulfillment'. With regard to the items that are supposed to measure 'Valued Living', this analysis suggested to split these into three factors. On the basis of content analysis, the three factors of the subscale Valued Living can be split into: factor two was interpreted as 'knowledge of goals in life', factor three 'elaboration and possession of values' and factor

four ‘committed action’. These factors show a good match with the underlying ACT-model. Clarification of intrinsic personal relevant values, which is reflected in factor three, is one of the main two processes of the engaged response style (Hayes et al., 2013). The second main process of engaged living is committed action. Commitment is the ability to follow one’s own personal value in everyday life and to detect and avoid maladaptive response styles which prevent living in accordance with values. A prerequisite for committed action is the knowledge of how to implement of values in everyday life. Hayes (2006) differentiates between values and plans, since values cannot be achieved. A part of engaged living is the deduction of plans from values. This aspect is reflected in factor two. The items´ content implies that this factor concerns the knowledge of plans in life. The third factor concerns the elaboration of values which is the prerequisite for engaged living in general. The fourth factor is the achievement of these plans.

However, a limitation of the factor analyses is the relatively small sample size. According to MacCallum, Widaman, Zhang and Hong (1999) this would not be problematic when the all communalities were above .60. The results yet showed lower communalities in item 1, 13 and 15. Therefore, additional research is needed to investigate the factorial structure of the ELS-state. Further research should be conducted with bigger sample sizes.

Conclusion

This study provided initial support for the ELS-trait’s sensitivity to change. The ELS-trait yields stable, yet modifiable results. Changes detected in emotional and psychological well-being are reflected in scores from the ELS-trait. These outcomes not only demonstrate the ELS-trait’s sensitivity to change, but also support the ACT model. In line with the ACT-model, the ELS-trait change scores predicted a part (15-20%) of the variance in change scores from the MHC-subscales. These findings indicate the importance of other processes in predicting mental health, such as the processes from the centered and open response style (Hayes et al., 2011). Furthermore, these results are supported by earlier research from Ryff and Keyes (1995), who found strong correlations between concepts of psychological and emotional well-being and concepts closely related to engaged living.

The pilot study on the factorial structure of the ELS-state gives preliminary indications for ELS-state’s agreement with the theoretical ACT-model. In accordance with the factor

structure of the ELS-state's predecessor (ELS-trait), the items from the Life-Fulfillment subscale loaded high on the same factor. The remaining items (items 1-10) were divided over three factors, which can be attributed to the ACT-processes values and committed action. Thus, the findings show a close fit with the ACT-model.

The findings suggest that the ELS-trait may contribute to further investigations of ACT's underlying working mechanisms. Together with questionnaires measuring the open and centered response style, it appears to be possible to examine which response styles mediate improvements in psychological flexibility, mental well-being or clinical change. The ELS-trait may also help to create prognostic ratings on the effectiveness of ACT, e.g. a low score on the ELS-trait may suggest that clients will benefit from ACT.

Furthermore, on the basis of content analysis it may be concluded that the ELS-state yields more process-specific results, since it includes a temporal references. The pilot study also gives preliminary evidence for a more sophisticated factor structure of the ELS-state. This supports the idea that the ELS-state is more process-specific than the ELS-trait. However, the pilot study was conducted with a small sample size and further research is required.

Future research could concentrate on the question whether the ELS-state, which includes temporal references in its items, yields a more sophisticated factor-model. Therefore, the ELS-state's factor structure must be analyzed with a greater sample size. Future studies on the ELS's sensitivity should be conducted in a RCT with an ACT-treatment of known effectiveness. With respect to ELS's reliability, other studies could examine closer temporal interval to get a more detailed picture of the reproducibility of scores.

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Appendix

ELS-trait's items

1. I have values that give my life more meaning.
2. I know what motivates me in life.
3. I believe that I've found important values to live according to.
4. I know exactly what I want to do with my life.
5. I make choices based on my values, even if it is stressful.
6. I know how I want to live my life.
7. I know what I want to do with my life.
8. I believe that my values are really reflected in my behavior.
9. I believe that how I behave fits in with my personal wants and desires.
10. My emotions don't hold me back from doing what's important to me.
11. I live the way I always intended to live.
12. I am satisfied with how I live my life.
13. Nothing can stop me from doing something that's important to me.
14. I believe that I am living life to the full right now.
15. I make time for the things that I consider important.
16. I feel that I am living a full life.

ELS-state's items

1. Ik heb warden die mijn leven meer zin gaven in de afgelopen week.
2. In de afgelopen week wist ik wat mij motiveerde in het leven.
3. In de afgelopen week wist ik welke waarden voor mij belangrijk waren.
4. In de afgelopen week wist ik precies wat ik wilde doen met mijn leven.
5. In de afgelopen week maakte ik keuzes op grond van mijn waarden, zelfs als het moeilijk was.
6. In de afgelopen week wist ik precies hoe ik mijn leven wilde leven.
7. In de afgelopen week wist ik heel goed wat ik met mijn leven wilde doen.
8. In de afgelopen week kwamen mijn warden echt tot uiting in mijn gedrag.
9. In de afgelopen week paste de wijze waarop ik mij gedroeg, bij mijn persoonlijke behoeften en wensen.
10. In de afgelopen week weerhielden onaangename emoties me er niet van om te doen wat ik belangrijk vond.
11. In de afgelopen week leefde ik zoals ik altijd zou willen leven.
12. Ik ben tevreden met hoe ik de afgelopen week mijn leven heb geleid.

13. In de afgelopen week kon niets mij ervan weerhouden om te doen wat ik belangrijk vind.
14. In de afgelopen week leefde ik voluit.
15. In de afgelopen week maakte ik veel tijd voor de dingen die ik belangrijk vond.
16. In de afgelopen week heb ik alles uit het leven gehaald.