The Effects of Positive Psychology, Cognitive Restructuring and Acceptance Interventions on Emotion Regulation: A Micro-Randomised Trial

Hannah Krähling (2594587)

Master Thesis Positive Clinical Psychology and Technology (202200087)

Department of Psychology, University of Twente

1st Supervisor: Dr Thomas Vaessen

2nd Supervisor: Dr Jannis Kraiss

February 11, 2025

Abstract

Background: Many therapeutic traditions target emotion regulation strategies to treat mental disorders. However, the working mechanisms of their interventions are largely unexplored. Specifically, Ecological Momentary Interventions (EMI) delivered in everyday life could provide dynamic and context-sensitive emotion regulation support. By examining the effects of cognitive behavioural therapy, positive psychology and acceptance and commitment therapy EMIs on the strategies of positive reappraisal, savouring, gratitude, and acceptance, this study aims to provide insights into different therapeutic working mechanisms. **Method:** Seventy-two participants took part in a 23-day micro-randomised trial including a 16-day intervention period featuring Gratitude, Savouring, Cognitive Restructuring and Acceptance EMIs. Emotion regulation strategies were assessed on a distal (pre- and post-intervention) and proximal (Ecological Momentary Assessments 30 minutes following each EMI) level. For the analysis, Linear Mixed-Effects Models were used. **Results:** Participants improved in distal gratitude (p=.023) and decreased in experiential avoidance (*p*=.014). Concerning proximal changes, the Gratitude EMI and the Savouring EMI affected all emotion regulation strategies, improving savouring, gratitude, positive reappraisal and experiential avoidance. The Acceptance EMI affected experiential avoidance and the Cognitive Restructuring EMI affected gratitude and positive reappraisal. **Conclusion:** Underscoring the effectiveness of EMIs on emotion regulation, the Savouring and Gratitude EMI broadly enhanced emotion regulation, while the Cognitive Restructuring and Acceptance EMI targeted specific strategies. These differences suggest opportunities for personalised treatment, enhancing either specific strategies or overall emotion regulation. Moreover, future comparative research is needed, especially exploring the conceptual basis of savouring and gratitude.

Keywords: Emotion Regulation, Ecological Momentary Intervention, Gratitude, Savouring, Positive Reappraisal, Experiential Avoidance

The Effects of Positive Psychology, Cognitive Restructuring and Acceptance Interventions on Emotion Regulation: A Micro-Randomised Trial

Mental health problems pose a major burden on individuals and society, affecting nearly 1 billion people globally (WHO, 2022). Treating mental disorders and low well-being, psychotherapy and interventions based on different therapeutic traditions, such as cognitive behavioural therapy (CBT) and positive psychology, are generally considered effective (Barkham & Lambert, 2021; Munder et al., 2019). However, these existing treatments still require improvements in terms of relapse, remission rates and personalisation needs (Chaves et al., 2016; Cuijpers et al., 2016). While each therapeutic tradition is theorized to rely on distinct working mechanisms, the specificity of how they facilitate therapeutic change remains unclear (Cuijpers, 2019; Salkovskis et al., 2023). Contrasting the claim of distinct working mechanisms, the "common model" suggests that shared factors of different therapeutical traditions, such as the expectation of improvement, account for successful treatment (Cuijpers, 2019). Research into these change processes is crucial to find empirical evidence for the tradition's theoretical assumptions, assess differences between treatments and identify helpful practices to personalize and improve treatment effects (Cuijpers, 2019). Additionally, due to a shortage of mental health care professionals, many people lack access to psychotherapy, highlighting the need to improve treatment accessibility, for instance with digital intervention (Balaskas et al., 2021; Endale et al., 2020).

Maladaptive emotion regulation is a prominent feature of both mental disorders, such as depression and anxiety, and low well-being (Aldao et al., 2010; Boemo et al., 2022; Kraiss et al., 2020). For that reason, a central treatment focus of many therapeutic traditions is emotion regulation, defined as the modification of the intensity and type of emotional states to respond to environmental demands (Aldao et al., 2010; Southward et al., 2021). Proposing distinct working mechanisms, different therapeutic traditions aim to enhance one or several

adaptive emotion regulation strategies (Aldao et al., 2010; Moyal et al., 2015). Unlike maladaptive ones, these strategies, including acceptance or cognitive reappraisal, benefit mental health by reducing symptoms of depression and anxiety, commonly referred to as psychological distress (Aldao et al., 2010; Wolgast et al., 2011).

The first-in-line treatment for the majority of mental disorders is CBT, a problem-focused tradition which aims to reduce pathological symptoms (Beck, 2021; NIH, 2022). Studies have demonstrated its effectiveness for many mental disorders, including anxiety and depression, yet challenges with relapse and patients not responding to treatment remain (David et al., 2018; Flynn & Warren, 2014; Levy et al., 2021). In practice, a frequently used CBT tool is cognitive restructuring, referring to the systematic replacement of unrealistic and negative with more realistic and positive thought patterns (Beck, 2021; Wolgast et al., 2011). This tool targets the use of the emotion regulation strategy positive reappraisal, a specific type of cognitive reappraisal, theorised to be a central CBT working mechanism (Clark, 2022; Shiota & Levenson, 2009; Wolgast et al., 2011). Specifically, positive reappraisal includes attributing positive meaning, such as that it resulted in personal growth, to reframe a distressing situation (Shiota & Levenson, 2009). In general, there is little research on CBT working mechanisms and while existing studies support adaptive changes in negative thought patterns and positive reappraisal, this also applied to treatments not specifically targeting dysfunctional thinking (Clark, 2022; Cuijpers, 2019; Salkovskis et al., 2023).

Contrary to traditional CBT, acceptance and commitment therapy (ACT) changes the treatment focus from restructuring the content of cognitions to altering how individuals relate to their internal experiences (Blackledge & Hayes, 2001; Hayes et al., 2006). This focus has been found effective for several mental disorders, including depression (Powers et al., 2009). ACT proposes acceptance, an adaptive emotion regulation strategy, as its main mechanism to influence emotions (Blackledge & Hayes, 2001; Wojnarowska et al., 2020). Instead of

restructuring, ACT helps individuals to take an observing stance and accept unwanted thoughts and feelings (Dindo et al., 2017), aiming to decrease experiential avoidance, a harmful process of avoiding unwanted internal experiences, for instance by drinking excessively, that prolongs and intensifies distress (Blackledge & Hayes, 2001). Looking into working mechanisms, the meta-analysis of Stockton et al. (2019) suggests that acceptance seems to be a central mechanism of ACT, but also calls for further high-quality research.

Similar to ACT, positive psychology emphasises a holistic understanding of mental health aiming to facilitate individuals to live a fulfilling life, growing rapidly in research and practice over the past 25 years (Kern et al., 2020; Seligman & Csikszentmihalyi, 2000). Having been found moderately effective for various mental disorders, such as depression and anxiety (Carr et al., 2021), positive psychology treatments place a distinct focus on positive aspects of life, suggesting different mechanisms to foster positive emotions (Parks & Titova, 2016; Santos et al., 2013). One key mechanism is savouring, an adaptive emotion regulation strategy that involves focusing on the positive aspects of experiences, theorised to strengthen the emotional impact of positive events by prolonging their effects (Bryant, 2021; Jose et al., 2012; Smith & Bryant, 2017). Gratitude, another focus of positive psychology and frequently employed in exercises, is the recognition of a good event, accompanied by the appraisal that it was caused by another person or an impersonal entity (Boggio et al., 2020; Bohlmeijer & Hulsbergen, 2018; Cunha et al., 2019). Still, a need for research on the working mechanisms of positive psychology remains (Jankowski et al., 2020), including emotion regulation targeting positive emotion (Doorley & Kashdan, 2021).

While emotion regulation has traditionally been researched and treated as a stable factor, recent studies highlight its dynamic nature and its high susceptibility to situational, momentary and contextual influences (Colombo et al., 2019; Pruessner et al., 2020), suggesting the importance of examining and supporting emotion regulation strategies in

everyday contexts. A promising way to include therapeutic treatments into people's daily lives and improve accessibility is by employing digital interventions, such as Ecological Momentary Interventions (EMI). Delivered repeatedly in real-life and natural settings, EMIs can help support the use of emotion regulation strategies, addressing their context-sensitive and dynamic nature (Balaskas et al., 2021; Colombo et al., 2019). EMIs use mobile technology, predominantly mobile phones, and can be employed as standalone or a supplement to other treatments (Balaskas et al., 2021). To assess their impact, Ecological Momentary Assessments (EMAs)- real-life and real-time measurements often delivered via short mobile phone questionnaires- can be sent in close temporal proximity to EMIs, allowing for timely, ecological and convenient assessment of EMIs effects (Myin-Germeys & Kuppens, 2022).

Research has begun to explore the effect of EMIs on emotion regulation strategies. LaFreniere and Newman (2023) found that participants suffering from generalised anxiety disorder used significantly more savouring after a 7-day intervention including savouring EMIs, with sustained effects at a 30-day follow-up. At both time points, they also found significant effects on positive emotions, worrying and symptoms of depression. Furthermore, Bonnier et al. (2025) found a 12-month follow-up effect of an acceptance EMI on psychological flexibility (of which acceptance is a part) for people with high negative affectivity. Employing cognitive restructuring and other CBT EMIs, Bernstein et al. (2022) found both immediate and 2-hour delayed improvements in the gratitude levels and negative emotions of suicidal patients, including no control setting. They also found pre-to post-intervention improvements in anxiety, depression and anger symptoms. However, there is generally little research on EMIs' effects on emotion regulation (Colombo et al., 2019), and the effects of gratitude EMIs on emotion regulation are unexplored. While existing studies indicate that EMIs can affect various aspects of emotion regulation including different

strategies, the specifics of how EMIs based on different therapeutic traditions affect emotion regulation, especially on a momentary basis, are still unclear. Furthermore, EMI research investigating not only correlational but also causal momentary relationships is required to get insights into working mechanisms.

To measure the momentary causal effects of EMIs on emotion regulation, a Micro-Randomized Trial (MRT), which involves repeatedly randomising intervention components at various decision points throughout the study fittingly enables researchers to assess time-varying effects (Klasnja et al., 2015). Repeated within-person randomisation at each decision point, meaning if an intervention is delivered to a specific participant, provides insights into a participant's cognition and emotion with and without the intervention at various time points, helping to identify causal effects (Klasnja et al., 2015). Thus, as this design allows to repeatedly randomise whether participants receive an EMI at a specific time point, the research design of an MRT is suitable for investigating causal working mechanisms of EMIs.

To summarise, while there is limited research supporting the effects of CBT, ACT and positive psychology EMIs on emotion regulation following an intervention, there is no research into their momentary causal effects on their putative working mechanisms. My research question "*How are emotion regulation strategies targeted by EMIs based on cognitive restructuring, gratitude, savouring and acceptance?*" focuses on the momentary and pre- to post-intervention effects of these EMIs in the daily life of adults experiencing psychological distress.

Specifically, I hypothesise that...

H1) The use of each emotion regulation strategy increased after compared to before the intervention period.

H2) The use of each emotion regulation strategy increased after compared to before the intervention period with the engagement in more strategy-specific EMI.

H3) Savouring EMIs but not Gratitude, Acceptance or Cognitive Restructuring EMIs are associated with higher momentary savouring.

H4) Gratitude EMIs but not Savouring, Acceptance or Cognitive Restructuring EMIs are associated with higher momentary gratitude.

H5) Cognitive Restructuring EMIs but not Gratitude, Acceptance or Savouring EMIs are associated with higher momentary positive reappraisal.

H6) Acceptance EMIs but not Gratitude, Savouring or Cognitive Restructuring EMIs are associated with lower momentary experiential avoidance.

Method

This research is part of a larger intensive longitudinal study on the efficacy, working mechanisms and adherence of several EMIs within an MRT. The study was registered at the Open Science Framework (https://osf.io/z645p/) and was approved by the BMS Ethics Committee of the University of Twente under request 240007.

Participants

Convenience sampling was employed to recruit participants via Facebook groups and social media, posters, flyers and the Sona system - a research subject pool of psychology students. Based on a power analysis for MRTs conducted with the MRT-SS Calculator, aiming at 80% power to detect a constant effect size of 0.1, 72 participants were recruited. Expecting a 25% dropout rate, 54 participants would suffice to reach 82% power to detect a small to moderate effect of pre- to post-intervention changes.

Inclusion criteria for participation were being over 18 years old, understanding English, and having at least mild psychological distress, indicated by a score of 10 or higher on the Kessler-10 psychological distress scale (Kessler et al., 2003). For their participation, participants received participation credits (subject hours) as part of their university program

or an Amazon gift card for up to 50 € depending on whether they filled out the pre- and post-measurement and how many of the EMAs they completed.

Design

After filling out the pre-measurement as part of the distal outcomes, referring to pre- and post-intervention assessments, participants followed a 23-day study period (Figure 1). The study started with a 7-day baseline assessment in which participants filled out four standard EMAs, each containing 14 questions about momentary affect, context and emotion regulation strategies on their smartphones per day (Myin-Germeys et al., 2018). A standard EMA was sent once at a random moment within a fixed time frame (8:80-10:30, 12:00-14:00, 15:30-17:30 and 19:00-21:00), resulting in four standard EMAs a day. Participants had 30 minutes to access the questions before an EMA expired.

The baseline period was followed by a 16-day intervention period, which was identical to the baseline period with two additions: i) following the standard EMAs participants received an EMI in two randomly chosen time frames and ii) participants received a follow-up EMA including 9 to 11 questions depending on if an EMI was received, assessing affect, emotion regulation, engagement, and adherence 30 minutes after each standard EMA. Per day, participants thus received two EMIs and eight EMAs which measure momentary effects, providing the proximal results of this study. It was estimated that it would take participants around 2 minutes to complete any EMA.

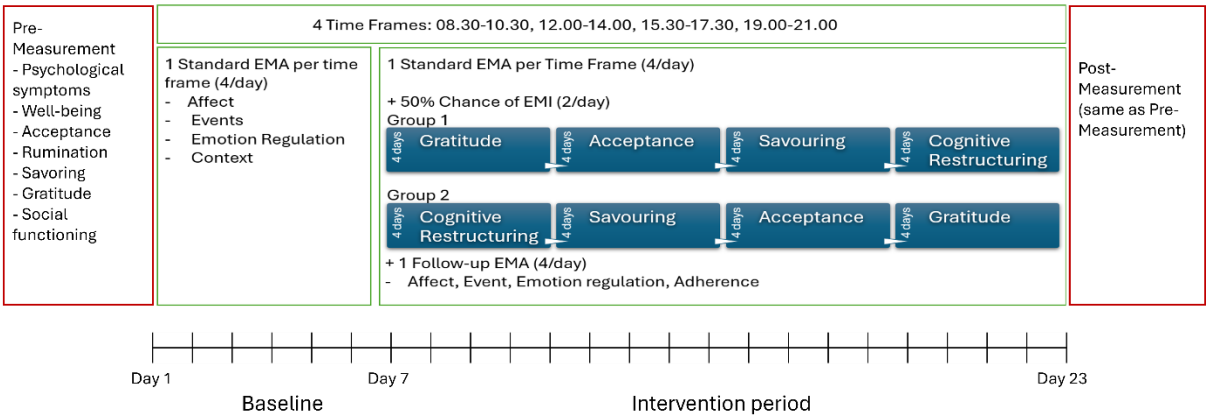
For the intervention period, participants were randomly divided into two groups which completed the EMIs in reversed order. Group 1 started with a Gratitude EMI, followed by an Acceptance EMI, a Savouring EMI and ended with a Cognitive Restructuring EMI while group 2 followed the reversed order to account for potential sequential effects. Participants received the same EMI for four days in a row and were instructed to spend

around 10 minutes on one EMI, which was delivered via the mobile phone app m-path (m-Path, n.d.).

After the intervention period, the distal outcomes (post-measurement) were assessed again.

Figure 1

Overview of the Study Design



Note. Measures in red boxes investigated distal outcomes and measurements in green boxes investigated proximal outcomes.

Measures

Distal outcomes

The pre- and post-measurements included questionnaires assessing savouring, gratitude, acceptance and positive reappraisal. All items can be found in Appendix A.

Savouring. To test the habitual use of savouring, the Reminiscent subscale of the Savouring Beliefs Inventory (SBI) was used. It includes 8 items, which can be answered on a scale from 1 (lowest) to 7 (highest). Individuals' perception of their use of savouring is indicated by a sum score, ranging between -28 and 28 and calculated by subtracting the score of the negatively worded items from the score of the positively worded items. The SBI was found to be a reliable and valid assessment for savouring, including good internal consistency

of the Reminiscent subscale with Cronbach's alphas around .8 (Bryant, 2003). In this study, similar Cronbach's alphas of .74 for the pre- and .83 for the post-measurement were found.

Gratitude. Assessing how thankful one feels, the Gratitude Questionnaire-6 (GQ-6) includes 6 items, answered on a scale from 1 (strongly agree) to 7 (strongly disagree). A sum score indicates the participant's level of gratitude, calculated by reversing negatively worded items. This score ranges from 6 to 42, with a high score indicating high levels of gratitude. The GQ-6 was found to be a reliable measure of the intensity, frequency, span and density of gratitude with a good internal consistency, indicated by a Cronbach's alpha of .82 (McCullough et al., 2002). Similarly, this study found Cronbach's alphas of .75 for the pre- and .88 for the post-measurement.

Positive Reappraisal. The positive reappraisal subscale of the Cognitive Emotion Regulation Questionnaire (CERQ) includes 4 items which examine the use of positive reappraisal. Items can be answered on a scale from 1 (almost never) to 5 (almost always), adding up to a sum score between 4 and 20. The CERQ has been found to have strong psychometric properties, also finding a good internal consistency for the positive reappraisal subscale with Cronbach's alphas ranging between .84 and .85 (Garnefski & Kraaij, 2007). This study found Cronbach's alphas of .85 for the pre- and .88 for the post-measurement.

Acceptance. Lastly, acceptance was tested with the Acceptance and Action Questionnaire-II (AAQ-II). The AAQ-II includes 7 items assessing psychological flexibility, answered on a scale from 1 (never true) to 7 (always true). The sum score of all items ranges from 7 to 49, with a high sum score suggesting greater experiential avoidance and a low score indicating more acceptance. Found to have satisfactory psychometric properties and good internal consistency with Cronbach's Alphas around .84 (Bond et al., 2011), the AAQ-II in this study similarly had a Cronbach's alphas of .88 for the pre- and .89 for the post-measurement.

Momentary Emotion Regulation

Different emotion regulation strategies were assessed in both standard EMA and follow-up EMA with one item each (Table 1). Participants could indicate how much they engaged in the emotion regulation strategy in the last 30 minutes before starting the questionnaire with a Likert scale ranging from 1 (not at all) to 7 (very much). All items were based on the ESM repository (ESM Item Repository, n.d.). The ICC of the items indicated poor to moderate test-retest reliability during the baseline period, ranging between 0.12 to 0.31, potentially reflecting the dynamic nature of emotion regulation.

Table 1

Items Assessing Emotion Regulation in Standard and Follow-up EMAs

Strategy	Item
Experiential Avoidance	I tried to avoid or distract myself from negative thoughts and feelings.
Positive Reappraisal	I tried to look at my negative thoughts and feelings from a more positive perspective.
Savouring	I enjoyed good things that happened to me.
Gratitude	I felt that I have things in life to be thankful for.

EMIs

The intervention consisted of four different EMIs asking participants to write about their experiences and memories, each being sent to the participants for four consecutive days (Appendix B).

The Gratitude EMI consisted of an exercise called the “Gratitude Journal” including writing down three things one is grateful for, reflecting on why one is grateful and then paying attention to arising positive emotions, aiming at increasing feelings of gratitude (O’Connell et al., 2018). To elicit more positive emotions, the Savouring EMI consisted of

thinking of one good memory, reconstructing it in great detail and paying attention to arising emotions (Speer et al., 2014). Next, the Acceptance EMI involved thinking of a personal struggle and observing one's distressing emotions and cognitions to increase the use of acceptance when faced with distress (Bonnier et al., 2025). Lastly, the Cognitive Restructuring EMI consisted of thinking of an unpleasant thought, taking perspective, and coming up with a more positive alternative for this thought, aiming at fostering the use of positive reappraisal (Ehret et al., 2018). All exercises described in the EMIs are adapted versions of common psychological practices from CBT, ACT and positive psychology (Bonnier et al., 2025; Ehret et al., 2018; O'Connell et al., 2018; Speer et al., 2014).

Data Analysis

The data were analysed in RStudio with Linear Mixed-Effects Models (LMER), addressing the missing values and nested data structure (Kraiss et al., 2023). After fitting the models, the normal distribution of the residuals was tested. A p-value of .05 was chosen as a cutoff value to test the hypotheses.

First, participant demographics were assessed. The reported use of emotion regulation strategies regarding the pre-measurement, post-measurement, standard EMAs and follow-up EMAs was examined. Furthermore, the average number of total and strategy-specific EMIs in which participants engaged was assessed.

To test hypothesis 1 analysing the distal results of the different EMIs on emotion regulation strategies four LMER models were constructed with the lme4 package. In each model, time (levels: 0= pre-measurement, 1= post-measurement) was the fixed effect and a random intercept for the participants was included to account for repeated measures within individuals. The dependent variable was the specific emotion regulation strategy, thus gratitude, savouring, positive reappraisal or acceptance. To test hypothesis 2 regarding whether the number of the specific EMIs a participant completed influenced their use of

emotion regulation strategies, the number of strategy-specific EMIs completed was inserted as a moderator of the relationship between time and the emotion regulation strategy in the models described above, creating four additional LMER models. Interaction graphs were constructed to visualise the moderations, grouping participants based on whether they completed more or fewer than the median number of strategy-specific EMIs.

To test hypotheses 3 to 6 examining the proximal effects of different EMIs on emotion regulation strategies, 4 LMER models were constructed. The dependent variable was the specific emotion regulation strategy as reported during the follow-up EMA. Each model included the EMI type completed (levels: 0=no EMI, 1= gratitude, 2= savouring, 3= cognitive restructuring, 4= acceptance) as a fixed effect, with no EMI as the reference category, and a random intercept for participants. The respective emotion regulation strategy reported during the standard EMA was added to control for the baseline level of the strategy. To compare the proximal effects of different EMIs on one emotion regulation strategy, pairwise post hoc analyses using estimated marginal means were conducted with the emmeans package.

To visualize the results, the ggplot2 package was used.

Results

Sample description

The analysis was conducted with the complete sample of 72 participants (female = 48, male= 21, Mage = 22.90, SDage = 3.66). Most of the participants were students or working students and had a German (24) or Dutch (19) nationality. On average participants completed 4.81 Acceptance EMIs (SD= 2.18), 4.88 Cognitive Restructuring EMIs (SD= 2.03), 4.99 Savouring EMIs (SD= 1.88) and 5.00 Gratitude EMIs (SD= 2.24), carrying out 79.12% of all EMIs. Indicating their momentary emotion regulation, participants answered 77.57% of the Standard EMAs and 60.68% of the Follow-up EMAs. A detailed overview of the sample

descriptives can be found in Table 2 and information concerning baseline levels of symptoms and emotion regulation strategies in Table 3 (see pre-measurement).

Table 2

Overview of Participants' Demographics

	Description	N (%)
Gender	Male	48 (66.67)
	Female	21 (29.17)
	Other	3 (4.17)
Nationality	German	24 (33.33)
	Dutch	19 (26.39)
	Spain	2(2.78)
	Other	29 (37.5)
Occupation	Students	42 (58.33)
	Working students	17 (23.61)
	Part-time	8 (11.11)
	Unemployed	3 (4.17)
	Full-time	2 (2.78)
Highest Completed Education	High school	35 (48.61)
	Some college but no degree	4 (5.56)
	Bachelors	22 (30.56)
	Masters	9 (12.5)
	Doctoral	1 (1.39)
	Other	1 (1.39)

Distal Outcomes

The results of the analyses assessing the change in emotion regulation strategies from pre- to post-measurement (H1) are summarized in Table 3. In line with H1, gratitude significantly increased, $t(69) = 2.33$, $p=.023$, and experiential avoidance decreased, $t(70) = -2.51$, $p=.014$, from pre- to post-measurement. Savouring, $t(70) = .38$, $p=.707$, and positive reappraisal, $t(70) = 1.34$, $p=.185$, however, did not change.

Only experiential avoidance was significantly moderated by the number of Acceptance EMIs, $t(70) = -2.00$, $p=.0499$, suggesting a dose-response relationship. Figure 2 indicates that the difference in experiential avoidance score at the pre-measurement drove this interaction, revealing that participants who engaged in more Acceptance EMIs and experienced a bigger decrease also had higher experiential avoidance levels before the

intervention period. For savouring, gratitude and positive reappraisal, no significant dose-response relationships were found, contradicting hypothesis 2.

Table 3

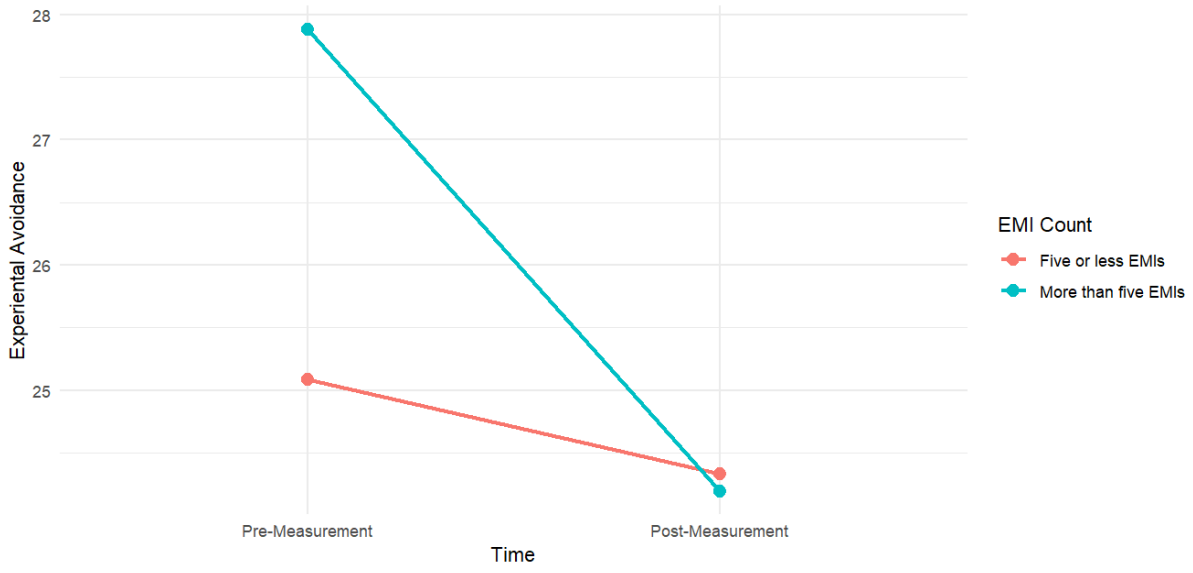
Mean and Standard Deviations of Symptoms and Emotion Regulation Strategies Regarding the Distal and Proximal Outcomes

Variable	Pre-Measurement		Post-Measurement		Standard EMA		Follow-up EMA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Symptoms	1.15	0.60	0.94	0.54				
Pos. Reappraisal	12.70	3.73	13.15	3.58	3.42	1.77	3.49	1.78
Savouring	10.83	7.10	10.94	8.13	4.81	1.45	4.91	1.34
Gratitude	31.21	5.54	32.41	6.39	4.88	1.40	4.98	1.33
Exp. Avoidance	26.11	8.67	24.28	8.73	3.07	1.75	3.01	1.68

Note. Symptoms based on the Global Severity Index of the Brief Symptom Inventory which indicates responders' distress level, combining information about severity and number of symptoms.

Figure 2

Interaction Graph Showing the Difference Between Pre- and Post-Measurement of Participants With Different EMI Engagement Rates



Proximal Outcomes

Descriptives of momentary emotion regulation strategies can be found in Table 3 and detailed outcomes of the LMER models in Table 4.

Fitting to H3, savouring was significantly higher following a Savouring EMI compared to no EMI, $t(2733) = 3.48$, $p<.001$. In line with H4, gratitude was also significantly higher following a Gratitude EMI than after no EMI, $t(2728) = 5.65$, $p <.001$. As theorized in H5, participants following a Cognitive Restructuring EMI had significantly higher consecutive positive reappraisal scores compared to no EMI, $t(2725) = 3.02$, $p=.003$. In line with H6, after the Acceptance EMI participants had a significantly lower experiential avoidance score than if they had done no EMI, $t(2730) = -2.93$, $p=.003$.

Contradicting hypotheses H3 to H6, EMIs also had effects on other emotion regulation strategies. Participants following a Gratitude EMI had significantly higher savouring, $t(2732) = 4.00$, $p <.001$, positive reappraisal, $t(2725) = 2.31$, $p=.021$, and decreased experiential avoidance, $t(2727) = -2.53$, $p=.011$, compared to no EMI. Participants doing the Savouring EMI had significantly higher gratitude, $t(2729) = 4.70$, $p <.001$, positive reappraisal, $t(2725) = 2.66$, $p=.008$, and decreased experiential avoidance, $t(2728) = -2.03$, $p=.042$, compared to no EMI. Participants following a Cognitive Restructuring EMI had significantly higher gratitude, $t(2729) = 2.22$, $p = .026$, compared to no EMI.

Further analysis showed significant differences between the effects of the different EMIs on each emotion regulation strategy. Regarding the strategy savouring, participants following a Savouring EMI, $t(2740) = 2.15$, $p=.032$, and a Gratitude EMI, $t(2740) = 2.53$, $p=.011$, had significantly higher consecutive scores than after a Cognitive Restructuring EMI. Emotion regulation strategy gratitude was significantly higher following a Gratitude EMI compared to an Acceptance EMI, $t(2734) = 2.92$, $p=.004$, and a Cognitive Restructuring EMI $t(2737) = 2.64$, $p=.008$. After a Savouring EMI participants also had significantly higher

gratitude scores than after an Acceptance EMI, $t(2738) = 2.21$, $p=.027$. Regarding experiential avoidance, participants of an Acceptance EMI had significantly lower scores than after a Cognitive Restructuring EMI, $t(2735) = -2.04$, $p=.042$. All other effects of the EMIs, such as regarding the emotion regulation strategy positive reappraisal, did not significantly differ from each other.

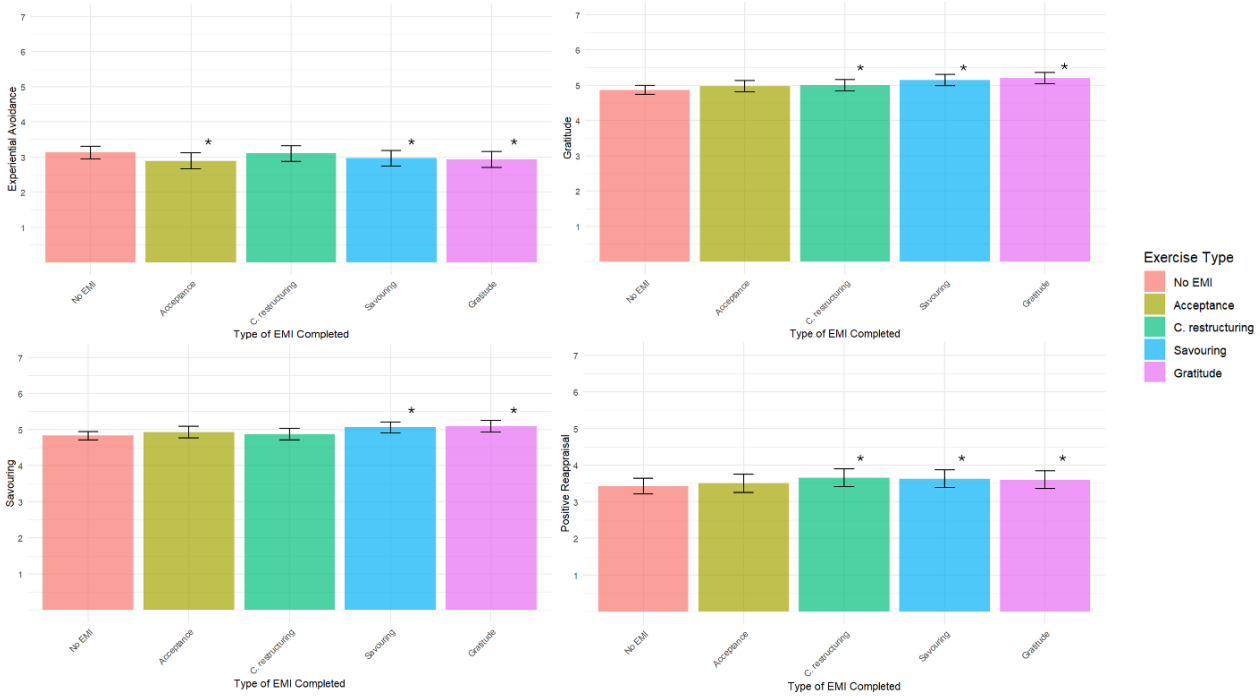
Table 4

Results of the LMER Models Concerning the Proximal Outcomes

Outcome	Predictor: EMI Type	Estimate	Std Error	D.f.	95% CI	t-value	*p*-value
	No EMI compared to...						
Savouring	Savouring EMI	0.23	0.07	2733	(.1, .36)	3.48	<.001*
	Gratitude EMI	0.26	0.06	2732	(.13, .39)	4.00	<.001*
	Cog. Restructuring EMI	0.05	0.06	2733	(-.08, .17)	0.71	.480
	Acceptance EMI	0.09	0.07	2736	(-.04, .22)	1.39	.164
Gratitude	Savouring EMI	0.28	0.06	2729	(.16, .40)	4.70	<.001*
	Gratitude EMI	0.33	0.06	2728	(.22, .45)	5.65	<.001*
	Cog. Restructuring EMI	0.13	0.06	2729	(.01, .24)	2.22	.026*
	Acceptance EMI	0.11	0.06	2731	(-.01, .22)	1.74	.081
Positive	Savouring EMI	0.20	0.07	2725	(.05, .34)	2.66	.008*
Reappraisal	Gratitude EMI	0.17	0.07	2725	(.03, .32)	2.31	.021*
	Cog. Restructuring EMI	0.22	0.07	2725	(.08, .37)	3.02	.003*
	Acceptance EMI	0.07	0.08	2727	(-.08, .22)	0.95	.344
Experiential	Savouring EMI	-0.16	0.08	2728	(-.31, -.01)	-2.03	.042*
Avoidance	Gratitude EMI	-0.20	0.08	2727	(-.34, -.04)	-2.53	.011*
	Cog. Restructuring EMI	-0.03	0.08	2727	(-.17, .13)	-0.33	.744
	Acceptance EMI	-0.23	0.08	2730	(-.39, -.08)	-2.93	.003*

Figure 4

The Effects of the Different EMIs on Momentary Emotion Regulation Strategies



Note. Asterisks indicate EMIs which significantly differed from no EMI.

Discussion

This study aimed to investigate the working mechanisms and specificity of four different EMIs targeting cognitive restructuring, savouring, gratitude, and acceptance. Distal results indicate that, following the intervention period, participants increased their use of gratitude and decreased their use of experiential avoidance. A dose-response relationship was found for the Acceptance EMI on experiential avoidance. However, this effect appears to be primarily attributable to the differences in the baseline levels of experiential avoidance. On a momentary basis, doing an EMI was associated with higher levels of the emotion regulation strategy targeted by that specific EMI. In addition, the Gratitude and Savouring EMIs seemed to have more general effects, similarly increasing both gratitude, savouring, positive reappraisal and decreasing experiential avoidance. Contrary, the Cognitive Restructuring EMI

increased only positive reappraisal and gratitude, and the Acceptance EMI decreased only experiential avoidance, showing more specific effects.

Effectiveness of EMI's on Emotion Regulation Strategies

Broad Effects of Positive Psychology EMIs

The overlapping proximal effects of the Gratitude and the Savouring EMI on all emotion regulation strategies might be understood through their shared roots in positive psychology and their practical similarity (Cunha et al., 2019; Jose et al., 2012). According to positive psychology, gratitude, being thankful to external sources, and savouring, the process of prolonging emotions of positive experiences, both emphasise positive aspects of a person's life and life satisfaction (Cunha et al., 2019; Jose et al., 2012; Parks & Titova, 2016). This shared theoretical overlap in positive perspectives might be an important part of their working mechanism. Furthermore, the constructs of gratitude and savouring are similar in their practical implementation. Specifically, in the Gratitude EMI, participants were instructed that they may also focus on experiences they are grateful for and arising positive feelings, which is the principle of savouring. In the Savouring EMI, participants thought of positive memories and connecting positive emotions, which could have included gratitude for the experience. For instance, Bryant et al. (2021) found that savouring can elicit post-intervention gratitude, suggesting that by reflecting on memories to savour valuable "life lessons" people can discover thankfulness for how their life has unfolded. However, differences between the two EMIs might still emerge over time, also suggested by the distal results of this study. Looking at unique aspects, the construct of gratitude often links to past experiences, while savouring emphasizes the present moment (Burzynska-Tatjewska et al., 2022). Future research should clarify the overlap by examining long-term impacts and incorporating gratitude and savouring EMIs that highlight unique elements, such as their differing time perspectives. Concluding, the Gratitude and the Savouring EMI have a shared

theoretical focus and overlap in their practical implementation, raising concerns about their conceptual underpinnings and calling for more comparative research.

Both the Savouring and Gratitude EMIs broadly affected all momentary emotion regulation, potentially relating to their focus on positive aspects of lives broadening participants' psychological perspectives. These wide-ranging effects are in line with research showing that positive psychology interventions can support various emotion regulation strategies such as cognitive change and response modulation in the short and long term (Quoidbach et al., 2015). Similar to LaFreniere & Newman's (2023) findings on a savouring EMI increasing savouring and suggesting an increase of other emotion regulation strategies, this study also found the Savouring EMI effect on savouring and other strategies. In practice, gratitude and savouring EMIs might be especially helpful for people with emotion regulation difficulties as they seem to facilitate the use of several adaptive strategies. Looking into working mechanisms, the focus on positive aspects and emotions might ease the use of other emotion regulation strategies. Specifically, the Broaden-and-Built theory suggests that experiencing positive emotions can expand individuals' cognition and attention, fostering flexible and wider-range thinking and acting (Garland et al., 2010; Tugade & Fredrickson, 2007). As the Savouring and Gratitude EMI both include thinking of positive memories or aspects of life and attending to positive emotions arising as part of the exercise, this could have broadened participants' cognitive thought patterns, increasing and easing the use of other emotion regulation strategies. More specifically, broadening cognition and attention could ease coming up with alternate positive interpretations as part of positive reappraisal (Boggio et al., 2020), and encouraging cognitive flexibility could facilitate the exploration of unwanted thoughts and emotions regarding acceptance.

Specificity of the Acceptance and the Cognitive Restructuring EMI

The Acceptance EMI exclusively decreased momentary experiential avoidance, supporting the proposed mechanism of ACT (Blackledge & Hayes, 2001; Hayes et al., 2006). While most literature discusses acceptance like any other emotion regulation strategy, Wojnarowska et al. (2020) argue that it differs significantly, focusing exclusively on accepting difficult thoughts and feelings, whereas most other strategies aim to modify the current emotional state. This distinction potentially explains why the Acceptance EMI did not influence any other emotion regulation strategy, as it does not involve active change or restructuring processes overlapping with other strategies. The effect found is in line with Bonnier et al. (2025), who found a distal effect of an acceptance EMI on psychological flexibility (of which acceptance is a part), moderated by negative affect. Other studies also identified effects of acceptance intervention on experiential avoidance (Gratz & Gunderson, 2006; Zakiei et al., 2021). As the Acceptance EMI also decreased experimental avoidance most effectively, this suggests that this EMI might be especially helpful for individuals avoiding their distressing thoughts and emotions, presenting the opportunity to personalise treatment. However, differently to the results of this study effects of acceptance interventions have also been found on cognitive reappraisal (Segal et al., 2023). To clarify these inconsistencies, further research could examine the effects of acceptance interventions on multiple emotion regulation strategies, including both experiential avoidance and different types of cognitive reappraisal (positive and detached reappraisal).

Next to improving positive reappraisal, the Cognitive Restructuring EMI also increased gratitude. Bernstein et al. (2022) found that EMIs based on cognitive restructuring and other CBT components can elicit momentary increases in gratitude and a distal effect of positive reframing on gratitude has also been found (Wong et al., 2017), which is in line with the results of this study. Potentially, a cognitive restructuring EMI could foster gratitude

because it helps individuals to actively reinterpret their experiences in ways that make the good aspects of life more accessible and emotionally resonant, uncovering aspects eliciting feelings of gratitude. Recent insights on cognitive reappraisal, including positive reappraisal, show that learning to change the emotional meaning of events is a complex process as it entails learning and updating schemata (Wang & Yin, 2023), potentially limiting the effectiveness of the EMI due to the short practice time. Hence, further EMI research with longer practice times is needed to clarify both momentary and distal effects.

Strengths and Limitations

The main strength of this study is the research design, specifically embedding the data collection into an MRT. This ensures the possibility of examining causal and temporal effects of EMIs on emotion regulation strategies, which represents a methodological innovation because most intensive longitudinal data observes correlational phenomena (Klasnja et al., 2015; Myin-Germeys & Kuppens, 2022). Next, this study compared four EMIs of different therapeutic traditions, a relatively large number, as most previous research focused on only one EMI (Balaskas et al., 2021). Contributing to the understanding of how EMIs enhance emotion regulation, comparing different EMIs is crucial to finding fitting EMIs for specific and personalized emotion regulation support.

However, when interpreting the results of this study limitations in terms of generalisability and duration should be considered. Firstly, even though participants were sampled randomly, the majority were students or working students of German or Dutch origin, limiting generalisability to other populations. Secondly, while the overall study was long compared to other EMA studies (Van Berkel et al., 2017), participants had to learn four different EMIs, maximally practising each exercise eight times. The limited practice duration and repetitions could explain insignificant changes and small effects, also regarding dose-response interactions, indicating that research with longer practice periods might yield more

nuanced insights into the effects of doing EMIs over time. Thirdly, the observed overlap in the effect of the Gratitude and the Savouring EMI on emotion regulation strategies revealed a practical similarity, which might have extended the practise time of these emotion regulation strategies, influencing both momentary and distal results. Potentially, the Gratitude EMI and the Savouring EMI were also formulated too similarly, missing distinct aspects of the two concepts.

Conclusion

Summarizing, this study provided insights into the specificity and effectiveness of EMIs based on cognitive restructuring, savouring, gratitude, and acceptance in promoting emotion regulation strategies. Participants improved in distal gratitude and (decreased) experiential avoidance, supporting EMIs as an effective and accessible treatment for enhancing emotion regulation. The Gratitude and Savouring EMI exhibited broad momentary effects on all strategies, suggesting a wide-ranging impact, but also raising concerns about their conceptual overlap. In contrast, the Acceptance and the Cognitive Restructuring EMI demonstrated more tradition-specific effects. Overall, these findings underscore the effectiveness of EMIs on emotion regulation and suggest opportunities for personalised therapeutic treatments, either targeting specific strategies or broad emotion regulation.

References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Balaskas, A., Schueller, S. M., Cox, A. L., & Doherty, G. (2021). Ecological momentary interventions for mental health: A scoping review. *PLOS ONE*, *16*(3). https://doi.org/10.1371/JOURNAL.PONE.0248152

Barkham, M., & Lambert, M. (2021). The Efficacy and Effectiveness of Psychological Therapies. In *Bergin and Garfield's Handbook of Psychotherapy and Behavior Change: 50th anniversary edition* (7th ed., pp. 135–189). John Wiley & Sons, INC. https://books.google.nl/books?hl=en&lr=&id=u7ZHEAAAQBAJ&oi=fnd&pg=PA135&dq=psychotherapy+in+practise+variability+therapy+form+effectivness&ots=CE03ePtBcS&sig=IlViZoYz7QTwVPEKiJ1wfBWYX9Y#v=onepage&q=psychotherapy in practise variability therapy form effect

Beck, J. S. (2021). *Cognitive Behavior Therapy: Basics and Beyond* (3rd ed.). The Guilford Press. https://books.google.nl/books?hl=en&lr=&id=yb_nDwAAQBAJ&oi=fnd&pg=PP1&dq=cbt+beck&ots=wjoZHzHTWc&sig=_JcdOiCQIn7CJhn5j7WzvCEX4Gg&redir_esc=y#v=onepage&q=cbt beck&f=false

Bernstein, E. E., Bentley, K. H., Nock, M. K., Stein, M. B., Beck, S., & Kleiman, E. M. (2022). An Ecological Momentary Intervention Study of Emotional Responses to Smartphone-Prompted CBT Skills Practice and the Relationship to Clinical Outcomes. *Behavior Therapy*, *53*(2), 267–280. https://doi.org/10.1016/j.beth.2021.09.001

Blackledge, J. T., & Hayes, S. C. (2001). Emotion regulation in acceptance and commitment

therapy. *Journal of Clinical Psychology*, *57*(2), 243–255. https://doi.org/10.1002/1097-4679(200102)57:2<243::AID-JCLP9>3.0.CO;2-X

Boemo, T., Nieto, I., Vazquez, C., & Sanchez-Lopez, A. (2022). Relations between emotion regulation strategies and affect in daily life: A systematic review and meta-analysis of studies using ecological momentary assessments. *Neuroscience & Biobehavioral Reviews*, *139*, 104747. https://doi.org/10.1016/j.neubiorev.2022.104747

Boggio, P. S., Giglio, A. C. A., Nakao, C. K., Wingenbach, T. S. H., Marques, L. M., Koller, S., & Gruber, J. (2020). Writing about gratitude increases emotion-regulation efficacy. *Journal of Positive Psychology*, *15*(6), 783–794. https://doi.org/10.1080/17439760.2019.1651893

Bohlmeijer, E., & Hulsbergen, M. (2018). *Using Positive Psychology Every Day: learning how to flourish*. Routledge.

Bonnier, R. A., Beames, J. R., Kiekens, G., van Aubel, E., Schirmbeck, F., de Haan, L., Marcelis, M., van der Gaag, M., van Winkel, R., van Amelsvoort, T., Vaessen, T., Reininghaus, U., Lafit, G., & Myin-Germeys, I. (2025). Predicting clinical outcomes in a blended care intervention for early psychosis: Acceptance and Commitment Therapy in Daily-Life (ACT-DL). *Translational Psychiatry*, *15*(1), 1–10. https://doi.org/10.1038/s41398-024-03214-1

Bryant, F. B. (2021). Current Progress and Future Directions for Theory and Research on Savoring. *Frontiers in Psychology*, *12*, 771698. https://doi.org/10.3389/fpsyg.2021.771698

Bryant, F. B., Osowski, K. A., & Smith, J. L. (2021). Gratitude as a Mediator of the Effects of Savoring on Positive Adjustment to Aging. *The International Journal of Aging and Human Development*, *92*(3), 275–300. https://doi.org/10.1177/0091415020919999

Burzynska-Tatjewska, B., Stolarski, M., & Matthews, G. (2022). Do time perspectives moderate the effects of gratitude, savoring and prioritizing positivity on well-being? A test of the temporal match-mismatch model. *Personality and Individual Differences*, *189*, 111501. https://doi.org/10.1016/J.PAID.2022.111501

Carr, A., Cullen, K., Keeney, C., Canning, C., Mooney, O., Chinseallaigh, E., & O'Dowd, A. (2021). Effectiveness of positive psychology interventions: a systematic review and meta-analysis. *Journal of Positive Psychology*, *16*(6), 749–769. https://doi.org/10.1080/17439760.2020.1818807

Chaves, C., Lopez-Gomez, I., Hervas, G., & Vazquez, C. (2016). A Comparative Study on the Efficacy of a Positive Psychology Intervention and a Cognitive Behavioral Therapy for Clinical Depression. *Cognitive Therapy and Research*, *41*, 417–433. https://doi.org/10.1007/s10608-016-9778-9

Clark, D. A. (2022). Cognitive Reappraisal. *Cognitive and Behavioral Practice*, *29*(3), 564–566. https://doi.org/10.1016/J.CBPRA.2022.02.018

Colombo, D., Fernández-álvarez, J., Palacios, A. G., Cipresso, P., Botella, C., & Riva, G. (2019). New technologies for the understanding, assessment, and intervention of emotion regulation. *Frontiers in Psychology*, *10*, 1261. https://doi.org/https://doi.org/10.3389/fpsyg.2019.01261

Cuijpers, P. (2019). Targets and outcomes of psychotherapies for mental disorders: an overview. *World Psychiatry*, *18*(3), 276–285. https://doi.org/10.1002/wps.20661

Cuijpers, P., Ebert, D. D., Acarturk, C., Andersson, G., & Cristea, I. A. (2016). Personalized Psychotherapy for Adult Depression: A Meta-Analytic Review. *Behavior Therapy*, *47*(6), 966–980. https://doi.org/10.1016/J.BETH.2016.04.007

Cunha, L. F., Pellanda, L. C., & Reppold, C. T. (2019). Positive Psychology and Gratitude Interventions: A Randomized Clinical Trial. *Frontiers in Psychology*, *10*, 430258. https://doi.org/10.3389/fpsyg.2019.00584

David, D., Cristea, I., & Hofmann, S. G. (2018). Why Cognitive Behavioral Therapy Is the Current Gold Standard of Psychotherapy. *Frontiers in Psychiatry*, *9*, 4. https://doi.org/10.3389/FPSYT.2018.00004

Dindo, L., Van Liew, J. R., & Arch, J. J. (2017). Acceptance and Commitment Therapy: A Transdiagnostic Behavioral Intervention for Mental Health and Medical Conditions. *Neurotherapeutics*, *14*(3), 546–553. https://doi.org/10.1007/S13311-017-0521-3

Doorley, J. D., & Kashdan, T. B. (2021). Positive and Negative Emotion Regulation in College Athletes: A Preliminary Exploration of Daily Savoring, Acceptance, and Cognitive Reappraisal. *Cognitive Therapy and Research*, *45*(4), 598–613. https://doi.org/10.1007/s10608-020-10202-4

Ehret, A. M., Joormann, J., & Berking, M. (2018). Self-compassion is more effective than acceptance and reappraisal in decreasing depressed mood in currently and formerly depressed individuals. *Journal of Affective Disorders*, *226*, 220–226. https://doi.org/10.1016/j.jad.2017.10.006

Endale, T., Qureshi, O., Ryan, G. K., Esponda, G. M., Verhey, R., Eaton, J., De Silva, M., & Murphy, J. (2020). Barriers and drivers to capacity-building in global mental health projects. *International Journal of Mental Health Systems*, *14*(1), 1–12. https://doi.org/10.1186/S13033-020-00420-4/TABLES/2

ESM Item Repository. (n.d.). *ESM Item Repository*. Retrieved June 26, 2024, from https://esmitemrepositoryinfo.com/

Flynn, H. A., & Warren, R. (2014). Using CBT effectively for treating depression and anxiety. *Current Psychiatry*, *13*(6), 45–53. https://www.mdedge.com/psychiatry/article/82695/anxiety-disorders/using-cbt-effectively-treating-depression-and-anxiety

Garland, E. L., Fredrickson, B., Kring, A. M., Johnson, D. P., Meyer, P. S., & Penn, D. L. (2010). Upward Spirals of Positive Emotions Counter Downward Spirals of Negativity: Insights from the Broaden-and-Build Theory and Affective Neuroscience on The Treatment of Emotion Dysfunctions and Deficits in Psychopathology. *Clinical Psychology Review*, *30*(7), 849–864. https://doi.org/10.1016/J.CPR.2010.03.002

Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire: Psychometric features and prospective relationships with depression and anxiety in adults. *European Journal of Psychological Assessment*, *23*(3), 141–149. https://doi.org/10.1027/1015-5759.23.3.141

Gratz, K. L., & Gunderson, J. G. (2006). Preliminary Data on an Acceptance-Based Emotion Regulation Group Intervention for Deliberate Self-Harm Among Women With Borderline Personality Disorder. *Behavior Therapy*, *37*(1), 25–35. https://doi.org/10.1016/j.beth.2005.03.002

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and Commitment Therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, *44*(1), 1–25. https://doi.org/10.1016/J.BRAT.2005.06.006

Jankowski, P. J., Sandage, S. J., Bell, C. A., Davis, D. E., Porter, E., Jessen, M., Motzny, C. L., Ross, K. V., & Owen, J. (2020). Virtue, flourishing, and positive psychology in psychotherapy: An overview and research prospectus. *Psychotherapy*, *57*(3), 291–309. https://doi.org/10.1037/pst0000285

Jose, P. E., Lim, B. T., & Bryant, F. B. (2012). Does savoring increase happiness? A daily diary study. *The Journal of Positive Psychology*, *7*(3), 176–187. https://doi.org/10.1080/17439760.2012.671345

Kern, M. L., Williams, P., Spong, C., Colla, R., Sharma, K., Downie, A., Taylor, J. A., Sharp, S., Siokou, C., & Oades, L. G. (2020). Systems informed positive psychology. *The Journal of Positive Psychology*, *15*(6), 705–715. https://doi.org/10.1080/17439760.2019.1639799

Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S.-L. T., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003). Screening for Serious Mental Illness in the General Population. *Archives of General Psychiatry*, *60*(2), 184. https://doi.org/10.1001/archpsyc.60.2.184

Klasnja, P., Hekler, E. B., Shiffman, S., Boruvka, A., Almirall, D., Tewari, A., & Murphy, S. A. (2015). Microrandomized trials: An experimental design for developing just-in-time adaptive interventions. *Health Psychology*, *34*(Suppl), 1220–1228. https://doi.org/10.1037/hea0000305

Kraiss, J. T., Kohlhoff, M., & Ten Klooster, P. M. (2023). Disentangling between- and within-person associations of psychological distress and mental well-being: An experience sampling study examining the dual continua model of mental health among university students. *Current Psychology*, *42*, 16789–16800. https://doi.org/10.1007/s12144-022-02942-1

Kraiss, J. T., ten Klooster, P. M., Moskowitz, J. T., & Bohlmeijer, E. T. (2020). The relationship between emotion regulation and well-being in patients with mental disorders: A meta-analysis. *Comprehensive Psychiatry*, *102*, 152189. https://doi.org/10.1016/J.COMPPSYCH.2020.152189

LaFreniere, L. S., & Newman, M. G. (2023). Upregulating positive emotion in generalized anxiety disorder: A randomized controlled trial of the SkillJoy ecological momentary intervention. *Journal of Consulting and Clinical Psychology*, *91*(6), 381–387. https://doi.org/10.1037/ccp0000794

Levy, H. C., O'Bryan, E. M., & Tolin, D. F. (2021). A meta-analysis of relapse rates in cognitive-behavioral therapy for anxiety disorders. *Journal of Anxiety Disorders*, *81*, 102407. https://doi.org/10.1016/J.JANXDIS.2021.102407

m- Path. (n.d.). *m-Path – Free tool for blended care by KU Leuven*. Retrieved June 23, 2024, from https://m-path.io/landing/

McCullough, M. E., Emmons, R. A., & Tsang, J.-A. (2002). Gratitude Questionnaire-6 [Database record]. *APA PsycTests*. https://psycnet.apa.org/doiLanding?doi=10.1037%2Ft01837-000

Moyal, N., Cohen, N., Henik, A., & Anholt, G. E. (2015). Emotion regulation as a main mechanism of change in psychotherapy. *Behavioral and Brain Sciences*, *38*. https://doi.org/10.1017/S0140525X14000259

Munder, T., Wampold, B. E., Flückiger, C., Leichsenring, F., Abbass, A. A., Hilsenroth, M. J., Luyten, P., Rabung, S., & Steinert, C. (2019). Is psychotherapy effective? A re-analysis of treatments for depression. *Epidemiology and Psychiatric Sciences*, *28*(3), 268–274. https://doi.org/10.1017/S2045796018000355

Myin-Germeys, I., Kasanova, Z., Vaessen, T., Vachon, H., Kirtley, O., Viechtbauer, W., & Reininghaus, U. (2018). Experience sampling methodology in mental health research: new insights and technical developments. *World Psychiatry*, *17*(2), 123–132. https://doi.org/10.1002/WPS.20513

Myin-Germeys, I., & Kuppens, P. (Eds.). (2022). *The open handbook of experience sampling methodology: A step-by-step guide to designing, conducting, and analyzing ESM studies* (2nd ed.). Leuven: Center for Research on Experience Sampling and Ambulatory Methods Leuven.

NIH. (2022). *In brief: Cognitive behavioral therapy (CBT)*. https://www.ncbi.nlm.nih.gov/books/NBK279297/

O'Connell, B. H., O'Shea, D., & Gallagher, S. (2018). Examining Psychosocial Pathways Underlying Gratitude Interventions: A Randomized Controlled Trial. *Journal of Happiness Studies*, *19*(8), 2421–2444. https://doi.org/10.1007/S10902-017-9931-5/TABLES/4

Parks, A. C., & Titova, L. (2016). Positive Psychological Interventions: An Overview. *The Wiley Handbook of Positive Clinical Psychology*, 305–320. https://doi.org/10.1002/9781118468197.CH21

Powers, M. B., Zum Vörde Sive Vörding, M. B., & Emmelkamp, P. M. G. (2009). Acceptance and commitment therapy: a meta-analytic review. *Psychotherapy and Psychosomatics*, *78*(2), 73–80. https://doi.org/10.1159/000190790

Pruessner, L., Barnow, S., & Holt, D. V. (2020). A Cognitive Control Framework for Understanding Emotion Regulation Flexibility. *Emotion*, *20*(1), 21–29. https://doi.org/10.1037/emo0000658.supp

Quoidbach, J., Mikolajczak, M., & Gross, J. J. (2015). Positive interventions: An emotion regulation perspective. *Psychological Bulletin*, *141*(3), 655–693. https://doi.org/10.1037/a0038648

Salkovskis, P. M., Sighvatsson, M. B., & Sigurdsson, J. F. (2023). How effective

psychological treatments work: mechanisms of change in cognitive behavioural therapy and beyond. *Behavioural and Cognitive Psychotherapy*, *51*(6), 595–615. https://doi.org/10.1017/S1352465823000590

Santos, V., Paes, F., Pereira, V., Arias-Carrión, O., Silva, A. C., Carta, M. G., Nardi, A. E., & Machado, S. (2013). The Role of Positive Emotion and Contributions of Positive Psychology in Depression Treatment: Systematic Review. *Clinical Practice and Epidemiology in Mental Health: CP & EMH*, *9*, 221–237. https://doi.org/10.2174/1745017901309010221

Segal, O., Sher, H., Aderka, I. M., & Weinbach, N. (2023). Does acceptance lead to change? Training in radical acceptance improves implementation of cognitive reappraisal. *Behaviour Research and Therapy*, *164*, 104303. https://doi.org/10.1016/J.BRAT.2023.104303

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology. An introduction. *The American Psychologist*, *55*(1), 5–14. https://doi.org/10.1037/0003-066X.55.1.5

Shiota, M. N., & Levenson, R. W. (2009). Effects of Aging on Experimentally Instructed Detached Reappraisal, Positive Reappraisal, and Emotional Behavior Suppression. *Psychology and Aging*, *24*(4), 890. https://doi.org/10.1037/A0017896

Smith, J. L., & Bryant, F. B. (2017). Savoring and well-being: Mapping the cognitive-emotional terrain of the happy mind. In M. Robinson & M. Eid (Eds.), *The Happy Mind: Cognitive Contributions to Well-Being*. Springer, Cham. https://doi.org/10.1007/978-3-319-58763-9_8

Southward, M. W., Sauer-Zavala, S., & Cheavens, J. S. (2021). Specifying the mechanisms and targets of emotion regulation: A translational framework from affective science to psychological treatment. *Clinical Psychology: Science and Practice*, *28*(2), 168–182.

https://doi.org/10.1037/cps0000003

Speer, M. E., Bhanji, J. P., & Delgado, M. R. (2014). Savoring the past: Positive memories evoke value representations in the striatum. *Neuron*, *84*(4), 847–856. https://doi.org/10.1016/j.neuron.2014.09.028

Stockton, D., Kellett, S., Berrios, R., Sirois, F., Wilkinson, N., & Miles, G. (2019). Identifying the Underlying Mechanisms of Change During Acceptance and Commitment Therapy (ACT): A Systematic Review of Contemporary Mediation Studies. *Behavioural and Cognitive Psychotherapy*, *47*(3), 332–362. https://doi.org/10.1017/S1352465818000553

Tugade, M. M., & Fredrickson, B. L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies*, *8*(3), 311–333. https://doi.org/10.1007/S10902-006-9015-4/METRICS

Van Berkel, N., Ferreira, D., & Kostakos, V. (2017). The Experience Sampling Method on Mobile Devices. *ACM Computing Surveys (CSUR)*, *50*(6), 1–40. https://doi.org/10.1145/3123988

Wang, Y. X., & Yin, B. (2023). A new understanding of the cognitive reappraisal technique: an extension based on the schema theory. *Frontiers in Behavioral Neuroscience*, *17*, 1174585. https://doi.org/10.3389/FNBEH.2023.1174585

Wojnarowska, A., Kobylinska, D., & Lewczuk, K. (2020). Acceptance as an Emotion Regulation Strategy in Experimental Psychological Research: What We Know and How We Can Improve That Knowledge. *Frontiers in Psychology*, *11*, 242. https://doi.org/10.3389/FPSYG.2020.00242

Wolgast, M., Lundh, L.-G., & Viborg, G. (2011). Cognitive reappraisal and acceptance: An

experimental comparison of two emotion regulation strategies. *Behaviour Research and Therapy*, *49*(12), 858–866. https://doi.org/10.1016/j.brat.2011.09.011

Wong, Y. J., Gabana, N. T., Zounlome, N. O. O., Goodrich Mitts, N., & Lucas, M. (2017). Cognitive correlates of gratitude among prison inmates. *Personality and Individual Differences*, *107*, 208–211. https://doi.org/10.1016/J.PAID.2016.11.043

World Health Organization. (2022, June 8). *Mental disorders*. Public Library of Science. https://www.who.int/news-room/fact-sheets/detail/mental-disorders

Zakiei, A., Khazaie, H., Rostampour, M., Lemola, S., Esmaeili, M., Dürsteler, K., Brühl, A. B., Sadeghi-Bahmani, D., & Brand, S. (2021). Acceptance and Commitment Therapy (ACT) Improves Sleep Quality, Experiential Avoidance, and Emotion Regulation in Individuals with Insomnia—Results from a Randomized Interventional Study. *Life*, *11*(2), 133. https://doi.org/10.3390/LIFE11020133

Appendix A

Table A1

Items Measuring Emotion Regulation Strategies in the Pre- and Post-Measurement.

Strategy	Items	Scale
Savouring	I enjoy looking back on happy times from my past.	1 (lowest) to 7(highest)
	I can make myself feel good by remembering pleasant events from my past.	
	I like to store memories of fun times that I go through so that I can recall them later.	
	It's easy for me to rekindle the joy from pleasant memories.	
	I don't like to look back at good times too much after they've taken place. *	
	When I reminisce about pleasant memories, I often start to feel sad or disappointed. *	
	I find that thinking about good times from the past is basically a waste of time. *	
	For me, once a fun time is over and gone, it's best not to think about it. *	
Gratitude	I have so much in life to be thankful for.	1 (strongly agree) to 7 (strongly disagree)
	If I had to list everything that I felt grateful for, it would be a very long list.	
	When I look at the world, I don't see much to be grateful for. *	
	I am grateful to a wide variety of people.	
	As I get older, I find myself more able to appreciate the people, events, and situations that have been part of my life history.	
	Long amounts of time can go by before I feel grateful to something or someone.*	
Positive reappraisal	I think I can learn something from the situation.	1 (almost never) to 5(almost always)
	I think that I can become a stronger person as a result of what has happened.	
	I think that the situation also has its positive sides.	
	I look for the positive sides to the matter.	
Experiential avoidance	My painful experiences and memories make it difficult for me to live a life that I would value.	1 (never true) to 7 (always true)
	I'm afraid of my feelings.	
	I worry about not being able to control my worries and feelings.	
	My painful memories prevent me from having a fulfilling life.	
	Emotions cause problems in my life.	
	It seems like most people are handling their lives better than I am.	
	Worries get in the way of my success.	

Note. *Negatively worded items need to be revered or subtracted to calculate a sum score.

Appendix B

Interventions

Gratitude Journal

This activity, the Gratitude Journal, is designed to focus on things in your life you're thankful for. This practice can encompass anything from simple pleasures (like enjoying a delightful lunch) to major life events (such as the birth of a healthy niece).

Viewing positive experiences as gifts helps prevent taking them for granted. Research indicates that regularly engaging in this exercise can significantly boost well-being.

Instructions

1. List down three things currently in your life – events, experiences, people, or any other aspect – that you feel grateful for. You can write them down in the textbox below or on paper.
2. Reflect on why you are grateful for these particular things. You can write these reflections down in the textbox below, use pen and paper, or simply ponder them without writing. Your reflections are meant for yourself and will therefore not be read by the researchers of the study.
3. Pay attention to the positive feelings that arise during your reflection on them. You can ask yourself the following questions:

- Which emotions do you notice as you reflect on what makes you grateful right now?
- How does your body react to these feelings of gratitude? (Do you feel warmer, more relaxed, or perhaps a smile forming on your face?)
- What changes do you observe in your mood as you focus on these grateful feelings?

Savouring: Positive Memory

Experiencing positive emotions can often be achieved by revisiting joyful memories. The Positive Memory exercise is an effective way to do just that.

This exercise involves recalling a happy memory in as much detail as possible and focus on how you felt during that moment. Good example memories for this exercise are those where you felt significant positive emotions such as joy, love, or inspiration, but it can also be any other memory you experienced as pleasant.

Instructions

1. Think of a memory where you experienced strong positive emotions.
2. Aim to reconstruct the memory in as much detail as possible. If you like, you can write your thoughts in this textbox or use pen and paper. Consider these questions to guide your writing: What exactly happened in the memory you selected? What were your feelings at the

moment it occurred? How do you feel now as you revisit this memory? What changes do you observe in your mood as you focus on this positive memory?

Try to include many details to vividly recall the experience, but remember to keep the writing process enjoyable.

Acceptance exercise: Opening up

The goal of this exercise is to accept and embrace negative thoughts and emotions instead of trying to get rid of them. Resisting unpleasant feelings may actually cause them to become stronger and more frequent. By embracing our thoughts and feelings and accepting that they are there, we don't need to suffer from our struggles in trying to control them.

Instructions

1. What have you been struggling with lately (e.g., stress, anger, sadness, guilt, shame, fear, pain, worries...)? You can use the textbox below to write them down, or use pen and paper.
2. See if you can open up to these unpleasant feelings, allowing them to just be there.
3. Explore what there is to experience— are the feelings getting heavier, lighter, do they remain the same, or do they fluctuate?
4. Can you stay present with these difficult thoughts and feelings and keep in touch with them?
5. See if you can continue giving some space to these unpleasant feelings for a while, instead of trying to control them or trying to get rid of them.

Cognitive Restructuring Exercise

With this exercise, we will have a good look at unpleasant thoughts you may have and help you to investigate if they are really helpful and true, or if there are positive alternative thoughts that are more realistic. The unpleasant thoughts you may have, such as worries about the future, negative thoughts about yourself or others, or memories about an unpleasant situation in the past, are often unrealistically negative and not helpful. With this exercise, we will see if we can replace these unpleasant thoughts with more positive, realistic thoughts.

Instructions

1. Think of an unpleasant thought that is causing you stress or negative emotions lately. Take a moment so you have the unpleasant thought clear in your mind. You can use the text box below to write it down, or use pen and paper.
2. Now try to challenge this unpleasant thought a little: Is it really true? What evidence do you have for it? Is this unpleasant thought helping you?
3. What would you tell a close friend if they were having these thoughts?

4. Now try to come up with another, more positive interpretation, and write it down in the text box below. What evidence do you have for this more positive thought? Is this thought more helpful?

5. Now take a moment to think about both thoughts. Is it possible that your unpleasant thoughts are not the most realistic or helpful ones? See if you can challenge your unpleasant thoughts this way for a while, and replace them with more helpful, more positive thoughts.