The Effect of Emotion Regulation Flexibility on Efficient Recovery from Daily Stressors – An Experience Sampling Study

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Abstract

Background. Even brief everyday stressors can promote the development of psychopathology and other health-damaging diseases. In order to minimize the destructive effects of daily stressors, a quick recovery from them is crucial. There are various emotion regulation strategies which are influential factors in the stress recovery process. Nevertheless, newer research increasingly focuses on the flexible use of emotion regulation strategies, as adaptability of these strategies to different contexts and emotions seems important for sufficient and fast recovery. As the effectiveness of emotion regulation flexibility is still understudied, this paper aims at clarifying the influence of emotion regulation flexibility on the efficiency of affective recovery from daily stressors.

Method. An experience sampling study design was used, where 21 students (M_{age} = 21.1, SD_{Age} = 1.81) filled in a questionnaire ten times per day for six consecutive days. Linear Mixed Model analyses with stress recovery as the dependent and coping flexibility, as well as emotion regulation flexibility as the independent variables were run.

Results. No significant results were found in this research. More precisely, no significant associations between emotion regulation flexibility and daily stress recovery, as well as coping flexibility and daily stress recovery were found. Accordingly, this suggests that neither trait nor state emotion regulation flexibility seems to positively influence the recovery process from daily stressors in this sample.

Conclusion. Even though no significant effects on stress recovery were found, this research is one of the first to empirically investigate the flexible use of emotion regulation strategies in the context of daily stress recovery. In addition, results facilitate understanding of how university students recover from daily stressors.

Keywords: emotion regulation, ER, emotion regulation strategies, ERS, daily stress, stress recovery, ESM

The Effect of Emotion Regulation Flexibility on Efficient Recovery from Daily Stressors

Introduction

Over the past decades, research has shown that stress can affect an individual's health and psychological well-being. Stress can be broadly described as "an organism's adaption to challenging environmental conditions over time" (Monroe, 2008, p. 34). Often, individuals find themselves confronted with so called daily stressors, which are disruptors of one's daily routine (Piazza et al., 2012). According to the findings of a study conducted by Almeida (2005), daily stressors appear relatively regularly, as participants reported being confronted by them on approximately 40% of the study days.

Daily stressors tend to be surprising minor inconveniences or smaller challenges faced throughout the day (Almeida, 2005; Piazza et al., 2012). Therefore, daily stressors can be spilling coffee on one's shirt, getting stuck in traffic jam, or dealing with malfunctioning technology (Almeida, 2005; Piazza et al., 2012). When considered individually, these stressors appear to be nothing more than minor irritations. However, when cumulated, they can cause a person to feel overly stressed. Hence, even though everyday stressors are experienced more shortly and less intense compared to major life stressors, they can still negatively impact an individual's well-being.

Whenever stress exceeds an optimal level, a person's mental and physical health is at risk. Conscious and unconscious problems, as well as profound diseases might arise following stress, especially when dealt with it in an unhealthy way (Kumar & Bhukar, 2013; Wang & Saudino, 2011). Experiencing negative stressors can lead to social-behavioural, cognitive-emotional, physiologic-somatic, or cellular-genetic changes within a person (Plaumann et al., 2006). For example, stressed individuals may be more prone to substance abuse, aggressive behaviour, concentration problems, feelings of anxiety, frustration, and exhaustion, elevated blood pressure, weakened immune system, and DNA damage (Cohen et al., 1995; Plaumann et al., 2006; Quick et al., 1987). As a result, these negative short-term effects can evolve into undesirable long-term disorders, such as substance abuse disorders, sleeping disorders, psychosomatic disorders, depression, burnout, social isolation, or illnesses like stroke, hypertension, cancer, and heart diseases (Chu et al., 2021; Cohen et al., 1995; Plaumann et al., 2006; Quick et al., 1987). In summary, stressful events can cause the onset of psychopathologies or the development of serious diseases, thus threatening a person's overall well-being.

Affective Stress Reactivity and Recovery

There is evidence that people react differently to the same stressor, which is also known as stress reactivity (Schlotz, 2013). Whereas some people show a calmer approach when encountering stress, others react more strongly (Piazza et al., 2012). One way to assess stress reactivity is by measuring an individual's change in affect. That is, while some people might show little emotional change on stressful days compared to stress-free days, others may display large emotional fluctuations on stressful days compared to stress-free days (Piazza et al., 2012). The extent to which an individual shows an emotional reaction to a stressor is also referred to as affective reactivity (Bolger & Zuckermann, 1995).

Increased or prolonged affective reactivity to daily stressors has been identified as a contributing factor to the onset of psychopathology or diseases. Specifically, increased affective reactivity to daily stressors was linked to a greater risk of developing mental disorders and a higher likelihood of reporting a chronic physical condition (Charles et al., 2013; Piazza et al., 2012). Likewise, Booij et al. (2018) found out that increased affective reactivity predicts depressive symptoms.

Since prolonged affective reactivity can lead to serious health impairments, a quick recovery from stress is crucial. The recovery period begins after a person's reaction to a stressor. Hereby, stress recovery involves returning a person's affectivity level to its initial baseline (Leger et al., 2018). Next to prolonged affective reactivity, slowed recovery has been proven harmful to a person's health as well. To clarify, delayed recovery from daily stressors means longer exposure to the negative effects of stress, which in turn increases its harmful impacts on health (de Calheiros Velozo et al., 2020). Therefore, to prevent the formation of psychopathology or other diseases, a more rapid stress recovery compared to a delayed one is always desirable.

Existing studies imply an association between prolonged affective recovery from everyday stress and the danger for psychopathology (de Calheiros Velozo et al., 2020). For instance, the results of a study conducted by Vaessen et al. (2019) showed that individuals in the early stages of psychosis recovered particularly slowly compared to chronic stage individuals. Accordingly, delayed stress recovery might already indicate a risk for psychopathology before its actual development (de Calheiros Velozo et al., 2020). Therefore, it is important to investigate the recovery process from daily stressors more thoroughly and identify facilitating factors.

Emotion Regulation

One important factor influencing affective recovery from daily stressors is how people decide to deal with a stressful event. Often, people engage in coping, which is a process where a person attempts to manage stressful or impactful experiences and the emotions associated with them. A specific and essential coping strategy is emotion regulation (ER). ER consists of "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions […]" (Thompson, 1994, pp. 27-28). Research identified ER as an effective way of dealing with stress, by mainly involving the "modulation of internal emotional changes so as to meet the external needs" (Wang & Saudino, 2011, p. 96). Thus, ER helps people for instance, to assess the appropriate emotional reaction when encountering a stressful event and by doing so, aids in keeping emotional balance.

There are different emotion regulation strategies (ERS) that people use, for example, *rumination*, *expressive suppression*, *reappraisal*, *reflection*, *distraction*, and *social support* (Brans et al., 2013). *Rumination* can be defined as persistent, repetitive focus on negative emotions (Radstaak et al., 2011). Another ER strategy is *expressive suppression*, in which an individual "tries to inhibit ongoing negative or positive emotion-expressive behaviour" (Gross, 2014, p. 10). When making use of *reappraisal* one attempts to reassess a potentially emotion-eliciting situation to alter its meaning and emotional impact (Cutuli, 2014). Further, *reflection* focuses above all on positive self-reflection (Brans et al., 2013). Next, *distraction* includes the voluntary redirection of attention away from the emotion-eliciting situation (Sandner et al., 2021). And lastly, *social support* describes the experienced help and care of others for oneself.

Every ERS influences an individual's affectivity and stress recovery process in their own way. For instance, rumination has shown to impair physiological stress recovery by prolonging the duration of cortisol activation and extending cardiovascular activation following a stressor (Key et al., 2008; Shull et al., 2016). Furthermore, rumination has been linked to psychological disorders, like depression and anxiety (Capobianco, Morris & Wells, 2018; Ruscio et al., 2015). In this case, rumination seems to negatively influence the recovery from emotional responses through repetitive thinking (Capobianco, Morris & Wells, 2018). In similar manner, individuals who make use of suppression reported experiencing less positive and more negative emotions (Brans et al., 2013; Vally & Ahmed, 2020). On the contrary, reappraisal has been associated with increased positive affect, well-being, and better interpersonal performance (Brans et al., 2013; Jentsch & Wolf, 2020). Additionally, past research indicates that reappraisal positively influences recovery from negative emotions and facilitates psychophysiological adaptation in response to stress (Jentsch & Wolf, 2020; Meyer

et al., 2012). Alike reappraisal, studies demonstrated an association between reflection and increasing positive affect as well (Brans et al., 2013). Furthermore, results of a study focusing on self-reflection and emotional introspection implied that becoming aware of one's emotional state can have a buffering effect on emotional arousal (Herwig et al., 2010). Additionally, engaging in distraction seems to foster physiological recovery from stress. Specifically, higher levels of distraction predicted a steeper and possibly more adaptive cortisol decline after stress exposure (Janson & Rohleder, 2017). Moreover, a longitudinal study of distraction in formerly depressed inpatients showed that shifting one's attention away from depressive symptoms predicted less symptoms over time (Huffziger et al., 2009). Similarly, research outcomes showed that social support also moderates the relationship between stress and depression (Wang, et al., 2014). Furthermore, good social support positively influences a person's self-esteem, the appraisal of difficult situations, and use of coping strategies (Wang et al., 2014). Thus, it indirectly aids in the coping process by influencing other factors.

Emotion Regulation Flexibility

New research increasingly focuses on the flexible use of ERS. ER flexibility aims at using emotions in a controlled, intelligent manner (Kobylińska & Kusev, 2019) and is believed to be central in the "identification, prevention, and treatment of the affective disturbances that characterize many mental disorders" (Aldao et al., 2015, p. 263). One possible explanation for this might be that the environment in which humans live is always changing and it has been recognized that inflexible responses are often maladaptive (Aldao et al., 2015). Individuals with a broad spectrum of ERS may find it easier to flexibly adapt their use of different strategies in response to contextual demands and may thus benefit from their use (Aldao et al., 2015). Therefore, research encourages the view that greater flexibility in the use of ERS is related to better adaption to the environment, which is demonstrated by greater mental health (Aldao et al., 2015). Similarly, Kobylińska and Kusev (2019) argue that by adapting to contextual demands ER "enables meeting the regulatory goals in specific situations" (p. 4) and thus facilitates psychological and physiological well-being. Accordingly, it is crucial to further examine the concept of ER flexibility, as research outcomes could help with the development of psychological interventions that focus on reducing emotion dysregulation and promoting appropriate use of ER strategies (Kobylińska & Kusev, 2019).

Current Research & Experience Sampling Method

The aim of this research paper is to examine whether emotion regulation flexibility influences the efficiency of affective recovery from daily stressors by means of an experience sampling design. The Experience Sampling Method (ESM) is a dairy technique in which respondents complete several measurements throughout the day, over the course of several days. ESM is considered to be particularly competent in measuring fluctuations in people's everyday experiences. Since this research is interested in daily stressors, people's change in affect when encountering a stressful event, and ultimately their affective recovery, an ESM design was identified as most suitable.

In total, there are five major strengths associated with ESM. First, ESM enables researchers to deepen their knowledge about behaviour and its interrelationships (Scollon et al., 2003). Second, ecological validity is increased by collecting data while participants remain in their natural environment (Scollon et al., 2003; Vaessen et al., 2013). Third, ESM allows researchers to investigate within person-processes (Scollon et al., 2003). Fourth, disadvantages of self-report measurements such as recall bias are reduced (Scollon et al., 2003). Finally, ESM enables researchers to implement a multi-method approach (Scollon, et al., 2003).

The current study assumed that individuals who display emotion regulation flexibility, recover faster from daily stressors, as the flexible adaptation to the demands of the environment is expected to facilitate the recovery process from daily stressors. Consequently, the following hypotheses were investigated:

H1: Flexibility in the use of emotion regulation strategies is associated with faster recovery from daily stressors.

H2: Individuals who report a higher level of state flexibility adapt better to stressful events in daily life.

Methods

Research Design

The data collection of this research project was a joint effort of three psychology students. This research made use of an ESM study design, whereby the participants affective recovery and emotion regulation flexibility were measured ten times every day, randomly in a time span of 1.5h for six consecutive days. Data was collected by means of self-report questionnaires administered over an application called Ethica.

Participants

Participants were recruited through convenience sampling, which describes a non-probability sampling method, where researchers look for participants in their social environment. Researchers aimed for a minimum of 30 participants, who filled out more than 30% of the presented daily questionnaires. In total, 51 individuals participated in the study. However, 25 participants were excluded due to a respondence rate lower than 30%. Moreover, participants who did not complete the Coping Flexibility Scale Revised (CFS-R) were excluded as well. Therefore, the final sample consisted of 21 English-speaking university students, most of whom were female (66.7%) and in their early twenties (M = 21.1, SD = 1.8). The most represented nationality was German (n=18) (Table 1).

Table 1

Demographics of Participants (N=21)

Demographics		*n (%)*	*M (SD)*
Age in years	18 – 27	21 (100%)	21.10 (1.8)
Gender	Female	14 (66.7%)	
	Male	7 (33.3%)	
Nationality	German	18 (85.7%)	
	Romanian	2 (9.5%)	
	Dutch	1 (4.8%)	

Materials

Data was collected using quantitative online questionnaires which were developed and presented via the application Ethica. In total, three different questionnaires were administered, of which one collected demographic data of the participants (age, gender, nationality). All questionnaires were provided in English.

Coping Flexibility

The Coping Flexibility Scale-Revised (CFS-R) was administered in this research to measure the participant's trait level of coping flexibility (Appendix C). The questionnaire comprised three scales, namely *abandonment* (e.g., 'I do not repeat using a coping strategy that made the situation worse'), *recoping* (e.g., 'If the situation has not improved, I consider a different coping strategy'), and *metacoping* (e.g., 'I know which coping strategies are effective and which strategies are ineffective'), with four items each (Kato, 2020). Thus, the whole questionnaire included a total of 12 items. Each item was assessed on a four-point Likert scale (1='not applicable', 4='very applicable'). An overall sum score per subscale was computed. Afterwards, the sums were added up to create an overall coping flexibility score. This overall score could vary from 12 to 48, whereby a higher score indicated richer coping flexibility (Kato, 2020). Next, participants were classified into one of three groups based on their score, namely having either low (4-18), average (19-33), or high (34-48) coping flexibility. For reliability analysis, Crohnbach's alpha was calculated which indicated good internal consistency of the questionnaire (α=.87). Overall, the psychometric properties of the CFS-R showed good internal reliability, acceptable test-retest reliability coefficients, and appropriate validity of the CFS-R scores (Kato, 2020).

Daily Questionnaire

Additionally, a daily questionnaire was used in this research to collect data about participants affective states, their stress levels and use of ERS (Appendix D).

Negative affect

Items for negative affect were newly constructed but based on items utilized in previous research (see Myin-Germeys & Kuppens, 2022). In total, three items were used to assess negative affect: 'At the moment I feel down', 'At the moment I feel insecure', and 'At the moment I feel anxious'. Participants scoring higher on this subscale experienced greater negative affect. Items were measured on a seven-point Likert Scale (1='strongly disagree', 7='strongly agree').

Stress

Respondents were asked to recall the most important event that had happened to them since the last measurement point ('beep'). Afterwards, they were asked to report how pleasant or unpleasant they perceived this event on a seven-point Likert scale (-3='very unpleasant', 3='very pleasant'). Hereby, a negative score was evaluated as a respondent experiencing stress,

whereas a positive score was equated with no stress. Subsequently, the stress variable was dummy coded (0='no stress', 1='stress').

Emotion Regulation Flexibility

Next, participants indicated how they dealt with the most important event that had happened to them since the last beep. Hereby, their use of the different ERS was assessed. ERS were measured with the help of six items scored on a seven-point Likert scale (1='not at all', 7='very'). Each ERS was assessed by one item per strategy. Items were based on those used in past research (see Brans et al., 2013; Gross & John, 2003; Treynor et al., 2003; Wells & Davies, 1994).

The item 'I kept thinking about it' was used to measure *rumination* (Treynor et al., 2003). *Expressive suppression* was assessed with help of the item 'I expressed my emotions' (Gross & John, 2003). 'I engage in activities to distract myself' was used to measure *distraction* (Wells & Davies, 1994). *Reappraisal* was measured with 'I looked at it from a different perspective' (Gross & John, 2003). *Reflection* was measured with 'I calmly reflected on it' (Brans et al., 2013). And finally, *social support* was assessed with 'I talked about it with others' (Brans et al., 2013).

For evaluation, the item measuring expressive suppression needed to be reverse coded first. Afterwards, an ER sum score was calculated by adding up the scores of the items per valid measurement point. The calculated ER sum score could vary from 6 to 42, whereby a higher score indicated higher ER flexibility.

Procedure

This research project was approved by the Ethics Committee of the Faculty of Behavioural Sciences at the University of Twente. Participants for this research were recruited through convenience sampling, meaning that the researchers asked individuals in their direct environment, whether they would like to partake in the study. Besides that, participants were able to sign up to the study via SONA systems, which is a website for students to register for research studies. In exchange for their participation, respondents were granted 0.25 participation points. Data collection took part in April and May 2022, using an application for smartphones called Ethica.

Prior to the begin of the study, participants were informed about the aim of the research and gave their informed consent via the online platform "Qualtrics" (Appendix A). Moreover, they were informed about the voluntary nature of the study, the anonymous processing of their data, and the ability to withdraw from the study any time and without further consequences.

After reading all the necessary materials provided and giving their informed consent, participants received precise instructions on how to install the application on their mobile device (Appendix B).

Once the application was installed successfully, participants were able to start the study immediately. When opening the app, two questionnaires were presented to the participants that needed to be filled in only once at the beginning of the study. Precisely, these were questions about demographics (e.g., age, gender) and the Coping Flexibility Scale Revised (CFS-R). Participants could decide for themselves which questionnaire they wanted to fill in first. After completing these questionnaires, the respondents were done for the day. Moreover, the questionnaires stayed available until the end of the research, in case the responded did not have the time to fill them in directly.

One day after registration, data collection of the respondent's affective states, daily stress experience and use of ERS by means of the daily questionnaire started. Measurement took place from 7am in the morning to 10pm in the evening, randomly ten times a day, for six consecutive days. In a span of 1.5 h, participants received the same Daily Questionnaire via Ethica and were asked to fill it in. Furthermore, respondents had 40 minutes to complete the questionnaire, before it expired. Completion of the questionnaire took approximately a minute or two. Moreover, to maximise engagement in the study, participants received reminders when the questionnaire was available. Further, it was ensured that there was at least a 30-minute time span between questionnaires.

The daily questionnaire first asked the participants about how they felt right before the beep occurred. Next, respondents indicated to what extent they felt down, insecure, relaxed, cheerful, anxious, or satisfied. Afterwards, they were asked to recall the most important event since the last beep and accordingly, to rate how pleasant/unpleasant this event was. This was followed by questions about the way they dealt with the event. After receiving the last questionnaire on the sixth day, the study automatically ended.

Data analysis

Analyses were carried out in SPSS (Version 28). Data was presented and analysed in long format. Before data analysis, insufficient data was removed from the data set. Specifically, participants who did not complete the Coping Flexibility Scale Revised and had a response rate lower than 30% on the daily questionnaire were excluded. Moreover, the dataset was screened for measurement points that were suitable for analysis. Hence, only measurement points where participants reported a stressful event, their affect levels for this beep, as well as for the beep thereafter were included for further analysis. In total, the 21 final participants reported 98 valid

measurement points. Thus, computation of a recovery score for these measurement points was possible, which made the data eligible for further analysis.

After filtering out inadequate data, means and standard deviations were examined for the trait and state measurements, as well as for recovery. Further, descriptive statistics of the participant's demographics were determined. Moreover, participant means and participant mean-centred scores for negative affect were calculated. In the following, the participants recovery was calculated, by first lagging the participant mean-centred scores and afterwards, subtracting the lagged variable from the participant mean-centred scores. To answer the established hypotheses, a multilevel analysis was performed. Precisely, two Linear Mixed Models (LMM) were run, to see whether emotion regulation flexibility had an influence on the participant's affective recovery period from daily stressors. To test the first hypothesis, a LMM with stress recovery as the dependent and coping flexibility as the independent variable was run. Furthermore, to test the second hypothesis, a LMM with stress recovery as the dependent variable and ER flexibility as the independent variable was run. Coping flexibility and ER flexibility were fixed factors, whereas participant was a random factor included as subject in both LMM. Additionally, age and gender were included as covariates in all analyses.

Results

Altogether, participants reported 98 stressful events with a measurement point thereafter. Within the sample, some participants reported more events than others. Accordingly, the number of stressful events experienced per participant ranged from 1 to 11.

Descriptive Statistics

Descriptive statistics for state and trait measurements, as well as for recovery and negative affect are displayed in Table 2. Mean scores of *coping flexibility* and *ER flexibility* indicate that the sample showed average levels of trait flexibility and average levels of state flexibility. Moreover, when grouping participants according to their coping flexibility score, no participant showed low, 66.7% (N=14) of the participants showed average, and 33.3% (N=7) showed high coping flexibility. Additionally, the mean score of *negative affect* suggests that overall respondents experienced fewer negative emotions. Furthermore, *recovery* showed a positive mean score indicating that participants were able to recover from stressful events.

Table 2

Minimum, maximum, mean, and standard deviation (SD) for trait/state measures, recovery, and negative affect (n=21)

Variable	Minimum (min. observed score)	Maximum (max. observed score)	*M*	*SD*
Coping flexibility (trait)	19	44	30.67	6.11
Abandonment	6	16	9.76	2.55
Recoping	6	16	10.81	2.46
Metacoping	6	16	10.19	2.77
Emotion regulation flexibility (state)	12	35	24.23	5.16
Negative affect	1	6.33	3.18	1.31
Recovery	-2.67	4.33	0.42	1.26

In general, large differences between respondent's overall coping flexibility (Figure 1), ER flexibility (Figure 2) and recovery (Figure 3) are observable. The between-participant differences in coping flexibility are clearly visible when comparing, for instance, the score of participant number 3 with the one of participant number 5. Furthermore, data of the ER flexibility and recovery per participant shows a lot of scattering and thus large variation in ER flexibility and recovery within the participants. Moreover, a wide distribution of the data is noticeable.

Figure 1

Overview Coping Flexibility Scores per Respondent (n=21)

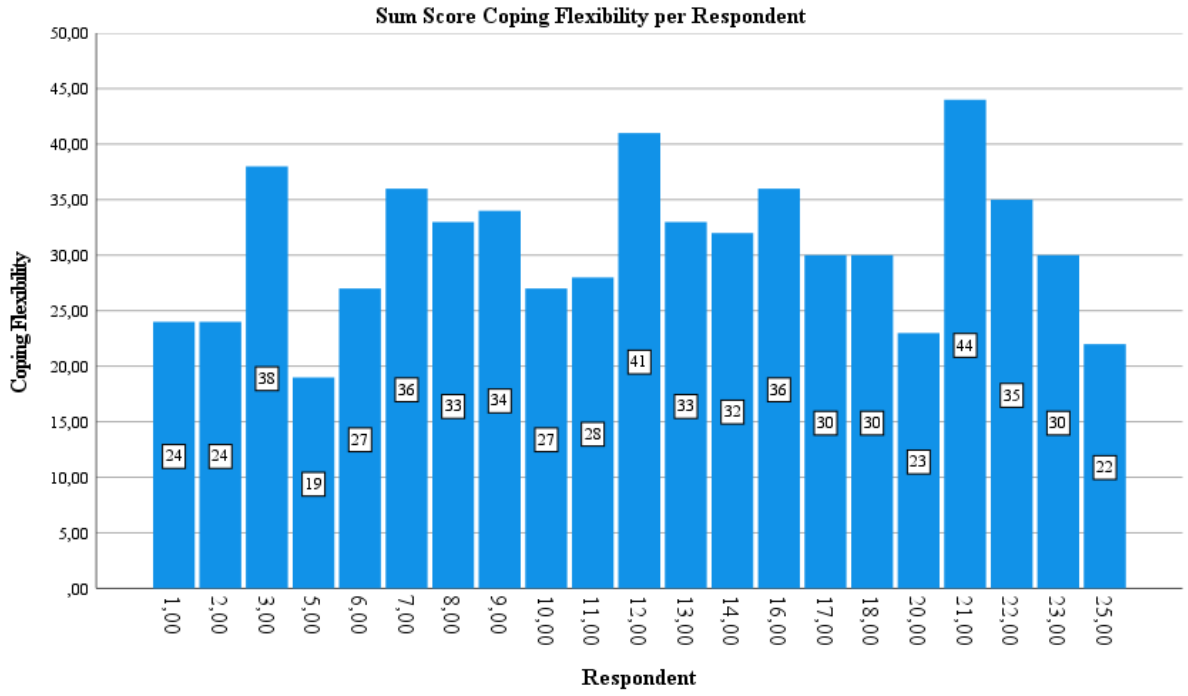


Figure 2

Boxplot of ER Flexibility per Respondent

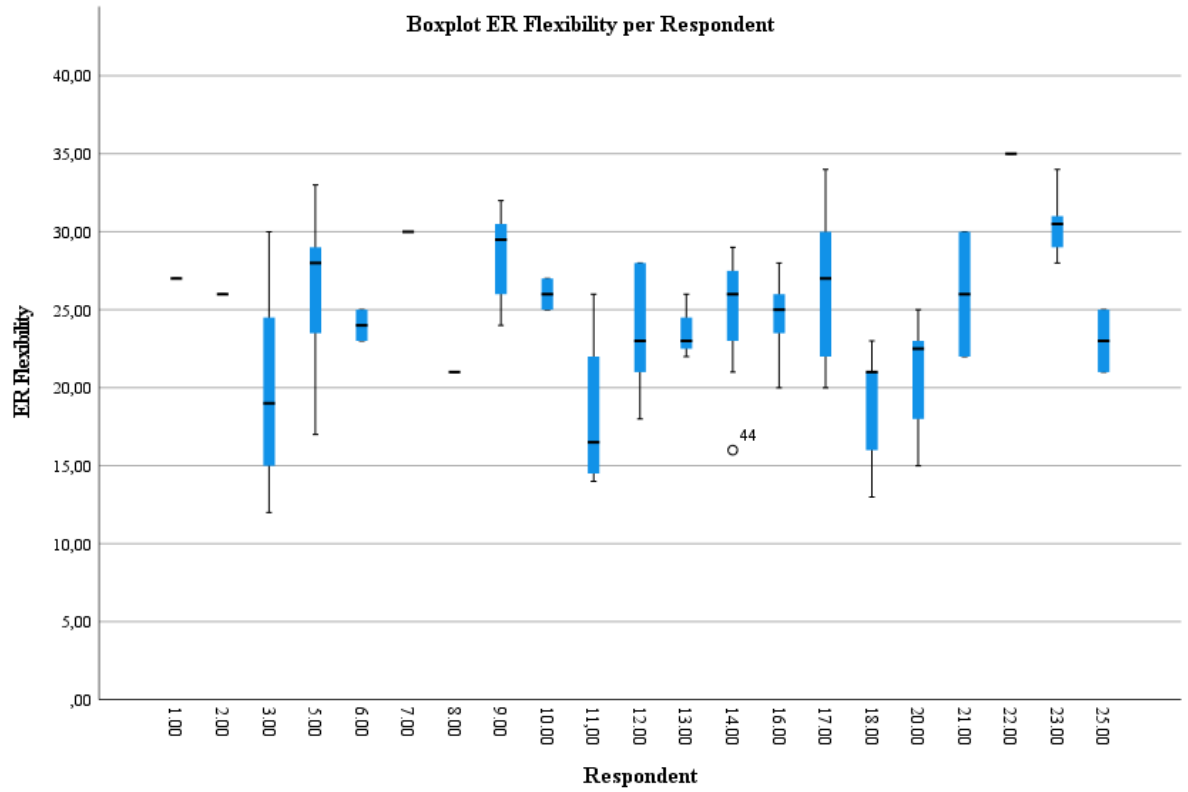
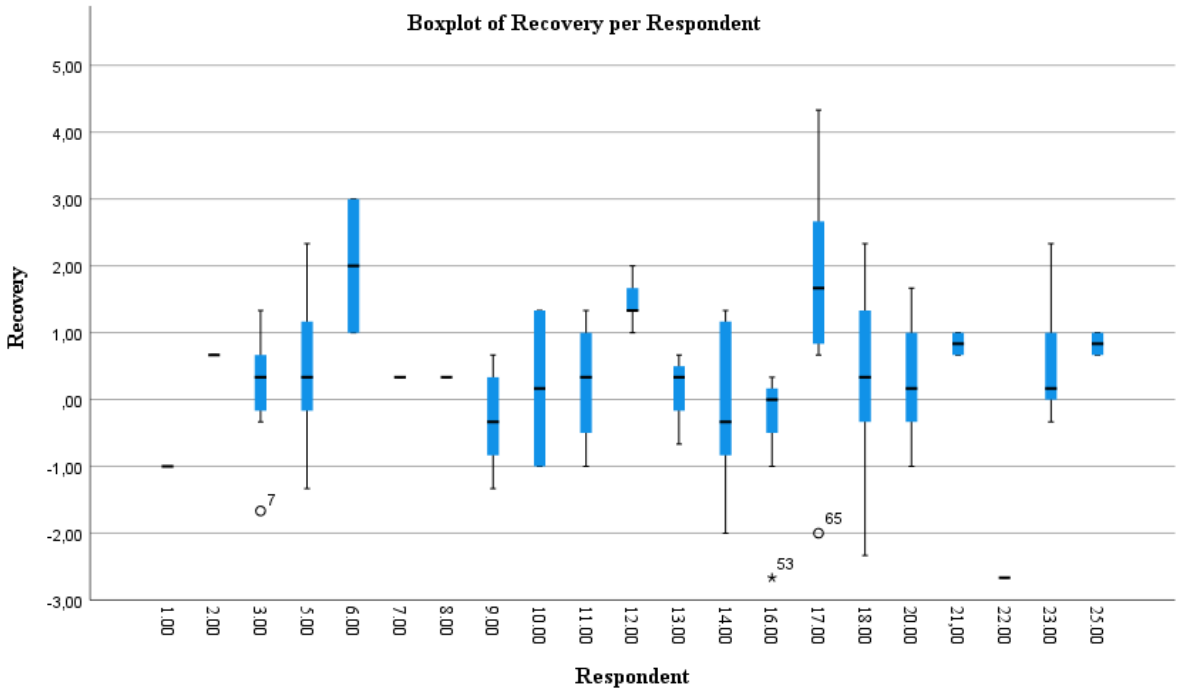


Figure 3

Boxplot of Recovery per Respondent



Hypothesis Testing

A LMM analysis investigated the association between trait flexibility and recovery from daily stressors. Contrary to the expectations, the outcomes of the first LMM analysis showed that trait flexibility did not predict faster recovery from daily stressors, B = -0.00, SE = 0.03, $t(15.82) = 0.01$, p = .93, 95% CI [-0.07, 0.06]. Therefore, the first hypothesis was rejected.

A second LMM analysis was conducted to examine the association between state flexibility and recovery from stressful events in daily life. The outcomes of the second LMM analysis indicated that state flexibility did not predict better adaptation to stressful events in daily life, B = -0.02, SE = 0.02, $t(94) = 1.17$, p = .28, 95% CI [-0.09, 0.02]. Therefore, the second hypothesis was rejected as well. To summarise, the results of both LMM analyses imply that emotion regulation flexibility did not fosters recovery from daily stressors.

Discussion

The main purpose of this ESM study was to examine in what way emotion regulation flexibility influences the efficiency of affective recovery from daily stressors. Contrary to the expectations, the outcomes of this study provided no indication of any significant associations between ER flexibility, coping flexibility, and stress recovery. Accordingly, this suggests that

neither trait, nor state emotion regulation flexibility seem to positively influence the recovery process from daily stressors in this sample.

Until now, only few studies empirically assessed ER flexibility. For instance, Wang et al. (2020) focused their research on the association between the variable use of ERS and depression. Outcomes indicated that people with higher between-strategy variability and withing-strategy variability (for distraction and reappraisal) showed lower levels of depressive symptoms, suggesting a buffering effect of the variable use of ERS on depressive symptoms (Wang et al., 2020).

Furthermore, Blanke et al. (2020) demonstrated in their research that between-strategy variability was linked with lower negative affect on the between-person level, as well as on the within-person level, when controlling for mean strategy endorsement. The researchers concluded that people who prioritize particular ERS experience less negative affect on average, and moreover that individuals experience less negative affect in situations with more between-strategy ER variability (Blanke et al., 2020). Given that past studies were able to prove advantages of ER flexibility, the question arises (a) if the significance of the results might have been influenced, and/or (b) how the results of the study could be explained.

Alternative Explanations for Recovery

As the results show, ER flexibility does not affect the participant's recovery from daily stressors. Nevertheless, participants demonstrated daily stress recovery. This suggests that other factors must have influenced the respondent's recovery process and that ER flexibility is not that important in the recovery from everyday stressors in students.

First of all, it is likely that participants did not exclusively use ER, but other coping strategies as well. A popular coping strategy is problem-focused coping which aims at "resolving the stressful situation or event or altering the source of stress" (Carroll, 2020, p. 1747). Therefore, instead of engaging in ER, participants could have tried to modify the situation they are in. This explanation would be in line with findings from Troy et al. (2013), whereby reappraisal showed a negative relationship with depressive symptoms when respondents were confronted with uncontrollable stress and a positive relationship when stress was controllable. Researchers concluded that when faced with controllable situations, people might profit from changing the situation rather than altering their emotions (Troy et al., 2013). Furthermore, engagement in problem-focused coping in the stress context is more prominent in younger (18-39 years) adults than older adults (>60 years) (Chen et al., 2017). Given these outcomes, it is possible that participants in this sample preferred problem-focused coping over

emotion-focused coping and recovered from stress by changing the stressor and not by engaging in ER.

Secondly, other activities could have helped participants with stress recovery. Outcomes of interviews with college students suggest that regular physical exercise is an effective way to reduce stress (Kim & McKenzie, 2014). Furthermore, a study conducted by Pierceall and Keim (2007) showed that students primarily engaged in leisure activities and sports in addition to talking with family and friends to cope with stress. Hence, it is likely that students who participated in this research recovered from daily stressors by exercising or other leisure activities.

Negative Affect

Overall, the sample displayed relatively low levels of negative affect, indicating that the participants did not seem to be very stressed. One explanation for this finding might be that data collection took part after the examination phase of the academic year. Thus, students were most likely finished with their exams and therefore less stressed. Furthermore, participant probably had more leisure time to engage in fun activities. A second explanation might be that the time between measurements was too long. Mentally healthy individuals seem to recover faster from sad moods than individuals showing symptoms of psychopathology (Sanchez et al., 2013). Since it was assumed that the sample of this research consisted of mainly mentally healthy university students, it could be that participants needed less time to recover.

Limitations and Strengths of Present Research

One of the biggest and probably most pressing limitations of this research is the small amount of data that was eligible for analysis. Therefore, it should be noted that the results cannot be generalized. Participants were collected through convenience sampling. Especially in ESM studies, this can lead to participants sharing the same factors (Napa Scollon, Prieto, & Diener, 2009). One way of counteracting the low number of data points in the future would be by only excluding non-valid measurement points and not by excluding participants according to their overall response rate. By doing so, probably more adequate measurement points would have been detected.

Moreover, even though enough people registered for participation in the study, the compliance rate was low. Several reasons might explain this phenomenon. First of all, it could be that people simply forgot to fill in the questionnaires. A few participants reported that the reminders suddenly stopped working, right in the middle of the study. Hence, respondents were not alerted when a new questionnaire occurred and thus missed it. Secondly, questionnaires

sometimes expired before participants were able to fill them out. To avoid these mistakes in the future, researchers could make use of multiple reminders to prevent forgetfulness of participants. Moreover, they could remind the participants to turn on the notifications on their phone. Third, the duration of study days and amount of measurement points per day could explain the little data available as well. It is possible that the recurring reminders to use the app annoyed participants which is why they decided to stop participating. Lastly, researchers observed that often the very first beeps in the morning between 7am and 9am were missing, indicating that students are still asleep and thus hindered to complete the questionnaire. Consequently, future research should consider adapting the measurement time frame according to the research group.

On the other hand, this study also has multiple strong points. The biggest strength of this study is its design. Using an ESM study design enabled researchers to measure participant's fluctuations in affect and their recovery over the course of several days, in real time, and in a natural setting. Furthermore, the design made it possible to capture the occurrence of daily stressors. Another advantage of the study is that the data collection took part via a smartphone app. This made it particularly easy for people to participate, since a big percentage of people carry their smartphone with them most of the times. Additionally, the implementation of technology simplified data collection for the researchers, since they did not have to constantly remind the participants to fill in the questionnaires.

Additional Remarks - Conceptualisation of Emotion Regulation Flexibility

No universal conceptualization for ER flexibility exists so far which complicates the appropriate measurement of ER flexibility (Aldao et al., 2015). As long as researchers do not agree on a uniform conceptualization of ER flexibility, the development of standardized measurement tools is very difficult. Regarding the assessment of flexibility in ERS, the only thing researchers agree on is that an ESM study design is well suited for capturing ER flexibility (Aldao et al., 2015). However, opinions diverge again on how and what exactly should be assessed. No instrument has yet been selected as the right one. Hence, the question remains whether the questionnaires and items selected for this study were indeed the most appropriate ones to capture ER flexibility according to the definition used beforehand. Overall, research suffers from the absence of a common conceptualisation and missing frameworks on empirical ways to measure the construct (Sanchez-Lopez, 2021). Thus, finding a uniform conceptualisation is a goal future researchers could work towards.

Direction for Future Research

Regarding the current study, future studies could either (a) try to replicate the study with a bigger and more heterogeneous sample to see whether research outcomes stay the same, and/or (b) focus more on the specific context in which what ERS is used and how this influences the overall recovery from daily stressors. Furthermore, future research could decrease the time between measurement points in order to assess the recovery from participants more adequately. Moreover, future research could focus on establishing a widely accepted conceptualisation of ER flexibility, since a universal definition would significantly simplify the invention of a reliable and valid measurement instrument to assess ER flexibility.

Conclusion

Stress is an omnipresent phenomenon and associated with potentially drastic effects on human health. Therefore, research will never stop investigating stress and stress-related constructs. The current ESM study was one of the first that collected longitudinal data for analysing the effect of ER flexibility on efficient recovery from daily stressors. Overall, no significant associations between stress recovery and ER flexibility were found. Accordingly, these results imply no relationship between ER flexibility and the stress recovery process of an individual. However, the study may provide insight into how university students cope with daily stress. It seems like the flexible use of ERS does not have a huge impact on the recovery from daily stressors. In addition to that, the study examined a relatively unexplored area which is why it may serve as a starting point for future research that focuses on daily stress recovery. Moreover, it marks an important contribution to the research on stress recovery.

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Appendix

Appendix A

Instructions and Informed Consent

Instruction

Welcome to our study. First of all, we would like to thank you for helping us with this project. We are three third-year Psychology students, currently doing our bachelor thesis and the purpose of this project is to understand how students perceive events of their daily life. We are interested in how you feel about and react to the many things that happen during the day, no matter if it is only a small event such as a spilled cup of coffee.

For your information, the study will take 6 days. As you already have read in the invitation to this study, it is a diary study and you will work with the app “Ethica”. You will be asked to fill in the same set of questions several times a day. In general, the questions are about how you feel, what you think in relation to the last important event that you experienced during the day. You will get a notification every 1.5 hours because we really want to gain insight into your daily life. The app will send you a notification as a reminder to answer the questions. The reminders will allow us to get in-moment information without any recall bias. Also, it is important that you answer the questions right after you receive the notification.

The procedure of this study looks like the following: On the day before the main study starts you will have to fill in a questionnaire about some general information about you and your current emotional state. This will already take place via the app. This questionnaire needs to be filled in only once. The day after, you will start with the main study, which means that you will have to fill out the same set of questions 10 times a day.

For your explanation, one of the questions says “Think about the most important event since the last hour. This was…”. With "important events" we mean any event that was meaningful for you. Even if nothing really important happened, please pick the most important event that happened since the last questionnaire/beep and answer the questions.

After the last measurement of the sixth day, you successfully ended the study. We would like to stress that there are no right or wrong answers. Some questions may seem a bit strange or not applicable to you in that situation, but still try to answer them honestly.

Also, if you have any questions during the conduction of the study or if you come across problems with the app feel free to contact us any time. Moreover, you can always contact us during the study, if any additional questions arise. Moreover, your data will be treated confidentially. This means that the answers and information you give will remain anonymous. Please read the information on the following page carefully before you agree.

After you gave consent, you will receive all the information how to download the app and create an account. Additionally, you will get an access code for the study.

Informed Consent

You are being invited to participate in a research study about your perception of events in daily life. This study is being conducted by students from the Faculty of Behavioural, Management and Social Sciences at the University of Twente as part of their bachelor thesis. The purpose of this research is to measure how you perceive daily life events throughout the day. This study will run for 6 days. On the first day we will ask for your informed consent and you will be presented with short questions about your demographics, a questionnaire about your well-being, and a questionnaire about your use of coping strategies. These questions just need to be filled out once. Ten times a day (7am-10pm), randomly in a time span of 1.5h, you will be asked to answer a very short questionnaire for 6 consecutive days. Completing one questionnaire will take approximately 1 minute of your time. After filling in the last questionnaire on the sixth day, the study will end. You will receive daily reminders to complete the questionnaires. We are aware that you might be quite occupied during the day, but still, we want to ask you to fill in as many questionnaires as possible. For us, it is especially important that you do not adjust your daily routine to the study. Instead, please fill in the questionnaires directly after receiving the notification. Also, the questions will expire after 40 minutes.

Moreover, we would like to inform you that your participation in this study is entirely voluntary. You can withdraw from the study at any time, without having to give a reason. Your answers in this study are confidential. All data are collected anonymously as directly identifying information will not be obtained.

This study is approved by the BMS ethics committee. You can contact them if you want to file a complaint (ethicscommittee-bms@utwente.nl). If you have any questions about this study, please contact one of the researchers.

- o I consent, begin the study
- o I do not consent, I do not wish to participate

Appendix B

Ethica Installation Guide

How to get started?

Step 1: Download the App

You can download the App "Ethica" via the following links:

iOS: https://apps.apple.com/ca/app/ethica/id1137173052

Android: https://play.google.com/store/apps/details?id=com.ethica.logger

Step 2: Sign up as Participant

After you have installed the app you can sign up for a new account. By that, you enter your e-mail address and choose a password.

Step 3: Enroll in the study

You can access the study via the URL or by entering the registration code

URL: https://ethicadata.com/study/2433/

Study Registration code: 2433

By clicking on "Participate" you successfully have finished the enrollment process. We hope that setting up the app was easy. However, if you came across difficulties, please contact us right away.

Appendix C

Coping-Flexibility Scale Revised

Please answer to what extent the following statements apply to you regarding your use of coping strategies. (Likert-scale 1-4; not applicable-very applicable)

1. I can stop using a coping strategy that has made the situation worse.
2. I can stop using a failed coping strategy.
3. I do not repeat using a coping strategy that made the situation worse.
4. I can stop using a coping strategy that has been ineffective.
5. If the situation has not improved, I consider a different coping strategy.
6. If I did not cope well, I use an alternative coping strategy.
7. Even if the stressful situation has worsened, I can cope by using another strategy.
8. Even if I fail to cope with stress, I can come up with a new coping strategy.
9. I know which coping strategies are effective and which strategies are ineffective.
10. I know if a coping strategy has been successful or unsuccessful.
11. I cope with stress by establishing clear objectives.
12. I can grasp if a coping strategy that I have used has been working well.

Appendix D

Daily Questionnaire

The following questions are about how you felt right now before this beep (Likert-scale 1-7, not at all-very)

1. At the moment I feel down.
2. At the moment I feel insecure.
3. At the moment I feel relaxed.
4. At the moment I feel cheerful.
5. At the moment I feel anxious.
6. At the moment I feel satisfied.

Now think about the most important event since the last beep.
This even was… (Likert-scale -3-3, very unpleasant-very pleasant)

The following questions are about the way you dealt with this event.
How did you deal with this event? (Likert-scale 1-7, not at all-very)

1. I looked at it from a different perspective.
2. I calmly reflected on it.
3. I expressed my emotions.
4. I engaged in activities to distract myself.
5. I talked about it with others.
6. I kept thinking about it.