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Bachelor Thesis

The Association Between Emotion-focused Coping and Stress Levels among University Students within a Daily Context – An Experience Sampling Study

Elena Katharina Dimitriadou (s2160099)

Faculty of Behavioural Management and Social Sciences (BMS)

Department of Psychology

First supervisor: Dr. Matthijs L. Noordzij

Second supervisor: Drs. Nils Keesmekers

Abstract

Background. Stress plays an important role in daily life since it can negatively affect an individual's wellbeing; consequently, coping mechanisms have become an area of intense investigation. Emotion-focused coping (EFC) is one form of coping identified as ineffective when responding and dealing with stress. However, even if the relationship between EFC and stress seems well established, no study investigated the association on a state level within a daily context by differentiating the distinct units of EFC, namely avoidant EFC and active EFC.

Objective. The current study examined the association between momentary state EFC and momentary state stress in daily life. Moreover, the association between momentary avoidant EFC and momentary state stress and momentary active EFC and momentary state stress was examined. Finally, the study assessed the association between trait EFC and trait stress.

Method. The current study used the Experience Sampling Method (ESM) for eight consecutive days among 47 University students. (Mage= 21.13; 82,6% females) based on convenience sampling. State measures were assessed three times daily. Trait measures were assessed with the Perceived Stress Scale (PSS) and the Coping Inventory for Stressful Situations – Short form (CISS-SF) to measure dispositional stress and EFC. Further, state stress was assessed with the Stress Numerical Rating Scale-11 (SNRS-11) and state EFC with a combination of four items out of the Ways of Coping Checklist (WOCC).

Results. A simple linear regression analysis revealed a strong positive association between trait EFC and trait stress, indicating that people who, on average, report higher stress levels, on average, report more use of EFC. Further, three distinct linear mixed model analysis displayed that state EFC is positively associated with state stress ($\beta = .46$, $SE = .03$, $p < .000$.). Moreover, the higher state stress levels, the higher the use of state avoidant EFC ($\beta = .36$, SE= .03, $p < .000$, 95% CI [.30, .42]) and state active EFC ($\beta = .50$, $SE = .03$, $p < .000$, 95% CI [.44, .56]).

Conclusion. This study provides insight into the association between momentary state stress and momentary state EFC. Moreover, novel and unique insight was found for the differentation between the units of EFC, namely active EFC and avoidant EFC. Moreover, a greater use of state active EFC was identified compared to state avoidant EFC for mild stress levels within a daily context. Therefore, the current research expands and adds to the existing literature, which can add to the suggestions of effective coping stratgegies in daily used stress-management interventions by providing insight into the daily use of EFC, when mild stress levels are identified.

The Association between Emotion-focused Coping and Stress Levels among University Students within a Daily Context – An Experience Sampling Study

As stress is identified as a daily occurring phenomenon (Kumar & Bhukar, 2013), it became a domain of intense investigation in recent years. Stallmann (2019) stated that especially among university students identified stress levels are constantly rising, highlighting that especially students are vulnerable to stress. As different stress levels evoke different coping mechanisms (Lazarus, 1993), extensive cross-sectional research investigated the association between stress levels and coping responses within individuals. For instance, emotion-focused coping (EFC) is a coping mechanism that holds, according to Looner (2007), mainly ineffective strategies to reduce stress. Nevertheless, existing research does not assess stress and coping responses, such as EFC in daily life, by considering an individual's current state. Even if Lazarus and Folkman (1984) conceptualized coping mechanisms as "state-dependent" (p.664), and Matthews, Deary and Whiteman (2003) stress as a constantly fluctuating construct, thereby emphasizing periodic assessment of EFC and stress to examine changes, existing research examined the association on one-time retrospective assessment, treating the constructs as trait dependent (Shiffman, 1992). For instance, Shermeyer, Morrow and Mediate (2019) or Stone and Shiffman (1992) investigated in retrospective stress level research by asking individuals to reconsider stressful encounters and their related coping behaviour, thereby neglecting the fluctuating nature of the two constructs (Strutton & Lumpkin, 1994). Shiffman (1992) indicated that retrospective research includes a recall bias and, therefore, a high error variance which might result in false results and interpretations of research outcomes.

Zuckerman (1979) reports that daily state measurements provide greater insight into behavioural and emotional responses compared to one-time retrospective assessments, as estimated as more accurate. This emphasizes the relevance of assessing stress and coping on a daily state level by, for instance, utilizing the Experience Sampling Method (ESM), which provides more insight into the fluctuating nature of coping and stress (Myin-Germeys, Kasanova, Vaessen, Vachon, Kirtley, Viechtbauer & Reininghaus, 2018). Moreover, as state assessments of the association between stress and coping within a daily context are rare, the current research facilitates theoretical foundations of daily interventions to support individuals in practical everyday coping (Christmann, Hoffmann & Bleser, 2017).

Trait Stress and State Stress

As stress plays a substantial role in daily life and many diseases, significant research

investigated the everyday varying phenomenon and its fluctuating nature (Kumar & Bhukar, 2013). Stress levels vary, depending on an individual's perception and interpretation of an identified stressful situation. Atz (2012) indicated that stress is an "individual perception of a challenging stimulus "(p. 640), highlighting that the perception of a stressor is subjective, depending on how the individual interprets the perceived stressful stimulus (Clancy & McVicar, 1993; Lazarus, 1993; Pakenham, Bursnall & Cannon, 2007). Some people are more tolerant concerning daily stressor, while others are more vulnerable, therefore being more prone to hold high stress levels (Atz, 2012). However, stress varies from one time to another, from one day to another; therefore, stress levels are not perceived as stable (Folkman & Lazarus, 1984). Since stress varies daily, it should be investigated and examined as a momentary fluctuating state (Matthews, Deary and Whiteman, 2003).

However, existing stress literature assesses stress levels mainly on a trait level by using retrospective, validated stress questionnaires such as the Perceived Stress Scale (PSS), the most widely used questionnaire to assess stress levels within individuals (Cohen, Kamarck & Mermelstein, 1994). However, the PSS was not used to determine momentary stress levels but an individuals' stress level of the past month (Cohen, Kamarck & Mermelstein, 1994). The research focused on stress as a constant disposition, indicating that individuals with a higher level of trait stress are less tolerant of perceived stressful encounters, holding greater trait stress levels than individuals with lower perceived trait stress (Cohen, Kamarck & Mermelstein, 1994). Thus, the fluctuating nature of stress and its perception and interpretation was averaged out by assessing stress within individuals as a steady trait.

Existing research uses the ESM to assess state stress by associating with other variables, proofing the variability of stress and the validation of ESM. For instance, Myin-Germeys, Krabbendam, Jolles, Delespaul & van Os (2002) found that individuals holding higher sensitivity towards stressful encounters tend to maintain greater stress levels than individuals being less stress sensitive. Furthermore, Myin-Germeys, Peeters, Havermans, Nicolson, DeVries, Delespaul & Van Os (2003) investigated emotional reactivity towards stress, revealing similar results by indicating that individuals holding high stress-sensitivity perceived daily stress. However, ESM studies assessing momentary stress levels mostly use psychiatric samples, who tend to be highly stress-sensitive, therefore being more vulnerable to experience severe stress (Myin-Germeys et al., 2003). Sadaghiani (2013) emphasized that the daily stress of mentally ill individuals and healthy individuals differ, therefore, emphasizing assessing stress responses within the non-clinical population.

Conceptualization of Emotion-focused Coping

Stress is associated with many mental disorders, therefore, substantial existing research investigates individuals' responses to the perceived stressor, which influences the outcome of the stressful encounter and, therefore, an individual's well-being (Christmann, Hoffmann & Bleser, 2017). In literature, the reaction to stressful encounters is referred to as coping (Lazarus, 1993). Emotion-focused coping (EFC) is one form of coping and is shortly defined as "regulating emotional responses to the problem" (Heppner, Cook, Wright & Johnson, 1995, p. 280). Lazarus and Folkman (1984) reported that EFC focuses on mitigating a demand by minimizing the emotional outcome rather than eliminating the aversive situation. As a result, the demand is still present, as the focus is to control and decrease adverse emotional effects (Nakahara, 2020). Therefore, the stressor remains present, causing negative strain (Nakahara, 2020). This leads to the consideration that most EFC features are mainly ineffective coping mechanisms, driving dysfunctional outcomes such as negative affect, distress, depression, and anxiety (Lonner, 2007; Ben-Zur, 2009).

Research often fails to take the wide variety of specific coping responses into account; however, EFC includes various coping responses (Biggs, Brough & Drummond, 2017). Scheier, Weintraub and Carver (1986) reported that primarily EFC is associated with multiple features, which can widely differ from each other, namely an active approach of EFC and an avoidant approach of EFC (Ryan, 2013). The active method of EFC includes coping strategies, which emphasize the active attempts to adapt, regulate, and express the perceived emotional constrain, such as seeking social support by actively communicating experienced emotions (Shimazu & Schaufeli, 2007; Ryan, 2013). Contradictory, avoidant EFC includes the non-regulation of the experienced stress, thereby avoiding the evoked negative emotions, such as denying stress and the negative emotional effect (Ryan, 2013). Therefore, Biggs, Brough and Drummond (2017) conceptualize EFC as an "ambiguous construct" (p. 355) since it holds multiple different coping strategies.

Stress and Emotion-focused Coping

Stress and EFC are intertwined constructs, as EFC is an ineffective coping mechanism evoked when stress is perceived. Everly, Lating and Gravitz (2002) described that "the individual's interpretation of the environment is the primary determinant in the elicitation of the stress response in reaction to a psychosocial stressor" (p. 164). Thus, individuals will perceive the stressful encounter as either threatening or non-threatening, depending on the specific stressor, which decides which coping behaviour a person will engage in (Looner,

2017). This is according to Lazarus (1993) a "cognitive mediator approach" (p. 5), implying that the appraisal and evaluation of a particular stressor determine the coping response. Herman and Tetrick (2009) stated that a high level of distress evokes the use of EFC as individuals do not have the capacities or capability to reduce the stressor, as being occupied with regulating their negative emotional responses. This leads to a cycle of EFC features such as self-blame and frustration, thereby not minimizing the stressor itself (Gordon, Daniele & Diller, 1992).

Extensive existing cross-sectional research investigated the association between stress and EFC on a trait level. The study of Ryan (2013) assessed EFC among university students by examining the features of EFC, avoidant, and active EFC. Ryan (2003) stated that actively dealing with the adverse emotions that arose through stress is associated with higher life satisfaction and lower perceived stress than avoidance. Thus, according to Ryan (2013), active EFC is perceived as a more practical coping style of EFC, while withdrawal and denial are maladaptive. Furthermore, Miller, Gordon, Daniele and Diller (1992) study revealed that EFC is chosen over other coping strategies when a person perceives a high-stress intensity situation. The perceived stressful situation is not associated with a decrease in stress level intensity, as avoidant EFC was chosen to excessive demands, which hinders an individual in actively dealing with experienced negative emotions, which negatively influences wellbeing (Miller, Gordon, Daniele & Diller, 1992; Lazarus & Folkman, 1984). Additionally, Kobasa (1982) stated that avoidant EFC is associated with higher psychological distress, as in the long term, negative emotions cannot be ignored and impair wellbeing. Therefore, existing research revealed that EFC and stress are associated positively; however, according to Miller, Gordon, Daniele & Diller (1992), the avoidant feature of EFC is associated with a greater level of stress than active EFC.

However, little research investigated the association between EFC and stress on a state level using the ESM. Existing studies assessed the association by adding additional variables. For instance, Weinstein, Brown and Ryan (2009) investigated mindfulness, stress and coping. The results indicated that individuals were not stable within their coping responses (Weinstein, Brown & Ryan, 2009). However, individuals being more mindful demonstrated a more active way of EFC by regulating their emotional responses, while less mindful individuals engaged in avoidant EFC (Weinstein, Brown & Ryan, 2009). Therefore, an individual's awareness concerning the current emotional state is associated with an active style of EFC. Nakahara (2020) investigated EFC and stress in association with sleep quality and revealed that EFC impairs the negative relationship of stress and sleep quality since the

regulation or avoidance of emotions actively eliminates the perceived stressor, leading to a high level of distress.

Present research

Although the relationship between EFC and stress is well researched and established, research about the association between stress and EFC on a state level within a daily context using the ESM has been little assessed yet. Especially the differentiation between state active EFC and state avoidant EFC and their association with stress has not been examined yet even if, amongst others, Scheier, Weintraub and Carver (1986) conceptualized EFC as an ambiguous construct, holding multiple and different coping strategies. Lazarus (1984) indicated that coping behaviours are not stable and therefore "state-dependent" (p.664). Moreover, Matthews, Deary and Whiteman (2003) stated that stress levels are constantly varying. Thus, both stress and EFC are fluctating contstructs, which emphasizes on the assessment of this association on a daily state level (Lazarus & Folkman, 1984; Matthews, Deary & Whiteman, 2003). Moreover, Matthews, Deary and Whiteman (2003) argued that state measurements take the different features and facets of a contsruct, such as in this case EFC into account, emphasizing the daily state examination of avoidant EFC and active EFC. This highlights the importance of investigating stress and the related EFC response daily and momentary, as stress and coping mechanisms are an everyday fluctuating phenomenon (Stone & Shiffman, 1992). Therefore, the research aims to assess the association between momentary state stress and momentary state EFC by additionally examining the association between momentary state stress and momentary state avoidant EFC and momentary state stress and momentary state active EFC. The present research will use the ESM to capture the fluctuating and dynamic nature of stress and the associated EFC responses (Lazarus, 1984).

First, it will be examined whether there is an association between state stress and state EFC. *(1) It is expected that there is a positive association between state stress and state EFC, indicating that high-stress levels are associated with more use of EFC.* Second, the association between state stress and state avoidant EFC and the association between state stress and state active EFC will be examined. *(2) It is expected that the association between state avoidant EFC and state stress is positively stronger than the association between state active EFC and state stress,* indicating that state stress is associated with more use of state avoidant EFC, while the use of state active EFC is somewhat associated with state stress.

Method

Design

The current study utilized the longitudinal Experience Sampling Method (ESM), a self-report diary method that assesses real-life experiences and processes in naturalistic environments by using several daily assessments (Van Berkel, Ferreira & Kostakos, 2017). This ensures that participants do not have to rely on their long-term memory, thereby avoiding recall biases and memory biases and elevating ecological validity (Van Berkel, Ferreira & Kostakos, 2017; Csikszentmihalyi, 2014). Data were collected in April and May 2021, using the "Ethica" application (Ethicadata, 2020) on the participant's smart phone devices. The Behavioural, Management, and Social Sciences Ethics Committee of the University of Twente approved the study.

After the registration for the study, one day before the ESM started, demographic data and trait measurements were assessed. For examining the state measures, fixed-time sampling was used. The state assessments were obtained in predetermined daily time intervals (9 AM until 10.30 AM, 2 PM until 3.30 PM, 8 PM until 9.30 PM) for eight consecutive days resulting in 24 state measurements.

Participants

Participants of the current study were English-speaking students, age 18 and older. The participants possessed either an Apple or Android device for using the Ethica application. Through convenience sampling using the Test Subject Pool System of the University of Twente (SONA) and the researcher's references on social media, participants were collected.

Overall, 63 individuals agreed to participate in the current study. Participants who did not complete the trait measures and the state measure above 60% were removed and thus not included in the analysis. This resulted in a total sample of 46 participants. The participants' ages ranged from 19 to 27 (M = 21.13, SD = 1.833). 82.6% of the participants identified themselves as female and 17.4% as male. Individuals from different nationalities participated, with the majority being of German (67.4%) or Dutch (21.7%) nationality, but also individuals of Romania (4.3%), the US, the United Kingdom, and Italy (each 2.2%) participated.

Materials and Measures

The study was part of more extensive research, thus, also containing questionnaires concerning neuroticism and basic need satisfaction. However, only the measurements of both trait and state stress and trait and state EFC were used for the intended purpose of the current research study.

Ethicadata

Ethica is an application for Apple and Android mobile and web devices used for questionnaire studies (Ethica data, 2020). Ethica implements Experience Sampling studies in a user-friendly and convenient way by using the application on smartphones. The application allows the researcher to observe participants behaviour on a continuous daily state level through, for instance, self-report (Ethica data, 2020). Thus, Ethica provides more in-depth information than traditional questionnaires and is especially appliable for ESM studies (Matthews, Deary & Whiteman, 2003. Concerning the utilization, questionnaires are sent to the participants on predetermined time frames, including push notifications, to ensure that state measures are captured in this time interval (Ethica data, 2020). In the research with human subjects, Ethica is especially concerned regarding the privacy of uploaded data. Collected data will be verified and safely stored within the application, in line with the regulations of Ethical/Institutional Review Boards (IRBs) (Ethica data, 2020). Appendix A depicts the application.

Trait measures

Trait Emotion-focused coping: Coping Inventory for Stressful Situations – Short form (CISS-SF). The CISS-SF consists of three subscales (Cohan, Jang & Stein, 2006). The current study used the Emotion-oriented subscale of the CISS-SF, assessing emotional responses to stress (Cohan, Jang & Stein, 2006). The short form of the CISS was used, as items that hold the lowest item-total correlations have been eliminated from the CISS (Cohan, Jang & Stein, 2006), resulting in the currently used version. The questionnaire contains 21 items in total, seven items accessing the emotion-focused style of coping (see Appendix B) (e.g., “Blame myself for being too emotional”) (Cohan, Jang & Stein, 2006). Participants were instructed to rate the extent to which they engage in EFC in a particular situation when being confronted with perceived stress on a 5-point Likert scale ranging from “Not at all” to “Very often” (Cohan, Jang & Stein, 2006). The total score was obtained by summing up the item scores, with higher scores indicating a greater engagement in EFC (Imran, MacBeth, Quayle & Chan, 2020). The psychometric properties of the Emotion-oriented scale of the CISS-SF indicate a Cronbach’s alpha ranging from .78 to .87, indicating excellent internal consistency (Cohan, Jang & Stein, 2006). The current sample showed a Cronbach’s alpha of .87, revealing excellent internal consistency.

Trait Stress: Perceived Stress Scale (PSS). The PSS assesses the perceived stress of individuals (Cohen Kamarck & Mermelstein, 1983). The current study used the ten-item

questionnaire (see Appendix C) since the psychometric properties are preferable to other versions of the PSS (Lee, 2012). Participants were instructed to indicate on a five-point Likert scale, ranging from Never (0) to Very often (4), how often they felt or thought regarding stressful situations within the last month (Cohen, Kamarck & Mermelstein, 1983). Six of the ten items are negatively stated (e.g., "In the last month, how often have you felt nervous and "stressed"?). The remaining four items are positively stated (e.g., "In the last month, how often have you felt that things were going your way?") and needed reversed coding. A total score was obtained by summing up the item scores, which results in a range from 0 to 40, with higher scores indicating a greater level of perceived stress (Lee, 2012). The PSS holds moderate to excellent internal reliability and test-retest reliability (>.70) (Lee, 2012). Cronbach's alpha equals .80, which indicates excellent internal reliability (Remor, 2006). The current sample showed a Cronbach's alpha of .87, representing excellent internal reliability.

State measures

The current research assessed state measures three times daily; therefore, the questionnaire was kept short since the ESM should take a maximum of two minutes daily (Myin-Germeys et al., 2018) to prevent participant burden and retention (Van Berkel, Ferreira & Kostakos, 2017). The items of the daily state measures of state EFC were arranged randomized, meaning that for each state measurement, the items were presented in a different order to prevent ordering effects (Ho & Imai, 2006).

State Emotion-focused coping: The Ways of Coping Checklist (WOCC). The WOCC assesses momentary EFC responses (Folkman & Lazarus, 1985), therefore especially applicable for examining state EFC. The current study used the WOCC for the student sample, as the current study participants were University students. The scale is composite out of eight scales, six of them assessing EFC (Folkman & Lazarus, 1985). Participants were instructed to indicate to what extent they used EFC based on their current stress level on a 4-point Likert scale ranging from "Not used" (0) to "Used a great deal" (3), higher scores indicating greater use of EFC. All scales hold moderate to good internal Cronbach's alpha ranging from .76 to .86, indicating good to excellent internal consistency (Folkman & Lazarus, 1985).

For the current research, four items derived from four EFC scales of the WOCC, one item per scale, namely the Detachment scale, the Self-blame scale, the Wishful thinking scale, and the Seeking social support scale assessed state EFC, due to the highest factor loading within the scale. The item of the Detachment scale ("Try to forget the whole thing.") holds a

factor loading of .61 (Folkman & Lazarus, 1985). From the Self-blame scale, the item "Criticize or lecture myself." was used with the factor loading of .69 (Neacsiu, Rizvi, Vitaliano, Lynch & Linehan, 2010). The item of the Wishful thinking scale ("Wish that I could change what is happening or how I feel.") and the item of the Seeking social support scale ("Talk to someone about how I'm feeling.") were used with the factor loadings of .78 and .71 (Folkman & Lazarus, 1985). The items of Self-blame and Detachment measured state avoidant EFC, and the items of Seeking social support and Wishful thinking measured state active EFC (Miller, Gordon, Daniele & Diller, 1992).

State stress: Stress Numerical Rating Scale-11 (SNRS-11). Stress state was measured by using one item ("On a scale of 0 to 10, with 0 being no stress and 10 being worst stress possible, what number best describes your level of stress right now?") derived from the SNRS-11. Participants were asked to identify their current stress level by indicating the stress intensity on a scale from one to ten. The SNRS-11 shows moderate to strong construct validity (Karvounides, Simpson, Davies, Khan, Weisman & Hainsworth, 2016).

Procedure

During the study set-up, questionnaires and general informational statements were checked continuously regarding their operating mode and improved accordingly. A pre-test was administered from the three researchers for two days to check the user's interface, the general functionality of the questionnaires and the corresponding items, the timing of the application, including the timing of the notifications. Afterwards, modifications were applied to remedy unintended mistakes in the implementation of the survey.

As a pre-requirement for participating in the study, participants were instructed to download the "Ethica" application in the Apple Store for iOS or the Google Play Store for Android on their mobile devices. Additionally, they were asked and instructed how to turn on the notifications within the application to receive pop-up messages on their screen. Then, participants needed to register themselves in the "Ethica" application by providing their email address and choosing a password to participate and view the study. Immediately after signing up for the study, participants received a notification to start the study. Firstly, they were briefed. According to Palmier-Claus, Jasper, Myin-Germeys, Barkus, Bentley, Udachina, Delespaul, Lewis, and Dunn (2010), a detailed briefing is essential in ESM studies as the researchers will not be present to explain the instructions or answer questions. The briefing contained information regarding the duration of the study, purpose, procedure, data storage, and the rights for the participants, that their participation is voluntary, and that they can

withdraw from the study at any time. Participants had to agree to the online consent form actively to participate in the study. After accepting the informed consent, participants completed questions concerning their demographics. Moreover, they filled out the four trait questionnaires before the ESM will start the next day.

For the following eight days, participants were provided with an identical survey three times a day. The assessments were scheduled between 9 AM and 10.30 AM, between 2 PM and 3.30 PM, and between 8 PM and 10.30 PM to capture and get insight into the real-life stress levels within an entire day. The daily questionnaire included eight statements in total, which took the participants around one minute to complete. Van Berkel, Ferreira, and Kostakos (2017) indicated, ESM questionnaires need to be concise to prevent participant burden. Answering the items was mandatory to get to the following statements to avoid data loss. Participants received push notifications when an assessment was available. Moreover, they received two more notifications after 30 minutes and one hour as a reminder when they did not fill out the questionnaire yet.

Students of the University of Twente were able to sign up via the Test Subject Pool System of the University of Twente to received 1.5 credits for participating in the current research to increase their motivation through reward (Wiersma, 1992).

Data analysis

The data was exported from "Ethicadata" into Excel to prepare and modulate the data to fit statistical analysis. Further, the adjusted data were imported into SPSS version 27.0 for statistical analysis. Participants who did not complete the assessment (response rate < 60 %) were excluded from the analysis. New variables for state active EFC and state avoidant EFC were created by assigning the corresponding items to either active EFC or avoidant EFC. Then the two datasets of trait measurements and state measurements were united to obtain one data set and then transformed into a long format.

Descriptive statistics were examined to assess and get insight into the participant's state and trait measurements by assessing means and standard deviations. Further, person means (PM) scores were computed to get the average score of state stress and state EFC per participants for all 24-time points, allowing for between-person analysis. For all state and trait variables, scores were standardised for comparison, resulting in z-scores, resulting in standardised estimates, which are used in the following analysis. For the trait measurements, simple linear regression analysis was conducted, and linear mixed model (LMM) analysis for the state measurements to account for clustering (Gueorguieva, 2001).

First, to assess the association between trait EFC and trait stress, a simple linear regression analysis was conducted, treating trait stress as a predictor variable and trait EFC as the outcome variable. Validity of the state measurements, the association between state EFC and trait EFC and the association between state stress and trait stress were assessed and investigated by two LMM analysis (Csikszentmihalyi & Larson, 2014). Trait scores were treated as predictor variables and the PM scores of the state measures as outcome variables.

Further, to assess the association between momentary state EFC and momentary state stress, an LMM analysis was conducted. State EFC was treated as the outcome variable and state stress as the predictor variable. Two additional LMM analyses were conducted to assess the association between momentary state avoidant EFC and momentary state stress and the association between momentary state active EFC and momentary state stress. State active EFC and state avoidant EFC were treated as the outcome variable, while state stress was used for both LMM analyses as the predictor variable.

For assessing the stability of the state measures, test-retest reliability was conducted. The dataset was split into two halves by contrasting the odd and the even timepoints. The marginal means of the first and second half participants were compared using Pearson correlation (Palmier-Claus et al., 2010). According to Cohen (1988), a Pearson coefficient *r* of > .1 (-.1) indicates a weak association, *r* > .3 (-.3) indicates a moderate correlation, and *r* > .5 (-.5) assumes as a strong correlation.

Results

Descriptive Statistics

In total, 1.104 state measurements and 46 trait measurements were completed. Descriptive statistics for trait and state measurements are displayed in Table 1.

Minimum, maximum, means, and standard deviations (SD) for the trait and state measures in the final sample (N=46).

Variable	Minimum (minimum scale score)	Maximum (maximum scale score)	Mean (SD)
Trait Stress	0 (0)	35 (40)	2.07 (.72)
Trait EFC	2 (0)	35 (35)	2.58 (1.08)
State Stress	0 (0)	10 (10)	3.02 (2.52)
State EFC	0 (0)	12 (12)	.68 (.66)
State active EFC	0 (0)	6 (6)	.67 (.74)

State avoidant EFC	0 (0)	6 (6)	.68 (.73)

Reliability

Test-retest reliability was obtained by the scores on state EFC and state stress. Pearson correlation analyses indicated significant correlations between the scores for state EFC (first and second half: $r = .95$, $p < .000$). Furthermore, the correlations between the scores for state stress revealed significant correlations (first and second half: $r = .96$, $p < .000$).

Validity

Linear mixed model analyses were conducted to determine whether the trait measurements were significant covariates for the PM state measurements. Trait stress was found to be a non-significantly covariate for average state stress, $r = -.16$, $p = .34$, implying no supporting evidence for an association between the trait and average state stress. Further, trait EFC was found to be a non-significantly covariate for state EFC, $r = .04$, $p = .82$, indicating no supporting evidence for an association between the trait and state EFC.

Trait Stress and Trait Emotion-focused coping

A linear regression analysis investigated the expected positive association between trait stress and trait EFC. A scatterplot with an imposed regression line of trait stress and trait EFC was plotted to illustrate linearity. The visual inspection of the plot indicated a linear relationship between trait stress and trait EFC. Further, trait stress statistically significantly predicted trait EFC, $F(1, 1102) = 1927.757$, $p < .000$ with an $R2$ of .80. Further, the results revealed that trait stress significantly affects trait EFC, ($\beta = .80$ $t = 43.91$, $p < .000$).

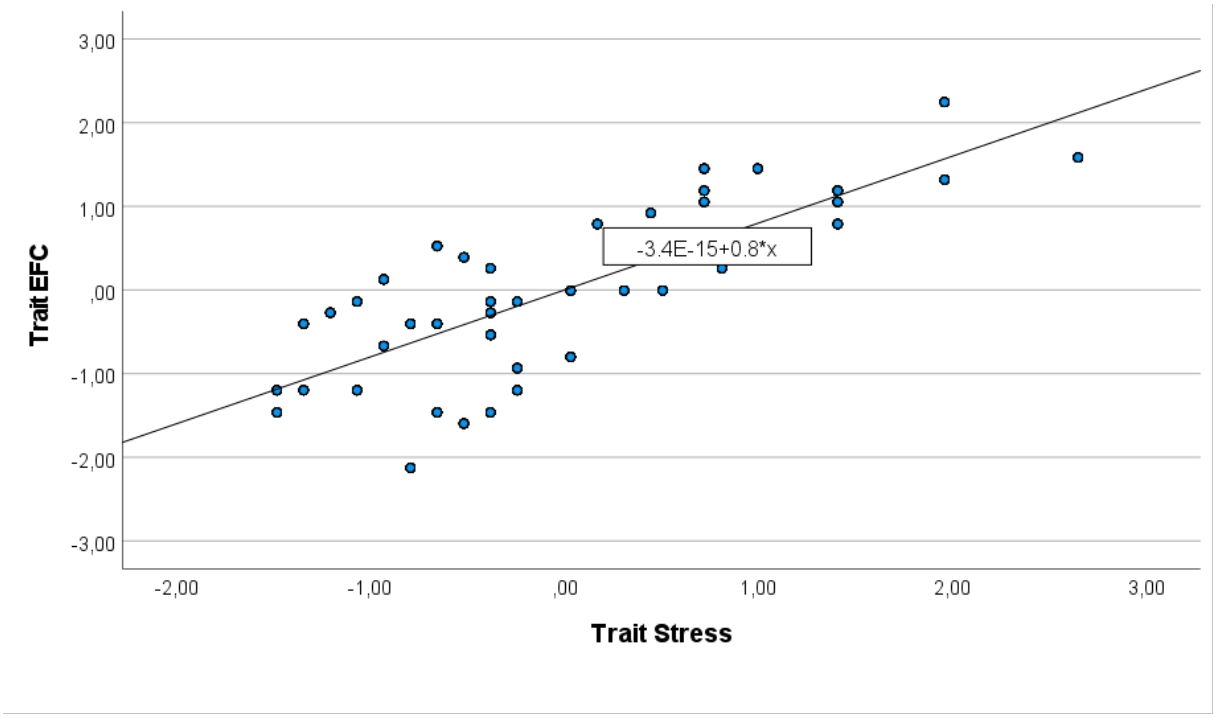

Figure 1. Scatterplot depicting the linear relationship of standardized scores of Trait EFC and Trait Stress.

State stress and State Emotion-focused coping

A Linear Mixed Model analysis investigated the expected positive association between momentary state stress and momentary state EFC. It was found that state stress statistically significantly predicts state EFC, F (1, 926.504) = 268.723, $p < .000$. The results revealed a statistically significant, moderate positive association of state stress and state EFC, $\beta = .46$, $SE = .03$, $p < .000$.

Two additional LMM analysis were conducted to investigate the association of momentary state stress and momentary state avoidant EFC and momentary state stress and momentary state active EFC. The results of the LMM analysis of state stress and state avoidant EFC revealed that state stress statistically significantly predicts state avoidant EFC, F (1,924.707) = 145.397, $p < .000$. It was found that state avoidant EFC has a positive weak association with state stress ($\beta = .36$, SE = .03, $p < .000$, 95% CI [.30, .42]). The results of the LMM analysis of state stress and state active EFC indicated that state stress statistically significantly predicts state active EFC, F (1, 753.781) = 254.892, $p < .001$. It was found that state stress has a significant positive moderate association with state active EFC ($\beta = .50$, $SE = .03$, $p < .000$, 95% CI [.44, .56]).

Discussion

The current research aimed to assess the association between momentary state stress and momentary state EFC. Moreover, the association between momentary state stress and momentary avoidant EFC and momentary state stress and momentary active EFC was examined. The current research revealed three main findings. First, supporting evidence was found regarding the positive association between momentary state EFC and momentary state stress. This indicated that an increase in momentary stress levels evokes an increase in momentary EFC (Knippenberg, de Vugt, Ponds, Verhey & Myin-Germeys, 2018). Secondly, against the expectations, active EFC was associated to a greater extent with momentary stress, namely moderately positive, compared to momentary avoidant EFC, holding a weak positive association with momentary stress. This finding implicates that for the current sample there was more use of momentary state actice EFC than momentary state avoidant EFC when stress was perceived.

Interpretation of Results and Theoretical Reflection of Emotion-focused coping and Stress

Emotion-focused Coping and Stress

A large extent of the existing literature focuses on the one-time retrospective assessment of the association between stress and EFC. Therefore, the current study replicated the effect of trait EFC and trait stress first to validate existing research results (Burman, Reed & Alm, 2010). The current research indicated that dispositional EFC is strongly associated with dispositional stress, which aligns with existing findings, such as from Nakahara (2018). The study revealed that an increase in stress evokes an increase in EFC usage (Ryan, 2013). Additionally, Miller, Gordon, Daniele and Diller (1992) identified that high psychological distress predicts EFC engagement, which even leads to higher stress, as negative emotions evoke with which the individual is occupied with, rather than with eliminating the stressor itself.

The current research supports the hypothesis that an increase in momentary stress stimulates an increase in momentary EFC. As indicated, few existing research studies investigated the effect of momentary state stress on momentary state EFC daily by using the ESM. Nakahara (2020) reported that students using EFC coping strategies tend to hold high levels of distress, resulting in sleep disturbances, as the individual's occupation to either avoiding or regulating emotional responses towards the stressor. However, the current research results revealed a moderate association between momentary stress and momentary EFC. According to van Knippenberg et al. (2018), especially when assessing coping

mechanism daily, individuals tend to engage in more than one coping strategy. A person tends to engage in EFC and problem-focused coping, identified as an active approach to reduce the stressor itself when encountering daily stress (van Knippenberg et al., 2018).

Nevertheless, no supporting evidence was found concerning the correlation between state stress and trait stress and state EFC and trait EFC. Trait measures reflect retrospective reflection on stable patterns of a person, while state measures assess momentary states. Conner and Barrett (2012) differentiate between the experiencing (momentary) self and the remembering (retrospective) self. The experiencing self is more connected to stress-related reactions, especially emotions, therefore better assessing objectively the current state of stress and EFC. In contrast, the remembering self recalls affective states, missing the introspection of the momentary affective state within a person due to retrospection (Conner & Barrett, 2012).

Additionally, Matthews, Deary and Whiteman (2003) indicated that state measurements could take the different facets and features of dispositions into account, while trait measurements are not. Especially in periods of stress, trait measurements cannot take occurring changes within an individual's state into account, therefore not taking the interdependence between constructs into consideration, compared to state measurements (Matthews, Deary & Whiteman, 2003). Consequently, they argued that state and trait measurements assess different constructs (Matthews, Deary & Whiteman, 2003), explaining the non-correlation of the current state and trait measurements. Weinstein, Brown, and Ryan (2009) also indicated that individuals are not stable in their coping responses as they are fluctuating. Therefore, trait measurements are not able to account for the fluctuating nature of EFC. Thus, state measurements account for a broader variability (Matthews, Deary & Whiteman, 2003) in the association between stress levels and EFC.

State avoidant Emotion-focused Coping and state active Emotion-focused Coping

Both momentary avoidant EFC and momentary active EFC hold a significant association with stress for the current sample. The only existing research investigated in those two features of EFC distinctively is the research of Ryan (2013), however, on a trait level, not on a momentary state level. Ryan (2013) revealed a strong positive association between stress and avoidant EFC; however, no significant association between active EFC and stress. The current study investigated the two distinct features of EFC on a state level, therefore accounting for the fact that state measurements can examine different elements of constructs (Matthews, Deary & Whiteman, 2003), such as the EFC (Matthews, Deary & Whiteman,

2003. As mentioned above, Conner and Barrett (2012) explain that the experiencing self is more able to assess affective states, such as emotions, compared to retrospectively, as individuals get an accurate introspection into their current state, without holding recall biases could falsify the response. Moreover, Matthews, Deary and Whiteman (2003) stated that trait measurements could not account for changes within fluctuating constructs such as stress and EFC.

For the current sample, the two features of EFC, namely avoidant EFC, and active EFC, can be differentiated in the association with stress. Momentary active EFC was associated with stress to a greater extent than avoidant EFC, therefore in the current sample state active EFC was more used when stress levels were identified compared to state avoidant EF. Avoidance is chosen when the problem seems unresolvable; therefore, stress levels are perceived as high (Lazarus & Folkman, 1984). Individuals feel incapable of dealing with stressors when they are perceived as too threatened, which results in distracting and distancing coping strategies (Lazarus, 1993; Ryan, 2013). However, the current sample holds mild stress levels, and avoidance is mainly chosen when stress levels are high, resulting in the exceed of coping resources (Lazarus, 1993). This implies that the current sample does not perceive the experienced stressful encounter as unresolvable, therefore using momentary active EFC, such as actively expressing their emotional state to others. Individuals held the perception of having the capacities to regulate and actively deal and express their emotional responses, therefore engaging in momentary active EFC to a greater extent than in momentary avoidant EFC.

Existing literature supported and explained the current finding of a greater engagement of avoidant EFC than active EFC. Folkman and Lazarus (1985) support this finding in their research with college students since seeking social support was first used when confronted with distress. Avoidance was used when students did not know how to deal with the perceived stress and the evoked negative emotional effect. Moreover, Van Knippenberg et al. (2018) revealed supporting evidence that individuals engaging in avoidant EFC hold less emotional reactivity towards the stressor. Regulating the stressor means dealing with the perceived emotionality the stressor evokes, which also increases the perceived level of stress, compared to avoiding it (Lazarus, 1993). Also, Miller, Gordon, Daniele and Diller (1992) revealed that wishful thinking, identified as active EFC (Ryan, 2013), is also identified with distress. The individual actively ineffectively addresses their emotional state by focusing on different desirable outcomes, rather than accepting and actively adapting and regulating their current emotional state (Miller, Gordon, Daniele and Diller, 1992).

Strengths and Limitations

This research contributes to the existing literature about EFC and stress, as literature on this association in daily life is little established. Significantly, the investigation of the momentary association between state EFC and state stress was not established yet within a daily context on a state level, as well as the differentiation of the two features of EFC, avoidant EFC and active EFC. Therefore, the current study provides a novel and unique insight into this significant association of state EF and state stress and the differentation of avoidant EFC and active EFC in a real life context (Zuckerman, 1979). A second asset is the assessment of this association utilising the ESM since it is not investigated in existing literature before. The ESM holds high ecological validity since it prevents inaccuracy in recalling the assessed experiences (Csikszentmihalyi & Larson, 2014). The ESM provides insight into naturally occurring experiences and processes (Csikszentmihalyi & Larson, 2014), providing more accurate results than trait measurements, as ESM takes the fluctuating nature of stress and EFC into account (Matthews, Deary & Whiteman, 2003).

Further, the ESM allows for the investigation in both within- and between-subject design, a unique feature regarding existing cross-sectional studies (Csikszentmihalyi & Larson, 2014). Another strength of the current research is the psychometric properties of the trait and state measurements. The reliability for both trait and state measures was excellent, indicating high internal consistency among the used scales (de Vet, Mokkink, Mosmuller & Terwee, 2017), which is in line with existing research (Cohan, Jang & Stein, 2006; Remor, 2006). For both trait and state EFC assessment, items out of the questionnaires were used, thereby creating a new scale, which was not implemented before, therefore holding a unique feature with excellent internal reliability. Further, the test-retest reliability assessment of the state measurements proved a strong correlation coefficient for both state EFC measures and state stress measures.

However, the current research also holds shortcomings such as technical issues, which resulted in the disappearance of state measurements. Therefore, some participants data could not be used as they holt to many missing values, leading to non-usage of collected data. Moreover, state stress was examined by a single item. The validity of the state and trait measures was not significant, which could be according to Connor (2009) due to the assessment of state stress by only one question to prevent participant burden. However, as above mentioned, the reason for the non-significant validity could be that state and trait measurements are examining different constructs, as trait measurements cannot take the

fluctuating nature of stress and EFC into account, therefore measuring different things that cannot be compared to each other (Matthews, Deary & Whiteman, 2003).

Furthermore, another limitation of the study is the sampling method and the sample itself. Convenience sampling was used exclusively, resulting in the inclusion of university students only. This resulted in an overrepresentation of females (82,6%) and individuals with a German nationality (67,4%), who were all higher educated. Therefore, the identified mild stress levels could be due to more leisure time for students, while higher stress levels are primarily present in examination phases (Weekes, Lewis, Patel, Garrison-Jakel, Berger & Lupien, 2006).

Future Research

Firstly, no research exists concerning the association between momentary state active EFC and momentary state stress and momentary state avoidant EFC and momentary state stress by using the ESM. Therefore, further research could investigate this association and differentiation to validate the current research findings (Burman, Reed & Alm, 2010). Moreover, since the current sample holds mild stress levels, additional research studies identifying different stress levels would provide further insights into the association between momentary stress levels and momentary EFC, as high stress levels might evoke a different usage of EFC and avoidant and active EFC. Lastly, further research should investigate another part of the population. Extending the sample to other sections of society would allow drawing more powerful inferences of the study's outcomes.

Generally, the current research study contributes to the theoretical foundation of daily coping interventions by providing deeper insight into the everyday use of EFC when perceiving stress. For instance, existing applications address stress management techniques, including effective coping strategies to improve wellbeing, as wellbeing depends on effective coping when being stressed (Christmann, Hoffmann & Bleser, 2017). Those applications are used daily to enhance individuals' coping behaviour and, therefore, their wellbeing (Christmann, Hoffmann & Bleser, 2017). Individuals can determine their stress level, then the applications suggests effective coping responses (Christmann, Hoffmann & Bleser, 2017). For EFC, effective coping tactics are for instance social skills training for experessing emotional states or practicing mindfulness and relaxation of the mind through meditation (Bauman, Haaga & Dutton, 2008; Kassymova, Kosherbayeva, Sangilbayev & Schachl, 2018). This prevents them from overthinking, which can result in self-blame or the avoidance of problems, causing negative effects on wellbeing (Weinstein, Brown & Ryan, 2009). Therefore, the current research contributes to the theoretical ground of those applications by

assessing the use of EFC dependent on their stress state, in this case, mild stress levels, within a daily context, capturing everyday experiences and processes, therefore allowing to get a greater insight into the use of EFC and its two units in everyday life. This can allow existing applications to incorporate the current findings to work on or improve existing support in coping strategies.

Conclusion

Since existing research mainly investigated in one-time retrospective assessment of the association between stress and EFC, thereby neglecting the fluctuating nature of stress and EFC, the current research investigated the association on a daily state level. The study revealed that the use of state EFC is associated with state stress. Moreover, momentary active EFC and momentary avoidant EFC can be differentiated into distinct units for the current sample, with a greater use of momentary state active EFC than momentary state avoidant EFC when holding momentary state stress. Additionally, as the current study provides novel insights, which can serve as theoretical foundations for existing stress-management applications which support individuals in using effective coping strategies depending on their stress level to effectively regulate the emotional response when stress is perceived to improve wellbeing.

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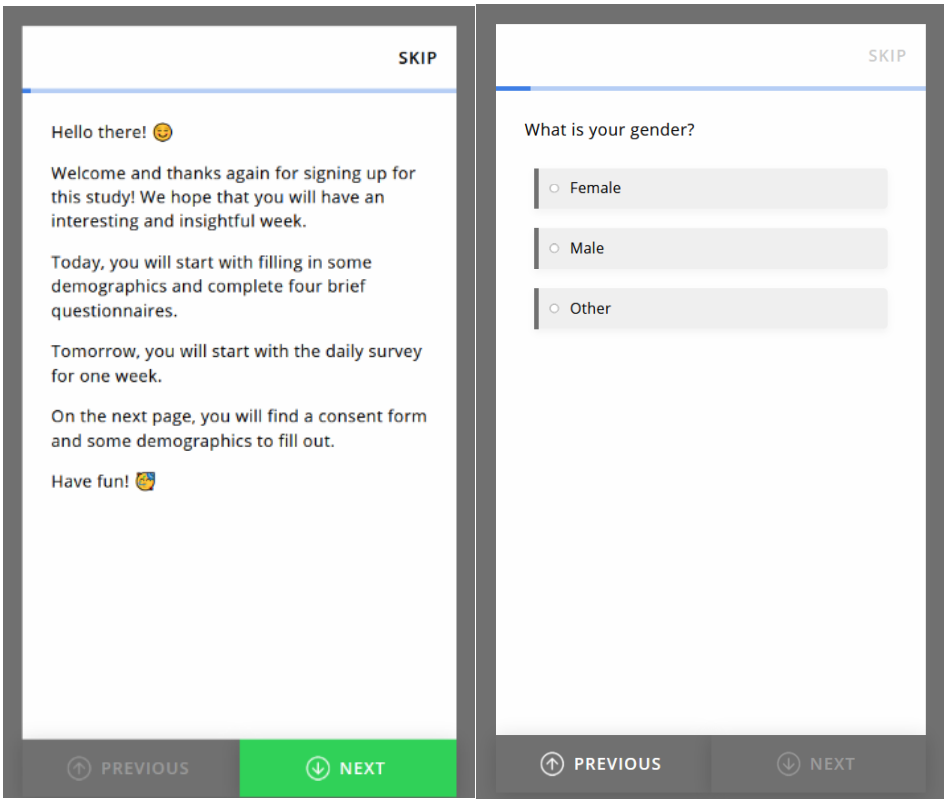
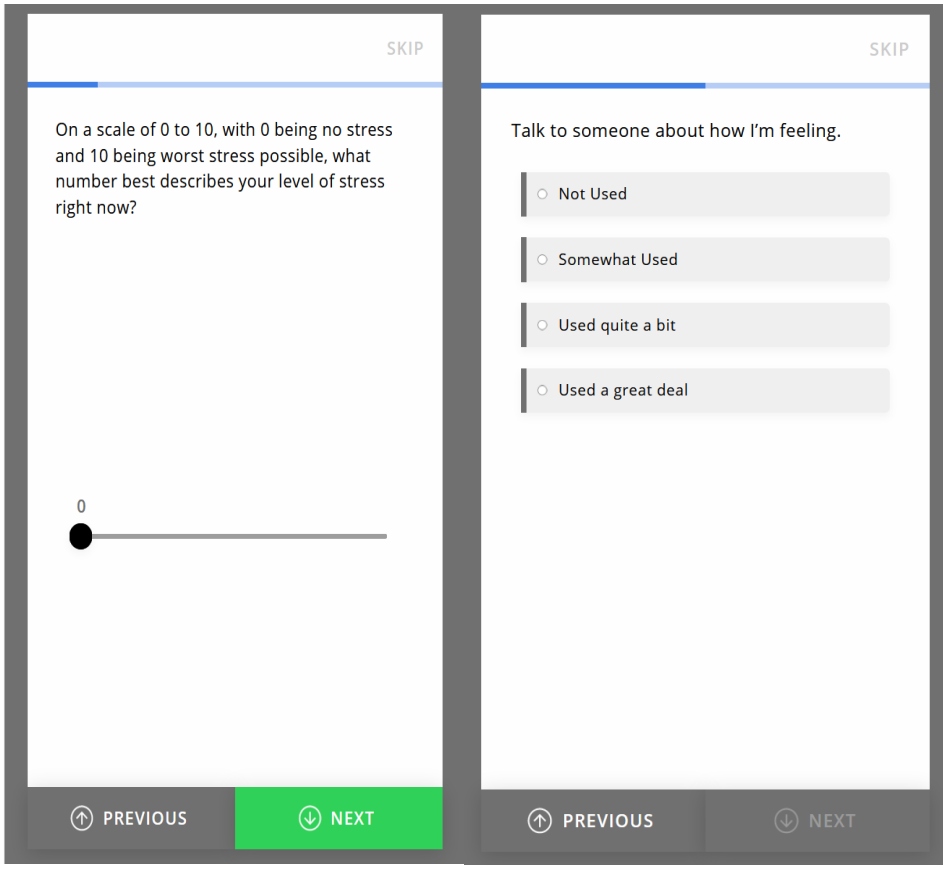
Appendices

Appendix A – "Ethica data" application

Conception, Example of Demographic Questions, and Examples of State Measures.





Appendix B - Coping Inventory for Stressful Situations – Short form (CISS-SF)

1. Blame myself for the situation

2. Worry about being unable to cope

3. Blame myself for being too emotional

4. Become very upset

5. Blame myself for not having solution

6. Wish I could change things

7. Focus on my inadequacies

Appendix C – Perceived Stress Scale (PSS)

1. In the last month, how often have you been upset because of something that happened unexpectedly?

2. In the last month, how often have you felt that you were unable to control the important things in your life?

3. In the last month, how often have you felt nervous and "stressed"?

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

5. In the last month, how often have you felt that things were going your way?

6. In the last month, how often have you found that you could not cope with all the things that you had to do?

7. In the last month, how often have you been able to control irritations in your life?

8. In the last month, how often have you felt that you were on top of things?

9. In the last month, how often have you been angered because of things that were outside of your control?

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?