

**Exploring the Association between Basic Need Satisfaction and Emotion-Focused Coping  
in University Students within Daily Life: An Experience-Sampling Study**

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Master Thesis PCPT

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July 16<sup>th</sup>, 2023

## Abstract

**Background:** As stress levels among students continue to rise, understanding factors that facilitate adaptive coping becomes increasingly important. Emotion-focused coping (EFC) is one category of coping and includes both active (i.e., more adaptive) and avoidant (i.e., less adaptive) strategies. In the context of self-determination theory (SDT), previous cross-sectional research has identified basic need satisfaction (BNS) as a core precedent of adaptive coping. However, the dynamic nature of BNS and coping, essential for understanding daily coping, has been overlooked.

**Objectives:** This study aims to examine the fluctuation and association between BNS and use of EFC in the daily lives of students using the experience sampling method (ESM). Besides, sub-types of EFC (i.e., active and avoidant) and lagged associations were examined.

**Methods:** A total of 84 students reported their current BNS and use of EFC three times a day for one week. Data were collected in 2021 using primary trait items and in 2023 using revised items based on ESM questionnaire recommendations.

**Results:** Both BNS and EFC fluctuated considerably for the updated version of the questionnaire. Using linear mixed models, a weak negative association between state BNS and state EFC was found ( $\beta = -.29, p < .001$ ), indicating that higher BNS was associated with less use of EFC. Satisfaction of autonomy and competence negatively influenced the use of state EFC, whereas relatedness showed no significant association. State BNS was also negatively associated with both active ( $\beta = -.21, p < .001$ ) and avoidant ( $\beta = -.32, p < .001$ ) EFC. However, only autonomy and competence were related to active EFC, while all three basic needs were associated with avoidant EFC. The association between state BNS and lagged state EFC was weakly negative ( $\beta = -.10, p = .010$ ).

**Discussion:** The findings support the dynamic nature of BNS and EFC, highlighting the importance of measuring and associating BNS and coping on a within-person level. Consistent with previous cross-sectional studies, need satisfaction was negatively associated with use of emotion-focused strategies. Satisfaction of autonomy, competence, and relatedness enables individuals to view stressful situations as challenges, making them directly address the problem rather than relying on emotion-focused strategies. However, the assumption that BNS would be positively related to active EFC while being negatively related to avoidant EFC was not supported. Future research should use more comprehensive study designs, comprehensively capturing BNS and coping while considering mediating variables.

## **Exploring the Association between Basic Need Satisfaction and Emotion-Focused Coping in University Students within Daily Life: An Experience-Sampling Study**

In today's competitive environment, students face increasing demands due to excessive workload, challenges in time management and pressure to perform (Beiter et al., 2015). As a result, stress is omnipresent in students' lives negatively impacting their academic performance and mental health (Chou et al., 2011; Schönfeld et al., 2016). Psychological resources like *basic need satisfaction* (BNS; autonomy, competence, and relatedness) and coping play a vital role in protecting students from the harmful effects of stressors. This is demonstrated by how a student's appraisal of difficulties associated with an academic challenge (e.g., setbacks, slow progress) may vary depending on their level of BNS. High BNS characterized by a sense of control, capability and supportive relationships may lead to a more positive appraisal and the use of adaptive coping strategies, such as seeking help. In contrast, low BNS, involving feelings of being forced, incapable, or alone, may frustrate a student prompting maladaptive coping strategies such as procrastination or self-blame.

Accordingly, previous research suggests that BNS and coping are intertwined, indicating that how individuals cope is influenced by their perceived autonomy, competence, and relatedness during a stressful encounter (Amiot et al., 2008; Betoret & Artiga, 2011; Pereira & Gonzalez, 2020). However, it remains unclear how BNS influences the way students manage emotions arising from stressful situations, specifically in terms of employing active or avoidant *emotion-focused coping* (EFC) strategies (Holahan & Moos, 1987; Lazarus & Folkman, 1984). Additionally, both coping and BNS show substantial situational variability, as they depend on specific challenges faced by individuals (Coxen et al., 2021; Roesch et al., 2010). Nonetheless, prior research has focused on how individuals differ in coping based on need satisfaction, neglecting the dynamic and context-specific nature of both constructs. To enhance theoretical understanding and inform tailored interventions, this study aims to address these limitations by investigating how BNS affects a student's use of active or avoidant EFC in daily life by using the experience sampling method (ESM) which is "a structured self-report diary technique" (Myin-Germeys & Kuppens, 2022, p. 10).

### **Basic need satisfaction**

BNS is a concept from *self-determination theory* (SDT), a broad theory of human behaviour outlining the necessary conditions for human thriving supported by many studies in

various fields (Deci & Ryan, 2008; Vasconcellos et al., 2020). SDT posits that humans have three inherent basic psychological needs. The need for *autonomy* refers to acting in accordance with one's interests and values. *Competence* refers to effectively interacting with one's environment. Finally, *relatedness* involves interacting with and connecting with others (Deci & Vansteenkiste, 2004). SDT claims that fulfilment of these needs facilitates well-being and peoples' intrinsic motivation to engage in a given adaptive behaviour (Deci & Ryan, 2000). In the educational context, findings suggest that BNS is related to autonomous student motivation (Vasconcellos et al., 2020), active learning behaviour (Holzer et al., 2021), and resilience (Neufeld & Malin, 2019). Need frustration, on the other hand, causes alienated functioning and passivity (Deci & Vansteenkiste, 2004; Reis et al., 2018) and is a predictor of anxiety, somatization and exhaustion (Cordeiro et al., 2016). These findings highlight the crucial link between a student's level of need satisfaction and subsequent responses to stressful situations.

BNS exhibits substantial day-to-day variability, showing more variation on a daily than weekly level (Coxen et al., 2021). Besides, Ryan et al. (2010) found daily fluctuations in BNS, predicting daily variation in well-being. However, looking more closely at this association, while all needs were associated with well-being on a single day, overall only competence and relatedness were related to well-being (Neubauer & Voss, 2018). This finding shows a distinction between the factors that bring happiness on a day-to-day basis versus those that contribute to general well-being underlining the importance of measuring BNS at an individual level using ESM. Surprisingly, there has been limited research on the daily fluctuations in students' BNS and its relationship to beneficial outcomes such as adaptive coping (for exception see Martin et al., 2021). This is unfortunate considering that students often experience varying emotions from day to day (Larson et al., 2002), suggesting that BNS may fluctuate significantly, thereby impacting their ability to cope with stressors.

### **Coping**

Next to BSN, adaptive coping is another vital resource protecting students from the harmful effects of stress. According to the *transactional stress and coping model* (TSCM), coping refers to “constantly changing cognitive and behavioural efforts to manage external and/or internal demands that are appraised as taxing or exceeding the resources of a person” (Lazarus & Folkman, 1984, p. 141). While there are over 400 recognized coping strategies, they can be generally categorized as problem-focused coping (PFC) or EFC. PFC involves efforts to directly resolve the

stressor, such as planning, taking action, or seeking assistance, and is generally considered adaptive (Lazarus & Folkman, 1984). EFC includes attempts to reduce the negative emotional response elicited by a stressor and involves both active and avoidant strategies. Active EFC strategies encompass emotion-expression and acceptance and bring individuals into closer contact with the stressful situation which is often beneficial. Avoidant EFC strategies include denial and self-distraction and allow an individual to withdraw from stress (Ryan, 2013; Schnider et al., 2007). Previous research found active EFC to be associated with positive outcomes. Avoidant EFC, on the other hand, may initially help individuals manage their day-to-day activities, especially for stressors that seem unresolvable, but relying on this coping style over time can lead to negative long-term effects on mental health (Biggs et al., 2017; Schnider et al., 2007).

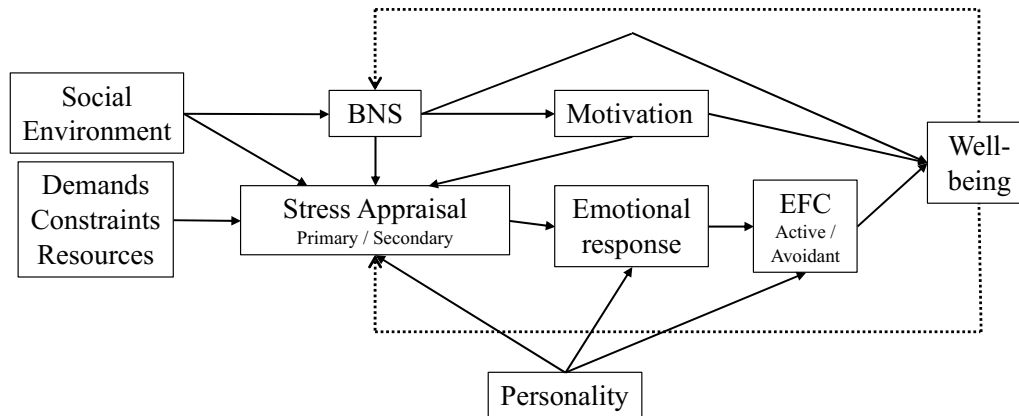
As with BNS, findings suggest high within-person variation for a variety of coping responses, especially emotion-focused strategies (Roesch et al., 2010). Besides, in various ESM studies, retrospective reports of coping corresponded weakly with state measures indicating that a reflection of how one copes does not align with actual coping behaviour as recall bias is present (Roesch et al., 2010; Schwartz et al., 1999; Stone et al., 1998). For example, while women retrospectively recalled using more EFC than men did, who reported more PFC, no gender differences were found for daily reports of coping (Hamilton & Fagot, 1988; Porter et al., 2000). Thus, instead of a trait-like construct that can be measured using retrospective checklists, coping is rather “a dynamic process with substantial intra-individual and inter-individual variability” (Ntoumanis et al., 2009, p. 251). These findings emphasize the need for examining coping from a within-person perspective, considering its variability and its relationship with other psychological constructs such as BNS.

### **Coping from a Self-Determination Theory Perspective**

EFC and BNS are closely intertwined, as BNS affects how individuals appraise and in turn cope with stress (Skinner & Edge, 2002). Following this reasoning, Ntoumanis et al. (2009) propose a model that integrates TSCM with SDT (see Figure 1), addressing the lack of research on the joint influence of motivational and coping factors. Based on Lazarus and Folkman (1984), they suggest that stress appraisal and use of coping strategies are influenced by demands, constraints, the availability of resources and personality factors. Incorporating SDT, stress appraisals are also influenced by BNS, resultant motivation and the environment that either supports or undermines BNS.

**Figure 1.**

*Integrating components of the TSCM (Lazarus & Folkman, 1984) and the SDT (Deci & Ryan, 2000; adapted from Ntoumanis et al., 2009)*



The model proposes that feeling autonomous, competent, and related in a stressful situation leads to appraising stressors as challenges, resulting in adaptive coping responses. In contrast, when psychological needs are thwarted, individuals are more likely to experience lack of control, helplessness, and alienation, leading to negative appraisals and use of maladaptive coping strategies (Meaney et al., 2016; Ntoumanis et al., 2009). On a cross-sectional level, this is supported by Pereira and Gonzalez (2020) who found that level of BNS among students was positively related to proactive coping, strategic planning, and instrumental support seeking while being negatively related to procrastination, avoidance coping and stress. Likewise, BNS was associated with less avoidance coping among students (Betoret & Artiga, 2011). Similar results have been found in the context of work stress, dealing with life changes, and athletic coping (Amiot et al., 2008; Knee & Zuckerman, 1998; Mouratidis & Michou, 2011; Parker et al., 2013).

Applying this model to the student faced with a large research project, both the amount of time available, the personal circumstances as well as the student's personality influence how they appraise the stressor. In addition, and relevant to the current study, perceived autonomy in conducting the project, feelings of capability and connection to relevant others (i.e., peers or instructors) affect the student's appraisal, resulting emotions (i.e., positive or negative) and subsequent use of coping strategy. If there is a positive appraisal of circumstances and BNS, adaptive coping (i.e., active EFC) may be prompted.

It is important to note that the evidence supporting the proposed model paths has been limited to a between-person level. However, considering that both BNS and EFC are dynamic constructs that fluctuate within individuals across situations, it is crucial to examine the model on a within-person level to assess its validity in daily life.

### **Present Study**

The present study aims to provide insight into the relationship between BNS and EFC in students' daily lives. While previous research has suggested an association between these constructs, it has been limited to cross-sectional studies, neglecting that both BNS and EFC are dynamic and state-dependent concepts (Biggs et al., 2017; Coxen et al., 2021; Lazarus & Folkman, 1984). Therefore, this study used ESM to validate single paths of Ntoumanis' et al., 2009 model on a within-person (i.e., daily) level. Specifically, the path of BNS relating to stress appraisals and respective active or avoidant EFC was examined. Using ESM allowed for close examination of lived day-to-day experiences in a natural context, thereby increasing ecological validity. Also, measurement error due to biased retrospective recall was minimized.

Informed by Ntoumanis' et al., 2009 model, measuring and associating EFC and BNS on a within-person level gives rise to several research questions. First, we examined how state BNS and state EFC vary within students over time and what the direction and magnitude of their association are (RQ1). Secondly, building on previous cross-sectional studies that link high BNS to adaptive coping (i.e., active EFC; Meaney et al., 2016; Ntoumanis et al., 2009), we investigated to what extent BNS is associated with the use of active versus avoidant EFC in students' daily lives (RQ2). Finally, we investigated the temporal relation between BNS and EFC. Based on Ntoumanis et al., (2009), it was expected that state BNS predicts future adaptive coping (i.e., active EFC). To hint towards directionality, we include a lag 1 for state EFC. Thus, we examined to what extent previous state BNS is associated with state EFC at the next measurement point ( $T_{+1}$ ; RQ3)?

## **Methods**

### **Participants and Design**

The study used the ESM and followed a longitudinal study design. The data was initially collected in April and May 2021 by Dimitriadou (2021) and von Harling (2021). After reviewing the data and finding substantial problems with within-person variation scores, further data was collected in March and April 2023 updating the questionnaire design to match recent ESM

questionnaire recommendations (Myin-Germeys & Kuppens, 2022). The study was approved by the BMS Ethics Committee (230239).

Convenience sampling was used to recruit participants from the Test Subject Pool System of the University of Twente (SONA) and social media. A total of 84 participants took part in the study ( $N_1 = 64$ ;  $N_2 = 20$ ), with 61 participants ( $N_1 = 45$ ;  $N_2 = 16$ ) included in the final sample after exclusion criteria were applied (i.e., not completing trait measures or a response rate of less than 50% for the state measures). Participants' ages ranged from 18 to 31 ( $M = 21.54$ ,  $SD = 2.15$ ). The majority of participants identified as female (75.4%) and were of German (75.4%) or Dutch (16.4%) nationality. Full demographics can be found in Appendix A.

## **Materials and Measures**

### ***Ethica data***

Ethica is a mobile and web-based application for questionnaire-based research designed to conduct ESM studies conveniently using smartphones (Ethica Data, 2023).

### ***Trait measures***

#### ***Trait BNS***

The Basic Needs Satisfaction in General Scale (BNSG-S) was used to assess trait BNS and relate it to state BNS in the current study (Deci & Ryan, 2000; Gagné, 2003; Johnston & Finney, 2010). The BNSG-S includes autonomy (7 items), competence (6 items), and relatedness (8 items) subscales (Appendix B). Participants rated their agreement (e.g., "I feel like I am free to decide for myself how to live my life.") on a 7-point Likert scale ranging from one ("Not true at all") to seven ("Very true"). Questionable to good internal consistency coefficients were found for the autonomy ( $\alpha = .69$ ), competence ( $\alpha = .86$ ), and relatedness ( $\alpha = .71$ ) subscales (Gagné, 2003; Siswaningsih et al., 2017). In the current sample, questionable to good reliability estimates were found for autonomy ( $\alpha = .70$ ), competence ( $\alpha = .69$ ), and relatedness ( $\alpha = .83$ ).

#### ***Trait EFC***

The current study used the emotion-oriented subscale (7 items) of the Coping Inventory for Stressful Situations – Short form (CISS-SF) to measure trait EFC to validate ESM measures (Appendix C; Cohan et al., 2006). Participants rated their engagement in EFC strategies (e.g., "Blame myself for the situation"; "Worry about being unable to cope") on a 5-point Likert scale ranging from zero ("Not at all") to five ("Very often"; Cohan et al., 2006). Good internal consistency coefficients ( $\alpha = .78 - .87$ ) were found for the emotion-oriented subscale of the CISS-



SF (Cohan et al., 2006). In the current sample, the emotion-oriented subscale of the CISS-SF showed good reliability ( $\alpha = .84$ ).

### ***State measures***

A full overview of state items can be found in Appendix D.

#### ***State BNS.***

Three items from the BNSG-S were selected and averaged to measure state BNS (Deci & Ryan, 2000; Gagné, 2003; Johnston & Finney, 2010). One item each to measure autonomy (“I feel like I can pretty much be myself in my daily situations”), competence (“Most days I feel a sense of accomplishment from what I do”), and relatedness (“People are generally pretty friendly towards me”). Following the recommendation of Myin-Germeys and Kuppens (2022), ESM items “should capture state-like features that assess something that is specific to the present moment” (p. 74). As the previous items were taken from a trait questionnaire and therefore don’t match recent ESM questionnaire recommendations, new items were constructed and used in an updated version of the study to improve ecological validity. After checking the ESM item repository without success (Kirtley et al., 2023), new items based on Wang & Hwang (2020) were used for autonomy (“During the past two hours, I felt I can pretty much be myself“), competence (“During the past two hours, I felt competent and capable“), and relatedness (“During the past two hours, I felt close and connected with people).

High construct validity scores ( $r = .70 - .74$ ) and good reliability coefficients were found for autonomy ( $\alpha = .83$ ), competence ( $\alpha = .77$ ), and relatedness ( $\alpha = .88$ ; Wang et al., 2020). In the current sample, splitting the state BNS scale into the odd and even time points, a high correlation of  $r = .97$ ,  $p < .001$  was found between both halves indicating high split-half reliability (Csikszentmihalyi & Larson, 2014).

#### ***State EFC***

The adapted Ways of Coping Checklist (WOCC) for a student sample was used to measure state EFC as it was specifically designed to assess momentary EFC responses. Specifically, single items with the highest factor loading from the emotion-focused subscales of the WOCC were used and summed to measure active and avoidant EFC. Active state EFC included wishful thinking (“Wish that I can change what is happening or how I feel”) and seeking emotional support (“Talk to someone about how I’m feeling”). Avoidant state EFC included distancing (“Try to forget the whole thing”) and self-blame (“Criticize or lecture myself”; Folkman & Lazarus, 1985).

Participants indicated to what extent they used a certain EFC strategy on a 4-point Likert scale ranging from zero (“Not used”) to three (“Used a great deal”; Folkman & Lazarus, 1985). To comply with recent ESM questionnaire recommendations, the following instruction was added to the updated version of the study: “Please indicate to what extent you have used the following coping strategies while encountering stress during the past two hours”. In the current sample, splitting the state EFC scale into odd and even time points, a high correlation of  $r = .95$ ,  $p < .001$  was found (Csikszentmihalyi & Larson, 2014).

### **Procedure**

Participants were recruited through the Test Subject Pool System of the University of Twente (SONA) and social media. They were provided with a briefing about the study, including information about the duration, purpose, procedure, data storage, and participants' rights. It was emphasised that participation was voluntary and that they could withdraw at any time. Following the briefing, participants completed informed consent, demographic questions, and trait EFC and BNS questionnaires. Over the following seven days (excluding the day of registration), participants were asked to complete three identical surveys (stress, state EFC, state BNS) each day at specific timeframes, using a variable time-based sampling strategy (randomly scheduled between 9 AM and 10.30 AM, 2 PM and 3.30 PM, and 8 PM and 9.30 PM). The survey contained eight randomised items and took around one to two minutes to complete. Participants received a notification to fill in the questionnaire, with reminders after 30 minutes and 1 hour. If the participant did not complete the questionnaire, a missing value was assigned. Finally, students from the University of Twente were able to earn 1.5 credits for participating in the study through the Test Subject Pool System (SONA) of the university.

### **Data Analysis**

After preparing the data in Excel, the data was analysed using SPSS and R. Consistent with common ESM practice, participants with a response rate of less than 50% were excluded from the analysis (Conner & Lehman, 2012). New variables were created for state BNS, state EFC, state active EFC, and state avoidant EFC. Besides, a lagged version of state EFC ( $T_{+1}$ ) was created by lagging state EFC by one timepoint and deleting every first timepoint of the day to avoid data jumping from one day to another. To ensure that missing data occurred randomly, Little’s Missing Completely at Random (MCAR) test was conducted. Descriptive statistics were calculated for demographic data and trait and state variables.

Reliability of the trait EFC (CISS-S) and trait BNS (BNSG-S) within the current sample was determined by computing Cronbach's Alpha. Also, odd-even timepoints split-half reliability analysis was used to determine internal consistency of state measures (Csikszentmihalyi & Larson, 2014). Indication of validity of the shortened state EFC and BNS questions was tested by computing Pearson's correlation between (person mean) state and trait (CISS-S, BNSG-S) measures. Intraclass correlation coefficients (ICC) were computed to evaluate the extent of within-person variability in state variables. Low ICC values indicate that an item possesses high within-person variability; ICCs below .5 are usually accepted within ESM research (Myin-Germeys & Kuppens, 2022). The original ESM items used by Dimitriadou (2021) and von Harling (2021) were compared to the updated items used for the present research to evaluate whether reformulating the items based on recommendations improved variable operationalisation and state variation (Formula for ICC can be found in Appendix E, Myin-Germeys & Kuppens, 2022).

To answer the research questions, Linear Mixed Models (LMM) were used to handle missing values and the nested structure of ESM data. All models were two-level models with observations nested within participants. A restricted maximum likelihood and a first-order autoregressive (AR1) covariance matrix were used based on the assumption that correlations between measurements decline exponentially over time.

To answer the first research question, an LMM was applied to measure the association between state EFC (DV) and state BNS (IV) accounting for time point (IV). To answer the second research question, two LMMs with either state active EFC (DV) or avoidant EFC (DV) and state BNS (IV), and time point (IV) was carried out. To answer the final research question, the association between lagged EFC (DV -  $T_{+1}$ ) and state BNS (IV) was analysed using an LMM. To make interpretation more accessible, unstandardized as well as standardized effect sizes were reported. While the unstandardized estimates represent each predictor's influence based on the original metric and provide information on the magnitude and direction of the effect of a predictor, the standardized estimates show the relative importance of each predictor.

## Results

### Descriptive statistics

Table 1 presents descriptive statistics for trait and state EFC and BNS. The final sample of 61 participants had a mean response rate of 85.65 % ( $SD = 9.82$ ). Little's MCAR test was not

significant,  $\chi^2(11, N = 1254) = 12.161, p = .352$  indicating that values were missing completely random (Little, 1988).

### Validity

The correlation between mean state BNS (PM) and trait BNS (BNSG-S) was found to be strong ( $r = .64$ ). Further analysis of BNS into its components revealed that correlations of autonomy ( $r = .64, p < .001$ ), competence ( $r = .72, p < .001$ ), and relatedness ( $r = .57, p < .001$ ), between the state measure and the BNSG-S were fairly high indicating good construct validity of the state BNS measure. The correlation between mean state EFC (PM) and trait EFC (CISS-SF) was weak ( $r = .26$ ) indicating limited representation of the trait score by the mean state score. This indicates a poor construct validity of the state EFC measure.

When comparing the data collected by Dimitriadou (2021) and von Harling (2021), who used more general item formulations, with the data collected for the present study, which used items in line with ESM questionnaire recommendations, it is clear that ICCs for state BNS and EFC for the original questionnaire are  $> .5$  for almost all state items, indicating that more than half of the variability of state BNS and EFC was due to between-person differences (Table 1). However, for the updated state questionnaire, ICCs are  $< .5$  for all items, meaning that more than half of the variability of state BNS and EFC is due to within-person differences (i.e., most of the variance is due to fluctuations in how a participant rated state BNS and EFC at different measurement points). Thus, state BNS and EFC had more within-person variability for the updated questionnaire compared to the original questionnaire suggesting a higher state variation.

**Table 1**

*Descriptive Statistics for Trait EFC (CISS-SF), Trait BNS (BNSG-S), State EFC and State BNS.*

Variable	N	Min	Max	M	SD	ICC	ICC*	ICC**
CISS-SF	61	2 (0)	35 (35)	18.15	6.745	-	-	-
BNSG-S	61	2.78 (1)	6.45 (7)	4.75	.83	-	-	-
Autonomy	61	1.71 (1)	6.57 (7)	4.63	.93	-	-	-
Competence	61	1.83 (1)	6.5 (7)	4.26	1.01	-	-	-
Relatedness	61	2.5 (1)	7 (7)	5.35	.98	-	-	-
State EFC	1253	1 (1)	4 (4)	1.64	.62	.52	.59	.27
Active EFC	1253	1 (1)	4 (4)	1.65	.70	.35	.45	.1

Avoid EFC	1254	1 (1)	4 (4)	1.63	.71	.55	.58	.36
State BNS	1254	.67 (0)	7 (7)	5.04	1.14	.68	.81	.37
Autonomy	1254	0 (0)	7 (7)	5.25	1.30	.61	.79	.34
Competence	1254	0 (0)	7 (7)	4.46	1.51	.65	.75	.26
Relatedness	1254	0 (0)	7 (7)	5.41	1.45	.6	.76	.27

*Note.* Theoretical minimum and maximum per scale are indicated in parenthesis

\* ICCs from items used by Dimitriadou (2021) and von Harling (2021), N = 45

\*\* ICCs from items used for the updated study based on ESM item recommendations, N = 16

### Inferential statistics

We conducted several LMMs to explore the association between state BNS, state EFC, and their components. Firstly, a weak negative association between state BNS and state EFC was found,  $\beta = -.29$ ,  $F(1, 1149.70) = 93.72$ ,  $p < .001$ , indicating that higher state BNS was associated with less use of EFC. Figure 1 shows random slopes of participants indicating the variability of the relationship for all different participants. Further analysis revealed that autonomy and competence were negatively related to the use of state EFC, while relatedness was not associated with state EFC (see Table 2 and Appendix F for unstandardized estimates).

**Table 2**

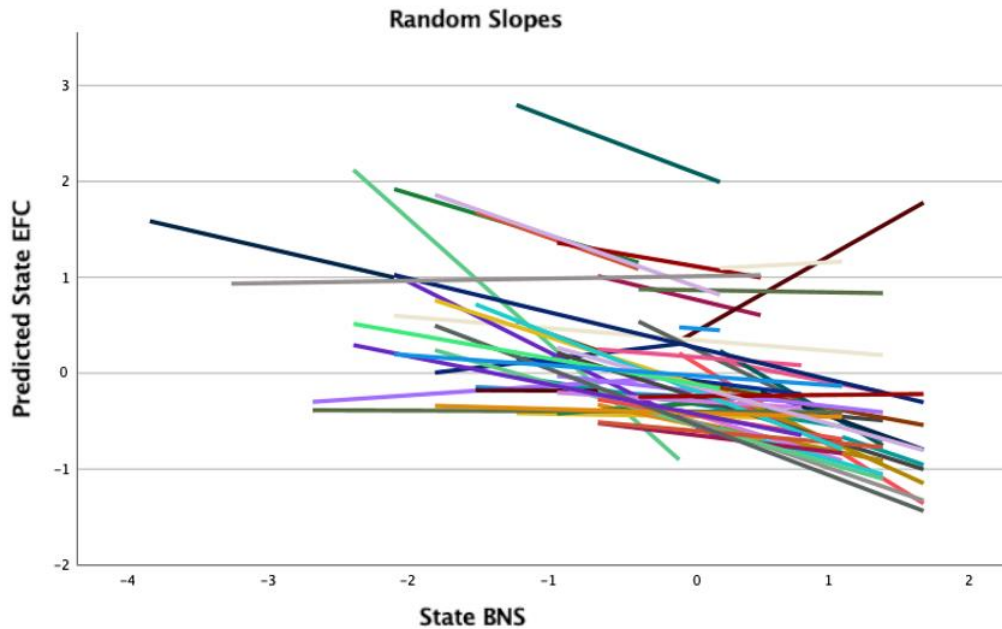
*Results of Linear Mixed Model predicting use of state EFC from state BNS (standardized)*

Model	$\beta$	SE	t	p	95% CI
State BNS*	-.29	.03	-9.68	<.001	[-.35; -.23]
Autonomy*	-.15	.03	-4.69	<.001	[-.21; -.09]
Competence*	-.20	.03	-6.31	<.001	[-.26; -.14]
Relatedness	-.02	.03	-0.63	.527	[-.07; .04]

*Note.* \* Statistically significant at  $p < .05$

**Figure 2**

*Random slopes of participants (N=61) extracted from LMM plotting state BNS against predicted state EFC values (standardized)*



Secondly, we examined the association of state BNS and the use of active versus avoidant EFC by fitting separate LMMs with state active or state avoidant EFC as the dependent variable. Results showed a weak negative association between state BNS and the use of both state active EFC,  $\beta = -.21$ ,  $F(874.50) = 41.17$ ,  $p < .001$  and state avoidant EFC,  $\beta = -.32$ ,  $F(1, 1149.70) = 93.72$ ,  $p < .001$ . On closer inspection, while autonomy and competence predicted less use of active EFC, relatedness was not statistically related. However, all three basic needs were associated with less use of avoidant EFC (see Table 3 and Appendix F for unstandardized estimates).

**Table 3**

*Results of Linear Mixed Models predicting use of state active versus avoidant EFC from state BNS (standardized)*

Model	$\beta$	SE	t	p	95% CI
State BNS* - active EFC	-.21	.03	-6.42	<.001	[-.28; -.14]
Autonomy*	-.18	.04	-4.80	<.001	[-.25; -.10]

Competence*	-.12	.04	-3.41	<.001	[-.19; -.95]
Relatedness	.03	.03	1.08	.281	[-.03; .01]
State BNS* - avoidant EFC	-.32	.03	-10.71	<.001	[-.38; -.26]
Autonomy*	-.10	.03	-3.10	.002	[-.16; -.04]
Competence*	-.22	.03	-6.79	<.001	[-.28; -.15]
Relatedness*	-.09	.03	-2.95	.003	[-.15; -.03]

*Note.* \* Statistically significant at  $p < .05$

Finally, the association of state BNS and lagged state EFC ( $T_{+1}$ ) was examined using an LMM analysis. A very weak negative association between state BNS and lagged state EFC ( $T_{+1}$ ) was found,  $\beta = -.10$ ,  $F(731.23) = 6.59$ ,  $p = .010$ . Further analysis showed that neither autonomy, competence or relatedness were significantly associated with lagged state EFC ( $T_{+1}$ ; see Table 4 and Appendix F for unstandardized estimates).

**Table 4**

*Results of Linear Mixed Model predicting use of lagged state EFC ( $T_{+1}$ ) from state BNS (standardized)*

Model	$\beta$	SE	t	p	95% CI
State BNS*	-.10	.04	-2.57	.010	[-.17; -.02]
Autonomy	-.02	.04	-0.45	.649	[-.11; .06]
Competence	-.04	.04	-1.03	.306	[-.12; .04]
Relatedness	-.05	.04	-1.35	.177	[-.13; .02]

*Note.* \* Statistically significant at  $p < .05$

### Individual cases

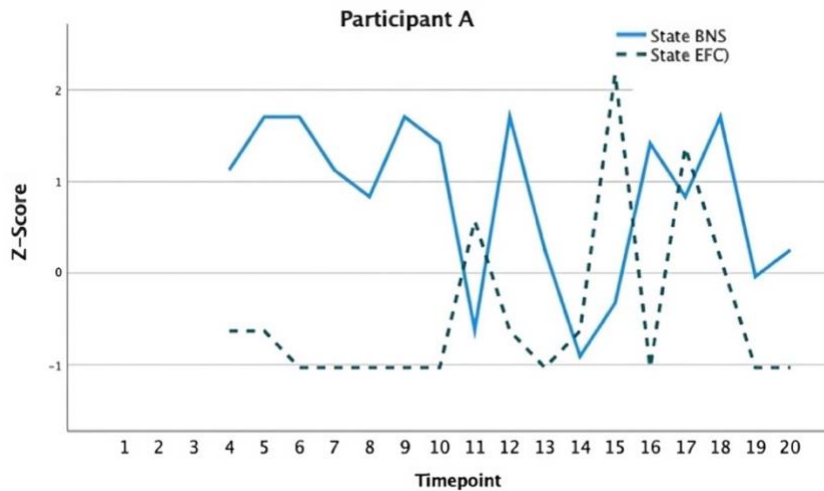
To illustrate the results on an individual within-person level, an exploratory approach was chosen to explore the fluctuation and association of state BNS and state EFC. Specifically, three plots of representative participants with low, moderate and high average BNS scores compared to the overall sample were chosen and visually inspected.

Figure 3 shows participant A who had a high average state BNS of 5.98 ( $SD = 1.02$ ) and a negative slope for the first LMM ( $\beta = -.38$ ). When looking at the association between state BNS

and state EFC over time for this participant, it becomes clear that BNS fluctuated to a larger degree than use of EFC. In line with the results of the first LMM, as BNS scores were high, EFC scores were low (Timepoint 12) and as BNS decreased, the use of EFC increased (Timepoint 15).

**Figure 3**

Scores for state BNS and state EFC over time for an exemplary participant (standardized)

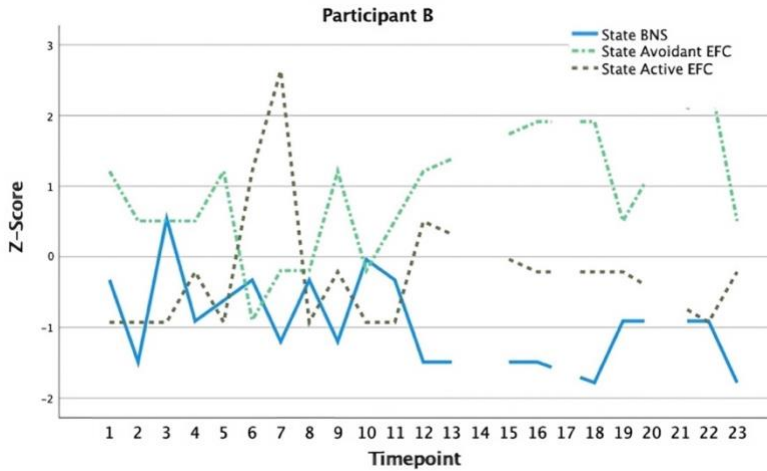


A similar association can be seen for participant B who had a moderate average state BNS of 4.06 (SD = 0.76), a negative slope for the first LMM  $\beta = (-.44)$ , and is displayed in Figure 4. Overall, the participant used more avoidant than active EFC strategies with one exception (Timepoint 7). Looking at fluctuations, for the first half of the timepoints, large fluctuations of state BNS and state active and avoidant EFC scores can be observed. At some instances, as BNS decreases, use of active EFC increases (Timepoint 7). However, this association is not as clear cut as for participant A. For the second half, as state BNS remains low, state EFC scores remain high and there is less fluctuation (Timepoint 13-23).



**Figure 4**

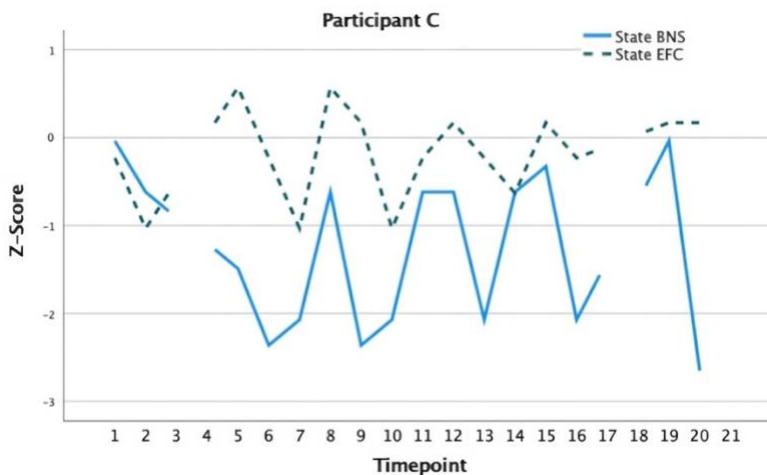
Scores for state BNS and state active and avoidant EFC over time for an exemplary participant (standardized)



For participant C who had a low average state BNS of 3.56 (SD = 1.07) and showed a positive slope between state BNS and EFC ( $\beta = .13$ ), a high variability of state BNS and state EFC was given as depicted in Figure 5. Compared to the other two participants, a contrary association between state BNS and state EFC can be observed. Opposite to the found overall effect in the sample, as state BNS scores increase, state EFC scores increase as well (Timepoint 8). Besides, as state BNS scores decrease, state EFC scores decrease also (Timepoint 10).

**Figure 5**

Scores for state BNS and state EFC over time for an exemplary participant (standardized)



## **Discussion**

Stress is highly prevalent among students and has been linked to academic difficulties and mental health issues (Chou et al., 2011; Schönfeld et al., 2016), but little research has examined psychological factors like BNS contributing to adaptive day-to-day coping. Therefore, we examined the association between students' daily experience of BNS and use of (active or avoidant) EFC strategies using ESM.

Findings showed substantial within-person fluctuation for BNS and EFC. The updated questionnaire with ESM items based on recommendations by Myin-Germeys and Kuppens (2022), had particularly high within-person variability. Additionally, state need satisfaction was weakly negatively related to the use of EFC at the within-person level, with autonomy and competence showing negative associations, while relatedness showed none. Secondly, state BNS was negatively associated with both active EFC and even more with avoidant EFC. Autonomy and competence were linked to reduced use of active strategies, while all three needs were associated with decreased use of avoidant strategies. Finally, we found limited support for an association between state BNS and later EFC use (lagged  $T_{+1}$ ). Although an overall effect was present, none of the three BNS components showed a significant association with later EFC use.

### **Day-to-day Variability of Basic Need Satisfaction and Emotion-Focused Coping**

Drawing on TSCM and SDT perspectives emphasizing dynamic BNS and coping, we hypothesized daily fluctuations in BNS and EFC among students. Our findings support this assumption, as high variability scores were observed for state BNS and EFC especially for the updated item formulations. This is in line with Coxen et al. (2021) who found that the variation in daily need satisfaction was primarily due to differences within individuals rather than between individuals. Results also align with authors highlighting dynamic coping beyond coping styles (Lazarus & Folkman, 1984; Lazarus, 1991; Ntoumanis et al., 2009). ICCs were consistent with previous research on BNS and EFC in daily life (Campbell et al., 2021; Roesch et al., 2010). These findings emphasize that both EFC and need satisfaction vary within students across situations, underscoring the importance of measuring and studying them at a within-person level.

### **The Association of Basic Need Satisfaction and Emotion-Focused Coping**

Regarding their association, BNS and EFC negatively relate in the present moment, but no lagged effect was found as suggested by Ntoumanis et al. (2009). This aligns with cross-sectional findings that high BNS helps individuals view stressful situations as challenges to overcome

instead of harmful or threatening events, leading to reduced use of emotion-focused or avoidant coping strategies (Betoret & Artiga, 2011; Doron et al., 2011; Ntoumanis et al., 2009; Pereira & Gonzalez, 2020).

However, EFC encompasses both active and avoidant strategies, making it an ambivalent construct. Based on previous cross-sectional research and the proposed model, it was assumed that need satisfaction would make students use more active EFC (considered more adaptive) while making them use less avoidant EFC (considered less adaptive; Betoret & Artiga, 2011; Ntoumanis et al., 2009; Pereira & Gonzalez, 2020). Importantly, contrary to this assumption, a negative association between BNS and both active and avoidant EFC was found even though the negative association was stronger for avoidant EFC. Thus, results deviate from previous cross-sectional findings, which showed positive relations between BNS and active general coping (i.e., proactive coping, reflective coping, and emotional support seeking) and negative relations with avoidant general coping (Bakracheva, 2019). As no prior research has solely investigated EFC strategies, interpretation has to be treated with caution.

Examining the relative influence of each need, autonomy and competence satisfaction related to less active EFC use, while all three needs were associated with reduced avoidant EFC. This implies that when students experience satisfaction in autonomy and competence in daily life, they tend to rely less on both active and avoidant EFC strategies. However, when they feel connected to others, this is not related to less use of active strategies but only avoidant strategies.

This finding may be explained by the current focus on emotion-focused strategies as opposed to problem-focused strategies. Firstly, autonomy and competence serve as indicators of problem solvability as individuals feel in control and capable of addressing the problem (Coyne & Racioppo, 2000; Ntoumanis et al., 2014). Subsequently, the stressor is more likely to be appraised as a challenge and more positive emotions are elicited. In turn, no emotion-focused but rather problem-focused strategies may be prompted as the stressor does not elicit negative emotions that require regulation by means of EFC (Ntoumanis et al., 2009; Wegner et al., 2022).

Concerning the role of relatedness, a study found that while overall BNS was associated with post-traumatic growth and thus a similar concept to active EFC, regression analyses revealed that only relatedness was related to post-traumatic growth which is partly in line with current findings (Yeung et al., 2016). Relatedness is less related to the solvability of a problem but rather reminds individuals that emotional support and instrumental advice are available in their social

networks which promotes adaptive coping (Ntoumanis et al., 2009; Yeung et al., 2016). Reflecting on the operationalisation of active EFC in the current study which included seeking emotional support, feeling related to others might not negatively affect using active EFC strategies and might even promote seeking emotional support explaining why relatedness was not negatively associated to active EFC (Shih, 2019). Furthermore, Kagitcibasi (2005) found that autonomy is often emphasized more in individualistic societies, while relatedness is more valued in collectivistic societies. Therefore, in this study's Western sample, the feeling of autonomy may have exerted a stronger influence on coping compared to the feeling of relatedness explaining its reduced influence.

### **Implications for Understanding Coping from an SDT Perspective**

From a theoretical standpoint, concluding a direct link between need satisfaction and use of certain coping strategies remains challenging. While the findings align with the argument that need satisfaction directly influences stress appraisal and coping, as certain needs are markers of problem solvability (i.e., competence and autonomy) and result in a positive appraisal of challenging situations and thus reduce the tendency to use EFC, various other factors influence this relationship (Ntoumanis et al., 2009). As seen in Figure 1, these factors include environmental influences, demands and constraints, availability of resources, (autonomous) motivation, personality factors (such as beliefs about control, causality orientations and coping styles), stress appraisals and emotional responses (Lazarus, 1991; Ntoumanis et al., 2009). Of course, these factors also interact with BNS and thus might have a secondary influence. However, stress appraisals and emotional responses require special attention as they directly mediate the relationship between need satisfaction and coping. As the study didn't measure these variables, a definitive statement on the BNS-EFC link is not appropriate. Future research should investigate said mediators and specifically measure the primary and secondary appraisal as well as emotional responses to fully account for the suggested model.

Overall, results indicate that satisfaction of basic needs, specifically autonomy and competence is associated with less use of EFC strategies in a student's daily life. While the current design does not allow for a complete deconstruction of the need-coping relationship, it serves as a starting point to explore the relative prominence of the three basic needs in affecting people's coping choices.

## Strengths and Limitations

This study showed strengths in employing ESM. Firstly, ESM offered high ecological validity, measuring real-world experiences with representativeness and generalizability, making it suitable for capturing daily-life EFC and BNS (Myin-Germeys & Kuppens, 2022).

Secondly, ESM allowed real-time measurement of BNS and EFC strategies. While both coping and need satisfaction are traditionally measured using memory-based self-report questionnaires, this study was able to measure the fluctuation of both constructs (Cohan et al., 2006; Johnston & Finney, 2010).

Thirdly, the study employed different formulations of ESM items and compared within-person fluctuation, which added a methodological dimension and improved the ecological validity of the ESM items. Comparing original ESM item formulations (Dimitriadou, 2021; von Harling, 2021) with updated versions (Myin-Germeys & Kuppens, 2022) reveals that using present-moment or time interval formulations improves within-person variation. Table 1 shows that using state items (e.g., “During the past two hours, I felt close and connected with people”) improved within-person variability substantially compared to repeatedly using trait items (e.g., “People are generally pretty friendly towards me.”). This methodological refinement allowed for a more accurate measurement of the fluctuations in individuals' experiences of the constructs.

However, there are limitations to consider. Firstly, the study employed a limited conceptualization of coping, focusing only on a specific form of EFC. Coping is a complex construct, and by solely examining EFC, the study may have overlooked other coping strategies that individuals may employ in different situations (Coyne & Gottlieb, 1996). The EFC questionnaire showed low construct validity and reliability in the current sample, questioning measurement accuracy and consistency. Moreover, the distinction between active and avoidant EFC, suggested by a previous study, appeared questionable in the current data.

Secondly, the study design had its limitations. Missing values were a concern since participants might not have filled out the questionnaire during high-stress or low-motivation times, potentially biasing the results (Scollon et al., 2009). Also, the repeated questioning about coping mechanisms might have triggered reactivity, including active reflection (e.g., “I seem to be a person that uses approach EFC strategies”) or feedback processes (e.g., “I realize that I am often avoiding stress, I want to stop that”). Besides, variable time-based sampling is suboptimal since

EFC strategies are tied to stressful events. Event-based sampling tied to such events would enhance measurement relevance.

Thirdly, reliance on convenience sampling limits generalizability as the sample had students with high average BNS and moderate EFC use. A more diverse and representative sample would offer broader insights into BNS-coping relationships among students.

Future research should address these limitations by using a more comprehensive questionnaire that measures coping in a more nuanced way to enhance the understanding of coping processes and their associations with BNS. Besides, using experimental methods to investigate whether manipulating BNS (e.g., by providing autonomy-supportive feedback) leads to change in coping behaviour would be valuable.

### **Conclusion**

To conclude, we investigated the within-person association between students' daily experience of BNS and use of EFC using an ESM approach. Our findings revealed substantial fluctuations in both state BNS and state EFC throughout the study, particularly when using ESM items that specifically capture state-like features. Besides, it was found that need satisfaction, and particularly satisfaction of autonomy and competence was negatively associated with the use of both active and avoidant EFC on a within-person level. BNS was not related to later use of EFC. These findings support the notion that need satisfaction enables individuals to perceive stressful situations more positively, framing them as challenges to overcome rather than harmful or threatening events resulting in less use of EFC strategies. Future research should employ more comprehensive study designs while taking mediating variables into account to fully understand the need-coping relationship.

## References

- Amiot, C. E., Blanchard, C. M., & Gaudreau, P. (2008). The self in change: A longitudinal investigation of coping and self-determination processes. *Self and Identity*, 7(2), 204–224. <https://doi.org/10.1080/15298860701580793>
- Bakracheva, M. (2019). Coping Effects on Life Meaning, Basic Psychological Needs and Well-Being. *Psychology*, 10(10), 1375–1395. <https://doi.org/10.4236/PSYCH.2019.1010090>
- Beiter, R., Nash, R., McCrady, M., Rhoades, D., Linscomb, M., Clarahan, M., & Sammut, S. (2015). The prevalence and correlates of depression, anxiety, and stress in a sample of college students. *Journal of Affective Disorders*, 173, 90–96. <https://doi.org/10.1016/j.jad.2014.10.054>
- Betoret, F. D., & Artiga, A. G. (2011). The Relationship among Student Basic Need Satisfaction, Approaches to Learning, Reporting of Avoidance Strategies and Achievement. *Electronic Journal of Research in Educational Psychology*, 9(24), 463–496. [https://www.researchgate.net/publication/281351301\\_The\\_relationship\\_among\\_student\\_basic\\_need\\_satisfaction\\_approaches\\_to\\_learning\\_reporting\\_of\\_avoidance\\_strategies\\_and\\_achievement](https://www.researchgate.net/publication/281351301_The_relationship_among_student_basic_need_satisfaction_approaches_to_learning_reporting_of_avoidance_strategies_and_achievement)
- Biggs, A., Brough, P., & Drummond, S. (2017). Lazarus and Folkman’s Psychological Stress and Coping Theory. In C. L. Cooper & J. C. Quick (Eds.), *The Handbook of Stress and Health* (pp. 349–364). <https://doi.org/10.1002/9781118993811.ch21>
- Campbell, R., Vansteenkiste, M., Soenens, B., Vandekerckhove, B., & Mouratidis, A. (2021). Toward a Better Understanding of the Reciprocal Relations Between Adolescent Psychological Need Experiences and Sleep. *Personality and Social Psychology Bulletin*, 47(3), 377–394. <https://doi.org/10.1177/0146167220923456>
- Chou, P. C., Chao, Y. M. Y., Yang, H. J., Yeh, G. L., & Lee, T. S. H. (2011). Relationships between stress, coping and depressive symptoms among overseas university preparatory Chinese students: A cross-sectional study. *BMC Public Health*, 11. <https://doi.org/10.1186/1471-2458-11-352>
- Cohan, S. L., Jang, K. L., & Stein, M. B. (2006). Confirmatory factor analysis of a short form of the coping inventory for stressful situations. *Journal of Clinical Psychology*, 62(3), 273–283. <https://doi.org/10.1002/jclp.20211>
- Conner, T. S., & Lehman, B. J. (2012). Getting started: Launching a study in daily life. BT - In

- Handbook of Research Methods for Studying Daily Life; In M. Mehl & T. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 89–107).  
[https://www.researchgate.net/publication/257947348\\_Handbook\\_of\\_Research\\_Methods\\_for\\_Studying\\_Daily\\_Life](https://www.researchgate.net/publication/257947348_Handbook_of_Research_Methods_for_Studying_Daily_Life)
- Cordeiro, P., Paixão, P., Lens, W., Lacante, M., & Luyckx, K. (2016). The Portuguese validation of the Basic Psychological Need satisfaction and Frustration Scale: Concurrent and longitudinal relations to well-being and ill-being. *Psychologica Belgica*, *56*(3), 193–209.  
<https://doi.org/10.5334/pb.252>
- Coxen, L., van der Vaart, L., Van den Broeck, A., & Rothmann, S. (2021). Basic Psychological Needs in the Work Context: A Systematic Literature Review of Diary Studies. *Frontiers in Psychology*, *12*(October), 1–18. <https://doi.org/10.3389/fpsyg.2021.698526>
- Coyne, J. C., & Gottlieb, B. H. (1996). The Mismeasure of Coping by Checklist. *Journal of Personality*, *64*(4), 959–991. <https://doi.org/10.1111/j.1467-6494.1996.tb00950.x>
- Coyne, J. C., & Racioppo, M. W. (2000). Never the twain shall meet? Closing the gap between coping research and clinical intervention research. *American Psychologist*, *55*(6), 655–664.  
<https://doi.org/10.1037/0003-066X.55.6.655>
- Csikszentmihalyi, M., & Larson, R. (2014). Validity and reliability of the experience-sampling method. In M. Csikszentmihalyi (Ed.), *Flow and the Foundations of Positive Psychology: The Collected Works of Mihaly Csikszentmihalyi* (pp. 35–54). Springer Netherlands.  
<https://doi.org/10.1097/00005053-198709000-00004>
- Deci, E. L., & Ryan, R. M. (2000). The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268.  
[https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, *49*(3), 182–185.  
<https://doi.org/10.1037/a0012801>
- Deci, E. L., & Vansteenkiste, M. (2004). Self-determination theory and basic need satisfaction: Understanding human development in positive psychology. *Ricerche Di Psicologia*, *27*(1), 23–40. <https://psycnet.apa.org/record/2004-19493-002>
- Dimitriadou, E. K. (2021). *The Association Between Emotion-focused Coping and Stress Levels among University Students within a Daily Context – An Experience Sampling Study*



- [University of Twente]. <https://essay.utwente.nl/87433/>
- Doron, J., Stephan, Y., Maiano, C., & Le Scanff, C. (2011). Motivational predictors of coping with academic examination. *Journal of Social Psychology, 151*(1), 87–104.  
<https://doi.org/10.1080/00224540903366768>
- Ethica Data. (2023). *About Ethica*. <https://ethicadata.com/about/>
- Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: Study of emotion and coping during three stages of a collage examination. *Personality and Social Psychology, 48*(1), 150–170. <https://webs.wofford.edu/steinmetzkr/Teaching/Psy150/LecturePDFs/Coping.pdf>
- Gagné, M. (2003). The Role of Autonomy Support and Autonomy Orientation in Prosocial Behavior Engagement. *Motivation and Emotion, 27*(3), 199–223.  
<https://doi.org/10.1023/A:1025007614869>
- Hamilton, S., & Fagot, B. I. (1988). Chronic Stress and Coping Styles: A Comparison of Male and Female Undergraduates. *Journal of Personality and Social Psychology, 55*(5), 819–823.  
<https://doi.org/10.1037/0022-3514.55.5.819>
- Holahan, C. J., & Moos, R. H. (1987). Risk, Resistance, and Psychological Distress: A Longitudinal Analysis With Adults and Children. *Journal of Abnormal Psychology, 96*(1), 3–13. <https://doi.org/10.1037/0021-843X.96.1.3>
- Holzer, J., Korlat, S., Haider, C., Mayerhofer, M., Pelikan, E., Schober, B., Spiel, C., Toumazi, T., Salmela-Aro, K., Kaser, U., Schultze-Krumbholz, A., Wachs, S., Dabas, M., Verma, S., Iliev, D., Andonovska-Trajkovska, D., Plichta, P., Pyzalski, J., Walter, N., ... Luftenegger, M. (2021). Adolescent well-being and learning in times of COVID-19-A multi-country study of basic psychological need satisfaction, learning behavior, and the mediating roles of positive emotion and intrinsic motivation. *PLoS ONE, 16*(5 May 2021), 1–22.  
<https://doi.org/10.1371/journal.pone.0251352>
- Johnston, M. M., & Finney, S. J. (2010). Measuring basic needs satisfaction: Evaluating previous research and conducting new psychometric evaluations of the Basic Needs Satisfaction in General Scale. *Contemporary Educational Psychology, 35*(4), 280–296.  
<https://doi.org/10.1016/j.cedpsych.2010.04.003>
- Kagitcibasi, C. (2005). Autonomy and relatedness in cultural context implications for self and family. *Journal of Cross-Cultural Psychology, 36*(4), 403–422.

- <https://doi.org/10.1177/0022022105275959>
- Kirtley, O. J., Hiekkaranta, A. P., Kunkels, Y. K., Eisele, G., Schoefs, S., Kemme, N. D. F., & Myin-Germeys, I. (2023). *The Experience Sampling Method (ESM) Item Repository*. <https://doi.org/10.17605/OSF.IO/KG376>
- Knee, C. R., & Zuckerman, M. (1998). A Nondefensive Personality: Autonomy and Control as Moderators of Defensive Coping and Self-Handicapping. *Journal of Research in Personality*, 32(2), 115–130. <https://doi.org/10.1006/jrpe.1997.2207>
- Larson, R. W., Moneta, G., Richards, M. H., & Wilson, S. (2002). Continuity, stability, and change in daily emotional experience across adolescence. *Child Development*, 73(4), 1151–1165. <https://doi.org/10.1111/1467-8624.00464>
- Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company. [https://books.google.de/books?hl=en&lr=&id=i-ySQQuUpr8C&oi=fnd&pg=PR5&dq=lazarus+and+folkman+1984&ots=DgJQhscqQe&sig=-MdHgDVhwsIWl8U6zliZCCS\\_-dg](https://books.google.de/books?hl=en&lr=&id=i-ySQQuUpr8C&oi=fnd&pg=PR5&dq=lazarus+and+folkman+1984&ots=DgJQhscqQe&sig=-MdHgDVhwsIWl8U6zliZCCS_-dg)
- Lazarus, R. S. (1991). *Emotion and Adaptation*. Oxford University Press. <http://site.ebrary.com/id/10087177>.
- Little, R. J. A. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83(404), 1198–1202. <https://doi.org/10.1080/01621459.1988.10478722>
- Martin, A. A., Horn, A. B., & Allemand, M. (2021). Within-person associations between attachment security, need satisfaction and psychological adjustment in daily life of older adults. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences*, 76(1), 56–66. <https://doi.org/10.1093/GERONB/GBZ148>
- Meaney, H., Corcoran, S. L., Leader, P., & Prentice, G. (2016). *The relationship between basic need satisfaction at work, stress, coping and resistance to change* [Dublin Business School]. <http://hdl.handle.net/10788/3115>
- Mouratidis, A., & Michou, A. (2011). Perfectionism, self-determined motivation, and coping among adolescent athletes. *Psychology of Sport and Exercise*, 12(4), 355–367. <https://doi.org/10.1016/j.psychsport.2011.03.006>
- Myin-Germeys, I., & Kuppens, P. (2022). *The open handbook of experience sampling methodology a step-by-step guide to designing, conducting, and analyzing ESM studies* (I.

- Myin-Germeys & P. Kuppens (eds.); 2nd ed.). Leuven: Center for Research on Experience Sampling and Ambulatory Methods Leuven.  
<https://www.kuleuven.be/samenwerking/real/real-book>
- Neubauer, A. B., & Voss, A. (2018). The Structure of Need Fulfillment: Separating Need Satisfaction and Dissatisfaction on Between- and Within-Person Level. *European Journal of Psychological Assessment*, *34*(4), 220–228. <https://doi.org/10.1027/1015-5759/a000326>
- Neufeld, A., & Malin, G. (2019). Exploring the relationship between medical student basic psychological need satisfaction, resilience, and well-being: A quantitative study. *BMC Medical Education*, *19*(1), 1–8. <https://doi.org/10.1186/s12909-019-1847-9>
- Ntoumanis, N., Edmunds, J., & Duda, J. L. (2009). Understanding the coping process from a self-determination theory perspective. *British Journal of Health Psychology*, *14*(2), 249–260. <https://doi.org/10.1348/135910708X349352>
- Ntoumanis, N., Healy, L. C., Sedikides, C., Duda, J., Stewart, B., Smith, A., & Bond, J. (2014). When the going gets tough: The “Why” of goal striving matters. *Journal of Personality*, *82*(3), 225–236. <https://doi.org/10.1111/jopy.12047>
- Parker, S. L., Jimmieson, N. L., & Amiot, C. E. (2013). Self-determination, control, and reactions to changes in workload: A work simulation. *Journal of Occupational Health Psychology*, *18*(2), 173–190. <https://doi.org/10.1037/a0031803>
- Pereira, J., & Gonzalez, B. (2020). Basic Psychological Needs, Procrastination and Coping in the Context of Healthy Aging. *Self-Determination Theory and Healthy Aging*, 211–228. [https://doi.org/10.1007/978-981-15-6968-5\\_11](https://doi.org/10.1007/978-981-15-6968-5_11)
- Porter, L. S., Marco, C. A., Schwartz, J. E., Neale, J. M., Shiffman, S., & Stone, A. A. (2000). Gender differences in coping: A comparison of trait and momentary assessments. *Journal of Social and Clinical Psychology*, *19*(4), 480–498. <https://doi.org/10.1521/jscp.2000.19.4.480>
- Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2018). Daily well-being: The role of autonomy, competence, and relatedness. *Relationships, Well-Being and Behaviour: Selected Works of Harry Reis*, 317–349. <https://doi.org/10.4324/9780203732496-13>
- Roesch, S. C., Aldridge, A. A., Stocking, S. N., Villodas, F., Leung, Q., Bartley, C. E., & Black, L. J. (2010). Multilevel factor analysis and structural equation modeling of daily diary coping data: Modeling trait and state variation. *Multivariate Behavioral Research*, *45*(5),

- 767–789. <https://doi.org/10.1080/00273171.2010.519276>
- Ryan, K. (2013). *How Problem Focused and Emotion Focused Coping affects College Students' Perceived Stress and Life Satisfaction* (Issue April) [Dublin Business School].  
<http://hdl.handle.net/10788/1622>
- Ryan, R. M., Bernstein, J. H., & Brown, K. W. (2010). Weekends, work, and well-being: Psychological need satisfactions and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology, 29*(1), 95–122.  
<https://doi.org/10.1521/jscp.2010.29.1.95>
- Schnider, K. R., Elhai, J. D., & Gray, M. J. (2007). Coping Style Use Predicts Posttraumatic Stress and Complicated Grief Symptom Severity Among College Students Reporting a Traumatic Loss. *Journal of Counseling Psychology, 54*(3), 344–350.  
<https://doi.org/10.1037/0022-0167.54.3.344>
- Schönfeld, P., Brailovskaia, J., Bieda, A., Zhang, X. C., & Margraf, J. (2016). The effects of daily stress on positive and negative mental health: Mediation through self-efficacy. *International Journal of Clinical and Health Psychology, 16*(1), 1–10.  
<https://doi.org/10.1016/j.ijchp.2015.08.005>
- Schwartz, J. E., Neale, J., Marco, C., Shiffman, S. S., & Stone, A. A. (1999). Does trait coping exist? A momentary assessment approach to the evaluation of traits. *Journal of Personality and Social Psychology, 77*(2), 360–369. <https://doi.org/10.1037/0022-3514.77.2.360>
- Scollon, C. N., Kim-Prieto, C., & Diener, E. (2009). Experience Sampling: Promises and Pitfalls, Strengths and Weaknesses. In E. Diener (Ed.), *Assessing Well-Being. Social Indicators Research Series* (vol 39., pp. 157–180). Springer. [https://doi.org/10.1007/978-90-481-2354-4\\_8](https://doi.org/10.1007/978-90-481-2354-4_8)
- Shih, S.-S. (2019). An Examination of Academic Coping and Procrastination from the Self-Determination Theory Perspective. *Journal of Education and Human Development, 8*(1), 57–68. [http://jehdnet.com/journals/jehd/Vol\\_8\\_No\\_1\\_March\\_2019/8.pdf](http://jehdnet.com/journals/jehd/Vol_8_No_1_March_2019/8.pdf)
- Siswaningsih, W., Firman, H., Zackiyah, & Khoirunnisa, A. (2017). Development of Two-Tier Diagnostic Test Pictorial-Based for Identifying High School Students Misconceptions on the Mole Concept. *Journal of Physics: Conference Series, 812*(1), 12117.  
<https://doi.org/10.1088/1742-6596/812/1/012117>
- Skinner, E., & Edge, K. (2002). Self-determination, coping, and development. In E. L. Deci & R.

- M. Ryan (Eds.), *Handbook of self-determination research*. (pp. 297–337). University of Rochester Press. [https://www.researchgate.net/publication/232605046\\_Self-determination\\_coping\\_and\\_development](https://www.researchgate.net/publication/232605046_Self-determination_coping_and_development)
- Stone, A. A., Schwartz, J. E., Neale, J. M., Marco, C. A., Shiffman, S., Hickcox, M., Paty, J., Porter, L. S., & Cruise, L. J. (1998). A comparison of coping assessed by ecological momentary assessment and retrospective recall. *Journal of Personality and Social Psychology*, *74*(6), 1670–1680. <https://doi.org/10.1037/0022-3514.74.6.1670>
- Vasconcellos, D., Parker, P. D., Hilland, T., Cinelli, R., Owen, K. B., Kapsal, N., Lee, J., Antczak, D., Ntoumanis, N., Ryan, R. M., & Lonsdale, C. (2020). Self-Determination theory applied to physical education: A systematic review and meta-analysis. *Journal of Educational Psychology*, *112*(7), 1444–1469. <https://doi.org/10.1037/edu0000420>
- von Harling, H. A. (2021). *Are you satisfied? The role of basic psychological need satisfaction in the perception of stress in university students – an experience sampling study* [University of Twente]. <https://essay.utwente.nl/87507/>
- Wang, N., Zhu, J., Dormann, C., Song, Z., & Bakker, A. B. (2020). The Daily Motivators: Positive Work Events, Psychological Needs Satisfaction, and Work Engagement. *Applied Psychology*, *69*(2), 508–537. <https://doi.org/10.1111/apps.12182>
- Wang, Y. L., & Hwang, M. Y. (2020). Daily activities and psychological need satisfaction of elderly adults: The experience sampling method. *Educational Gerontology*, *00*(00), 551–562. <https://doi.org/10.1080/03601277.2020.1786780>
- Wegner, L., Haucke, M. N., Heinzl, S., & Liu, S. (2022). Smartphone-Based Ecological Momentary Assessment of Coping with Loneliness amid COVID-19 in Germany. *International Journal of Environmental Research and Public Health*, *19*(7). <https://doi.org/10.3390/ijerph19073946>
- Yeung, N. C. Y., Lu, Q., Wong, C. C. Y., & Huynh, H. C. (2016). The roles of needs satisfaction, cognitive appraisals, and coping strategies in promoting posttraumatic growth: A stress and coping perspective. *Psychological Trauma: Theory, Research, Practice, and Policy*, *8*(3), 284–295. <https://doi.org/10.1037/tra0000091>

### Appendix A – Demographics

*Table X - Demographics for all participants*

Variable	Category	Sample 1*	Sample 2**	Sample (N = 61)
Age, M (SD)	Years	21.11 (1.84)	22.75 (2.52)	21.54 (2.15)
Gender, N (%)	Female	37 (82.2 %)	9 (56.3 %)	46 (75.4 %)
	Male	8 (17.8 %)	7 (43.8 %)	15 (24.6 %)
Nationality, N (%)	German	30 (66,7 %)	16 (100%)	46 (75.4 %)
	Dutch	10 (22.2 %)	-	10 (16.4 %)
	Romanian	2 (4.4 %)	-	2 (3.3 %)
	Italian	1 (2.2 %)	-	1 (1.6 %)
	British	1 (2.2 %)	-	1 (1.6 %)
	American	1 (2.2 %)	-	1 (1.6 %)

*Note.* \* data collected by Dimitriadou (2021) and von Harling (2021), N = 45

\*\* data collected 2023 using updated ESM items, N = 16

## Appendix B - Basic Need Satisfaction in General Scale (BNSG-S)

### Autonomy:

- I feel like I am free to decide for myself how to live my life.
- I feel pressured in my life. (R)
- I generally feel free to express my ideas and opinions.
- In my daily life, I frequently have to do what I am told. (R)
- People I interact with on a daily basis tend to take my feelings into consideration.
- I feel like I can pretty much be myself in my daily situations.
- There is not much opportunity for me to decide for myself how to do things in my daily life (R).

### Competence:

- Often, I do not feel very competent. (R)
- People I know tell me I am good at what I do.
- I have been able to learn interesting new skills recently.
- Most days I feel a sense of accomplishment from what I do.
- In my life I do not get much of a chance to show how capable I am. (R)
- I often do not feel very capable. (R)

### Relatedness:

- I really like the people I interact with.
- I get along with people I come into contact with.
- I pretty much keep to myself and don't have a lot of social contacts. (R)
- I consider the people I regularly interact with to be my friends.
- People in my life care about me.
- There are not many people I am close to. (R)
- The people I interact with regularly do not seem to like me much. (R)
- People are generally pretty friendly towards me.

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

1. Blame myself for the situation.
2. Blame myself for being too emotional.
3. Blame myself for not having a solution.
4. Worry about being unable to cope.
5. Become very upset.
6. Wish I could change things.
7. Focus on my inadequacies.



### Appendix D - State Items

BNS – based on BNSG-S (Deci & Ryan, 2000; Gagné, 2003; Johnston & Finney, 2010)

- Autonomy - “I feel like I can pretty much be myself in my daily situations”,
- Competence - “Most days I feel a sense of accomplishment from what I do”), and
- Relatedness - “People are generally pretty friendly towards me”

BNS – revised version based on Wang & Hwang (2020)

- Autonomy - “During the past two hours, I felt I can pretty much be myself”,
- Competence - “During the past two hours, I felt competent and capable”, and
- Relatedness - “During the past two hours, I felt close and connected with people”

EFC – based on WOCC (Folkman & Lazarus, 1985). For the revised version, the following instruction was added: “Please indicate to what extent you have used the following coping strategies while encountering stress during the past two hours”

- Active EFC
  - Wishful thinking - “Wish that I can change what is happening or how I feel”
  - Seeking emotional support - “Talk to someone about how I’m feeling”
- Avoidant EFC
  - Distancing - “Try to forget the whole thing”)
  - Self-blame - “Criticize or lecture myself”.

**Appendix E - Intraclass Correlation Coefficient Formula**

$$ICC = \frac{\tau^2}{\tau^2 + \sigma^2}$$

$\tau^2$  = between-subject variability

$\sigma^2$  = within-subject variability

### Appendix F – Unstandardized Effect Estimates

*Table X – unstandardized state BNS – state EFC*

Model	$\beta$	SE	t	p	95% CI
State BNS*	-.16	.02	-9.681	<.001	[-.19; -.13]
Autonomy*	-.07	.02	-4.69	<.001	[-.10; -.04]
Competence*	-.08	.01	-6.31	<.001	[-.11; -.06]
Relatedness	-.01	.01	-0.63	.527	[-.03; .02]

*Table X unstandardized state BNS – state EFC*

Model	$\beta$	SE	t	p	95% CI
State BNS* - active EFC	-.13	.02	-6.42	<.001	[-.17; -.09]
Autonomy*	-.10	.02	-4.80	<.001	[-.13; -.06]
Competence*	-.06	.02	-3.41	<.001	[-.09; -.02]
Relatedness	.02	.02	1.08	.281	[-.01; .05]
State BNS* - avoidant EFC	-.20	.02	-10.71	<.001	[-.24; -.16]
Autonomy*	-.05	.02	-3.10	.002	[-.09; -.02]
Competence*	-.10	.01	-6.79	<.001	[-.13; -.07]
Relatedness*	-.04	.01	-2.95	.003	[-.07; -.01]

*Table X unstandardized state BNS – state lagged EFC*

Model	$\beta$	SE	t	p	95% CI
State BNS*	-.05	.02	-2.57	.010	[-.09; -.01]
Autonomy	-.01	.02	-0.45	.649	[-.05; .03]
Competence	-.02	.02	-1.03	.306	[-.05; .02]
Relatedness	-.02	.02	-1.35	.177	[-.06; .01]

### Appendix G – BNS and EFC Over Time

