Measuring Emotions of Daily Life: The Association between Self-Esteem and Anxiety of University Students

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Abstract

Background: The association between trait-level self-esteem and anxiety received attention in the past because of the buffering effect self-esteem has on anxiety. This helps people to better cope with anxiety and to not experience too high levels of anxiety in the first place (Greenberg, Solomon, Pyszczynski, Rosenblatt, Burling, Lyon, Simon and Pinel, 1992; Abdel-Khalek, 2016). Even though this association is well established, the studies investigated the trait level of both constructs on the basis of retrospective self-reports and therefore, disregarded the association between self-esteem and the experience of anxiety in daily life. **Objective:** Therefore, the current study investigates how both trait-level self-esteem and anxiety are associated with anxiety on an average state level. Furthermore, a trait-level comparison of both concepts is executed. Lastly, as momentary anxiety is dependent on the context in which it is experienced, it was also examined what contexts affect average state anxiety the most. **Method:** An experience sampling study was conducted by 35 university students (M_{age}= 21.8, 80% females). To measure trait self-esteem, Rosenberg´s self-esteem scale (RSE) was used. To assess trait anxiety, Spielberger´s State-Trait Anxiety Inventory (STAI) was utilized. For state anxiety, the same survey as for trait anxiety was used, however modified, by only asking 5 of the overall 20 questions. The state questionnaire was prompted 3 times a day for a period of seven days. The participants conducted the whole study on their mobile phones. **Results:** A Pearson's correlation revealed a strong negative association between trait-level self-esteem and anxiety ($r = -.763$, $p < .01$). Thus, high levels of self-esteem are linked to lower levels of anxiety. Similar results were found on a trait-state level comparison as the association between self-esteem on a trait level and average state anxiety was also a strong and negative one ($r = -.548$, $p < .01$). Therefore, high trait-level self-esteem is associated with lower average state anxiety levels. The association between trait anxiety and average state anxiety is a strong positive one ($r = .763$, $p < .01$). Thus, possessing high levels of trait anxiety leads to the experience of higher levels of average state anxiety. For the participants, the most anxiety-evoking events are study- and work-related ($M = 2.18$). **Conclusion:** The study provides new insights into the association between self-esteem and anxiety in daily life and thereby extends prior research by showing that self-esteem on a trait level has similar effects on momentary anxiety as on trait-level anxiety. This highlights the need for tailored interventions aimed at increasing self-esteem to provide people with strategies to deal with anxiety in their daily lives.

Measuring Emotions in Daily Life: The Association between Self-Esteem and Anxiety of University Students

Feeling nervous or even anxious in certain situations is an experience most students are familiar with. The extent to which anxiety is experienced can vary and is a response to various circumstances in a student's life such as to the pressure of being successful or to the quality of the relationship with friends and family (Beiter, Nash, McCrady, Rhoades, Linscomb, Clarahan & Sammut, 2015). Until now, various studies have already investigated the association between positive psychological emotions like self-esteem and anxiety (Greenberg et al., 1992). These studies are important as anxiety is an emotion many students experience frequently (Price, McLeod, Gleich & Hand, 2006; Storrie, Ahern & Tuckett, 2010).

However, previous studies have neglected the fact that anxiety has a trait as well as a state component. The experience of anxiety can occur suddenly and disappear just as abrupt over the course of one day. Because of these fluctuations over time, it is important to conduct studies in daily life and over longer periods of time to add to the already existing field of research and to arrive at new insights into the topic. Ignoring fluctuations in anxiety can be detrimental when people do not possess appropriate strategies to cope with their emotional experience. This supports the necessity to explore positive psychological constructs like self-esteem because they own the potential to aid acceptance of the experience of negative emotions. Consequently, such constructs may offer coping strategies in order to regulate negative emotions (Albers, Schneider & Martijn, 2012). With in-depth knowledge about the association between trait- and state anxiety and self-esteem as a trait, improved interventions targeted at reducing momentary levels of anxiety could be developed in the future. In the following, the previously mentioned constructs are investigated in more detail to get a general overview about them and about already existing research on state- and trait anxiety and trait self-esteem.

Self-Esteem

In their article Suliman and Halabib (2007), refer to the definition of self-esteem of Rosenberg who defines self-esteem as the evaluations an individual has regarding themselves and their worth. This implies approval or disapproval towards themselves. According to Rosenberg´s definition, this evaluation process includes three aspects: reflected appraisal, social

comparison, and self-attribution. *Reflected appraisal* can be defined as the interpretation of how significant others perceive oneself (Suliman & Halabib, 2007; Felson, 1985). *Social comparison* already implies the fact that an individual compares oneself to the people around them. Lastly, *self-attribution* is about drawing conclusions about oneself from seeing whether results of a certain action were successful or not (Suliman & Halabib, 2007). Self-attribution is linked to another aspect important to the definition of self-esteem which is a person's belief about their skills and abilities (self-efficacy) (Abdel-Khalek, 2016).

Self-esteem is also considered to be part of the terror management theory (TMT) of social behavior. This theory claims that self-esteem protects people from the experience of anxiety due to their inherent motivation to maintain a positive self-image (Greenberg et al., 1992). Not having a positive self-image, thus having low self-esteem leads to having existential concerns which make these individuals more prone to anxiety (Koole, A Sin & Schneider, 2013). To protect people from the consequences of low self-esteem, the TMT views self-esteem as a "central psychological mechanism for protecting individuals from the anxiety that awareness of their vulnerability and mortality would otherwise create" (Greenberg et al., 1992). In other words, having a fundamental positive view about oneself is considered a coping mechanism that aids in handling difficult situations like the awareness of one's own mortality. This can be generalized to the assumption that high levels of self-esteem act as a moderator for all kinds of negative experiences.

Besides the effects self-esteem has on well-being and mental health as part of the TMT, previous literature has also proven the association between self-esteem and other psychological constructs. Several studies have shown that self-esteem is, for example, a significant predictor of depression and anxiety (Bos, Muris, Mulkens & Schaalma, 2006; Abdel-Khalek, 2016; Moksnes & Reidunsdatter, 2019). Even though self-esteem has already been extensively studied in relation to various psychological constructs, only a few studies have examined the effects of interventions targeted to raise low self-esteem. In their systematic review, Kolubinski, Frings, Nikčević, Lawrence and Spada (2018) explicitly stated that there are only few already existing interventions that were targeted at enhancing trait self-esteem. Also, other studies that investigated the association between self-esteem and different psychopathologies focused on trait level self-esteem.

A trait is considered to be a "generalized and enduring predisposition to react to many situations in a consistent manner" (Endler & Kocovski, 2001). Thus, trait self-esteem is the predisposition of an individual to feel about themselves and their self-worth. For the scope of the current study, it is also focused on self-esteem as a trait to add to the already existing basis of literature. Altogether, this can be used for developing interventions targeting low self-esteem as this field is only scarcely explored yet even though self-esteem is such a promising concept in reducing negative emotions. It would be beneficial for the development of such interventions to focus on trait self-esteem. Changing a trait may take longer as it is a relatively enduring predisposition, however, this also means that the change in the trait will be relatively enduring from which people will benefit in the long term. Therefore, the current study focuses on self-esteem as a trait variable.

Anxiety

Anxiety is an emotion students suffer from frequently. Remaining untreated, anxiety has a severe impact on the quality of life of people as well as of their well-being because it affects people´s psychological development (Garcia & O´Neil, 2021). For the scope of the current study, it is paid attention to anxiety experienced as a negative emotion, not as a psychological disorder. Due to the nature of the sample of the study, no meaningful data about anxiety as a psychopathology could be derived since the sample consists of students and it was not focused on whether these students suffer from an *anxiety disorder*. Therefore, anxiety is defined as "an emotional state, with the subjectively experienced quality of fear as a closely related emotion" (Endler & Kocovski, 2001). Thus, anxiety includes the subjective experience of a negative and displeasing emotion related to fear. Moreover, individuals experience different levels of anxiety, suggesting that anxiety exists on a continuum with one end representing the experience of low anxiety and high levels of anxiety being on the other end of the continuum (Endler & Kocovski, 2001).

Being measured on a continuum is only one aspect of the multidimensionality of anxiety meaning that anxiety can be distinguished between trait and state anxiety (Endler & Kocovski, 2001). In more detail, *trait anxiety* is an individual's predisposition to react anxious in many situations. Contrary, *state anxiety* is defined as a momentary emotion which can be verbally expressed (Endler & Kocovski, 2001; Tovilović, Novović, Mihić, & Jovanović, 2009). State

anxiety, furthermore, is accompanied by “feelings of tension, apprehensiveness, nervousness and worry” (Yan, 2007). State and trait anxiety can be seen as two factors potentially influencing each other (Endler & Kocovski, 2001). Scoring high on trait anxiety includes the consistent experience of anxiety in many different situations. Thus, it is likely that an individual with high trait anxiety also experiences state anxiety frequently.

Not only trait anxiety is associated with state anxiety but the context in which anxiety is experienced plays a significant role as well. The context can have a triggering effect on the experience of momentary anxiety as it has the power to elicit for example feelings of tension, nervousness or worry. A study on anxiety in 374 undergraduate students at the Franciscan University in Steubenville, Ohio named “academic performance, pressure to succeed, post-graduation plans, financial concerns, quality of sleep, relationship with friends, relationship with family, overall health, body image, and self-esteem” as causes of anxiety in students because significant positive correlations were found (Beiter et al., 2015). When speaking about context, it is especially important to consider that the current study is conducted during a global pandemic which has proven to influence the public's mental health, especially anxiety. People report more incidents in which they feel anxious since the outbreak of the coronavirus due to environmental changes (Usher, Durkin & Bhullar, 2020). Overall, it becomes apparent that students experience anxiety in many different contexts and that the experience of anxiety affects their lives drastically.

Importantly, most studies mentioned previously assessed the *trait* level of anxiety in students which is relatively stable. However, anxiety can also be a momentary experience, a *state* which fluctuates over time. Duraku (2016) mentioned test anxiety as an example of state anxiety as the experience of this type of anxiety is strongly related to the immediacy of a test. Nevertheless, this study did not focus on fluctuations of anxiety particularly. Besides some experience sampling studies investigating social anxiety associated with emotion regulation, there are not many existing studies on state anxiety as such (Kashdan & Steger, 2006; Daros, Daniel, Meyer, Chow, Barnes & Teachman, 2019).

It is apparent by now that anxiety as a state is not elaborately studied yet. Moreover, anxiety has tremendous negative impacts on people's mental health. To be able to develop tailored interventions to reduce anxiety it would be valuable to investigate which psychological constructs have the potential to counteract the experience of trait and state anxiety. Literature

search also brought to light the association between state anxiety and trait anxiety meaning that people having an anxiety-prone character are more likely to experience state anxiety as well. To not disregard the complexity of the topic under investigation and to not underestimate the influence trait anxiety might have on state anxiety, it is paid attention to both concepts in the scope of the current study.

Self-Esteem and Anxiety

It becomes apparent that self-esteem and anxiety are two concepts that were already investigated in association with one another. Several studies have shown that self-esteem is a predictor of anxiety (Bos, Muris, Mulkens & Schaalma, 2006; Abdel-Khalek, 2016). Thus, there is an already existing association between self-esteem and anxiety. Moreover, one study demonstrated that self-efficacy levels of students are negatively associated with their experienced anxiety level and resultantly affect test outcomes. Thus, high levels of self-efficacy are associated with students feeling able to master the exam which reduces their anxiety level (Barrows, Dunn & Lloyd, 2013). The underlying reason for the assumption that self-esteem can be associated with anxiety is the fact that the definition of self-esteem includes, amongst others, the beliefs that an individual has about their abilities/skills which is simultaneously the definition of self-efficacy. Hence, as self-efficacy has already been proven to reduce anxiety, levels of self-esteem might as well. As part of the TMT, self-esteem acts as a buffer for negative life experiences such as the confrontation with death (Greenberg et al., 1992). Anxiety can also be considered a negative experience in life. Therefore, it can be assumed that the buffering qualities of self-esteem would be applied in situations in which an individual feels anxious as well. Abdel-Khalek (2016) found out that self-esteem supports coping with challenging situations and resultantly helps coping with anxiety which is in line with the TMT. Being a student dealing with worries about finances or academic pressure can be challenging. Higher levels of self-esteem can therefore aid in mastering these types of situations.

Studies investigating the experience of anxiety in students, also in relation to other psychological constructs solely focus on trait levels of anxiety. Thus, an essential aspect goes missing: the multidimensionality of anxiety. During the investigation of literature, it became apparent that anxiety can be defined as a predisposition (trait) and as a momentary experience (state). Since trait anxiety can be associated with state anxiety, state anxiety and trait-level self-

esteem may have the same association because self-esteem and trait anxiety could already be associated in previous studies. However, because of the lack of research on this topic, this is just an assumption that still needs validation.

It is also important to investigate the potential association that can be drawn between state anxiety and the context in which it is experienced. Students may for example be anxious in the morning because they are writing an important exam. But when the exam is finished there is no need for them to be anxious anymore. This example not only stresses that state anxiety fluctuates but also highlights the role the context plays in relation to anxiety. Beiter et al. (2015) stated in their article that it is important to understand what aspects of life correlate with a decrease in anxiety. Thus, understanding which contexts trigger anxiety the most in students is beneficial to develop interventions aimed at reducing these context stressors in order to help students dealing with these situations in a better way.

Current Study

The current study investigates how trait self-esteem associates with trait- and state anxiety. As a state, anxiety is a context-dependent variable. Therefore, it is also investigated in which contexts state anxiety is experienced the most to better understand fluctuations in state anxiety. The knowledge that can be derived from the current study may aid developing interventions targeted at reducing anxiety by enhancing self-esteem levels or by combatting contextual triggers. Therefore, the overall research question is whether daily levels of anxiety (average state anxiety) can be associated with trait self-esteem. On this basis, three hypotheses were formulated: (1) Terror management theory draws a direct connection between the experience of anxiety and self-esteem. Other studies named self-esteem as a predictor of anxiety as well (Bos, Muris, Mulkens & Schaalma, 2006; Koole, A Sin & Schneider, 2012; Abdel-Khalek, 2016; Moksnes & Reidunsdatter, 2019). Therefore, it is assumed that individuals with high levels of trait self-esteem display low levels of trait anxiety. Thus, there is a negative association expected between these two variables on a trait-level comparison. (2) As literature indicates the buffering effect self-esteem has on anxiety, the same association is expected when comparing the trait self-esteem scores with average state anxiety scores. If this assumption holds on a trait-level comparison, it is likely that similar results can be observed on state-level anxiety too. People with high levels of trait self-esteem therefore show low levels of average state

anxiety. The association between trait self-esteem and average state anxiety is therefore also a negative one. Performing a second trait-state-level comparison, the expected outcome deviates from the former hypotheses. Previous literature mentioned that trait and state anxiety are concepts that potentially influence each other (Endler & Kocovski, 2001). In other words, people with high levels of trait anxiety naturally display high levels of average state anxiety. Thus, the level of trait anxiety is positively associated with the level of average state anxiety. (3) Lastly, state anxiety seems to be a context-dependent variable as literature indicated that various circumstances elicit anxiety in students. To be able to tailor interventions to the specific needs of a target group in the future, it is valuable to investigate in which situations the experience of anxiety is high. As the sample of the current study consists of students only, it is hypothesized that study-related contexts elicit the highest anxiety levels in participants.

Method

Participants

The study contained a sample of 35 participants between the age of 17 and 34 of which all participants are university students (Table 1). Participants were recruited through a convenience sampling method. Students from the University of Twente were able to join the study through their Behavioural, Management, and Social Sciences (BMS) faculty SONA system. Additionally, participants were recruited through personal contacts of the researcher. Students from the University of Twente earned an expense in the form of study credits when participating in the study. The researcher´s own personal contacts participated without receiving any compensation. As inclusion criteria, participants should be students, be proficient in English and own a device on which the application *Ethica* can be installed. The current study was approved by the Ethics Committee of the BMS of the University of Twente (request no. 210219).

Table 1

Demographics of the Study Sample

	N	%
Gender		
female	28	80
male	7	20
overall	35	100
Nationality		
Dutch	3	8.6
German	32	91.4
overall	35	100

Note. N = 40. 5 participants were excluded due to insufficient response rates. On average, participants were 21.8 years old (SD = 2.7).

Materials

To provide a tool for gathering data, the online application *Ethica* was utilized. The test battery that was used consisted of two questionnaires for measuring the levels of the trait variables (self-esteem and anxiety) and one questionnaire for assessing state emotions (anxiety).

Ethica

Ethica is an online application which aids researchers in fields like health, psychology, kinesiology and various others as well. From the participant´s perspective, *Ethica* offers studies in which the participant is interested to partake. Most recent smartphones and other technical devices using Android or iOS operating systems are capable of installing *Ethica*. For researchers, *Ethica* provides more than simply an application which can be installed on their personal smartphone or similar technical device. It provides researchers with a web desktop setting (ethicadata.com) with which the researcher needs to get familiar with to set up their survey, monitor response rates and evaluate the results of their studies afterwards (Ethica, 2021). In the current study, version 422 was used which was updated on 29.01.2021.

Trait questionnaires

Rosenberg´s Self-Esteem Scale (RSE scale). To capture the individual levels of participants´ self-esteem, the Self-Esteem Scale of Rosenberg was utilized. The RSE scale consists of 10 items (Appendix A) which can be answered on a 4-point Likert scale ranging from one (strongly agree) to four (strongly disagree). Items of the RSE scale are formulated in a way that for some items “strongly agree” indicates a high level of self-esteem, whereas for other items “strongly disagree” corresponds with high levels of self-esteem. An example item for the former is item 2 “I feel that I have a number of good qualities” which represents high self-esteem when answered with either “agree” or “strongly agree”. However, an example item for the latter is item 9 “I certainly feel useless at times” which shows high levels of self-esteem when answered with either “disagree” or “strongly disagree”. The minimum score of self-esteem which can be achieved is 0. Contrary, the maximum self-esteem score which can be reached within the RSE scale is 30. Thus, the scores range from 0 (lowest trait self-esteem) to 30 (highest trait self-esteem). Also, the RSE scale provides an excellent internal consistency (Guttman scale coefficient of reproducibility of .92). Moreover, the reliability of the scale was proven to be of

adequate stability by conducting a test-retest reliability over a two-week period (correlation of .85 and .88) (Ciarrochi & Bilich, 2006). For the current study it can be said that the reliability is excellent with Cronbach's alpha = .878.

Spielberger´s State-Trait Anxiety Inventory (STAI): The developers of the State-Trait Anxiety Inventory (STAI) are Spielberger, Gorsuch and Lushene who designed a self-report assessment device for measuring state and trait anxiety in 1964. The trait STAI consists of 20 items (Appendix B) which can be answered on a 4-point Likert scale ranging from one (almost never) to four (almost always). Example items of the STAI are item 6 “I feel rested”, item 9 “I worry too much over something that really doesn't matter” and item 15 “I feel inadequate”. The score range of the STAI lies between a minimum score of 20 which means displaying the lowest anxiety level possible and a maximum score of 80 which indicates the highest level of anxiety possible (Spielberger, 1972). Vitasaria, Wahabb, Herawanc, Othmand and Sinnaduraie (2011) determined the reliability and validity coefficients of the STAI in a sample of students by computing Cronbach's alpha and by executing a factors analysis and computing a coefficient correlation. Overall, the STAI has adequate reliability (Cronbach's alpha .85). Moreover, the correlation between items is strong (KMO of .842) which indicates adequate validity of the STAI as well. The sample of the current study displays excellent reliability (Cronbach's alpha = .922).

State questionnaire

Spielberger´s State-Trait Anxiety Inventory (STAI). As previously mentioned, Spielberger and colleagues invented a measurement device to assess both trait anxiety as well as state anxiety. Literature indicated an existing association between state and trait anxiety. Therefore, it is valuable to use the STAI for assessing state levels of anxiety as the corresponding measuring device was already used to assess trait levels of anxiety. Vitasari et al. (2011) highlighted the fact that consistent and strong correlations between state and trait measurements of the STAI were found which supports the idea of using the STAI for assessing state and trait anxiety to get significant results. Generally, the state STAI also consists of 20 items which can be answered on a 4-point Likert scale ranging from one (not at all) to four (very much so). However, since the state questionnaire was answered by the participants multiple times a day over a longer period of time, it was decided to not include all 20 items as this would be too time consuming and reduce participants´ motivation to participate (van Berkel, Ferreira, & Kostakos,

2017). To still be able to catch a variety of feelings, a total of 5 items were chosen which represent the overall 20 items the best by covering negative as well as positive emotions. These items are item 3 “I am tense”, item 6 “I feel upset”, item 15 “I am relaxed”, item 17 “I am worried and item 19 “I feel steady” (Appendix C). Items 3, 15 and 17 were chosen as literature highlighted that tension and worry are feelings that accompany state anxiety (Yan, 2007). The items 6 and 19 are chosen because they are closely related to the feelings of tension, worry and nervousness.

Context Assessment. As mentioned in the introduction, it can be detrimental to neglect the context in which anxiety is experienced. In order to consider the context which affects the experience of state anxiety, two additional questions regarding anxiety-evoking events were asked. These questions asked about whether an anxiety-evoking event was experienced recently and about the nature of this event (e.g., argument with someone, work-or study-related event or Covid-related event). Questions about the event´s nature were chosen based on the findings of Beiter at al. (2015) who named academic success, relationship with friends and family and health as major anxiety-evoking contexts. When the participant indicated that they did not experience any anxiety-evoking event recently, no follow-up questions were given. When, however, the participant indicated the experience of such an event, one follow-up question was given asking about the nature of this event.

Design

As a trait is relatively enduring over time and is unlikely to change, trait anxiety and trait self-esteem were assessed once at the beginning of the study with help of the STAI and the RSE scale. Furthermore, a structured, repeated-measure questionnaire was chosen to assess state-level anxiety meaning that the same variable is measured repeatedly over time. Doing so, the Experience Sampling Method (ESM) was used to ensure capturing momentary feelings of anxiety the best way possible. ESM monitors feelings, moods, behaviour, thoughts and appraisals of participants and the specific context in which they are experienced by adapting a self-report diary style of data collection (van Berkel et al., 2017). One reason ESM is so convenient to use is the fact that it decreases the burden of the memory of participants to recall experiences and emotions as it is about their feelings and appraisals in that particular moment, they receive the notification to answer the questionnaire (van Berkel et al., 2017). Therefore,

participants receive various reminders throughout the day to prompt them to answer a short questionnaire.

For the current study, it was decided that participants get reminders three times a day because the article of van Berkel et al. (2017) highlighted the fact that sending too many questionnaires per day inhibits the participant´s motivation to answer them. The frequency of sending reminders three times a day therefore assures a relatively low drop-out rate. Since the sample of the current study consists of students only, the times when the participants received reminders to fill in the daily questionnaires were scheduled at 09:00 am, 14:00 pm and 19:00 pm in the application *Ethica* (described above) to interfere as little as possible with their daily activities. Moreover, the choice of time enables the researcher to gather individual cut-outs of the participant´s experience of anxiety during the day. In addition, the same article states that an advisable duration of an experience sampling study is one to two weeks. Based on that, it was chosen to conduct the study over a period of 8 days to ensure having a representative dataset of appraisals participants´ make and of emotions the participants go through on a daily basis (van Berkel et al., 2017). The data collection took place from the 28th of March until the 26th of April in 2021.

Procedure

Overall, it took eight days for participants to complete the current study. After agreeing to participate in the study, either via SONA or because of personal requests of the researchers, the participants received the instruction to download the online application *Ethica* on their smartphone. After doing so, the researchers provided the registration code for the current study. By typing in this code and their email address, the participants were able to register for the study. In the environment of *Ethica*, they received a general introduction of the study and a description of the tasks they had to complete in order to successfully partake in the study. Moreover, the participants were informed that their participation is completely voluntary, and all data is treated anonymously. Additionally, the participants were given the information that they can withdraw from the study at any time without providing a reason (Appendix D). Participants agreed to the terms of the study by accepting the informed consent and clicking on the button “register” before any of the questionnaires were filled in.

Besides setting up all necessities on their smartphones, the first day was further dedicated to answering a demographic questionnaire asking about age, gender and nationality. Moreover, participants were tasked to fill in the two questionnaires assessing *trait* self-esteem and *trait* anxiety. In the application these questionnaires were labeled "Self-Esteem Scale" and "Trait Anxiety Inventory (for adults)" and needed to be filled in at the beginning of the study, *before* completing the daily state questionnaires in order to avoid biases. To ensure the trait questionnaires were filled in before answering the daily questions about anxiety, an expiry time of 48h was set up. When completing these tasks, the participants were instructed to wait for further information and look after the pop-up notifications for the daily questionnaires which were set up by the researchers.

On the following day, the participants received their first notification for filling in the daily questionnaire about *state* anxiety. First, they were introduced to a text explaining what a state is and how to approach and what to expect of the following questionnaire. This questionnaire was labeled "State Anxiety Inventory (for adults)" in the application and was asked repeatedly over the course of the following seven days. At the end of the study, participants were thanked for their participation. The participants who partake in the study via SONA were informed that they will receive their credit points after the closing of the study on April the 26th.

Before the current study was made available to participants, a two-day test phase (pilot study) was conducted with two researchers. The application *Ethica* was downloaded, and all questionnaires were tested. If necessary, the questionnaires were adjusted in order to provide a readable interface and to ensure that no important information was left out to avoid confusion and to ensure that the participants are able to complete the study with no problems. Also, the pop-up notifications were tested on their functionality. The response rate was monitored by the researchers to ensure that the questionnaires were answered continually.

Data Analysis

Version 25 of IBM SPSS Statistics was used to analyze the data that was exported from the application Ethica. All participants with a response rate of at least 60% were included in the final dataset as Conner and Lehman (2012) suggest this as a common cut-off point for experience sampling studies. Firstly, the researcher calculated descriptive statistics for the

participants´ demographic data (gender, nationality and age). To make a statement about whether the overall sample scores were rather high or low in both trait anxiety and trait self-esteem, the mean scores of both variables were calculated.

Further, Cronbach's alpha was calculated to evaluate the reliability of the trait questionnaires STAI as well as Rosenberg's self-esteem scale. In more detail, Cronbach's alpha is a calculation that measures the internal consistency of a scale. Thus, it is measured to what extent the items of a scale are measuring the same concept (Tavakol & Dennick, 2011). According to Shelby (2011), an acceptable item correlation coefficient is at least .40. To be an adequate scale, however, Cronbach's alpha should be between .65 and .70. An alpha of at least .80 indicates an excellent reliability. It was decided for these values as both trait questionnaires have relatively few items and to use high cut-off points of Cronbach's alpha would therefore result in a misleading outcome (Shelby, 2011). To calculate the reliability of the state questionnaire, split half reliability was utilized. Therefore, the scores of the state data from each individual were split in two halves. Afterwards, a mean score for each of the halves was calculated. These were then correlated using Pearson's correlation to compare mean scores from every participant of the first half of the week to those from the second half of the week (Pronk, Molenaar, Wiers & Murre, 2021). As the state questionnaire consisted of five questions, this procedure was applied 5 times for each of the items.

To investigate which contexts are indicated as the most common reasons to experience anxiety a frequencies analysis was conducted. Afterwards, the different reasons for experiencing anxiety were grouped into three categories and it was calculated which context corresponds with the highest average state anxiety levels. This was done by calculating the mean of each category to be able to compare them.

Since levels of state anxiety were assessed at multiple points in time from a number of participants, the estimated marginal mean (EMM) of each individual score was calculated by performing a linear mixed model (LMM) analysis. Doing so makes the comparison of state anxiety with trait anxiety as well as with trait self-esteem more meaningful as the EMM scores are adjusted for any other variable used. To be able to determine whether the relationship of trait self-esteem and trait anxiety are linearly related and to make claims about the strength and direction of this relationship, a Pearson's correlation was conducted. Furthermore, Pearson's correlation was also utilized to examine the relationship between (1) average state anxiety

(EMM) and the STAI and (2) average state anxiety (EMM) and RSE scale. The correlation coefficient (r) is interpreted the following: $r > .50$ equals a strong correlation, $r > .30$ is interpreted as moderate correlation and lastly, a weak correlation is indicated by a value of $r > .10$.

Results

Descriptives

Table 2 contains the mean, minimum, maximum and the standard deviation of both trait variables self-esteem and anxiety. Overall, the sample of the current study displays moderate levels of both trait self-esteem (M = 20.31) and trait anxiety (M = 43.62). Trait self-esteem levels can be described as moderate as scoring between 15 and 25 is suggested to be in a normal range, whereas scores below 15 indicate low self-esteem levels (http://www.wwnorton.com/college/psych/psychsci/media/rosenberg.htm). Trait anxiety levels can be described as moderate because a common cut-off point was suggested to be at 39-40 according to Knight, Waal-Manning and Spears (1983). The average response rate of the state data is 86, 91%.

Table 2

Minimum, Maximum Scores, Mean (M) and Standard Deviation (SD) of Trait Self-Esteem and Trait Anxiety

	N	Minimum	Maximum	Mean	Standard Deviation
Trait Self-Esteem	35	10	27	20.31	4.78
Trait Anxiety	35	27	72	43.62	10.19

Association between self-esteem and anxiety

Overall, the results of the study confirm the research question and show that daily levels of anxiety (average state anxiety) are associated with trait-levels of self-esteem. Moreover, all hypotheses could be confirmed on the basis of the analyses that were conducted. In the following, the results of the data analysis to answer the hypotheses are described in more detail.

Context analysis

Firstly, a frequencies analysis provided a general overview about how often the different anxiety-evoking events were given as a reason for experiencing momentary anxiety. As can be

seen in Table 3, in 74.9% of the cases no anxiety-evoking event was reported. However, the following most frequent reason responsible for the experience of anxiety is work- or study-related (14.5%). For further analyses, the remaining categories were grouped into one overall category because separately they were not chosen often enough as a reason for experiencing anxiety compared to the first two categories. Altogether, the remaining categories make up 10.5%.

To make a claim about which context elicits the most anxiety in participants on average, the mean scores of each category were calculated and compared to each other. Overall, it becomes apparent that work- or study-related events elicit the most anxiety in the participants of the current study.

Table 3

Frequencies of the different anxiety-evoking Events

Nature of anxiety-evoking event	Frequency	Percentage
I did not experience an anxiety-evoking event recently (0)	402	74.9
Argument/ disagreement with anyone (1)	20	3.7
Work - or study-related (2)	78	14.5
Home-related (3)	6	1.1
Health-related (4)	6	1.1
Covid-related (5)	4	0.7
Other event not listed (6)	21	3.9
Category	Mean Anxiety	
Category 1	1.66	
Category 2	2.18	
Category 3	2.00	

Note. Missing values (198) were not included. The sample size without the missing values is n = 537. The sample size including the missing values is n = 735.

Trait-level comparison

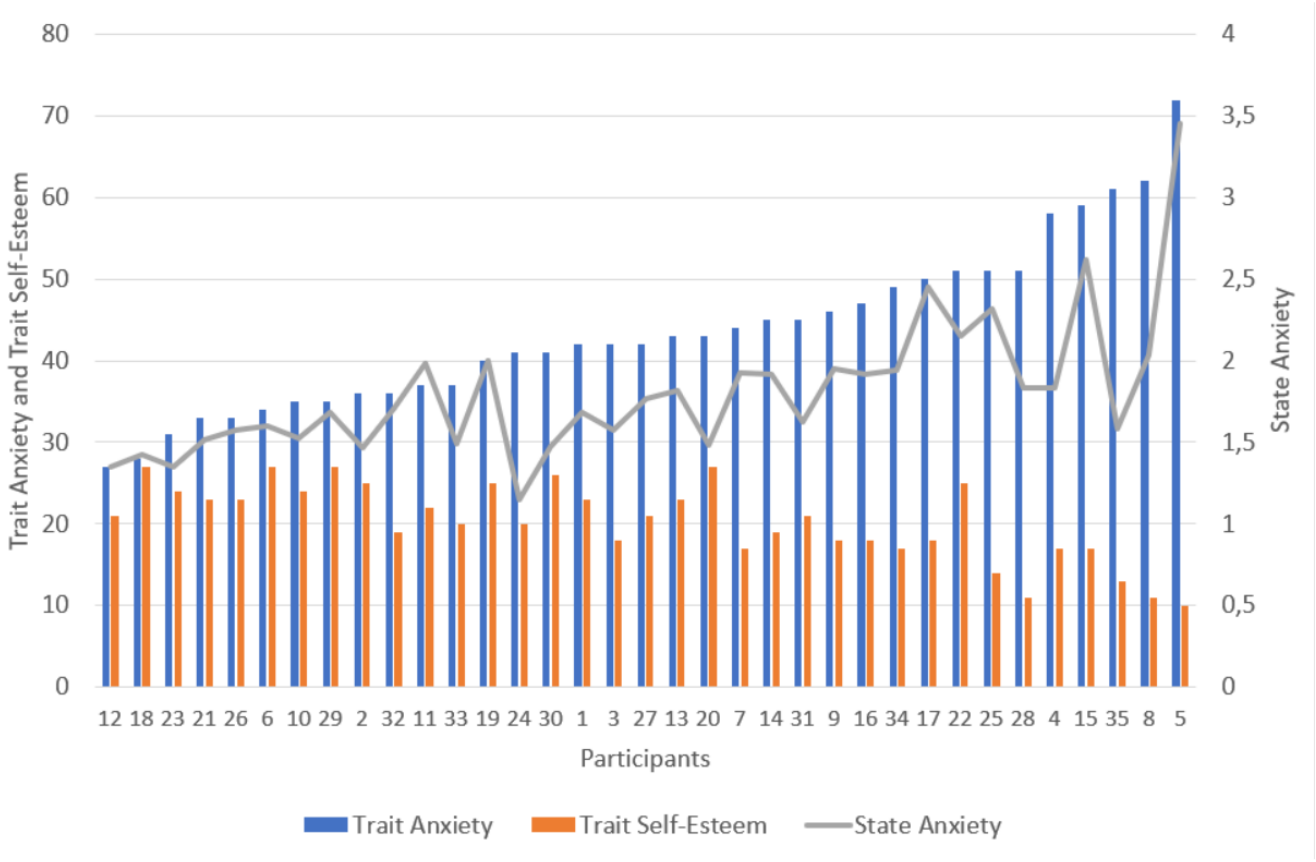
To see whether trait self-esteem is predictive of trait anxiety, a Pearson's correlation analysis, using both trait self-esteem and trait anxiety scores, was conducted. The analysis indicated a strong negative relationship between trait anxiety and trait self-esteem ($r = -.763$, $p < .01$, see Figure 1).

Trait-state level comparison

To investigate the hypothesis that trait self-esteem also is predictive of average state anxiety, a Pearson's correlation, using the trait self-esteem scores and the estimated marginal means of average state anxiety, was conducted. This analysis indicates a significant and strong negative correlation between trait self-esteem and state anxiety ($r = -.548$, $p < .01$). A second trait-state level comparison was utilized to visualize the correlation between trait anxiety and average state anxiety (EMM). When calculating the Pearson correlation for trait anxiety and average state anxiety, it revealed a significant and strong positive correlation between both variables ($r = .763$, $p < .01$). Both relationships are visually presented in Figure 1.

Figure 1

Visualization of the correlation between Trait Anxiety (blue), Trait Self-Esteem (orange) and Average State Anxiety (grey).



Discussion

To the best of the author's knowledge, no studies exist in which average state level anxiety was associated with self-esteem on a trait level. Thus, the purpose of the current study was to show the association between trait-levels of self-esteem and the experience of daily levels of anxiety during the course of one week. In addition, the current study revealed in which contexts students experience the highest levels of state anxiety. Even though there is already extensive literature on the association of trait levels self-esteem and anxiety, the study investigated this relation as well and substantiated previous findings. The results of the Pearson's correlation show a significant negative association between trait self-esteem and trait anxiety which confirms the first hypothesis. Also, the second hypothesis regarding state-trait-level comparison was confirmed as the results of the study indicate a significant negative association between trait self-esteem and average state anxiety. Furthermore, the results show a significant positive association between trait anxiety and average state anxiety which was also expected. Lastly, the hypothesis regarding the context in which anxiety was experienced can also be supported by the outcomes of the study. The results show that participants experience the highest level of state anxiety in contexts related to their work or studies. Overall, the research question as well as all hypotheses could be confirmed by the outcome of the study.

Interpretation and similarities with previous literature

Trait-level comparison. The results of the current study indicate that high levels of trait self-esteem can be associated with low levels of trait anxiety and vice versa. Previous research has already shown that self-esteem is predictive of anxiety and aids coping with challenging situations effectively (Bos, Muris, Mulkens & Schaalma, 2006; Abdel-Khalek, 2016). In addition, the TMT suggested that self-esteem acts as a buffer for negative life experiences as high levels of self-esteem act as a coping mechanism and saves people from experiencing too much negativity (Greenberg et al., 1992). Looking at the definition of self-esteem the findings mentioned earlier can be explained. Possessing high self-esteem means a person interprets the opinion significant others have of them as positive (reflected appraisal). Furthermore, in comparison to others a person scoring high on self-esteem is confident that they perform well in all kinds of social settings (social comparison). Lastly, high levels of self-esteem ensure that a person draws positive conclusions about their skills based on previous success (self-attribution)

(Felson, 1985; Suliman & Halabib, 2007). Altogether, these characteristics ensure that the experience of anxiety is diminished. Writing an important exam, for example, is a challenging situation in which students may experience anxiety. However, if they compare themselves to others and, due to high levels of self-esteem, come to the conclusion that they can perform better than their peers, the experience of anxiety may decrease. Additionally, because they previously performed well on other exams, students´ level of self-esteem may be high and therefore, they have the confidence to also master this exam as well. All in all, this example illustrates the buffering effect self-esteem has on anxiety (Abdel-Khalek, 2016). Conversely, low trait levels of self-esteem can be associated with high levels of anxiety as a trait as people with low levels of self-esteem miss its qualities regarding positive self-evaluation. Thus, the buffering effect of self-esteem goes missing in people with low self-esteem levels.

Trait-state-level comparison. The current study also showed that the association between trait anxiety and average state anxiety is a positive one meaning that high levels of trait anxiety correspond with low levels of average state anxiety and vice versa. Previous literature already indicated that trait- and state anxiety potentially influence each other (Endler & Kocovski, 2001). The results of the current study, therefore, substantiate previous findings. The association between trait and state anxiety can be explained by looking at the definitions of anxiety. According to Endler and Kocovski (2001), anxiety is a subjective experience related to the emotion of fear. This holds true for both trait and state anxiety. However, a trait is an enduring predisposition whereas a state in a momentary experience. Therefore, some people are predispositioned to experience fear in various situations. These people tend to experience the same displeasing emotion on a momentary level as well. This experience, however, is not enduring but context-dependent and appears as abrupt as it disappears. Thus, it is likely that people high in trait anxiety react more anxious in situations in which anxiety is experienced on a momentary level. In the current study, participants' trait level anxiety was assessed as well as the experience of daily levels of anxiety. The results have shown that a positive association between trait and state anxiety exists and therefore, substantiates the findings of previous literature.

The current study, furthermore, showed the negative association between trait self-esteem and average state anxiety. Indeed, previous literature focused more on trait levels of anxiety in relation to trait self-esteem levels, however, trait anxiety and average state anxiety can be associated with one another according to Endler and Kocovski (2001). This is further validated

by the findings of the current study. Due to the correlation between these two concepts and the correlation between trait anxiety and trait self-esteem, the results of the current study show that average state anxiety is associated with trait self-esteem as well. Thus, when trait self-esteem has a buffering effect on trait anxiety and makes people believe they have the ability to master difficult situations of all kinds and trait anxiety can be associated with state anxiety, the buffering qualities of trait self-esteem are also true on a state level of anxiety.

Context analysis. It was also analyzed in which contexts students experience the highest level of anxiety, which is a work- or study-related one. Beiter et al. (2015) indicated various contexts that trigger the experience of anxiety in students, however, they did not rank them from most anxiety-evoking context to least-anxiety evoking context. Because the sample of the current study consisted of students only, it was assumed that study-related contexts elicit the highest levels of average state anxiety. Surprisingly, participants indicated that they did not experience an anxiety-evoking event recently for the majority of the time. When indicating that now anxiety-evoking event was experienced, it would be logical to expect that the state anxiety level equals zero because if participants experienced momentary anxiety, there must have been an event that has elicited this emotion (Beiter et al., 2015). The results of the study, however, showed that the average state anxiety level was still above 1, even though no anxiety-evoking event happened recently. This leads to the assumption that other variables, that were not investigated in this study, are associated with the experience of momentary anxiety as well.

Another surprising outcome of the study was that only few participants indicated a Covid-related context as a reason for the experience of higher state levels of anxiety. Since the study was conducted during a global pandemic and since research has already proven that people report more incidences in which they feel anxious since the outbreak of the virus (Usher, Durkin & Bhullar, 2020) it would have been self-evident that the participants are influenced by that specific context. However, studies highlighted the fact that the outbreak of the coronavirus has especially severe consequences for people with a pre-existing illness. According to Callender, Curran, Bates, Mairesse, Weigandt and Betts (2020), people that suffer from a pre-existing condition like hypertension or diabetes and older people are at greater risk of dying due to Covid-19. Consequently, affected people feel more threatened by the virus and therefore experience higher levels of anxiety. One explanation why the participants of this study did not indicate Covid-related reason to their anxiety, may be that they do not belong to an at-risk group

and therefore feel less threatened. With regards to pre-existing conditions, this is merely an assumption as it was not asked about the health status of the participants of this study. However, none of the participants is part of the older population which is indicated by their age range. Thus, it can be confidently claimed that the current study´s participants are not part of a group that feel particularly threatened by the coronavirus.

Overall, the results of the study make clear that students with anxiety in an academic context need help to master their studies. As the highest level of state anxiety is elicited in a study-related context, this emotion seems to be linked to a fear of failure. This is a point that still needs validation since the current study did not ask what specific kind of anxiety is experienced. Therefore, that study-related anxiety is linked to a fear not to be successful, and failure is merely an assumption. However, self-esteem and specific types of state anxiety related to academic contexts have proven to be associated with academic performance. Akinleke (2012) conducted a study in which the association between test anxiety and self-esteem with academic performance was investigated. The study's results indicated that test anxiety negatively affects academic performance, meaning that high scores of test anxiety interfere with academic success. Furthermore, the study showed that high levels of self-esteem are a predictor of being successful in academic settings as these individuals do not focus on expectations of failure like their low self-esteem counterparts do (Akinleke, 2012). Due to findings like these and the outcomes of the current study that revealed a negative association between self-esteem and average state anxiety, enhancing students' self-esteem levels is advisable to help them master their studies. Lawrence (2006) found out that the teacher´s self-esteem level influences that of the students and that teachers are in the position to aid their students with low levels of self-esteem either intuitively or systematically. Lawrence (2006) mentioned, for example, that a positive study environment and establishing good relationships with the students aids enhancing their self-esteem levels. As the sample of the current study is a non-clinical population, literature reveals primary prevention programmes as most effective. These programmes can be conducted in an academic setting and focus on, for instance, skills training to enhance students' confidence regarding certain competencies (Bos, Muris, Mulkens, Schaalma, 2006). Kolubinski et al. (2018) stated that the offer of interventions aimed at enhancing self-esteem is scarce. Thus, teachers' influence as well as prevention programmes should be taken into account when developing interventions tailored to students with low levels of self-esteem.

Strengths, limitations and suggestions for the future

Strengths and limitations. To the best of the author's knowledge, not much research was conducted in the field of general state anxiety in relation to other psychological constructs such as self-esteem using an experience sampling approach. Extensive research has been done assessing the association between trait-level anxiety and self-esteem though (Bos, Muris, Mulkens & Schaalma, 2006; Abdel-Khalek, 2016), but none of these studies focused on *trait* self-esteem in relation to *state* anxiety. Some experience sampling studies were previously conducted to investigate specific types of state anxiety such as social anxiety related to emotion regulation (Kashdan & Steger, 2006; Daros et al., 2019). However, these studies focused on a very specific aspect of anxiety and neglected the fact that anxiety can also be experienced outside of social settings. Due to this, for helping students master their studies it would be disadvantageous to have such a narrow focus on anxiety. That anxiety does not only exist on a trait level and can be related to self-esteem as well is considered in the current study. Interventions targeting the level of self-esteem scarcely exist. The insights derived from the current study form a basis for the development of future interventions that are aimed at enhancing trait self-esteem to have a wider variety of interventions.

Another major strength of the study is the utilization of the ESM. Using an experience sampling approach reduces the reliance on recalling and reconstructing memories and therefore countervails memory biases of the participants. Furthermore, it is convenient to use for data collection in specific contexts (van Berkel et al., 2017). Thus, this method ensures a more accurate view of the emotions participants experience and the contexts in which they occur and therefore captures data that is close to reality. Also, assessing the context with help of the ESM is a strength of the study as the results give insights in which contexts affect students´ experience of anxiety and therefore their lives the most. Especially in a study-related context, it would be beneficial for the universities to know which contexts affect their students the most. If these are related to the student's studies, which was confirmed by the results of this study, universities or people developing interventions to reduce anxiety by enhancing self-esteem or combatting contexts that trigger anxiety in students can tailor their interventions to the specific needs of their target group.

Besides the previously mentioned strengths, there are also some limitations to this study. First of all, it is important to state that the reliability measures of the trait questionnaires are very

high. Thus, trait self-esteem and trait anxiety were really measured as such. However, some difficulties occurred when calculating the reliability of the state items. Utilizing the split-half reliability measure, the sample could be divided into two equal parts. When aiming for achieving a score for the reliability however, SPSS Statistics indicated an error. Therefore, the actual reliability of the state items could not be determined. Nevertheless, it can be assumed that the state item measurements are still reliable as only items from an already existing, well-validated and reliable survey (STAI) were chosen. In addition, items were chosen that closely resemble characteristics that Yan (2007) mentioned as part of the definition of state anxiety such as nervousness which supports the claim that the items used for the state questionnaire are reliable.

Regarding the generalizability, it is important to note that the sample of the current study consists of students only, which makes it very one-sided. Additionally, as only students participated in the study the age range is also very limited (18-34). Therefore, other populations, such as old people are excluded. Moreover, all participants either come from The Netherlands or Germany which excludes other ethnicities. According to Putwain (2007), for example, students with African or Hispanic roots display higher test anxiety than their white peers. Overall, it becomes apparent that the findings cannot be generalized to other populations due to various reasons. Lastly, it is noteworthy that there are some missing data points in the state data analysis as well as in the context analysis. This is the reason why out of 40 participants only 35 had a sufficient response rate (60% or higher).

Also, the current study assessed global levels of self-esteem in the sample. However, as the context analysis revealed that the sample experienced the highest levels of state anxiety in a study-related context, it would have been beneficial to focus on specific levels of self-esteem. Lawrence (2006) indicated in his book that global self-esteem refers to the overall evaluations people make about themselves and their self-worth. Contrary, specific self-esteem only refers to a specific area in which individuals have low levels of self-esteem. When students possess low self-esteem levels in an academic setting, this is specific self-esteem because these students only have low self-esteem in one specific area. However, Lawrence (2006) also stated that specific self-esteem can influence global self-esteem if the activity of specific self-esteem is valued by the person and their environment. This means that if academic success is valued by the student and their environment (peers, parents) and they perform badly (specific self-esteem), their global self-esteem, thus the evaluations of one's worth are threatened as well. Resultantly, measuring

global self-esteem was beneficial to achieve these insights, however, it is not known how measuring specific study-related anxiety would have affected the outcome of the study.

Suggestions for the future. The last-mentioned point leads to suggestions for future research in this field. Firstly, to actually know whether it would have led to different outcomes to measure global or specific self-esteem, future research should focus on measuring study-related state anxiety. It would be also beneficial to look at the situational context in more depth. This would help to explain why students often indicated they did not experience an anxiety-evoking event even though their corresponding state anxiety score was rather high suggesting that other context variables may also play a role. Momentary anxiety in relation to the context could be further investigated by creating a situation that may influence anxiety. This could be implemented by, for instance, letting participants write a test and measure their state anxiety level before and after the test. This example could be even more extended by implementing self-esteem as one component. In this case, participants could conduct exercises aimed at enhancing their levels of self-esteem over a longer period of time. Then they are asked to partake in a test and state anxiety levels are measured pre- and post-test. Another aspect important to consider for future research is the duration of the study. Van Berkel et al. (2017) suggested that an experience sampling study should be conducted over the course of one to two weeks. To get more individual data points for a more detailed analysis and to capture a greater variety of activities in the participants´ lives it would be advisable to conduct the study over a period of time longer than 8 days.

To conclude, the current study can be considered a preliminary step to gain more insights into the research self-esteem and state anxiety. The current study substantiated previous findings regarding trait level self-esteem and anxiety and showed that the sample experienced the highest levels of anxiety in study-related contexts. Additionally, the current study shed light on the association between trait-level self-esteem and average state anxiety. Following the notation of Kolubinski et al. (2018), the findings of the current study could be used to develop interventions aimed at enhancing self-esteem as a means to help students dealing with their anxiety and to add to the scarce variety of intervention within this field. Overall, this study hopefully contributes to a decrease of anxiety in students in the future.

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Appendices

Appendix A: RSE scale for trait items

Table 1. Rosenberg Self-Esteem Scale

1- Strongly Agree 2- Agree 3- Disagree 4- Strongly Disagree
1- I feel that I am a person of worth, at least on an equal basis with others.
2- I feel that I have a number of good qualities.
3- All in all, I am inclined to feel that I am a failure. *
4- I am able to do things as well as most other people.
5- I feel I do not have much to be proud of. *
6- I take a positive attitude toward myself.
7- On the whole, I am satisfied with myself.
8- I wish I could have more respect for myself. *
9- I certainly feel useless at times. *
10- At times I think I am no good at all. *

* Reverse-scored item

Note- many researchers change the 4-point scale to 5

Appendix B: STAI for trait items

	1	2	3	4
	Not at all	**A little**	**Somewhat**	**Very Much So**
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I feel tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel uncomfortable	1	2	3	4
11. I feel self confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I feel jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

Appendix C: STAI for state items and additional questions

Item Number	Item Formulation
1	I am tense.
2	I feel upset.
3	I am relaxed.
4	I am worried.
5	I feel steady.
6	Since the last time you answered a questionnaire for this study, did you experience any anxiety-evoking event?
7	How stressful was this event?
8	What was the stressful event about? Please, select the most fitting answer.

Appendix D: Informed Consent

Your participation in this survey is completely voluntary and all your responses are treated anonymously. None of the responses will be connected to identifying information. Data will only be used for statistical analyses. However, you can withdraw from the study at any time by simply stopping answering the daily questions without the need to give any reasons.

If you desire to receive further information about the study, please contact Hanna Worm (email: h.worm@student.utwente.nl) or Julia Dreimann (email: j.dreimann@students.utwente.nl).

I read and understood all the above mentioned and agreed to participate in the study. Further, I partake out of my own free will and I am informed that I can withdraw from the study at any time without providing a reason.