BACHELOR THESIS

Measuring the Width of the Window of Tolerance and Associations of Interoceptive Sensibility and Arousal in Student's Daily Life

Matas Matickas

Faculty of Behavioural Management and Social Sciences

Department of Psychology

UNIVERSITY OF TWENTE

1st Supervisor: Dr. Matthijs L. Noordzij

2nd Supervisor: Gerko Schaap

July 21st, 2022

Abstract

The Window of Tolerance (WoT) framework encompasses a wide range of arousal levels in which emotions can be processed without disruption. WoT is commonly used in clinical practice to have a better understanding of emotional fluctuations associated with arousal. Nevertheless, there is an apparent gap in the literature exploring the WoT by quantitative means in the context of daily life, which gives insight into the between and within-subject variability of the WoT. Trait *Interoceptive Sensibility* (IS) defined as a self-report of subjective body awareness was assessed next to the WoT, since increase in body awareness was linked to an increase in self-reported emotional regulation. This study aims to operationalize the WoT by means of arousal levels and empirically investigate between and within-individual differences in the WoT and to explore possible associations between WoT, arousal and IS. As such, a repeated measure design in the context of daily life was conducted over a week with 6 measurements per day. A convenience sampling among students was used (M= 25.47; SD= 8.625; 82.4% females). Body Perception Questionnaire (BPQ) Subscale: Awareness was applied to assess IS. Mean state arousal and IS revealed a significant positive moderate association (β = .35, p<0.01, 95% CI [.23, .50]). The association of the mean state width of the WoT and IS showed a significant weak negative association (β =-.19, p<0.01, 95% CI [-.25, -.13]). There were found significant difference in the width of the WoT between and within participants. Lastly, post-hoc analysis of mean state valence and IS displayed significant strong negative association (β = -.60, p<0.01, 95% CI [-.70, -.51]). The current study provides novel inquiry about the association of trait IS and state arousal and the individual within and between differences in the width of the WoT. Future studies should integrate a more objective tool for measuring IS and to incorporate contextual factors in order to examine the causes of variations.

Key words: arousal, window of tolerance, interoceptive sensibility, ESM

Association Between Width of the Window of Tolerance and Mean Arousal with Interoceptive Sensibility in the Context of Daily Life

One of the central aspects of healthy emotions is the ability to regulate and process emotional experiences (Raju et al. 2018). The capacity to regulate and process emotional states is called the Window of Tolerance (WoT), which refers to the optimal feelings of arousal containing many different emotions (Ogden & Minton, 2000; Siegel, 1999). The framework of WoT and its features are often used in clinical settings in order to understand and explain the disorders that appear due to severe trauma (Corrigan et al. 2011; Ogden et al. 2006). Nevertheless, although the trauma disorders are more comprehensible within the theoretical framework of WoT, WoT framework is still not validated experimentally (Corrigan et al. 2011). What is more, it has been suggested that the WoT differs across people (Corrigan et al. 2011; Siegel, 1999), although the differences in the WoT have not been empirically investigated to the author's knowledge. In addition, due to the essential attributes of emotions and affect, which vary with time (Kuppens, et al. 2010), it is highly likely that there are within-person differences in the WoT, which have not been investigated likewise. As such, the experience sampling methodology (ESM) is used, allowing to investigate the aspect of within differences of the WoT by means of tracking affect levels in real-time (Myin-Germeys & Kuppens, 2022), which grants the access to explore both within and between differences of the individuals.

Although there is very little empirical research into how to quantify the WoT, this research paper takes a first preliminary effort in order to quantify the WoT by means of arousal. This could be achieved through the investigation of personal levels of arousal and personal WoT boundaries, which could contribute to a more accurate assessment in regards to an individual's position in the WoT framework. Nonetheless, outside the WoT, there lies a hyper and hypo arousal states, signifying extremely high or low arousal (Figure 1), where the

arousal and associated emotional states are much more unbearable to the individual. When the tolerance of emotions is crossed into either boundary, people tend to be disturbed by dissociated bodily reactions, such as intrusive sounds, smells, body sensations (Ogden & Minton, 2000). Consequently, the information cannot be effectively processed and new learning is inhibited (Siegel, 1999). This could be especially detrimental to students, since students have a higher stress levels due to academic pressure and higher prevalence of psychological problems (Reddy et al. 2018; Sharp & Theiler, 2018; Weber et al. 2019).

Figure 1

The Window of Tolerance

Sympathetic-dominant Hyperarousal Emotions: rage, panic and terror Behavior: High risk practices, self-injury Bodily reactions: Flight or fight, vigilance, charged
Window of Tolerance Optimal arousal zone with workable ranges of emotion, encompassing intense emotions and states of relaxation, whereas information processing is not disturbed.
Parasympathetic-dominant Hypoarousal Emotions: Hopelessness, dulled feelings, flat affect, numb, helplessness. Behavior: shame, dysthymia, depression, self-contempt Bodily reactions: Low energy, sluggish immobility, shut down.

Thus far, since WoT was not empirically validated, an examination of possibly associated constructs was limited. Since it is argued that an increase in body awareness is associated with an increase in self-reported emotional regulation (Schuette et al. 2021), it

would be valuable to explore the association of WoT and arousal with interoceptive sensibility (IS), relating to self-evaluated assessment of subjective body awareness. Therefore, a novel daily life study, exploring within and between WoT differences in an empirical manner, could contribute to new and exciting insights. Further, the explored associations of IS with WoT and arousal could have the potential to better predict emotions and coping in daily life through possible future interventions.

Window of Tolerance and Arousal

Emotions can be differentiated on a scale from high to low arousal, whereas a wide range of arousal levels are contained within the WoT. According to Siegel (1999), WoT is described as a range of emotions within which the individual is able to experience arousal as tolerable and manageable. According to Corrigan et al. (2011), the system outside the WoT is characterized by an autonomic nervous system (ANS) and its response with sympathetic and parasympathetic nervous systems are associated with hype and hypo aroused states. The elicited behavior is expressed as disorganized movement, impulsivity, and seeking of sensory stimulation with accompanying emotions; rage, panic and terror for hyper aroused state respectively and as low energy, low vitality, passivity and poor eye contact with accompanying emotions; helplessness, hopelessness and despair for hypo aroused state (Corrigan et al. 2011), as illustrated in figure 1.

Consequently, the extremes of hyperaroused and hypoaroused states result in detrimental effects on an individual's physiology and behavior. High-risk practices and self-injury are associated with a hyperaroused state, while shame, dysthymia, depression, self-contempt, and loss of energy are associated with a hypoaroused state (Ogden et al. 2006). It is hypothesized that the corresponding impulsive behaviors, such as substance abuse, seek to regulate low and high arousal states (Corrigan et al. 2011; Raju et al. 2018). Hence, the efforts employed by individuals to obtain emotional regulation by means of dysfunctional behaviors

could result in a disorganized and turbulent experience, rather than goal-directed behavior, resulting in a sense of accomplishment.

The exploration of individual arousal levels coupled with the limits of the WoT could provide more accurate insights into differences in the individual's WoT. According to Raju et al. (2018), the WoT can be wide when the person is able to process high and low arousal, such as excitement and calmness, respectively, and narrow when activation outside the WoT results in a failure to cope with the experience.

Association of Interoceptive Sensibility with Arousal and Width of the WoT

Interoception is defined as the practice of sensing, interpreting, and assimilating sensations of the internal body in a visceral manner (Cameron, 2001; Khalsa, et al. 2018). It is the ability to sense one's internal body states and changes. There are three distinct types of interoception, split into interoceptive accuracy (IC), interoceptive sensibility (IS), and interoceptive awareness (IA) (Garfinkel et al. 2015). The distinction among the types of interoception lies in the measurement instrument or a combination of them, such as objective and subjective measurements, in the manner of heartbeat reports and self-report questionnaires for IC and IS, respectively, and metacognitive awareness for IA (Garfinkel et al. 2015). The subjective dimension of IS, gathered from self-reports, was chosen in the current study since IS was already indicated to predict emotion identification and emotion regulation (Schuette et al. 2021).

Furthermore, interoception may aid in establishing increased access to emotional experience through the processing of emotions by an active response of being aware of the bodily sensations (Ogden et al. 2006). The inspection of internal signals is crucial for guiding self-regulatory behavior (Craig, 2002). Besides, the ability to sense changes, or being highly interoceptive, varies from person to person (Garfinkelet et al. 2015). It is possible that a high-

scoring individual in IS could be more aware of their body and process emotions more efficiently, resulting in the diminishment of abnormal emotional and cognitive experiences.

As such, investigating IS and width of the WoT could be beneficial. It could be valuable to try predict the aspects of width of the WoT from the measurements of IS. In particular, since higher awareness of bodily sensations can promote the processing of unprocessed bodily reactions and help with neural integration (Ogden & Minton, 2000; Rose, 2014). As such, exploring the associations between the width of the WoT and IS could be essential for clinical practice.

The WoT in the Context of Experience Sampling Study

Most conventional cross-sectional methods used in the field of psychology focus on dispositional characteristics and are limited by memory biases (Myin-Germeys et al. 2009; Napa et al. 2009). More precisely, cross-sectional studies are exposed to selection and recall biases, which can affect the results of the study (Talari & Goyal, 2020). Furthermore, the importance of understanding the psychological variables and their expression in different situations was highlighted by researchers in order to grasp the full extent of the conditions under which behavior is elicited (Brunswik, 1949; Cattell, 1957). As such, attention was directed towards the study of personality in a variety of contexts and the utilization of ESM was supported to achieve that (Funder, 2001, as cited in Napa et al. 2009). Consequently, the commencement of experience sampling methodology (ESM), started in the late 1970s and has been attracting more attention in psychological research ever since (Bolger & Laurenceau 2013; Napa Scollon et al. 2009).

ESM, more specifically is used in order to track affect in real-time, which uses self-reports in order to capture momentary experiences and their context, which allows greater generalizability of the research findings (Myin-Germeys & Kuppens, 2022). In addition, the exploration of within-group differences in personality-related constructs has recently

intensified (Mendoza-Denton & Ayduk, 2012). The interest likely originates from increased finding of the variability of the individual's behavior across diverse contexts (Mischel, 2004).

In addition, the research on arousal in the context of ESM has been examined alongside various constructs, such as age, empathy, and emotional labor (Toomey & Rudolph, 2018). Another study in the context of ESM explored pleasure and arousal (Kuppens, 2008). Nevertheless, so far the research into WoT and arousal is scarce and it has not been empirically investigated. By its nature of investigating repeatedly naturally occurring experiences, ESM is an ideal tool to investigate mental states, which allows to uniquely explore within person variability and between person differences (Myin-Germeys et al. 2018), which is essential for the current study, since it is uncertain whether WoT is a stable characteristic within individuals.

Current study

As a consequence of the lack of the measurement tool of the WoT, this study's foremost goal was to investigate WoT from an empirical point of view by integrating arousal into the framework. The current study aimed to investigate the within and between person differences of the WoT in the context of ESM, by means of multiple daily measurements across a span of a week. The arousal scores were applied in order to quantify and examine the WoT. Because the intrinsic aspect of emotions and affect is in its fluctuations over time (Kuppens, et al. 2010), it was expected to find between and within differences in the width of the WoT. First research question has been formulated:

RQ: How does the width of the window of tolerance vary within and between students' as measured in daily life?

Furthermore, IS is explored in relation to arousal. It is stated that monitoring of internal signals is important for guiding self-regulatory behavior (Craig, 2002). As such, it could be beneficial to further identify and examine IS on a trait level and its relation with

arousal on a state level in the current research to test the association between IS and arousal. Since an increase in IS was already associated with increased self-reported emotion regulation (Schuette et al. 2021), it was expected that trait IS would be negatively associated with state arousal. Second research question has been formulated:

RQ: What is the association between trait interoceptive sensibility and mean state arousal in university students' as measured in daily life?

Lastly, the study aimed to explore possible associations between trait IS and the mean width of the WoT state. As a consequence of the lack of research, the ESM study could provide a unique insight into average state levels of WoT in relation to IS as a trait. Considering that higher awareness of bodily sensations can aid in the processing of unprocessed bodily reactions (Ogden & Minton, 2000), it is hypothesized that IS is going to be positively associated with the mean width of the WoT. Third research question has been formulated:

RQ: What is the association between trait interoceptive sensibility and the average width of the window of tolerance among university students?

Methods

Design

A longitudinal data collection design, using The Experience Sampling Method (ESM), also referred as Ecological Momentary Assessment (EMA), was chosen for this study. The method of ESM, provides the opportunity to collect the data in real-time, repeatedly across several days and different occasions in the natural environment (Conner & Mehl, 2015). The collected quantitative data was from a self-report, consisting of trait and daily state measures. The collection of the data took place at University of Twente, starting from 08.04.2022 till 08.05.2022.

Participants

This study applied a convenience sampling strategy among the student population. After filtering the participants, the sample consisted of 17 participants. The standard deviations, percentages and frequencies of demographic variables, age, gender and nationality are displayed in table 1. The participants were recruited through the University of Twente Sona systems, for which a reward of 0.75 sona credits was given, and other social media platforms, such as WhatsApp and Facebook. The inclusion criteria were (1) adequate comprehension of English, (2) willing to download the application "Ethica" and (3) being a university student. These criteria were included in the participation description.

Table 1

Means (M), Standard Deviations (SD), Percentages (%) and Frequencies (N)

Variables	Category	All students, N= 17
Age, M (SD)	Age	25.5 (8.625)
Gender, n (%)	Male	3 (17.6)
	Female	14 (82.4)
Nationality, n (%)	German	14 (82.4)
	Dutch	1 (5.9)
	Chinese	1 (5.9)
	South African	1 (5.9)

The planned sample was 50 participants in the current study in the interest of obtaining 30 participants after filtering. Nevertheless, the current study managed to recruit 32

participants in the original sample, whereas 5 participants were removed due to not fully completing the trait questionnaire, 2 were removed due to dropouts, and 8 were excluded as a consequence of low compliance, resulting in 17 participants. The compliance cutoff point, according to Myin-Germeys and Kuppens (2022), is an arbitrary decision and although Conner and Lehman (2012) recommends a compliance rate of 50%, due to the considerable number of frequencies of measurements per day and the already high number of participants excluded, the current study settled at a 40% compliance rate. Accordingly, the compliance rate for the current study was 41.7%–97.9%.

Materials

The data collection for this study comprise several materials. First of all, participants used their own iOS or Android smartphones in order to fill in online surveys, assessing trait and state levels of psychological constructs: IS, arousal, valence, and width of the WoT respectively. The online questionnaire was created using the online research platform, "Ethica". An additional subsection of questions consisted of "General Feelings," which indicated feelings of states in general but were excluded due to extremely low compliance.

Ethica

In order to assess momentary experiences in real life, an online research platform, called “Ethica” was used. Ethica is a platform that can be used as a web application or a mobile app for researchers and participants, respectively, suitable for iOS and Android devices in order to quantify human behavior. It provides the researcher with the possibility to construct and deploy surveys on different days with fluctuating times, multiple times per day. The automatic notification button with an expiration time reminds the participants to complete the surveys at the specified time interval in order for the measurements to take place at the intended time span. The current study published the surveys within Ethica and disseminated

the instructions to the participants on how to take part in the study using the "Ethica" application on their smartphones.

Trait Questionnaires

Demographics. Participants were asked to report their age, gender, nationality, highest level of education, and occupation.

Body Perception Questionnaire (BPQ) Subscale: Awareness. The trait IS was assessed with a body awareness questionnaire at the start of the survey (see appendix A). Among the awareness subscale, there were other subscales assessing stress response, autonomic nervous system (ANS), stress style, and health history, consisting of 122 item measures for all the subscales (Porges, 1993). The awareness subscale is a self-report that measures individuals' beliefs about their awareness of body processes. The body awareness subscale questionnaire has 45 items, with questions like: *"During most situations, I am aware of swallowing frequently"* and *"During most situations, I am aware of sweat on my forehead"*. Participants were asked to respond to the items on a five point Likert scale from (1= *Never* to 5= *Always*). In order to obtain a score for an awareness subscale, the total score of the participant had to be summed and divided with the number of total questions per subscale, which was by 45 for the awareness subscale (Porges, 1993).

Although there was no supporting publication by the author regarding the development or validation of the questionnaire (Mehling et al. 2009), the subscales of BPQ-SF have established high reliability and validity with one underlying factor (Cabrera et al. 2018). Further, the current study has obtained a Cronbach's Alpha of .92 for BPQ. The reliability of Cronbach's alpha ranges from 0, indicating no internal consistency to 1, which is a perfect internal consistency. For example, the cut out points are .40 for barely acceptable item correlations to .70 for adequate and from .8 and .9 is an indication of excellent reliability

(Shelby, 2011). According to Shelby (2011), a Cronbach's Alpha of.9 is an indication of excellent reliability. This indicates a high reliability of BPQ for the present study.

Daily state Questionnaire

In order to measure if the participants are in the hyper or hypo aroused state at the moment, two items were used: *"Is your experience unbearable right now?"* and *"Do you feel emotionally numb right now, to the point that it is hard to function?"*, on a three-point scale (1=*yes*, 2=*no* and 3=*Almost*). Additionally, two items were used to measure the width of the window of tolerance by incorporating core affect. The core affect consists of two dimensions, activation-deactivation and pleasure-displeasure (Russell, 2009). Although the current study focused on the first dimension, mainly arousal, measured with question: *„Let's say we have a scale of arousal from 0 to 100; the higher the number, the higher the arousal. What number on this scale is your arousal level right now? "*, there was an additional question assessing the dimension of valence: *"On a scale from 0, feeling very unpleasant, to 100, feeling very pleasant.", "What number would you be at right now?".* The last two items were inquiring directly into the hypothetical scores for hyperarousal and hypoarousal: *"Imagine there was a level of arousal on that same scale that would feel like too much for you, to the point of being unbearable." What could be that number for you right now? "*, which measures the upper boundary of the window of tolerance on a 0-100 sliding scale. The lower boundary of the window of tolerance on a 0-100 sliding scale was measured by the question: *"Imagine there was a number on that same scale that would start to feel so low that you would feel emotionally numb and could not function anymore." What could be that number for you right now? "*. Lastly, after each item, a confidence question was asked: *"How confident are you of the answer you just gave?"* on a 5-point Likert scale (1=*Not confident* to 5 = *Completely confident*).

Lastly, psychometric qualities were obtained by means of split half reliability. The longitudinal dataset was split and the mean scores of each individual for the first half of the week were compared to the mean scores of the second half of the week using Pearson correlation analyses, allowing for test-retest reliability of the measurements (Larson & Csikszentmihalyi, 2014; Palmier-Claus et al. 2010). The scores for the arousal means of the first and second half of the week were highly correlated ($r(15) = .84$, $p < .001$). By means of post hoc, moderate correlations were obtained for both halves of the mean valence ($r(15) = .67$, $p < .003$). The upper boundary of both halves had a moderate correlation ($r(15) = .74$, $p < .001$), while high correlations were obtained for the lower boundary of both halves ($r(15) = .96$, $p < .001$).

Procedure

First of all, an ethical approval of the Ethics Committee BMS at the University of Twente was obtained (nr. 220417). Furthermore, a short pilot test by the researchers was carried out in order to test the functionality of the application “Ethica” and the administered surveys. Subsequently, a dissemination process for the questionnaire took place and the data collection ensued. The participants received an invitation link in the email with a short description of how to access the study by means of downloading the application "Ethica." The participants, after signing up to the study by inserting the study code, were further informed by the general information about the research, such as the background of the study and contact information, and were provided a consent form with demographic questions. After filling in the demographic questions, participants received subsequent questions measuring body awareness trait by means of a 45-item questionnaire, taking around 15 minutes to complete while being administered once at the start of the survey. For the following seven days, participants received the state questionnaire six times per day. The triggering logistics for each participant were activated randomly at six different time points within the interval of

one hour. The first triggering logistic started between 9 a.m. and 10 a.m. (valid for 30 minutes), the second between 11 a.m. and 12 p.m., etc., till 8 p.m.

Data Analysis

In order to analyze the data, the data as a CSV file was exported from application "Ethica" and analyzed by means of IBM's 'Statistical Package for the Social Sciences (SPSS) version 28. In order to filter out the participants, only those individuals with a response rate of above 40% for the state questionnaires and those who fully completed the trait questionnaire were included in the final analysis. The two-tailed tests with a significance level of.05< were applied to all the analyses.

To start with, the descriptive statistics were used for the participants to calculate the means, standard deviations, and demographics (gender, nationality and age). Likewise, descriptive scores were established for confidence states, mainly for arousal, valence, and upper and lower boundaries of the WoT, providing clustering of confidence in the answers of respected states. Similarly, the procedure was carried out for the Body Perception Questionnaire (BPQ), measuring trait IS, state arousal, state valence, state width of the WoT and upper and lower boundaries of the WoT, which included minimum and maximum scores, mean and standard deviations. Boxplots were created to examine the variability within and between participants for state arousal, state valence, and state width of the WoT on a momentary basis.

Further, since the levels of state arousal, state valence, and state width of the WoT were assessed at multiple points in time, a time point variable was created in order to count each momentary assessment, which resulted in 43 time points per participant. Next to that, the width of the WoT was obtained by means of subtracting the state measures of the upper boundary by the corresponding state of the lower boundary of the WoT. To account for missing measurements, an autoregressive covariance structure with homogenous variance was

applied (AR1) (Curran & Bauer, 2011). Further, "Participants" was set as the subject variable, while "Time Point" was the repeated variable. An estimated marginal mean (EMM) of each individual score and measurement points was computed by means of a multiple linear mixed model (LMM) analysis.

Prior to the analysis, the variables were standardized. In the LMM analyses, the state arousal, state valence, state width of the WoT, and state upper and lower boundaries of the WoT were set as dependent variables, and the fixed independent factor was set to be either "Participants" or "Measurements points". Several LMM analyses were applied on standardized variables in order to establish the associations between states and between mean state scores of arousal, valence, and width of the WoT and the trait IS variable, where IS was a covariate variable with fixed effect. For example, a linear mixed model association between state width of the WoT and state arousal was established by setting state width of the WoT as a dependent variable and state arousal as a covariate variable with a fixed effect.

Results

Most of the momentary measurements of the participants indicated that they are in their WoT 94.5%. Only .9% of the measurements indicated being in the upper boundary, outside the limits of the WoT, and 1.9% of measurements indicated being in the lower boundary, outside the limits of the WoT. The descriptive statistics, the minimum, maximum, means, and standard deviations of the trait IS, state arousal, state valence state width of the WoT and state upper and lower boundaries of the WoT are displayed in table 2. Further, a Shapiro-Wilk's test ($W = 0.94$ $p > .36$) (Shapiro & Wilk, 1965; Razali & Wah, 2011), showed that the body awareness questionnaire was approximately normally distributed.

Table 2

Minimum, Maximum, Mean and Standard Deviation of Trait Interoceptive Sensibility, State variables Arousal, State Valence and Width of the WoT, WoT Lower limits and WoT Upper Limits

Variables	Minimum (Scale Minimum)	Maximum (Scale Maximum)	Mean	Std. Deviation
IS	1.4	3.9	2.7	.54
State Arousal	28.7	79.3	60.4	12.9
State Valence	26.2	82.9	57.5	14.6
WoT-Upper Boundary	80.1	99.3	89.1	5.3
WoT-Lower Boundary	.08	51.6	23.2	12.9
Width of WoT	33.3	99.3	65.9	15.6

Note. IS= Interoceptive Sensibility, WoT= Window of Tolerance.

Confidence Descriptive Scores

The measurement confidences, arousal, valence, and upper and lower boundaries of WoT, are illustrated in table 3. The majority of confidence ratings were indicated as 3 (*fairly confident*), while 5 (*Slightly confident*), 4 (*Somewhat confident*), 2 (*Completely confident*), and 1 (*Not confident*) followed, respectively, whereas 1 (*Not confident*) had the least answers. This indicates that the variation in confidence ratings is small and most of the answers cluster towards 3 (*fairly confident*), indicating that the questions made sense to the participants.

Table 3

Confidence of the Participants for the Measurements

Confidence ratings	Arousal	Valence	Upper WoT Boundary	Lower WoT Boundary
Not confident, n (%)	4 (.9)	1 (.2)	6 (1.3)	4 (.9)
Slightly Confident, n (%)	63 (13.6)	62 (13.5)	56 (12.1)	75 (16.3)
Somewhat confident, n (%)	61 (13.2)	48 (10.5)	63 (13.7)	53 (11.5)
Fairly confident, n (%)	323 (69.9)	333 (72.7)	303 (65.7)	298 (64.6)
Completely confident, n (%)	11 (2.4)	14 (3.1)	33 (7.2)	31 (6.7)

Variability of the Window of Tolerance

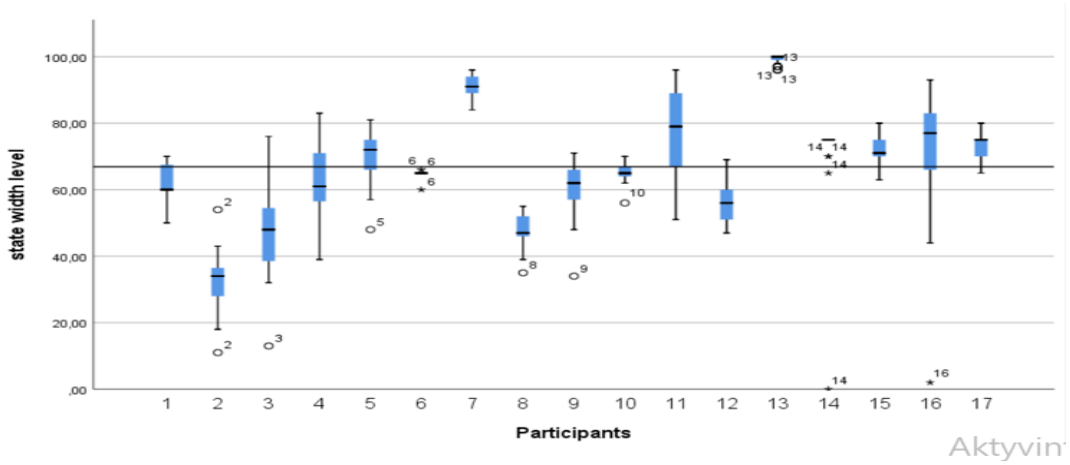
The participants reflected a considerable variability in the state width of the WoT, both within-person and between-persons (see figure 2). Analysis of mixed linear models was used to calculate the estimated marginal mean of the state width of the WoT per person. Factor "participant" had a significant fixed effect ($F = 73.3$, $p<0.01$), which indicates significant differences between participants. The fixed effect "Measurement point" was not significant on

the estimated mean of state width of the WoT among participants (F =.59, p =.99), which indicates no influence of time measurement in the data.

Participant 13 is shown to have the highest between person variability, with a mean of 99.3, and participant 2 has the lowest variability, with a mean of 33.3, respectively. The within person variation is also displayed in figure 2, indicating different levels of width of the WoT per participant at different measurements. Participants 11 and 16 are showing the biggest variability in their width of the WoT, and participants 13 and 6 have the smallest within differences, respectively.

Figure 2

Variation of the Width state of the WoT for Each Participant with a Reference Line Indicating the Group Mean (M= 65.9).



In addition, in order to calculate estimated marginal means, mixed modelling analysis was conducted for state arousal and state valence. There was a significant effect of mean state arousal (F = 15.58, p<0.01) and mean state valence (F = 15.2, p<0.01). As illustrated in figures 3 and 4 for mean state arousal and mean state valence respectively, there was found substantial within and between person differences. Correspondingly, participant 13 within variability is the highest in state arousal and state valence, while participant 3 variability in

state arousal is the smallest, but not in state valence. (See appendix B for additional width of the WoT visualization).

Figure 3

The Mean State Arousal per Participant with a Reference Line Indicating the Group Mean (M= 60.4).

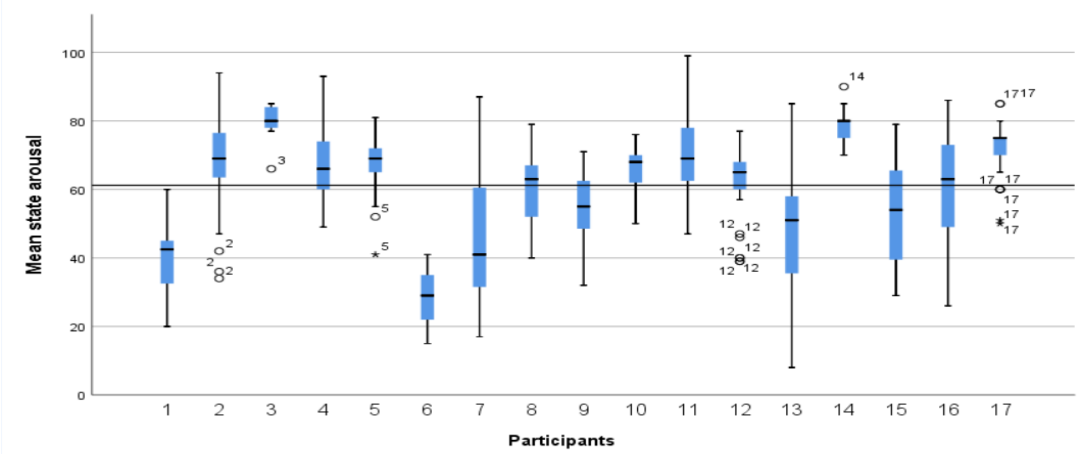
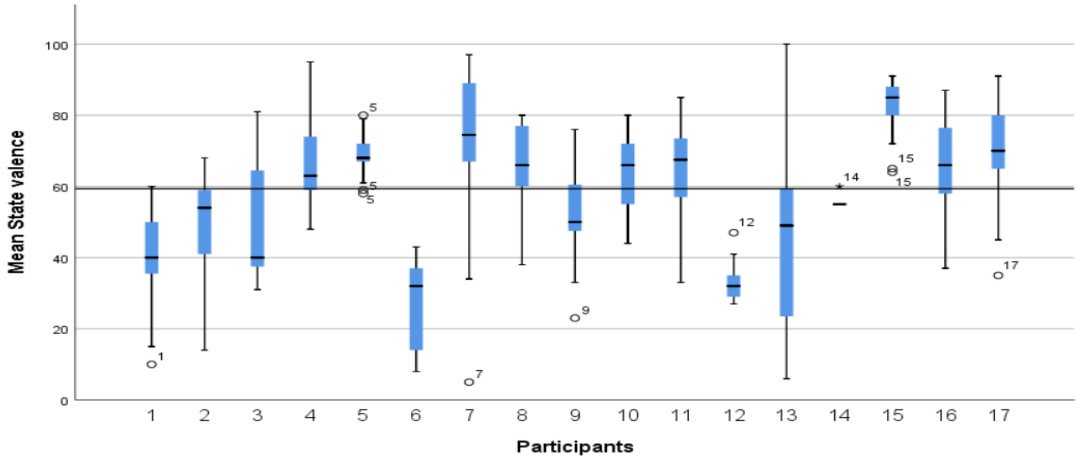


Figure 4

The Mean State Valence per Participant with a Reference Line Indicating the Group Mean (M=57.5).



The Associations Between Trait Interoceptive Sensibility and Mean States

Again, multiple mixed linear model analysis was conducted in order to test the associations between trait IS and mean state arousal and mean state valence and mean state width of the WoT. The associations between mean state arousal and IS show moderate significant positive effect ($\beta = .35$, $p < 0.01$, 95% CI [.23, .50]). Mean state valence and IS association on the other hand, shows significant moderate to strong negative effect ($\beta = -.60$, $p<0.01$, 95%CI [-.70, -.51]). Lastly, the association of mean state width of the WoT and trait IS show significant weak negative effect ($\beta =-.19$, $p<0.01$, 95% CI [-.25, -.13]).

Discussion

The purpose of this study was to investigate in the moment experiences of state arousal and state width of the WoT in relation to trait IS in the daily life in order to explore within and between differences in the Widh of the WoT of the students. Second, the associations between IS, mean state arousal, and mean state width of the WoT were explored. The results of this study indeed revealed substantial differences and variability in the width of the WoT within and between students. What is more, the associations between trait IS and mean state arousal unexpectedly had significant positive moderate associations. This means that, contrary to the original assumption, students with a higher level of trait IS also experienced a higher mean level of state arousal. Furthermore, trait IS was also weakly negatively associated with the mean state width of the WoT. Unexpectedly, this suggests that higher trait IS is associated with narrower WoT.

Lastly, there were some interesting post hoc findings. A moderate to strong negative association was found between IS and mean state valence. This unforeseen finding reveals that students with a higher level of trait IS feel more negative emotions. What is more, most of the confidence answers were clustered around 3 (*fairly confident*) for the state measures

across all measurements. This indicates that students were considerably confident in their answers.

State Width of the WoT in Daily Life

There was an indication of a difference in the mean of the width of the WoT levels across all participants. This suggests that the state width of the WoT is different between university students of this sample. This is according to the literature, since it has been suggested that the WoT differs across people (Corrigan et al. 2011; Siegel, 1999). The differences in the WoT could be accounted for by personal experiences of participants, such as trauma and personal disasters, which shape the sensitiveness of the individual's physiology and response to arousal (Corrigan et al. 2011; Ogden et al. 2006; Raju et al. 2018). Further observations and analyses indicate that besides between-person differences in the width of the WoT, there is a within-person variation over time. Some students had big variations in their WoT while others did not, indicating the fluctuating nature of the WoT within participants. This suggests the innate varying boundaries of the WoT. These variations of the WoT could be due to an essential attribute of emotions and affect, which varies with time (Kuppens, et al. 2010). Nonetheless, since this study did not examine the students' situational or environmental context during the measurement points, personal reasons for these variations cannot be presented, which would require additional examination.

Points to consider with regards to the variability of the width of the WoT is that the sample of this study contained a student population, where most of the students indicated being inside their WoT for most of the measurements. In addition, the sample contained mostly female representatives. According to Fabes (1994), there are gender differences in emotional reactivity and regulation. This could suggest that this particular variability of the WoT might be due to the overrepresentation of females in this sample. Lastly, students in general are identified as having a high perverseness of psychological problems and distress

coupled with academic pressure (Reddy et al. 2018; Sharp & Theiler, 2018; Weber et al. 2019).

The Association between States and Trait IS

The results indicated a moderate positive association between mean state arousal and trait IS, which suggests that students with a higher level of trait IS are experiencing higher mean levels of state arousal. The findings are contradictory to the hypotheses, since higher IS levels were argued to be associated with an increase in self-reported emotional regulation (Schuette et al. (2021). This is achieved through awareness of bodily sensations, which aids the processing of unprocessed bodily reactions and supports the neural integration (Ogden & Minton, 2000; Rose, 2014). As such, it was presumed that IS is negatively associated with arousal and that increased scores in IS would result in a decrease in arousal. It could be that students with higher arousal levels in general are more prone to perceiving somatic changes due to an already heightened state of arousal (Kirmayer & Looper, 2006). This could inflate scores on self-reported beliefs about the aptitude of body awareness.

Trait IS also had a weak negative association with the mean state levels of the width of the WoT, which may suggest a narrower WoT for students with higher scores on IS. Conversely, it was hypothesized that the width of the WoT is associated with a wider WoT. It was argued that by means of increased awareness of the body, autonomic arousal decreases, which allows easier processing of emotions (Ogden et al. 2006). Nevertheless, according to Mehling, et al. (2009), a heightened focus on somatic information could be potentially distressing. What is more, disturbances in physiological systems may account for attention to bodily sensations (Kirmayer & Looper, 2006). As such, an individual who is paying too much attention to his bodily sensations might already be experiencing more arousal.

Further, post hoc analysis of mean state levels of valence demonstrate a significant, moderate-to-strong negative association with trait IS. This negative association indicates that

students with higher scores on trait IS are experiencing higher levels of negative valence. It is contrary to the literature that portrays body awareness and its merits in emotional regulation, which allows goal-directed behavior (Raju et al. 2018). There are a couple of interpretations. First of all, the association could stem from the fact that participant's ability in IS could be influenced by negative valence, by means of students' attending to somatic experience more often when it is induced by negative emotion (Feldman, 1995). Second, it could be an insufficiency of the measurement instrument. According to Schuette et al. (2021), the Porges questionnaire used to assess IS might be prone to catching attention to somatic symptoms. As such, the items on IS could have been more negatively correlated.

Strengths and Limitations

Several strengths could be drawn from the present study. First of all, this study contributes to the limited literature on the window of tolerance (WoT) and the associations between arousal levels and the width of the WoT with IS in the context of daily life. Daily life studies are important in order to collect fluctuating experiences, which are an essential attribute of emotions and affect. It is the application of the experience sampling methods (ESM), which provides unique insights into the variability of within and between students' differences in real life, next to conventional methods of measuring trait variables (Kuppenset et al. 2010). In line with that, most studies neglect this differentiation while focusing mainly on dispositional characteristics and abandoning state fluctuations, which are crucial in investigating distinct concepts by means of repeated measurements and accounting for different effects. Accordingly, the ESM further enhances ecological validity along with external and construct validity (Trull & Ebner-Priemer, 2009), through the seizure of momentary experiences and their context (Myin-Germeys & Kuppens, 2022). This provides insights into naturally occurring experiences, which increases the extent to which this study and its findings could be applied to real-life.

Second, the design of this study is a block random sampling design, which is advantageous, since participants are signaled to complete a questionnaire at random points within fixed time intervals, which allows the researcher to ensure that the samples are taken across the entire day and reduces "anticipatory behavioural change" (Carter, 2016). Additionally, this study contributed to the investigation of arousal and WoT in a sample of the student population. It is important, since students experience average to high stress due to academic pressure (Reddy et al. 2018; Weber et al. 2019). This could result in high arousal levels, and it is important to investigate if the arousal levels could be associated with IS. More importantly, since IS could predict self-regulatory behavior (Schuette et al. 2021). The present study provides novel findings and is unique in that it tries to fill in the gap in the literature by providing a preliminary attempt for investigations on the WoT, on which literature is very scarce. As a result, the present study, by means of incorporating within and between individual differences in the context of daily life and encompassing IS and its associations with the state width of the WoT and state arousal, could provide a reference for further investigation and research into WoT.

However, some potential limitations and shortcomings should also be taken into consideration concerning the interpretation of the results of the study. To begin with, the sample size for the current study was limited to 17 participants. A median number of 19 participants was found for ESM studies (Van Berkel et al. 2017). As such, in order to assure that the study is not underpowered and has adequate statistical power, a bigger sample size would be preferable in order to have a good representation of the population. Likewise, both the sample and sampling method of the present study could be improved. Most of the participants recruited for the study took part in the study based on snowball convenience sampling methods, which produced an overrepresentation of females, (82.4%). Hence, the results might be more applicable to female students' rather than the general population of

students'. Further, the measurement tool of IS by means of a self-report could be biased as a results of requiring retrospective recall (Myin-Germeys et al. 2009).

Lastly, a further limitation lies in the use of single-item questions as state measures in the interest of diminishing participant burden (Conner & Lehman, 2012). Nevertheless, this could have clear limitations and consequences for the weak associations of state measures with corresponding trait measures, which could bring validity into question. This emphasizes the need to formulate standardizable and definable state questions and responses, measuring arousal and the width of the WoT at the state-level. As a consequence, in order to prevent this limitation and ensure the validity of the measurement, it is advised to use multiple items instead of a single item in order to measure the constructs (Thies & Kordts-Freudinger, 2019).

Practical Implications and Directions for Future Research

An important practical implication of the study would be in its incorporation of a more objective measurement tool assessing trait interoception next to interoceptive sensibility, such as interoceptive accuracy (AC). According to Garfinkel et al. (2015), AC is a central construct and basis for other interoceptive measures, which is measured by means of an objective interoceptive tasks and tools, such heartbeat tracking tasks and heartbeat detectors respectively. It would be interesting to explore associations between the trait-based self-reported beliefs about the aptitude for body awareness and actual objective measurements in order to support the overall validity of associations between the constructs and to explore the differences between the associations with state variables.

Furthermore, this study did not examine the students' situational or environmental context during the measurement period, which could be of further interest in order examine the causes of variation in experiences in state variables between and within participants. Hence, it could be advisable for future studies to incorporate additional categorical variables in the state questionnaire, such as the cause of arousal and satisfaction variables, for example.

Moreover, further research could examine other parts of the population with bigger samples in order to draw inferences about the wider array of people or target a more inclusive sample, representative of the more general population. Finally, with regards to the findings of the study, it might be possible that there are many other components that operate between and within individuals which can influence levels of arousal and levels of state width of the WoT. Therefore, it would be of interest to identify those variables with future research.

Conclusion

In conclusion, the results of this study contributed to the ESM research and its assumption towards the variability of affect and its change over time. The present study provides novel evidence about the association of IS and mean state arousal and mean width of the WoT of the participants. In particular, there were found to be between and within-person variations of mean state arousal and mean width of the WoT. What is more, there was found a moderate significant positive effect between trait IS and mean state arousal, while mean state width showed significant weak negative effect respectively. Consequently, the findings suggest the need to replicate the study in order to account for potential contextual factors with a larger and more diverse sample size. Lastly, this study provides further directions and ideas for research into the WoT.

References

Adler, J., & Parmryd, I. (2010). Quantifying colocalization by correlation: the Pearson correlation coefficient is superior to the Mander's overlap coefficient. Cytometry Part A, 77(8), 733-742. https://doi.org/10.1002/cyto.a.20896

Bolger, N., & Laurenceau, J. P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. Guilford press.

Brunswik, E. (1949). Systematic and representative design of psychological experiments. With results in physical and social perception. In *Proceedings of the [First] Berkeley symposium on mathematical statistics and probability* (Vol. 1, pp. 143-203). University of California Press.

Cabrera, A., Kolacz, J., Pailhez, G., Bulbena-Cabre, A., Bulbena, A., & Porges, S. W. (2018). Assessing body awareness and autonomic reactivity: Factor structure and psychometric properties of the Body Perception Questionnaire-Short Form (BPQ-SF). *International Journal of Methods in Psychiatric Research*, *27*(2), e1596–e1596. https://doi.org/10.1002/mpr.1596

Carter, L. A. (2016). *Rigorous methods for the analysis, reporting and evaluation of ESM style data*. The University of Manchester (United Kingdom).

Cattell, R. B. (1957). Personality and motivation structure and measurement.

Chen, T., & Lucock, M. (2022). The mental health of university students during the COVID-19 pandemic: An online survey in the UK. *PLoS One*, *17*(1), e0262562.

Conner, T. S., & Lehman, B. J. (2012). Getting started: Launching a study in daily life. In M. R. Mehl & T. S. Conner (Eds.), Handbook of research methods for studying daily life (pp. 89–107). The Guilford Press.

Conner, T. S., & Mehl, M. R. (2015). Ambulatory assessment: Methods for studying everyday life. Emerging trends in the social and behavioral sciences: An

interdisciplinary, searchable, and linkable resource, 1-15. https://doi.org/10.1002/9781118900772.etrds0010

Corrigan, F. M., Fisher, J. J., & Nutt, D. J. (2011). Autonomic dysregulation and the Window of Tolerance model of the effects of complex emotional trauma. *J Psychopharmacol, 25*(1), 17-25. doi:10.1177/0269881109354930

Critchley HD, Wiens S, Rotshtein P, Ohman A, Dolan RJ (2004). Neural systems supporting interoceptive awareness. Nat Neurosci 7: 189–195.

Curran, P. J., & Bauer, D. J. (2011). The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. Annual Review of Psychology, 62(1), 583-619. Doi:10.1146/annurev.psych.093008.100356

Fabes RA. 1994. Physiological, emotional, and beha-vioral correlates of gender segregation. New DirChild Dev 65:19–34.

Feldman, L. A. (1995). Valence focus and arousal focus: Individual differences in the structure of affective experience. *Journal of personality and social psychology*, *69*(1), 153.

Funder, D. C. (2001). Personality. *Annual Review of Psychology, 52*(1), 197-221. doi:10.1146/annurev.psych.52.1.197

Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: distinguishing interoceptive accuracy from interoceptive awareness. *Biol Psychol, 104*, 65-74. doi:10.1016/j.biopsycho.2014.11.004

Khalsa, S. S., Adolphs, R., Cameron, O. G., Critchley, H. D., Davenport, P. W., Feinstein, J. S., et al. (2018). Interoception and mental health: a roadmap. *Biological Psychiatry Cognitive Neuroscience and Neuroimaging, 3*(6), 501–513. https ://doi.org/10.1016/j.bpsc.2017.12.004.

Kuppens, P. (2008). Individual differences in the relationship between pleasure and arousal. *Journal of Research in Personality*, *42*(4), 1053-1059.

Kuppens, P., Oravecz, Z., & Tuerlinckx, F. (2010). Feelings change: accounting for individual differences in the temporal dynamics of affect. *J Pers Soc Psychol, 99*(6), 1042-1060. doi:10.1037/a0020962

Kirmayer, L. J., & Looper, K. J. (2006). Abnormal illness behaviour: physiological, psychological and social dimensions of coping with distress. *Current Opinion in Psychiatry*, *19*(1), 54-60.

Larson, R., & Csikszentmihalyi, M. (2014). The experience sampling method. In *Flow and the foundations of positive psychology* (pp. 21–34). Springer, Dordrecht.

Mather, M., & Sutherland, M. (2009). Disentangling the effects of arousal and valence on memory for intrinsic details. *Emotion Review*, *1*(2), 118-119.

Mehling, W. E., Gopisetty, V., Daubenmier, J., Price, C. J., Hecht, F. M., & Stewart, A. (2009). Body awareness: construct and self-report measures. *PLoS One, 4*(5), e5614. doi:10.1371/journal.pone.0005614

Mischel, W. (2004). Toward an integrative science of the person. Annual Review of Psychology, 55, 1–22. http://dx.doi.org/10.1146/annurev .psych.55.042902.130709

Mendoza-Denton, R., & Ayduk, Ö. (2012). Personality and social interaction: Interpenetrating processes. In K. Deaux & M. Snyder (Eds.), The Oxford handbook of personality and social psychology (pp. 446 – 466). New York, NY: Oxford University Press.

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

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

Myin-Germeys, I., Oorschot, M., Collip, D., Lataster, J., Delespaul, P., & Van Os, J. (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological medicine*, *39*(9), 1533-1547.

Napa Scollon, C., Prieto, C. K., & Diener, E. (2009). Experience sampling: promises and pitfalls, strength and weaknesses. In *Assessing well-being* (pp. 157-180). Springer, Dordrecht.

Ogden, P., & Minton, K. (2000). Sensorimotor psychotherapy: One method for processing traumatic memory. *Traumatology, 6*(3), 149-173. doi:10.1177/153476560000600302

Ogden, P., Pain, C., & Fisher, J. (2006). A sensorimotor approach to the treatment of trauma and dissociation. *Psychiatr Clin North Am, 29*(1), 263-279, xi-xii. doi:10.1016/j.psc.2005.10.012

Palmier-Claus, J. E., Myin-Germeys, I., Barkus, E., Bentley, L., Udachina, A., Delespaul, P. A. E. G., … Dunn, G. (2010). Experience sampling research in individuals with mental illness: reflections and guidance. Acta Psychiatrica Scandinavica, 123(1), 12–20. https://doi.org/10.1111/j.1600-0447.2010.01596.x

Porges, S. (1993). Body perception questionnaire. *Laboratory of Developmental Assessment, University of Maryland*.

Pronk, T., Molenaar, D., Wiers, R.W. et al. Methods to split cognitive task data for estimating split-half reliability: A comprehensive review and systematic assessment. Psychon Bull Rev (2021). https://doi.org/10.3758/s13423-021-01948-3

Raju, R., Corrigan, F. M., Davidson, A. J. W., & Johnson, D. (2018). Assessing and managing mild to moderate emotion dysregulation. *Advances in Psychiatric Treatment, 18*(2), 82-93. doi:10.1192/apt.bp.107.005033

Reddy, K. J., Menon, K. R., & Thattil, A. (2018). Academic stress and its sources among university students. Biomedical and Pharmacology Journal, 11(1), 531-537. Doi: 10.13005/bpj/1404

Russell, J. A. (2009). Emotion, core affect, and psychological construction. *Cognition & Emotion, 23*(7), 1259-1283. doi:10.1080/02699930902809375

Schuette, S. A., Zucker, N. L., & Smoski, M. J. (2021). Do interoceptive accuracy and interoceptive sensibility predict emotion regulation? *Psychol Res, 85*(5), 1894-1908. doi:10.1007/s00426-020-01369-2

Sharp, J., & Theiler, S. (2018). A review of psychological distress among university students: Pervasiveness, implications and potential points of intervention. *International Journal for the Advancement of Counselling*, *40*(3), 193-212.

Shelby, L.B. (2011). Beyond cronbach's alpha: considering confirmatory factor analysis and segmentation. An international journal, 16, 142-148. doi: 10.1080/10871209.2011.537302

Siegel, D. J. (1999). *The developing mind: Toward a neurobiology of interpersonal experience*. Guilford Press.

Talari, K., & Goyal, M. (2020). Retrospective studies–utility and caveats. *Journal of the Royal College of Physicians of Edinburgh*, *50*(4), 398-402.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International journal of medical education, 2, 53-55. doi: 10.5116/ijme.4dfb.8dfd

Thies, K., & Kordts-Freudinger, R. (2019). University academics' state emotions and appraisal antecedents: an intraindividual analysis. Studies in Higher Education, 44(10), 1723-1733. doi:10.1080/03075079.2019.1665311

Toomey, E. C., & Rudolph, C. W. (2018). Age-conditional effects in the affective arousal, empathy, and emotional labor linkage: Within-person evidence from an experience sampling study. *Work, Aging and Retirement*, *4*(2), 145-160.

Trull, T. J., & Ebner-Priemer, U. W. (2009). Using Experience Sampling Methods/Ecological

Van Berkel, N., Ferreira, D., & Kostakos, V. (2017). The experience sampling method on mobile devices. ACM Computing Surveys (CSUR), 50(6), 1-40. https://doi.org/10.1145/3123988

Verhagen, S. J., Hasmi, L., Drukker, M., van Os, J., & Delespaul, P. A. (2016). Use of the experience sampling method in the context of clinical trials. Evidence-based mental health, 19(3), 86-89. http://dx.doi.org/10.1136/ebmental-2016-102418

Weber, J., Skodda, S., Muth, T., Angerer, P., & Loerbroks, A. (2019). Stressors and resources related to academic studies and improvements suggested by medical students: a qualitative study. *BMC Medical Education*, *19*(1), 312. https://doi.org/10.1186/s12909-019-1747-z

Appendices

Appendix A: Body Awareness Questionnaire by Porges

Imagine how aware you are of your body processes. Select the answer that most accurately describes you. Rate your awareness on each of the characteristics described in Table E.1, using the following five-point scale:

Table E.1 The Body Perception Questionnaire by Porges[2]

I. Awareness					
During most situations, I am aware of:					
1. Swallowing frequently.	1	2	3	4	5
2. A ringing in my ears.	1	2	3	4	5
3. An urge to cough to clear my throat.	1	2	3	4	5
4. My body swaying when I am standing.	1	2	3	4	5
5. My mouth being dry.	1	2	3	4	5
6. How fast I am breathing.	1	2	3	4	5
7. Watering or tearing of my eyes.	1	2	3	4	5
8. My skin itching.	1	2	3	4	5
9. Noises associated with my digestion.	1	2	3	4	5
10. Eye fatigue or pain.	1	2	3	4	5
11. Muscle tension in my back and neck.	1	2	3	4	5
12. A swelling of my body or parts of my body.	1	2	3	4	5
13. An urge to urinate.	1	2	3	4	5
14. A tremor in my hands.	1	2	3	4	5
15. An urge to defecate.	1	2	3	4	5
16. Muscle tension in my arms and legs.	1	2	3	4	5
17. A bloated feeling because of water retention.	1	2	3	4	5
18. Muscle tension in my face.	1	2	3	4	5
19. Goose bumps.	1	2	3	4	5
20. Facial twitches.	1	2	3	4	5
21. Being exhausted.	1	2	3	4	5
22. Stomach and gut pains.	1	2	3	4	5
23. Rolling or fluttering my eyes.	1	2	3	4	5
24. Stomach distension or bloatedness.	1	2	3	4	5
25. Palms sweating.	1	2	3	4	5
26. Sweat on my forehead.	1	2	3	4	5
27. Clumsiness or bumping into people.	1	2	3	4	5
28. Tremor in my lips.	1	2	3	4	5
29. Sweat in my armpits.	1	2	3	4	5
30. Sensations of prickling, tingling, or numbness in my body.	1	2	3	4	5
31. The temperature of my face (especially my ears).	1	2	3	4	5
32. Grinding my teeth.	1	2	3	4	5
33. General jitteriness.	1	2	3	4	5
34. Muscle pain.	1	2	3	4	5
35. Joint pain.	1	2	3	4	5
36. Fullness of my bladder.	1	2	3	4	5
37. My eye movements.	1	2	3	4	5
38. Back pain.	1	2	3	4	5
39. My nose itching.	1	2	3	4	5
40. The hair on the back of my neck “standing up.”	1	2	3	4	5
41. Needing to rest.	1	2	3	4	5
42. Difficulty in focusing.	1	2	3	4	5
43. An urge to swallow.	1	2	3	4	5
44. How hard my heart is beating.	1	2	3	4	5
45. Feeling constipated.	1	2	3	4	5

Appendix B: Figure 2.

A Histogram Portraying State Width variability between participant for additional visualization.