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# MEASURING MINDFULNESS AND SELF-COMPASSION:

# A QUESTIONNAIRE AND ERP STUDY

Master's Thesis

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Running head: Measuring mindfulness and self-compassion

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## Kokkuvõte

## Mõõtes teadvelolekut ja enesesõbralikkust:

## Enesekohaste küsimustike ja ERP uuring

***Eesmärk:*** Käesoleva uuringu esimene eesmärk oli Viie Faktorilise Teadveloleku Skaala (VFTS) ja Enesesõbralikkuse Skaala (ESS) faktorstruktuuride sobivuse kinnitamine eesti keele kõnelejatele. Sellega seotult sooviti selgitada teadveloleku ja enesesõbralikkuse omavahelisi seoseid. Viimaseks uuriti aju elektriliste sündmuspotentsiaalide abil, kuidas erinevad VFTSi ja ESSi alaskaalad on seotud psühhofüsioloogiliselt hinnatud afektiivse reaktiivsusega. ***Meetod*****:** Küsimustike täitmises osales 237 (53 meest) katseisikut, kellest 23 (5 meest) osalesid ka afektiivses katses. Küsimustikke analüüsiti kinnitava faktoranalüüsi abil, mille järel võrreldi 11 alaskaala omavahelisi korrelatsioone. Katses vaatasid katseisikud stiimulpilte, kasutades erinevaid afektiivse regulatsiooni tehnikaid (teadvelolek, tähelepanu kõrvalejuhtimine, lihtsalt vaatamine), mille abil oli võimalik hinnata, mil määral ennustavad küsimustikega mõõdetavad omadused madalamat hilist sündmuspotentsiaali (*Late Positive Potential* – LPP) kui afektiivse reaktiivsuse markerit. ***Tulemused*****:** Kinnitava faktoranalüüsi tulemused näitasid, et originaalskaalade faktorstruktuur sobitub ka antud uuringu andmetele. VFTKi aktsepteerimisega seotud alaskaalad ja ESSi alaskaalad korreleerusid tugevalt. VFTKi Vaatlemise alaskaala oli ainuke, mis ennustas LPP-d, kuid oodatule vastupidises suunas. ***Järeldused*****:** VFTKiga mõõdetud aktsepteerimine ja ESSiga mõõdetud enesesõbralikkus on suures osas kattuvad konstruktid. Vaatlemine on teadvelolekuks tarvilik faktor, mis vähemalt meditatsiooniga mitte kokkupuutunud inimestel arvatavalt eelneb aktsepteerimisele ega pruugi toimuda sellega samaaegselt.

Märksõnad: teadvelolek, enesesõbralikkus, ERP, LPP, VFTK, ESS, Vaatlemine, tähelepanu, aktsepteerimine, afektiivne reaktiivsus

**Abstract**

***Objective:*** The present study aimed to first confirm the factor structures of the Five Facet Mindfulness Questionnaire (FFMQ) and Self-Compassion Scale (SCS) for the use in Estonian language, and then to provide clarification on how the mindfulness and self-compassion constructs are related to one another. The next aim was to deepen the understanding on how different FFMQ and SCS subscales correlate with psychophysiological Event-related Potential (ERP) data, measuring affective reactivity. ***Method:*** The questionnaire portion of the study included 237 (53 male) participants, out of whom 23 (5 male) particiapted in the experimental ERP portion of the study. For questionnaire portion Confirmatory Factor Analysis (CFA) was performed and correlations among 11 subscales analyzed. During the ERP portion, participants engaged in a picture-viewing task using different affect regulation strategies (i.e., mindful, distract, watch) to assess whether any of the FFMQ and SCS subscales relate to affective reactivity, employing Late Positive Potential (LPP) as a marker. ***Results*****:** The CFA fit indices for the Estonian FFMQ and SCS endorsed the original scales' factor structures. The FFMQ acceptance related subscales and SCS subscales were highly intercorrelated. Observe subscale from the FFMQ was the only subscale predicting the LPP measured affective reactivity, elbeit to the opposite direction than predicted. ***Conclusion*****:** FFMQ measured acceptance and SCS measured self-compassion appear to be highly overlapping constructs. Observing is a necessary factor of mindfulness, which at least in non-meditator populations is thought to precede, and might not co-occur with acceptance.

Keywords: mindfulness, self-compassion, ERP, LPP, FFMQ, SCS, Observing, attention, acceptance, affective reactivity

**Mindfulness.**

The Western world concept of mindfulness usually entails two aspects – an attentional aspect of keeping awareness in the present and an acceptance aspect of relating to one's experiences nonjudgmentally. A pioneering researcher of mindfulness, Jon Kabat-Zinn (1994, p.4), defines mindfulness as "paying attention in a particular way, on purpose, in the present moment, and non-judgmentally". Similarly, Bishop, Lau, Shapiro, Carlson, Anderson, Carmody…,Devins (2004) operationalize it as (1) self-regulation of attention, maintaining it in the present moment, immediate experiences and (2) orienting towards these present-moment experiences with curiosity, openness and acceptance. For some, a narrower focus on attentional aspects is maintained. Brown & Ryan (2003) view mindfulness as "a receptive attention to and awareness of the present moment"; Malinowski's (2013) Liverpool Mindfulness model proposes the development of several attentional skills, including sustaining attention, mind-wondering, monitoring attention, disengaging from distractions and shifting attention central to mindfulness. Yet, for others, even more components, like non-reactivity, compassion and self-compassion (e.g., Baer et al., 2010; Kabat-Zinn, 2013; Shapiro & Schwartz, 1999; Reibel et al., 2001), are included. Although there is still no unanimous operational definition of mindfulness, general agreement seems to exist regarding the involvement of attention in mindfulness.

As with the plurality of definitions, there are number of ways to cultivate mindfulness. A tandem of techniques and interventions have been developed bearing clinical practice in mind (e.g., Mindfulness Based Cognitive Therapy MBCT; Segal, Williams, & Teasdale, 2002; Mindfulness Based Stress Reductions MBSR; Kabat-Zinn, 1990, Components of Dialectical Behavior Therapy DBT; Linehan, 1993, Acceptance and Commitment Therapy, ACT; Hayes, Strosahl, & Wilson, 1999). Despite significant differences (Chiesa & Malinowski, 2011), all of these include various meditation practices, as well as cultivating acceptance and non-judgmental attitude, in concordance with evidence based therapies (e.g., CBT). There are also approaches relying singly on meditation (e.g., Vipassana, Gunaratana, 1993; Zen, Kapleau, 1965; Loving Kindness, focusing on an object, breath, Lutz, Slagter, Dunne, & Davidson, 2008). The former can be collectively viewed as *open monitoring* practices, entailing nonreactive monitoring of the content of experience from moment to moment, and the latter more as *focused attention* practices, involving voluntary focusing of attention on a chosen object (Lutz et al., 2008). Zen and Vipassana can combine both (Kabat-Zinn, 2010). Another way to look at these practices is in terms of WHAT is done in order to

achieve mindfulness (i.e., focusing and sustaining attention) and HOW it is done (i.e., with openness, curiosity, acceptance). All of these share an end-goal to alleviate suffering, be it from disease or everyday challenges, and/or improve wellbeing.

**Self-Compassion**

Closely related to mindfulness, especially the HOW skill, is another, less-known Buddhist originator - self-compassion. The most consistent with the Buddhist definition of self-compassion is a description by Neff (2003b) who sees it comprised of three mutually enhancing, essential elements. These involve treating oneself kindly, without harsh judgment; recognizing that hardships, failures and mistakes are part of a shared human experience; and maintaining a mindful awareness of painful thoughts and feelings, rather than over-identifying with, avoiding or suppressing them. All of these are particularly applicable in the face of hardship or perceived inadequacy (Neff, Kirkpatrick & Rude, 2007). Two additional definitions or theoretical orientations regarding self-compassion are proposed by Gilbert and his colleagues (Gilbert, 2000; Gilbert et al., 2004; Gilbert & Irons, 2005), and McKay and Fanning (2000). Gilbert's theory extends to evolutionary/biological etiology of self-compassion, but is otherwise quite similar in its definition to the conceptualization of Neff. Having a desire to care for oneself, understanding the roots of and being sympathetic towards one's distress, tolerating one's distress without judgment and criticism, and treating oneself with warmth are all part of the definition. McKay and Fanning see self-compassion as a three facet construct consisting of understanding, acceptance and forgiveness.

A number of studies have shown that mindfulness training increases self-compassion (Lykins & Baer, 2009; Moore, 2008) and a degree of change in mindfulness has been correlated with a degree of change in self-compassion (Shapiro, Brown, & Biegel, 2007). Interestingly, a recent study found no differences in the outcome between mindfulness and self-compassion intervention (Condon, Desbordes, Miller, & DeSteno, 2013). Following the intervention, participants from both groups became more compassionate, as measured with a naturalistic experiment. This supports the view that an expression of compassion is inherent in mindfulness (Kabat-Zinn, 2010), and the Buddhist understanding that compassion for self and others can not be separated (Neff, 2003b). Other studies have revealed self-compassion to be a stronger predictor of well-being than mindfulness (Woodruff et al., 2014; Van Dam, Sheppard, Forsyth, & Earleywine, 2011), although this could be due to measuring mindfulness with an instrument that overemphasizes the attentional aspect of mindfulness. When facets of mindfulness have been individually considered, non-judgment and non-reactivity have been shown to predict variety of psychological health outcomes (Coffey,

Hartman & Fredrickson, 2010; Woodruff et al., 2014). It is important to consider that many of the interventions to increase mindfulness also frequently include training to increase self-compassion (e.g. MBSR, DBT) and acceptance or non-judgment (e.g., DBT, ACT). Further, based on Neff's definition, self-compassion also consists of mindfulness (Neff, 2003a). It is thus hard to parse, to which aspect and to what extent can the benefits of such practices be attributed. It is possible that increased self-compassion is a by-product of mindfulness interventions, or that increases in self-compassion are cultivated through meditation practices intended to explicitly increase compassion toward oneself and others (e.g., compassionate image, Lee, 2005; Baer, 2010). It is also likely that mindfulness and self-compassion are somewhat overlapping constructs and research could benefit from clarification of this issue.

**Measuring mindfulness**

Stemming from definitional/theoretical differences of mindfulness (narrower versus broader focus) eight questionnaires assessing mindfulness have been published (for a review see Bergomi, Tschacher, & Kupper, 2013). One of them, Toronto Mindfulness Scale (TMS), is a situational/state measure, intended to address curiosity and decentering immediately after meditation (Lau et al., 2006). The other seven are dispositional/trait measures. The newest, Philadelphia Mindfulness Scale (PHLMS) is a 20-item questionnaire comprised of awareness and acceptance subscales (Cardaciotto et al., 2008). Mindful Attention Awareness Scale (MAAS) has a one-dimensional factor structure of mindfulness assessing present-centered attention awareness using 15 items (Brown & Ryan, 2004). Freiburg Mindfulness Inventory (FMI) is a 14-item, probably a two-dimensional measure comprised of a presence factor and an acceptance factor, but one-factor and four-factor solutions have been offered as well (Bucheld et al., 2001; Walach et al., 2006). The Cognitive and Affective Mindfulness Scale – Revised (CAMS-R) captures a capacity and willingness to be mindful via 12-item, one factor questionnaire, assessing attention, present-focus, awareness, and acceptance or non-judgment of thoughts and feelings (Feldman et al. 2007; Hayes and Feldman 2004). The Southampton Mindfulness Questionnaire (SMQ) is a 16-item scale with four related bipolar aspects of a mindful approach to distressing thoughts and images (Chadwick et al. 2008). The Kentucky Inventory of Mindfulness (KIMS) includes 39 items that largely target the conceptualization of mindfulness skills as described in DBT - observing, describing, acting with awareness, and accepting without judgment (Linehan 1993; Baer et al. 2004). Based on the last five measures (i.e., MAAS, FMI, CAMS, SMQ and KIMS), Baer and her colleagues (2006) used a bottom-up factor analytic approach to develop a new mindfulness questionnaire that would benefit from the input of various research teams' conceptualizations of mindfulness. Thus, the Five

Factor Mindfulness Questionnaire (FFMQ) includes items from all these scales and its 39 questions assess five latent constructs – Observing, Describing, Acting with Awareness, Non-judgment toward inner experiences and Non-reactivity toward inner experiences.

The Observing factor shows how much a person notices internal and external experiences, such as sounds, smells, sensations. The Describing factor shows the ease of of labelling internal experiences with words. Acting with awareness shows how well one can attend to the present moment activities with a sense of awareness. Nonjudging of inner experience shows how accepting and non-evaluating one is toward thoughts and feelings. Nonreactivity to inner experience how easy it is for one to allow thoughts and feelings come and go, without getting caught up in or carried away by them (Baer et al., 2006).

FFMQ has certain advantages over the other scales. Although the other instruments are generally reliable and valid, minor issues aside (e.g., the factor structure not stable for FMI or originally narrower orientation of SMQ and CAMS), FFMQ has the strongest psychometric properties across different populations and cultures. It has been validated for use with meditators and non-meditators, community and clinical samples (Williams et al., 2014). It has been also adapted to a variety of languages and cultures (Bohlmeijer et al., 2011; Deng et al., 2011; Heeren et al., 2011; Lilja et al., 2011; Cebolla et al., 2012; Sugiura et al., 2012; Dundas et al., 2013; Giovannini et al., 2014; Aguado et al, 2015) providing an advantage for cross-cultural research. Most importantly, FFMQ could be considered to assess the widest conceptualization of mindfulness. This would be critical when trying to establish individual factors' relations to other constructs (both convergently and divergently), their role in interventions and predictive abilities for outcome/wellbeing.

**Measuring Self-Compassion**

Currently, there is only one validated and published measure for self-kindness. The Self-Compassion Scale (SCS) was originally developed by Kristin Neff and stems from her groups' theory of self-compassion. It is comprised of 26 items, assessing the positive and negative aspects of the six components of self-compassion on a 5-point Likert scale, from 1 (almost never) to 5 (almost always). The three pairs of aspects are Self-Kindness versus Self-Judgment; Common Humanity versus Isolation; and Mindfulness versus Over-Identification. The Self-Kindness facet embodies an attitude of caring and kindness, its alternative, Self-Judgment represents self-criticism and blaming. Common humanity acknowledges that human suffering is inherent to the nature of life, and such an experience is shared by all of humankind. Isolation is its opposite, with a tendency to lack the interconnectedness. Mindfulness facet represents a stance of equanimity, as opposed to Over-identification of

being intertwined with difficult and uncomfortable thoughts and experiences (Neff et al., 2007, Barnard & Curry, 2011).

Utilizing psychometric scales is presently the standard approach for measuring self-attributed mindfulness (Sauer et al., 2013) and self-compassion, with some recent research starting to use vignettes or observational experiments (Condon et al, 2013). Establishing psychophysiological markers of mindfulness is underway. The largest body of evidence in measuring mindfulness with other than self-reports comes from functional neuroimaging (fMRI) studies, followed by electroencephalography (EEG), and various nervous system markers like heart rate variability (HRV), pulse rate and salivary cortisol levels. Research has been conducted to establish neuronal correlates of mindfulness, showing different patterns of gamma and theta activation at rest and during meditation (Aftanas & Golocheikine, 2005), in novices and long-term meditators (Cahn & Polich, 2006; Lutz et al., 2008); which have been differentially linked to questionnaire measured mindfulness (Creswell et al. 2007). Scant EEG research has started to explore mindfulness using an emotion regulation paradigm with a specific Event Related Potential (ERP) component Late Positive Potential (LPP).

**Late Positive Potential, mindfulness and self-compassion**

A key means in examining how attention to stimuli affects emotional responses can be achieved through measuring cortical electrical brain activity, using temporally sensitive EEG, with a particular focus on event-related potentials (Brown, Goodman, & Inslicht, 2013). The LPP is a slow positive deflection of the ERP waveform appearing approximately 400-500 ms post stimulus and lasting up to 5000 ms (Hajack, MacNamara & Olvet, 2010). Enhanced LPP reflects greater attentional deployment to emotional stimuli (Cuthbert et al., 2000, Schupp et al., 2000, Dennis & Hajack, 2009). It is further evident that LPP is responsive to certain emotion regulation strategies, including distraction and reappraisal (e.g., Hajack, Macnamara, & Olvet, 2010; Thiruchselvam, Belchert, Sheppes, Rydstrom, & Gross, 2011, Gootjes et al., 2011). Taken together, these findings suggest that the LPP can be used to investigate individual differences in neural responses to affective stimuli as a function of mindfulness-related traits.

Relatively few studies have explored LPP in relation to mindfulness. Brown, Goodman & Inzlicht (2013) explored whether individual differences in mindfulness modulate neural responses associated with the early processing of affective stimuli. They found self-reported mindfulness, measured with MAAS and FFMQ, Acting with awareness subscale, to be positively correlated with attenuated LPP amplitudes while viewing a variety of pictures from International Affective Picture Selection (IAPS; Lang, Bradley & Cuthbert, 2008).

Similarly, Sobolewski et al. (2011) discovered that experienced Buddhist meditators had decreased LPP response for unpleasant pictures compared to non-meditators. Curiously, the effect was found at the frontal electrodes rather than the generally reported centro-parietal sites. A recent study by Cosme and Wiens (2015) failed to show a positive relationship between questionnaire measured mindfulness and LPP attenuation.

While during these studies the participants were not asked to actively regulate their emotional responses (i.e., all of these were passive viewing tasks), a study comparing meditators with non-meditators found no difference in the early LPP amplitudes during an emotion regulation (reappraisal) task between the two groups, but later LPP was more attenuated for meditators (Gootjes et al., 2011). Another study by Bachmann (2014), found that while mindfulness initially increased the LPP (in comparison to control and distraction), it significantly decreased the neural response to negative stimuli with repeated picture viewing. This is consistent with the suggestion by Teper, Segal, & Inzlicht (2003) that mindful awareness initially increases responsivity to internal events (e.g., thoughts, feelings, sensations), allowing us to be insightful regarding the body's affective responses to events. Yet, later dampening of the responses occurs, possibly as a mechanism of acceptance and nonjudgmental attitude toward these events.

Compared to minimal literature on mindfulness and EEG, to the author's best knowledge, there is only one study correlating self-compassion with EEG data (Schoenberg & Speckens, 2015). This study looked at various changes in alpha and theta power in patients with depression after 8-week intervention of MBCT and correlated it with self-report measures. They reported that alpha event-related desynchronization was the sole measure which correlated with increased self-compassion pre-to-post MBCT, whereby reduced alpha event-related desynchronization correlated to greater questionnaire measured self-compassion (Schoenberg & Speckens, 2015).

Although some studies have shown the correlation between mindfulness and attenuated LPP, the evidence is not conclusive, and the literature on EEG and self-compassion is practically non-existent. Much is left to learn about the relations between the LPP, different facets of mindfulness and self-compassion.

**Aims and Hypotheses**

As evidence keeps piling up on various health benefits of mindfulness, psychological (Keng, Smoski, Robins, 2011) and physical alike (Grossman, Niemann, Schmidt, & Walach, 2004), it is important to validate the measures of mindfulness cross-culturally. While research and clinical fields have already benefited from having Estonian MAAS, the FFMQ allows

measuring separate facets of mindfulness, as these might be differentially related to intervention/health outcomes (e.g.,Woodruff, Glass, Arnkoff, Crowley, Hindman, & Hirschhorn, 2014, ). Because self-compassion has been shown, at the very least, to be a closely related construct to mindfulness, and possibly a mechanism for mindfulness (Baer, 2010), it was important to adapt SCS to Estonian language as well.

The first aim of the study was to confirm the factor structures of the FFMQ and SCS for use in Estonian language. Next, it was of interest to see how the latent variables of the FFMQ mindfulness and SCS are related to one another. It was hypothesized that more attentional FFMQ constructs (i.e., observing, acting with awareness) would not be highly correlated with SCS subscales. On the other hand, more acceptance-related constructs (i.e., non-judgment and non-reacting) would be expected to correlate with SCS subscales, particularly with self-kindness and self-judgment. Further, SCS mindfulness subscale was expected to correlate, at least weakly, with all FFMQ subscales.

The third aim of the study was to better understand how different subscales correlate with psychophysiological LPP data. If mindfulness is marked by greater calmness/equanimity in response to an experience, as evidenced by reduced affective reactivity (e.g., Brown, Ryan, & Creswell, 2007), then such reactivity as measured by LPP should be related to the traits measured by the FFMQ and SCS. It was of particular interest whether any subscale scores differentially related to (1) affective reactivity as measured with negative-neutral difference wave of LPP in different emotion regulation conditions, and (2) reduced affective reactivity during mindfulness induction compared to control conditions. It was hypothesized that the participants higher in both attentional and acceptance aspects of mindfulness, as well as self-compassion, would show decreased affective reactivity.

## Method

### Participants

A heterogeneous sample of 237 participants (53 male) was recruited through the University of Tartu listservs, a science news portal (ERR Novaator) and social media websites. The age of participants ranged from 18 to 66 (M=32.2, SD=) with the following reported education levels: basic (n=1), trade school (n=18), high school (n=51), bachelor's (n=68), master's (n=90), doctoral (n=8), education missing (n=1). Participants` level of experience with meditation, yoga or other mindfulness-related practices varied from none (n=142) to daily meditation (n=8). Cases with missing data for the SCS (n=14) were excluded from the analysis. Although the participants could not leave any questions unanswered, they

could leave the whole questionnaire aside, which was the case for these 14 participants. There was no missing data for the FFMQ.

A subgroup of 24 participants (5 males) also took part of an experimental picture viewing task with EEG measurement. The age of the experimental participants ranged from 21 to 44 (M=28.65, SD=6.21) with the education levels including high school (n=5), bachelor's (n=8), master's (n=8), and doctoral degrees (n=3). Two participants had prior experience with meditation, but did not practice regularly. Exclusion criteria were self-reported prior neurological, psychiatric disorders, or alcohol consumption within past 24 hours.

The experimental protocol was approved by the Ethics Committee of the University of Tartu as a part of a larger Emotion Regulation Study and a written informed consent was obtained from each participant prior to the experiment. Twenty books of "Mindfulness: Finding peace in a frantic world", by Mark Williams and Danny Penman, were raffled off to participants who opted to be included in the lottery after the questionnaire completion. All EEG participants received the book. Participants who were undergraduate students at the University of Tartu (n=3), also received research participation credit.

## Measures

### The Five Facet Mindfulness Questionnaire

The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) is comprised of 39 questions, assessing the five facets of mindfulness on a 5-point Likert scale, ranging from 1 (never or very rarely true) to 5 (very often or always true). The sample items are as follows: Observing (e.g., "I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing"); Describing (e.g., "I'm good at finding words to describe my feelings"); Acting with Awareness (e.g., "When I do things, my mind wanders off and I'm easily distracted"); Non-judging (e.g., "I think some of my emotions are bad or inappropriate and I shouldn't feel them"); Non-reacting (e.g., "In difficult situations, I can pause without immediately reacting").

### The Self-Compassion Scale

The Self-Compassion Scale (SCS; Neff, 2003) is comprised of 26 items, assessing the positive and negative aspects of the six components of self-compassion on a 5-point Likert scale, from 1 (almost never) to 5 (almost always). The sample items for the six components are as follows: Self-Kindness (e.g., "I try to be understanding and patient toward aspects of my personality I don't like") versus Self-Judgment (reverse-coded; e.g., "I'm disapproving and judgmental about my own flaws and inadequacies"); Common Humanity (e.g., "I try to

see my failings as part of the human condition") versus Isolation (reverse-coded; e.g., "When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world"); and Mindfulness (e.g., "When something painful happens I try to take a balanced view of the situation") versus Over-Identification (reverse-coded; e.g., "When I'm feeling down I tend to obsess and fixate on everything that's wrong.").

**Translation**

We started with forward-back translations of the questionnaires. Both SCS and FFMQ were translated into Estonian by three different English and Estonian proficient researchers. The translations were compared, best translations chosen and the questionnaires piloted. For the piloting, 10 participants filled out the questionnaires and commented on the understandability and interpretation of the items, based on which a few modifications were made. Then the items were translated back to English by a professional translator and compared to the original questionnaires by two researchers and original scale developers. Similar challenges to translating MAAS (Seema, Quaglia, Brown, Sircova, Konstabel, & Baltin, 20014) were faced with SCS and FFMQ translation. To deal with the lack of distinction between present and future tenses in Estonian language, the items were not translated word-for-word, but gerunds, adverbs and word order were used. The idioms were translated for meaning to make questions culturally understandable. The Estonian version of the FFMQ is available in Appendix 1 and SCS in Appendix 2.

**Procedure**

**Questionnaire Completion**

Participants were provided with initial study description either online or electronically via email, outlining the procedure and goals for the data collection. Upon deciding to enroll in the study, more detailed information was provided on the University of Tartu research website (kaemus.psych.ut.ee). Participants had an opportunity to fill out the questionnaires at their leisure with an option to quit anytime. Aside from demographic information, no questions could be left unanswered (i.e., on SCS and FFMQ). Upon completion, the participants received immediate questionnaire feedback (based on US norms).

**Experimental procedure**

Upon arrival, the participants were seated at a distance of 1 meters from a 19 inch computer screen, in an electrically shielded laboratory with attenuated light and sound. Stimulus pictures from IAPS were presented with 1024x768 screen resolution. During the placement of the sensors, participants were talked through the experiment in greater detail. The participants were instructed to remain still but relaxed, and to move or blink their eyes as

little as possible during the recording periods. They were informed of an option to stop the recording and take breaks if necessary. The participants were then told that pictures of different affective content would be presented on a screen and were instructed to keep their eyes on the screen for the duration of picture presentation. Before and after the experiment, resting state EEG was recorded, alternating six 1-minute recordings of participants keeping eyes open and eyes closed.

***Picture-viewing task***

The Picture-viewing task consisted of four blocks (WATCH, MINDFUL, DISTRACT, RATE) with 60 trials in each block. Sixty images (30 neutral, 30 negative) were chosen from the International Affective Picture System (IAPS; Lang et al., 2008). Both neutral and negative images were divided into three sets (A, B, and C), and were matched for both valence and arousal. Since the presence of human characteristics in images has been shown to affect the strength of the LPP (Schupp et al., 2004), the images were equated on human features as well. In the first three blocks, three different sets of 10 neutral and 10 negative pictures were presented in 3 repetitions (see *Figure 1*). In the RATE condition all previously shown pictures were presented again.

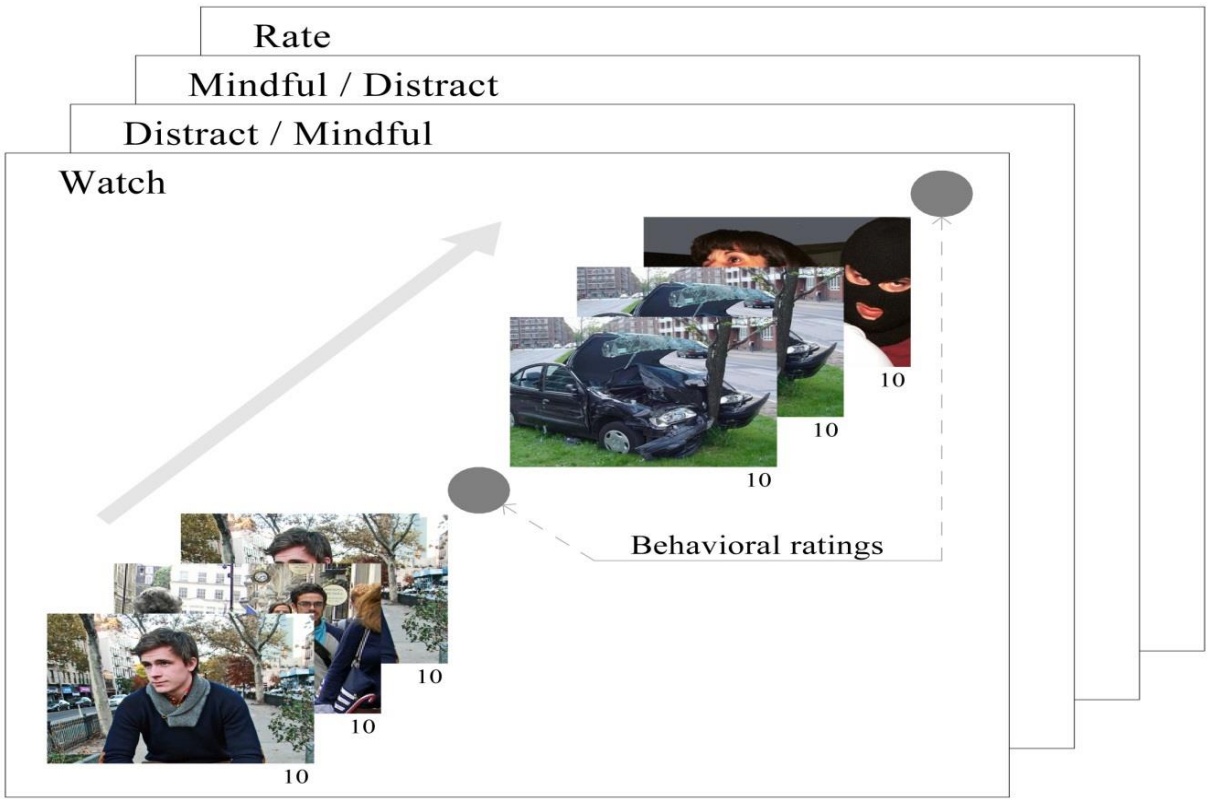


*Figure 1.* Schematic representation of the picture-viewing task.

All blocks were preceded by 6 rehearsal trials, during which the participants received feedback to assure they understood the assignments correctly. During the WATCH block, the participants were simply instructed to look at the screen and notice different details in the pictures. During the MINDFUL block, the participants were asked to notice and accept different feelings, thoughts and sensations arising within, while watching the pictures. During the DISTRACT block, the participants were told to count backwards from 655. The MINDFUL and DISTRACT blocks appeared in counter-balanced order to avoid order effects. During the final, RATE block, the participants viewed all the pictures again in randomized order and appraised the subjective valence and arousal of the pictures, using an affect grid (Russell, Weiss, & Mendelsohn, 1989). In between blocks, the participants answered questions on their mood and fatigue. This blocking approach and structure are consistent with other recent ERP studies on emotion regulation (e.g., Thirucshelvam et al., 2012; Cosme & Wiens, 2015). Each picture was presented for 5000 ms, preceded by a fixation cross appearing in the middle of the screen for 1500 ms. The inter-stimulus interval varied between 750 and 1250 ms. to reduce expectancy effects.

***EEG recording, processing and analysis***

Continuous EEG activity was recorded with a BioSemi system from 32 scalp electrodes, placed according to the International 10–20 system (Jasper, 1958), with 2 reference electrodes on left and right earlobe. Four ocular electrodes were used for recording eye movements. Raw EEG and EOG signals were sampled at 512 Hz.

Offline data processing was performed using EEGLAB (Delorme & Makeig, 2004) and Matlab software (The MathWorks, Inc., USA). The ERP data was pruned of ocular artifacts (blinks, vertical and horizontal eye-movements) using Independent Component Analysis (ICA). Next, the data were bandpass filtered between 0.25 and 30 Hz and segmented starting at 200 ms pre-stimulus baseline to 1500 ms of picture presentation. The segments with signals exceeding ±75 μV were automatically rejected. If a single electrode was responsible for more than 2% of trials being excluded, the electrode was excluded prior to segment rejection. All removed electrodes were spherically interpolated. Participants with less than 4 remaining trials out of 10 (n=3) in each valence-by-condition-by-repetition block were excluded from the study.

For ERP component selection, the averaging of electrodes was performed based on visual inspection of maximal signal amplitude, as well as topographic distribution commonly reported in previous studies (Foti et al., 2009, Foti and Hajcak, 2008, Hajcak and Nieuwenhuis, 2006, Keil et al., 2002, Schupp et al., 2000 and Schupp et al., 2003). The

average signal amplitude of six central-parietal sites (CP1, CP2, Pz, Cz, P3, P4) between 400 and 1000 ms was obtained as the measure of the LPP for statistical analyses.

Repeated-measures analysis of variance (ANOVA) was used to compare the mean amplitudes of the LPP and to discover main and interaction effects between valence (neutral, negative), condition (WATCH, MINDFUL, DISTRACT) and repetition (first, second, third). Results were considered significant based on a two-tailed $p \leq .05$. To minimize Type I errors, the Greenhouse–Geisser procedure was applied when appropriate for within-subject, repeated measures comparisons.

Stepwise linear regression was used to answer the question which of the independent variables (five subscales from FFMQ and 6 subscales from SCS) would in combination best predict LPP dynamics. Although some studies have simply employed the baseline corrected LPP waveforms as a measure of affective reacitivity, this study operationalized affective reactivity as the difference in LPP between negative and neutral picture-viewing. The latter approach is a more pure marker of stimulus induced emotional response, while the former might not provide enough differentiation from other simultaneous ongoing processes in the brain. Thus, the dependent variables of affective reactivity were the 3 difference waves in three conditions, and an affective reactivity difference wave between mindfulness and watch condition.

**Factor structure validation**

SPSS, version 18.0 was used to run descriptive statistics, test underlying assumptions about the samples, perform Exploratory Factor analysis and find reliability coefficients (Cronbach's alphas). For interpretation of the strength of the associations between subscales, r= 0-0.19 was considered very weak, 0.2-0.39 as weak, 0.40-0.59 as moderate, 0.6-0.79 as strong and 0.8-1 as very strong correlation.

Confirmatory Factor Analysis (CFA) was performed to explicitly tests the relations between observed variables (item scores) and latent variables/factors (Observing, Describing, Acting with Awareness, Nonjudging, Nonreactivity, Self-Kindness, Self-Judgment, Common Humanity, Isolation, Mindfulness, Over-Identification), using Mplus software (Version 7.3; Muthén & Muthén,1998–2014). CFA is particularly important in establishing construct validity of a scale with population different from that used in the development of the original scale and when adapting a scale to a different language (Brown, 2006). The guidelines recommended by Jackson, Gillaspy, Purc-Stephenson (2009) and Marsh, Hau and Wen (2004) were followed in performing the analysis. Because cut-offs to assess the model fit are influenced by sample size, data normality and model parameters, several fit indices are

reported, as recommended (Jackson et al., 2009; Klein, 2005; Marsh et al., 2004). First, the ratio of $\chi^2$ to degrees of freedom ($\chi^2/df$) below 3 shows that the model fits the data well. The Comparative fit index (CFI; Hu & Bentler, 1999) is an incremental fit index that compares the improvement of fit of an identified model with a more restricted model (Kline, 2005). CFI above 0,90 (with a conservative criterion above .95) indicates a good fit. The root mean square error of approximation (RMSEA; Marsh et al., 2004) incorporates parsimony as a criterion and it allows the evaluation of a more realistic hypothesis of close fit. The standardized root mean squared residual (SRMR; Hu & Bentler, 1999) is appropriate for evaluating model fit because of its sensitivity to simple model misspecification (Hu & Bentler, 1999). RMSEA values of .06 or less are thought to indicate a close fit, .08 a fair fit, and .10 a marginal fit and SRMR values of approximately .09 or less tend to indicate good fit (Hu & Bentler, 1999, Jackson et al., 2009). The Aikake information criterion (AIC; Aikaike, 1974 as cited in Jackson et al., 2009) was used as a measure of model parsimony, allowing the comparison of various models. Lower values of AIC correspond to a better model fit (Kline, 2005). Residual correlations were restricted to those theoretically justified, in combination with post hoc decisions based on modification indices. Because the observed variables were measured on a 5-point Likert scale and were non-normally distributed, Robust Maximum Likelihood (MLR*)* estimation was used with Satorra-Bentler correction for $\chi^2$ (Muthén & Muthén, 1998–2014).

As the original research on SCS development indicates that a single higher order factor of self-compassion explains the strong inter-correlations among the subscales (Neff, 2003), hierarchical model with a higher-order variable and six latent variables was first tested. Because some authors have been unable to confirm the original factor structure of SCS (Williams, Dalgeish, Karl & Kuyken, 2014), a theory-based analysis of a single-factor, six-factor and three-factor models was performed as well.

For FFMQ, a hierarchical model with five factors (Observe, Describe, Acting Aware, Nonjudgment, Nonreactivity) loading onto a higher-order mindfulness factor, a hierarchical model with four factors loading onto a higher-order mindfulness factor, as well as one-factor-four-factor and five-factor models were tested based on the original scale research (Baer, 2006; Baer et al. 2008) as well as recent findings (Williams et al., 2014).

## Results

### Factor structure confirmation

The data were first checked for normality, using histograms, skeweness and curtosis, which indicated a non-normal distribution. Then the exploratory factor analysis was

performed and internal consistencies for the FFMQ and SCS subscales calculated. The descriptive data for the sample ($N$ = 223 for SCS and $N$= 237 for FFMQ), and subscale Chronbach's alphas are presented in Table 1. The Chronbach's alpha was .92 for the whole scale FFMQ and .94 for the whole scale SCS. These results closely resemble the findings for the original scales' development (Baer et al. 2006; Neff, 2003) as well as later scale validations and adaptations (e.g, Williams et al., 2014; Garcia-Campayo et al., 2014). In order to confirm the factor structure of the FFMQ and SCS, CFA was employed.

**Table 1.** Descriptive statistics and reliability coefficients for the FFMQ and SCS facets

| Subscale Name | Mean | SD | Cronbach's α |
|---|---|---|---|
| 1. FFMQ Observe | 3.70 | .61 | .74 |
| 2. FFMQ Describe | 3.66 | .84 | .90 |
| 3. FFMQ Acting with Awareness | 3.33 | .80 | .88 |
| 4. FFMQ Non-judgement | 3.34 | .92 | .89 |
| 5. FFMQ Non-reacting | 3.06 | .80 | .87 |
| 6. SCS Self-kindness | 3.39 | .87 | .87 |
| 7. SCS Self-judgement (reversed) | 3.01 | .95 | .85 |
| 8. SCS Common Humanity | 3.47 | .86 | .75 |
| 9. SCS Isolation (reversed) | 3.03 | 1.08 | .83 |
| 10. SCS Mindful | 3.63 | .77 | .73 |
| 11. SCS Over-identification (reversed) | 2.73 | .94 | .79 |

*Note.* For the FFMQ and SCS facets, higher scores represent higher facet levels of mindfulness or self-compassion.

***FFMQ***

The results showed that for the FFMQ the five-factor model, where residuals for q.34 with q.38, q.14 with q.10, q. 37 with q.12, q. 2 with q. 16 and q.34 with q.23 were allowed to correlate, fit the data best. The fit indexes were $\chi^2$ = 1092.08 ($df$ = 692, $p < .00$), ($\chi^2/df$) =1.58, *CFI* =.90, *RMSEA* =.04, *AIC*=24018. The other possible factor structures reported in previous studies did not result in as good a fit. The results confirm the original factor structure of Baer et al. (2006), as well as the ones of a recent large-scale study by Williams et al. (2014). The factor loadings, residuals and correlated residuals for all 39 items in the FFMQ are presented in Appendix 3.

***SCS***

The results showed that for SCS the six-factor model, where residuals for q.7 with q.10, q.18 with q.13, and q.12 with q.19 were allowed to correlate, fit the data well. The fit indexes were $\chi^2$ = 448.15 (*df* = 281, *p* < .00), ($\chi^2$/*df*) = 1.59, *CFI* = .94, *RMSEA* =.05, *AIC*= 15212. Almost equally well fit the six-factor model with a single higher order factor. As seen in Table 2, the 1-factor and 3-factor models did not fit the data as well. Some of the model indices were better than originally reported by Neff et al. (2003) and Williams et al. (2014). The fit indices for both of these studies provide a better fit for a six-factor model without a higher order self-compassion factor. Yet, based on theoretical considerations, 6-factor hierarchical model is still accepted. The measurement model fit indices for SCS and FFMQ are presented in Table 2. The factor loadings, residuals and correlated residuals for the 26 items of SCS are presented in Appendix 4.

**Table 2.** Fit indices for the FFMQ and SCS

| | $\chi^2$* | *df* | $\chi^2$ difference | RMSEA | SRMR | CFI | AIC |
|---|---|---|---|---|---|---|---|
| **Models for the FFMQ** | | | | | | | |
| One-Factor: All items load onto one factor | 4782.57 | 741 | 6.45 | .116 | .127 | .444 | 25989 |
| Four-factor: OB, DE, AA, NJ, NR items load onto their respective factors | 1185.39 | 697 | 1.70 | **.054** | **.072** | .880 | 24110 |
| Five-Factor: OB, DE, AA, NJ, NR items load onto their respective factors | 1175.44 | 690 | 1.70 | **.054** | **.068** | .880 | 24109 |
| Hierarchical: Five factors OB, DE, AA, NJ, NR load onto one factor | 1092.08 | 692 | 1.57 | **.049** | **.072** | **.901** | 24018 |
| **Models for the SCS** | | | | | | | |
| One-Factor: All items load onto one factor | 922 | 299 | 3.08 | .097 | **.077** | .770 | 15743 |
| Three-Factor: Items load onto three factors SK and SJ, CH and IS, MI, OI | 526.27 | 287 | 1.83 | .061 | **.059** | **.914** | 15283 |
| Six-Factor: Items load onto six factors SK, SJ, CH, IS, MI, OI | 448.15 | 281 | 1.59 | **.052** | **.053** | **.941** | 15212 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Hierarchical: Six factors SK, SJ, CH, IS, MI, OI load on to one factor | 543.64 | 325 | 1.67 | **.053** | **.061** | **.908** | 15295 |

Bold indices signify that liberal cut-off criteria is satisfied when rounded to two decimal places. * Satorra-Bentler Scaled Chi-Square.

To answer the question how the questionnaires' subscales are related to one another, the correlations of the subscale mean scores are presented in Table 3. The hypotheses regarding the expected subscale correlations were confirmed. The FFMQ Non-judgment subscale correlated strongly with SCS Self-kindness (r= .60) and Self-judgment (r=.66). The FFMQ Non-Reacting subscale was strongly correlated with SCS Mindfulness (r=.61) and SCS Over-identification (r=.66), and moderately correlated with the rest of the SCS subscales. SCS Mindfulness subscale was weakly correlated with the FFMQ Observe (r=.31) and Describe (r=.30), moderately correlated with Acting with Awareness (r=.46) and Non-judging (r=.46), and strongly correlated with Non-reacting subscales (r=.61).

**Table 3.** FFMQ and SCS subscale correlations

| Subscale name | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. FFMQ Observe | 1 | | | | | | | | | | |
| 2. FFMQ Describe | .23** | 1 | | | | | | | | | |
| 3. FFMQ Acting Aware | .26** | .27** | 1 | | | | | | | | |
| 4. FFMQ Non-judging | .16** | .17** | .46** | 1 | | | | | | | |
| 5. FFMQ Non-reacting | .30** | .19** | .52** | .50** | 1 | | | | | | |
| 6. SCS Self-kindness | .29** | .29** | .42* | .60** | .54** | 1 | | | | | |
| 7. SCS Self-judgement (R) | .16* | .29** | .50** | .66** | .50** | .80** | 1 | | | | |
| 8. SCS Common Humanity | .29** | .31** | .26** | .31** | .45** | .54** | .40** | 1 | | | |
| 9. SCS Isolation (R) | .14* | .26** | .41** | .57** | .46** | .67** | .69** | .33** | 1 | | |
| 10. SCS Mindfulness | .31** | .30** | .46** | .46** | .61** | .68** | .51** | .57** | .54** | 1 | |
| 11. SCS Over-identification (R) | .06 | .19** | .53** | .59** | .66** | .59** | .67** | .35* | .63** | .59** | 1 |

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).( R)- indicates that the subscale was reversed.

**EEG Results**

Repeated measures analysis showed that there was a main effect on valence (F(1,20)= 124,14, p<.000), which confirms the knowledge from prior studies, that LPP amplitude is enhanced for negatively valenced pictures. There was also a main effect on condition (F(1,47;29,5)=5,96= 5,96, p=.005), providing evidence that distraction (M=2,45) reduces LPP

amplitudes irrespective of stimulus valence more than mindfulness (M=3,82), which in turn differs from simply watching the pictures (M=4,55). Pairwise comparison indicated statistically significant difference between Watch and Distract conditions (p=.007). Differences between Watch and Mindful, and Distract and Mindful were approaching significance (p=.07 and p=.06 respectively). There was also a main effect on repetition (F(1.9; 38.17)=7.12, p=.002), with the highest LPP amplitude at the second repetition (first M=2.61; second M=4.38; third M=3.82). Pairwise comparison indicated statistically significant difference between the first and second repetition (p=.001) and the first and third (p=.03). In addition, there was a two-way interaction between valence and repetition (F=9.08(1.97,39.41), p=.001). The results showed no significant interaction between valence and condition, or condition and repetition, as well as no significant three-way interaction between valence-by-condition-by-repetition. The ERP waveforms associated with neutral and negative stimuli, in different conditions are shown on Figure 2.

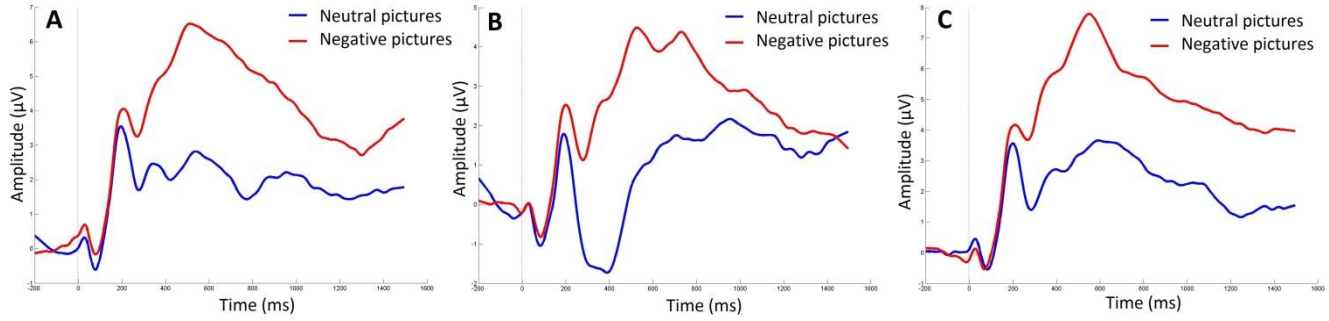


*Figure 2.* Picture-viewing waveforms for 3 experimental conditions. A-Mindful, B-Distract, C-Watch.

A stepwise multiple regression was conducted to evaluate which of the FFMQ and SCS subscales would be linked to the affective reactivity score (negative LPP minus neutral LPP) in the Mindfulness condition. At step 1 of the analysis, FFMQ Observe was a significant predictor ($F(1,19) = 10.13$, $p < .001$, $R^2 = .34$, $\beta = .59$). Approximately 34% of the variance of the affective reactivity in the mindfulness condition could be accounted for by the FFMQ Observe score. To see if this result was unique for the mindfulness induction, affective reactivity for Watch condition (neutral watch and negative watch difference) and Distract condition (neutral distract and negative distract difference) was calculated. For the Watch condition, Observe scores predicted the LPP difference again positively, but to a lesser degree than mindfulness ($F(1,19) = 4.65$, $p < .04$, $R^2 = .19$, $\beta = .44$). For the Distract condition, the relationship was inversed; observe subscores related negatively to the affective LPP amplification ($F(1,19) = 5.236$, $p < .03$, $R^2 = .21$, $\beta = -.46$). No other variables added any

predictive utility to the regression equation for affective reactivity. Further, no variables predicted the level of successful mindfulness application (i.e., (negative-neutral during mindful) – (negative-neutral during watch)).

## Discussion

In this study, it was important to first confirm the factor structures of the FFMQ and SCS and to see how the FFMQ attentional and acceptance aspects relate to the SCS subscales. Next, the study sought to provide evidence for the differential relations of the subscales to the affective reactivity as measured with the LPP. Another aim was to explore whether the participants higher in both attentional and acceptance aspects of mindfulness, as well as self-compassion, would show a decreased affective reactivity.

The confirmation of the original factor structure for the FFMQ and SCS was successful. Compared to other theoretical models tested, the original models, showing a second-order factors of mindfulness and self-compassion fit the best. Differently from the original scale development, but consistently with some other translations, a few items' residuals were allowed to correlate based on recommendations by Cole, Ciesla & Steiger (2007). These correlations could be due to translation (i.e., in Estonian the correlated items measure an additional component not measured by a latent variable), or could be considered random noise. To better understand their origin, it would certainly be advisable to replicate CFA with an additional sample.

Regarding the second aim, it was found that more attentional FFMQ constructs correlate weakly with the SCS subscales, with the exception of Acting with Awareness which correlated moderately with the SCS subscales. As expected, more acceptance-related constructs correlated moderately to strongly with the SCS subscales, particularly the FFMQ Non-judging with Self-kindness and Self-judgment, and the FFMQ Non-reacting with SCS Mindful and Over-identification. Further, the SCS Mindfulness subscale correlated with all FFMQ subscales, albeit weakly with FFMQ Observe and Describe subscales. The pattern from these results suggests that self-compassion, although not identical, is significantly overlapping with the acceptance aspects of mindfulness. This is consistent with the findings that self-compassion and mindfulness subscales are equally good predictors of positive health outcomes (Woodruff et al., 2014) and when mindfulness components independently predict such outcomes, the strongest predictors are acceptance related (Coffey et al., 2011). Stemming from this knowledge, a hypothesis worth a further exploration is whether self-compassion encompasses acceptance and non-judgment, but has an added dimension of

warmth, kindness and encouragement. It is equally likely that acceptance entails a more detached, decentered approach, and self-compassion a more nurturing, soothing approach.

Although preliminary in nature, due to a small sample size, the results from the experimental portion of the study provide interesting evidence. Regarding an aim to differentially link subscales of the FFMQ and SCS to the LPP, the results only partially confirmed the hypotheses. While it was expected that the participants higher in both attentional and acceptance aspects of mindfulness, as well as self-compassion, would show a decreased affective reactivity, only a single attentional Observe subscale predicted the extent of affective LPP amplification in the experimental condition of induced mindfulness. Similar, but weaker association was present for the Watch condition. In addition, this relation was positive, meaning that the participants with higher scores for Observe showed an increased affective reactivity. This is consistent with the findings of the Observe subscores being positively related to anxiety and neuroticism and negatively related to acceptance facets for the non-meditators (Baer et al. 2006, Lilja et al., 2011), but positively related for the meditators (Baer et al. 2006). The complex relationship of the Observe subscale to the other facets is also evident from the person-centered analysis (versus the variable centered approach) of the FFMQ facets by Lilja et al. (2012), indicating that even among individuals with relatively high overall levels of mindfulness, one of the greatest challenges is to combine high levels of observation with a high level of acceptance.

Now, to the possible reasons why the affective reactivity in Mindfulness condition was not significantly reduced compared to Watch or Distract (which showed the greatest attenuation of the LPP) conditions. Although in the current sample Observing and Non-judgment and Non-reactivity were positively correlated, it would be wise to consider the time-course of how these facets "produce" mindfulness. Mindfulness practice usually starts with the orienting, followed by sustaining and redirecting attention (Malinowski, 2013), moving on to acceptance of whatever the experience might be. Eventually, with a long-term practice these aspects should be rather simultaneous; in novices or people with no mindfulness experience, attentional deployment and acceptance might require much longer time (and effort) to manifest. It is rather likely that in our study population, who had very little or no prior exposure to mindfulness, we were unable to induce and explore the full effect of mindfulness in a time-course under exploration. In favor of this explanation is the evidence from fMRI studies, showing that for long-term meditators mindfulness reduces responding bottom-up, i.e., it is more automatic, while for novices, top-down responding with pre-frontal inhibition of subcortical areas (e.g., amygdala) is required (Chiesa, Cerretti & Jakobsen,

2013). This would also be in line with Sobolewski et al. (2011) LPP findings, which could be interpreted as supporting the role of prefrontal activation in mindfulness. In summary, the results of this study re-iterate that the LPP is not a universal and direct indicator of emotion regulation or affective reactivity, but it rather reflects the depth of emotional processing, strongly linked to motivated attention.

This study has its limitations which should be considered when interpreting the results. For the factor structure confirmation, the sample size was adequate, but considering a relatively large proportion of females and participants with meditation experience, it would be beneficial to repeat the process and see whether the results are sufficiently similar. This would also allow to better determine the nature of the residual correlations. While the study was able to provide evidence that the acceptance aspects of the FFMQ correlate with the self-compassion, it would be important to confirm the concurrent and divergent validities of the scales with other measures in Estonia. It would also be worthwhile to further explore the relationship between acceptance and self-compassion, for an example, using mediator hypotheses. Regarding the experimental part of the study, the biggest caveat is the small sample size, requiring large effects for significant findings. For example, it is entirely possible that with a bigger sample size more significant effects and relations to other subscale variables would have been present. It is also rather likely that the LPP is only measuring affective sensitivity as it relates to attentional deployment. To explore how acceptance and self-compassion are related to mindfulness, other EEG parameters as well as different correlates altogether could deepen the understanding of the underlying processes.

The study also provides new insight to the role of Observing in mindfulness and helps provide future directions. While observing is essential to mindfulness, an aspect of acceptance may also be required, at least for *open monitoring* practices, to decrease affective reactivity. It would be worth exploring whether *attentional focusing* and *open monitoring* practices rely on separate mechanisms on reaching a state of mindfulness. It could be hypothesized that *attentional focusing* works without the acceptance component, primarily through decreasing rumination, while the open monitoring works through acceptance and non-judgment. In other words, for open monitoring, which was induced in the current study, the attentional component is a necessary and the acceptance component a sufficient condition.

In conclusion, the study successfully confirmed the factor structures of the FFMQ and SCS for the use in Estonian language. It provided clarification to how the mindfulness and self-compassion are related – showing that overlap between these concepts lies within the

acceptance facets. It also provided valuable knowledge that Observing is an essential factor of mindfulness, most likely preceding the acceptance in non-meditator populations.

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**Appendix 1.** Questions on the Estonian version of the FFMQ.

1. Kõndides pööran teadlikult tähelepanu keha liikumisest tekkivatele aistingutele.
2. Oma tunnete kirjeldamiseks sõnade leidmine tuleb mul hästi välja.
3. Kritiseerin end irratsionaalsete ja ebasobivate tunnete kogemise pärast.
4. Tajun oma tundeid ja emotsioone ilma vajaduseta neile reageerida.
5. Midagi tehes läheb mu mõte sageli uitama ja ma olen kergesti häiritav.
6. Olles vannis või dushi all, on mu taju ärgas tunnetele mida vesi mu kehale tekitab.
7. Suudan kergesti sõnastada oma tõekspidamisi, arvamusi ja ootusi.
8. Ma ei pööra oma tegevusele tähelepanu, sest ma unistan, muretsen või olen mingil muul moel hajevil.
9. Vaatlen oma tundeid nendesse uppumata.
10. Ütlen enesele, et ma ei peaks tundma mida tunnen.
11. Panen tähele kuidas toitud ja joogid mu mõtteid, kehalisi aistinguid ja emotsioone mõjutavad.
12. Mul on raske leida sõnu oma mõtete kirjeldamiseks.
13. Ma olen kergesti häiritav.
14. Usun, et osa mu mõtteid on pahad või ebanormaalsed ja ma ei peaks niimoodi mõtlema.
15. Panen tähele aistinguid, nagu tuul mu juustes ja päike mu näol.
16. Minu jaoks on keeruline leida õigeid sõnu oma tunnete kirjeldamiseks.
17. Hindan oma tunded headeks või halbadeks.
18. Minu jaoks on raske hoida oma tähelepanu hetkes toimuval.
19. Häirivate mõtete ja kutluste korral, astun niiöelda sammukese tagasi ja olen oma mõtetest ja kujutlustest teadlik, ilma et need mind oma võimusesse võtaksid.
20. Panen tähele helisid, nagu kella tiksumine, lindude siristamine ja autode möödumine.
21. Keerulistes situatsioonides suudan korraks aja maha võtta ja mitte koheselt reageerida.
22. Kehalisi aisinguid tajudes on mul neid raske kirjeldada, sest ma ei suuda leida õigeid sõnu.
23. Tundub, et olen autopiloodil, ilma suurema teadlikuseta mida ma teen.
24. Tajudes häirivaid mõtteid või kujutlusi, rahunen üsna kiiresti maha.
25. Ütlen enesele, et ma ei peaks mõtlema nii nagu mõtlen.
26. Panen tähele asjade lõhnu ja aroome.
27. Isegi kui tunnen end ülihalvasti, suudan ma eneses toimuvat sõnadesse panna.
28. Toimetan tormakalt, ilma oma tegevustele suuremat tähelapanu pööramata.
29. Tajudes häirivaid mõtteid või kujutlusi , suudan neid tähele panna/jälgida ilma neile reageerimata.
30. Arvan, et osa mu emotsioone on halvad ja ebasobivad, ning ma ei peaks neid tundma .
31. Kunstis ja looduses panen tähele visuaalseid elemente nagu värve, kujundeid, tekstuuri ja valguse ning varju vaheldumist.
32. Mulle on loomuomane väljendada kogetut sõnades.
33. Tajudes häirivaid mõtteid või kujutlusi, panen neid korraks tähele ja lasen neil siis minna.
34. Teen töid või lahendan ülesandeid autopiloodil, olemata teadlik oma tegevusest.

35. Tajudes häirivaid mõtteid või kujutlusi, olen neist lähtuvalt enda suhtes kas kriitiline või heakskiitev.
36. Pööran tähelepanu sellele, kuidas mu emotsioonid mõjutavad mu mõtteid ja käitumist.
37. Tavaliselt suudan ma üsna detailselt kirjeldada mida hetkel tunnen.
38. Avastan end tegemas asju ilma neile tähelepanu pööramata.
39. Mõistan end irratsionaalsetest ideedest mõtlemise pärast hukka.

**Appendix 2**. Questions on the Estonian Version of the SCS

___ 1. Olen oma vigade ja puuduste suhtes hukkamõistev ja kriitiline.

___ 2. Kui ma end kehvasti tunnen, on mul kalduvus sellele üleliia keskenduda ja kinni jääda sellesse, mis on halvasti.

___ 3. Kui asjad lähevad halvasti, näen raskustes elu paratamatut osa, millega kõigil tuleb rinda pista.

___ 4. Oma puudustest mõeldes kipun tundma end üksiku ja muust maailmast äralõigatuna.

___ 5. Hingevalu tundes püüan jääda enda suhtes armastavaks.

___ 6. Kui olen millegi olulisega ebaõnnestunud, võtab saamatuse tunne minu üle võimust

___ 7. Kui miski mind jalust niidab, tuletan enesele meelde, et maailmas on palju teisigi inimesi, kes ennast sarnaselt tunnevad.

___ 8. Rasketel aegadel kipun olema endaga karm.

___ 9. Kui miski mind endast välja viib, püüan hoida oma emotsioone tasakaalus.

___ 10. Kui tunnen end mingis mõttes puudulikuna, püüan meeles pidada, et enamus inimesi tunneb end vahel samamoodi.

___ 11. Olen sallimatu ja kannatamatu nende isikuomaduste suhtes, mis mulle enda juures ei meeldi.

___ 12. Rasketel hetkedel olen enda suhtes hooliv ja hell.

___ 13. Halva tujuga tundub mulle, et enamus inimesi on minust õnnelikumad

___ 14. Kui miski mulle haiget teeb, püüan olukorda vaadelda selge pilguga.

___ 15. Püüan vaadelda oma läbikukkumisi osana inimeseks olemisest.

___ 16. Teen ennast maha, kui märkan enda juures midagi, mis mulle ei meeldi.

___ 17. Kui ma mõnes endale olulises asjas ebaõnnestun, üritan näha laiemat pilti olukorrast.

___ 18. Raskustega maadeldes tundub mulle, et teistel on kindlasti kergem.

___ 19. Kannatusi kogedes olen enda vastu heatahtlik.

___ 20. Kui miski mind endast välja viib, võtavad tunded mu üle võimust.

___ 21. Kannatustega rinda pistes võin olla enda suhtes hoolimatu.

___ 22. Kui ma end halvasti tunnen, püüan suhtuda oma tunnetesse uudishimulikult ja avatult.

___ 23. Olen oma vigade ja puuduste suhtes salliv/tolerantne.

___ 24. Kui juhtub midagi haigettegevat, on mul kalduvus teha sääsest elevant.

___ 25. Millegi olulise luhta minemisel kipun tundma end oma õnnetuses üksi.

___ 26. Püüan suhtuda mõistvalt ja kannatlikult isikuomadustesse, mis mulle enda juures ei meeldi.

| **Appendix 3.** FFMQ Items with factor loadings, residual variances and residuals allowed to correlate in the models | | | |
|---|---|---|---|
| **Observing** | Factor Loadings | Residual variances | Correlating residuals |
| Q 1 When I'm walking, I deliberately notice the sensations of my body moving. | .45 | 1.04 | |
| Q 6 When I take a shower or bath, I stay alert to the sensations of water on my body. | .48 | 1.00 | |
| Q 11 I notice how foods and drinks affect my thoughts, bodily sensations, and emotions. | .63 | .843 | |
| Q 15 I pay attention to sensations, such as the wind in my hair or sun on my face. | .62 | .554 | |
| Q 20 I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing. | .42 | .699 | |
| Q 26 I notice the smells and aromas of things. | .63 | .570 | |
| Q 31 I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow | .49 | .720 | |
| Q 36 I pay attention to how my emotions affect my thoughts and behavior. | .41 | .764 | |
| **Describing** | | | |
| Q 2 I'm good at finding words to describe my feelings. | .77 | .490 | with Q16 |
| Q 7 I can easily put my beliefs, opinions, and expectations into words. | .71 | .463 | |
| Q 12 It's hard for me to find the words to describe what I'm thinking. | .84 | .332 | with Q37 |
| Q 16 I have trouble thinking of the right words to express how I feel about things. | .84 | .404 | with Q2 |
| Q 22 When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words | .57 | .677 | |
| Q 27 Even when I'm feeling terribly upset, I can find a way to put it into words. | .70 | .612 | |
| Q 32 My natural tendency is to put my experiences into words. | .68 | .718 | |
| Q 37 I can usually describe how I feel at the moment in considerable detail. | .84 | .367 | with Q12 |
| **Acting with Awareness** | | | |
| Q 5 When I do things, my mind wanders off and I'm easily distracted. | .74 | .654 | |
| Q 8 I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted. | .80 | .391 | |
| Q 13 I am easily distracted. | .62 | .715 | |
| Q 18 I find it difficult to stay focused on what's happening in the present. | .77 | .400 | |
| Q 23 It seems I am "running on automatic" without much awareness of what I'm doing. | .68 | .677 | with Q34 |

| | | | |
|---|---|---|---|
| Q 28 I rush through activities without being really attentive to them. | .69 | .549 | |
| Q 34 I do jobs or tasks automatically without being aware of what I'm doing. | .58 | .691 | with Q38,Q23 |
| Q 38 I find myself doing things without paying attention. | .70 | .566 | with Q34 |
| **Nonjudging** | | | |
| Q 3 I criticize myself for having irrational or inappropriate emotions. | .59 | 1.014 | |
| Q 10 I tell myself I shouldn't be feeling the way I'm feeling. | .66 | .723 | with Q14 |
| Q 14 I believe some of my thoughts are abnormal or bad and I shouldn't think that way. | .81 | .513 | with Q10 |
| Q 17 I make judgments about whether my thoughts are good or bad. | .70 | .781 | |
| Q 25 I tell myself that I shouldn't be thinking the way I'm thinking. | .75 | .575 | |
| Q 30 I think some of my emotions are bad or inappropriate and I shouldn't feel them. | .88 | .355 | |
| Q 35 When I have distressing thoughts or images, I judge myself as good or bad, | .62 | .770 | |
| depending what the thought/image is about. | | | |
| Q 39 I disapprove of myself when I have irrational ideas. | .76 | .641 | |
| **Nonreactivity** | | | |
| Q 4 I perceive my feelings and emotions without having to react to them. | .54 | .763 | |
| Q 9 I watch my feelings without getting lost in them. | .67 | .585 | |
| Q 19 When I have distressing thoughts or images, I "step back" and am aware of the thought | .70 | .620 | |
| or image without getting taken over by it. | | | |
| Q 21 In difficult situations, I can pause without immediately reacting. | .66 | .621 | |
| Q 24 When I have distressing thoughts or images, I feel calm soon after. | .76 | .523 | |
| Q 29 When I have distressing thoughts or images I am able just to notice them without reacting. | .80 | .415 | |
| Q 33 When I have distressing thoughts or images, I just notice them and let them go. | .77 | .457 | |

| **Appendix 4. SCS Items with factor loadings, residual variances, and residuals allowed to correlate in the models** | | | |
|---|---|---|---|
| **Self-Kindness Subscale** | Factor loadings | Residual variances | Correlating residuals |
| Q5 I try to be understanding and patient towards those aspects of my personality I don't like | .67 | .619 | |
| Q12 I'm kind to myself when I'm experiencing suffering. | .72 | .518 | with Q19 |
| Q19 When I'm going through a very hard time, I give myself the caring and tenderness I need | .76 | .474 | with Q12 |
| Q23 I'm tolerant of my own flaws and inadequacies. | .79 | .485 | |
| Q26 I try to be loving towards myself when I'm feeling emotional pain. | .80 | .375 | |
| **Self-Judgment Subscale** | | | |
| Q1 When I see aspects of myself that I don't like, I get down on myself. | .77 | .552 | |
| Q8 When times are really difficult, I tend to be tough on myself. | .75 | .609 | |
| Q11 I can be a bit cold-hearted towards myself when I'm experiencing suffering. | .70 | .688 | |
| Q16 I'm disapproving and judgmental about my own flaws and inadequacies. | .77 | .644 | |
| Q21 I'm intolerant and impatient towards those aspects of my personality I don't like. | .67 | .704 | |
| **Common Humanity Subscale** | | | |
| Q3 When I feel inadequate in some way, I try to remind myself that | .46 | .765 | |
| feelings of inadequacy are shared by most people. | | | |
| Q7 I try to see my failings as part of the human condition | 53 | 1.04 | with Q10 |
| Q10 When I'm down and out, I remind myself that there are lots of other people in the world | 53 | 1.04 | with Q7 |
| feeling like I am. | | | |
| Q15When things are going badly for me, I see the difficulties as part of life that everyone goes through | .92 | .170 | |
| **Isolation Subscale** | | | |
| Q4 When I fail at something that's important to me I tend to feel alone in my failure | .77 | .744 | |
| Q13 When I think about my inadequacies it tends to make me feel more separate and cut off from | .70 | .988 | with Q18 |
| the rest of the world. | | | |
| Q18 When I'm feeling down I tend to feel like most other people are probably happier than I am | .60 | .986 | with Q13 |

| | | | |
|---|---|---|---|
| Q25 When I'm really struggling I tend to feel like other people must be having an easier time of it | .80 | .583 | |
| **Mindfulness Subscale** | | | |
| Q9 When something upsets me I try to keep my emotions in balance. | .46 | .877 | |
| Q14 When I'm feeling down I try to approach my feelings with curiosity and openness | .72 | .457 | |
| Q17 When something painful happens I try to take a balanced view of the situation | .74 | .466 | |
| Q22 When I fail at something important to me I try to keep things in perspective | .64 | .700 | |
| **Over-Identification Subscale** | | | |
| Q2 When something upsets me I get carried away with my feelings. | .80 | .468 | |
| Q6 When I'm feeling down I tend to obsess and fixate on everything that's wrong | .70 | .758 | |
| Q20 When something painful happens I tend to blow the incident out of proportion | .55 | 1.032 | |
| Q24 When I fail at something important to me I become consumed by feelings of inadequacy | .73 | .702 | |