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Emotional experience:
Relations to personality, subjective well-being,
recollection, and external influences



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Dissertation is accepted for the commencement of the degree of Doctor of Philosophy (in Psychology) on June 25, 2012 by the Council of the Faculty of Social Sciences and Education, University of Tartu.

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Commencement: August 30, 2012

Publication of this thesis is granted by the Department of Psychology, University of Tartu and by the Doctoral School of Behavioural, Social and Health Sciences created under the auspices of European Union Social Fund



European Union
European Social Fund



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ISSN 1024-3291
ISBN 978-9949-32-075-2 (trükis)
ISBN 978-9949-32-076-9 (PDF)

Autoriõigus: Liisi Kõöts-Ausmees, 2012

Tartu Ülikooli Kirjastus
www.tyk.ee
Tellimus nr 363

*“We shall call emotion
an abrupt drop of consciousness
into the magical.”*

Jean-Paul Sartre (1948, p. 90)

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following original publications and an unpublished manuscript, which will be referred to in the text by their respective Roman numerals:

- I **Kööts, L.**, Realo, A., & Allik, J. (2011). The influence of weather on affective experience: An experience sampling study. *Journal of Individual Differences*, 32, 74–84.
- II **Kööts, L.**, Realo, A., & Allik, J. (2012). Relationship between linguistic antonyms in momentary and retrospective ratings of happiness and sadness. *Journal of Individual Differences*, 33, 43–53.
- III **Kööts-Ausmees, L.**, Realo, A., & Allik, J. Reliving bygone moments: The relationship with recent emotional experience and personality. *Manuscript under review*.
- IV **Kööts-Ausmees, L.**, Realo, A., & Allik, J. (2012). The relationship between life satisfaction and emotional experience in 21 European countries. *Journal of Cross-Cultural Psychology*, xx, 1–22.
- V Realo, A., Siirinen, M., Tissari, H., & **Kööts, L.** (in press). Finno-ugric emotions: The meaning of anger in Estonian and Finnish. In K. R. Scherer, J. R. J. Fontaine, & C. Soriano (Eds), *Components of emotional meaning: A sourcebook*. Oxford: Oxford University Press.

The author of the present dissertation contributed to these publications as follows:

- In Studies I and II: participated in conducting the experiments and data collection; participated in carrying out data analyses and writing the manuscripts;
- In Study III: formulated the research question, participated in designing the questionnaire, carried out and supervised data collection, conducted the analyses, and wrote the manuscript;
- In Study IV: participated in formulating the research question, analyzed the data, and wrote the manuscript;
- In Study V: adapted the main questionnaire into Estonian and organized the Estonian data collection.

Principal aims of the studies are to:

- examine the influence of weather variables (sunshine, temperature, barometric pressure, and humidity) on affective experience (Study I);
- study individual differences in weather's possible impact on positive and negative affect, as well as fatigue (Study I);
- explore whether people can feel happy and sad at the same time, and if personality traits predict the probability of feeling happy and sad in a mixed way (Study II);
- examine the influence of emotional experience and specific personality traits on the re-experiencing of personal past events (Study III).
- investigate if, and to what degree, life satisfaction judgments are predicted by positive and negative affective experiences as well as by mixed emotions (Study IV);
- study whether the relationships between the affective and cognitive components of SWB vary across different countries or cultures, in terms of countries' aggregate levels of personality traits, cultural values, and human development (Study IV);
- analyze the meanings of the emotion term 'anger' in two similar Finno-Ugric languages, Estonian and Finnish, across different components of emotions (Study V);
- find out the features of emotion most likely related to the experience of anger in Estonian and Finnish (Study V).

INTRODUCTION

I. Experience of Emotions

Human emotion is a complex phenomenon – the brain is constantly processing and integrating sensory information from the world, somatovisceral information from the body, and prior knowledge about objects and situations to produce an affective state. Moreover, information about the external world is translated into whether an object or situation is helpful or harmful, rewarding or threatening, and requiring approach or withdrawal (Barrett, Mesquita, Ochsner, & Gross, 2007). Emotions are elicited when something relevant happens to the individual, having a direct bearing on their needs, goals, values, and general well-being (Scherer, 2001, 2009). There are many theories about what generates emotion: however, this dissertation complies with the principles of the appraisal theory (Scherer, Shorr, & Johnstone, 2001).

Appraisal of events is allegedly one of the six major components of emotion, in addition to psycho-physiological changes (bodily sensations), motor expressions (face, voice, and gestures), action tendencies (behavioural responses, such as approach or avoidance), subjective experiences (feelings), and emotion regulation (controlling the expression or intensity of emotions) (Ellsworth & Scherer, 2003; Fontaine, Scherer, Roesch, & Ellsworth, 2007). The essence of appraisal theory is the claim that emotions are elicited by evaluations (appraisals, interpretations) of events and situations (Roseman & Smith, 2001). Appraisals start the emotion process, initiating the physiological, expressive, behavioural, and other changes that comprise the resultant emotional state. Thus, it is evaluations of events, rather than events *per se*, that elicit an emotion (Roseman & Smith, 2001). In this dissertation the broad terms ‘emotional’ and ‘affective’ experience are used interchangeably, referring to more sustained mood states felt during an event or a time period. Both represent people's on-line or retrospective evaluations of the events that occur in their lives and the feelings they elicit.

I.1. Environmental effects on emotional states

People may hold many myths about what affects their feelings. One of the daily factors that is often believed to cause pleasant or unpleasant emotions is weather – sunshine makes people happy, whereas dark rainy days equal depressive mood. The main purpose of **Study I** was to connect weather records to emotion data, in order to find out if the popular claims have any truth to them. Watson (2000) has analyzed the most extensive data on this topic to date. He gathered over 20,000 daily mood assessments from several student samples and linked these with weather conditions for the corresponding days. Contrary to expectations, he found that mood is almost entirely unrelated to weather conditions. The only relevant finding from his research was that sunshine might

act on the intensity of both negative and positive affect. However, on dark and rainy days, average mood levels were reported. Watson (2000) considered the overestimation of the mood-related effects of weather as an example of an illusory correlation, which could extend the list of so-called urban legends. In **Study I**, we elaborated the research of Watson (2000) by using momentary ratings of affective states, which were collected by means of Experience Sampling Methodology (ESM; Scollon, Kim-Prieto, & Diener, 2003; see part 3.2 of this dissertation). These ratings were linked with hourly weather data (temperature, relative humidity, barometric pressure, and luminance) from a local weather station (in Tartu, Estonia) for the same time period. Results showed that positive emotions increase somewhat with sunlight, and both positive and negative emotions are to a small amount intensified by temperature rise. Nevertheless, weather conditions alone have only a small impact on people's emotional experience. For example, with each unit rise in absolute temperature both positive and negative affect increased as little as 0.006 and 0.002 units, respectively (**Study I**). Sunshine appears to be of greater influence, especially to ratings of positive affect – with each unit rise in luminance, the increment of positive emotions was 0.028 units. However, increase in humidity and decrease in barometric pressure (which imply rainy weather) were not significantly or consistently related to changes in affective experience. Therefore, regardless of some minor statistically significant effects, the relationships between weather variables and emotional states are not nearly as strong as could be inferred on basis of beliefs in folklore and popular culture. In the context of appraisal theory, it could be assumed that different individuals who appraise the same situation (for example, warm weather with high temperature) in significantly different ways (e.g., disturbing or enjoyable) would experience different emotions (e.g., irritation or happiness); and a given individual who appraises the same situation in significantly different ways at different times (bright sunshine while working indoors the whole day or while having a picnic in park) would also feel different emotions (Roseman & Smith, 2001). But this applies only as far as weather is indeed perceived as something relevant that has a direct bearing on people's needs, goals, values, and well-being. Yet, there seem to be psychological states that do depend more on external conditions than positive and negative affect. For example, the incidence of sleepiness and tiredness were considerably elevated in the cold and dark (**Study I**). All in all, with regard to prototypical emotions, there are a number of intra- and inter-personal factors that may affect emotional experience to a substantially larger degree than simply sunny or rainy weather. And it can also be concluded that people are not particularly adept at discerning the factors that influence their mood (Watson, 2000).

I.2. Relevance of emotional valence

For more than half a century, emotion researchers have attempted to establish the underlying dimensional space that would most comprehensively account for similarities and differences in emotional experience. Over the years, there has been considerable disagreement about the number and nature of the dimensions that provide an optimal framework for studying emotions (Fontaine et al., 2007). In studies of the structure of self-rated affect, two schemes have most repeatedly emerged. In a widely used circumplex model as proposed by Russell (1979) and colleagues (Russell & Carroll, 1999), these two dimensions are pleasantness (or valence) and arousal. This model opposes positively and negatively valenced affects along a single axis, which therefore create a bipolar valence dimension. Research has indicated that people sometimes report positive and negative feelings at the same time (**Study II**), meaning that if there is a negative correlation between positive and negative emotions, it cannot be a very strong one. This dissertation, hence, focuses on the second well-known approach to affect structure, which places positively and negatively valenced affects onto different axes – Positive Affect (PA) and Negative Affect (NA), respectively (Watson & Tellegen, 1985).

These two dominant dimensions of emotional experience consistently emerge across various descriptor sets, time frames, response formats, rotational schemes, languages, and cultures (Allik & Realo, 1997; Almagor & Ben-Porath, 1989; Watson & Clark, 1992). While PA reflects one's level of pleasurable engagement with the environment and serves as a cue to stay on course or to explore the environment, NA is a general factor of subjective distress playing a fundamental role in calibrating psychological systems and serving as a call for mental or behavioural adjustment (Cacioppo, 1999; Watson, 1988). As evidence of the separability of NA and PA dimensions, these experiences display some strikingly different properties – for example, distinct distributions over time (Watson, Wiese, Vaidya, & Tellegen, 1999). Namely, NA scores remain relatively low in the absence of threat or danger, but quickly elevate in response to potential emergencies. Yet PA shows substantial variability across a very broad range, reflecting the fact that positive mood is primarily concerned with approach and appetitive behaviors and therefore related to endogenous rhythms (Watson et al., 1999). Thus, PA and NA are highly distinctive dimensions that reflect separate underlying systems. These two adaptive systems must be in communication with – and be influenced by – one another (Watson et al., 1999).

About 24 years ago, Watson, Clark, and Tellegen (1988) proposed the Positive Affect Negative Affect Schedule (PANAS), which consists of two brief 10-item scales to measure PA and NA. Their original publication (Watson et al., 1988) has since then been cited 6,982 times (as at July 23rd, 2012) in the Web of Science. Watson and colleagues (1988) argued that the PANAS scales are internally consistent and have excellent convergent and discriminant correlations with lengthier measures of underlying mood factors. Later it has been

shown in large samples that PANAS is indeed a reliable and valid measure of the constructs it was intended to assess. Demographic variables have only very modest influences on PANAS scores and PANAS exhibits measurement invariance across demographic subgroups (Crawford & Henry, 2004). The hierarchical bipartite structure of emotion terms has been replicated in several other languages, including a non-Indo-European language, Estonian (Allik & Realo, 1997). In this dissertation, PANAS has been used for measuring retrospective affective experience in **Studies I** and **III**. In **Study I**, we also constructed scales of PA, NA, and Fatigue, using experience-sampling ratings of basic emotions as well as other emotion-related adjectives. In **Study IV**, the scales of PA and NA were created on the basis of the emotional experience items employed in the European Social Survey Round 3. In **Studies II** and **V** specific positive and/or negative emotion terms were examined in depth.

1.3. Mixed positive and negative emotions

According to Watson and Clark (1992), the two general affect dimensions of PA and NA are, at least in self-report, only weakly correlated and therefore relatively independent of each other (Watson & Clark, 1992). Yet, PA and NA are not entirely unbound, because in the case of extremely intense NA levels in critical situations, the currently nonessential PA system may be temporarily inhibited (Watson et al., 1999). It has indeed been demonstrated that people do not simultaneously experience both positive and negative affect at very intense levels (Diener & Iran-Nejad, 1986). The bipolarity of PA and NA is also supported from the linguistic point of view which states that “pleasantness and unpleasantness are opposites” (Beebe-Center, 1932, p. 3; cf. Schimmack, 2001). But it nevertheless appears that the levels of positive and negative affect that one experiences are not too tightly linked (Diener & Iran-Nejad, 1986). Positive and negative affect can occur rather independently over time, because low levels of one type of emotion are compatible with any level of the other type of emotion. So, average levels of positive and negative affect can be independent across persons, because most affect occurs at non-intense levels (Diener & Iran-Nejad, 1986).

In **Study II**, the examination of the relationship between PA and NA was taken a step further. Namely, instead of broad affect scales, momentary ratings of specific linguistic antonyms, happy and sad, were analyzed. As the data were gathered from over a hundred individuals in the course of a two-week experience sampling experiment, the moment-to-moment connections between emotions could be studied both at the intra- and inter-individual level. Results demonstrated that no strict bipolarity exists even between happiness and sadness. In fact, momentary ratings of these two emotions were only moderately negatively correlated: the Pearson product moment correlation between sadness and happiness across all the single measurement trials was $r = -.17$ ($p < .001$). For each of the 110 participants, there were on the average 80 measurement

trials over the couple of weeks of the experiment. Across individuals, the cumulative distribution of within-person correlations between happiness and sadness ranged from $-.73$ to $.35$, with the mean being close to $-.20$ ($SD = .21$). However, the correlation between the averaged ratings of happiness and sadness across all measurement trials was positive, though statistically insignificant ($r = .13$, $p = .166$). This suggests that for each and every person, feeling happy does not necessarily imply the absence of feeling sad at the same time (see Figure 1 for the relationship between the averaged estimations of happiness and sadness across all participants). This is consistent with the findings of Larsen and McGraw (2011) who stated that, in specific situations, many people can feel even these discrete emotions simultaneously. Yet, there are people who indeed cannot be happy when they are sad, and vice versa – about 14% of all participants never reported mixed feelings over the entire course of the experiment in **Study II**. Research has shown that the tendency to experience overlapping positive and negative moods is stable over time within persons and varies broadly across individuals (Rafaeli, Rogers, & Revelle, 2007).

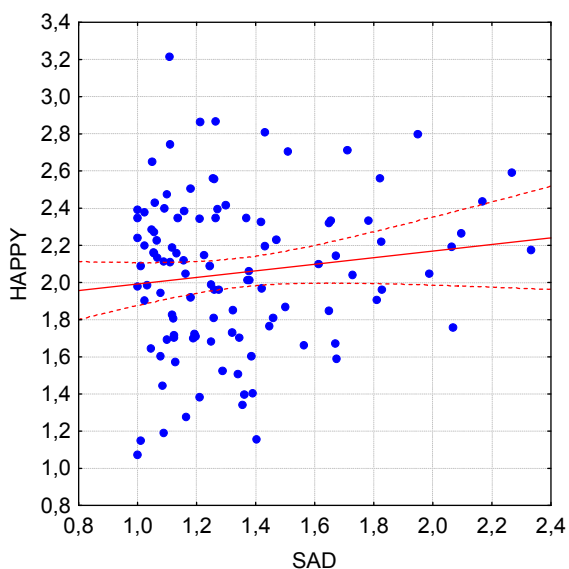


Figure 1. Bivariate distribution of the averaged estimations of happiness and sadness for the 110 participants ($r = .13$, $p = .166$; **Study II**).

Study II also revealed some personality differences in the tendency to simultaneously experience positive and negative emotions, which will be reported in the next part of this dissertation. Even more, the experience of mixed emotions seems to depend on cultural context. Whether and when mixed feelings will be reported probably depends on the cultural style of interpreting emotional

situations – some cultures find it important to foresee negative consequences of positive events, whereas others encourage positive reappraisals of negative situations (Miyamoto, Uchida, & Ellsworth, 2010). Altogether, the relationship between positive and negative affect is not invariably organized into a bipolar or independent bivariate structure. Pleasure and displeasure seem to be two separate affects that are reciprocally related in intensities, yet not mutually exclusive in momentary ratings (Schimmack, 2001). But when we analyze affective experience at the retrospective or between-subject level – happiness and sadness appear to be almost independent or even slightly positively correlated (**Study II**). Examining the degree of interaction between positive and negative emotions is not only an interesting field of study in itself, but it can also have significant implications to other psychological phenomena, such as general subjective well-being. For example, in **Study IV** it was found that the more people have experienced both positive and negative feelings over the past week, the higher their life satisfaction judgments (see part four of this dissertation).

2. Emotional Experience in Relation to Personality

Personality traits are dimensions of individual differences in relatively consistent patterns of actions, thoughts, and feelings (McCrae & Costa, 1990). The dominant personality theory in modern academic psychology is the five-factor model (FFM), which is a hierarchical organization of personality traits in terms of five basic dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (McCrae & John, 1992). Ever since antiquity, starting with Galen's classification of the four different humors (Irwin, 1947; cf. Scherer, Wranik, Sangsue, Tran, & Scherer, 2004), it has been assumed that individuals differ in their predisposition to experience certain emotions (Scherer et al., 2004). Nowadays, research has confirmed that there are systematic relations between self-rated affect and the Big Five personality traits (e.g., Allik & Realo, 1997). The emotion system has therefore also been considered as a subsystem of personality (Reisenzein & Weber, 2009). Two traits especially, Neuroticism and Extraversion, are thought to represent basic dimensions of affective temperament – neurotics and extraverts have a temperamental susceptibility to experience NA and PA, respectively (Watson & Clark, 1984, 1997).

Neuroticism is associated with pervasive feelings of distress and dissatisfaction. Individuals high in Neuroticism report elevated levels of nervousness, fear, guilt, shame, dissatisfaction, self-loathing, sadness, loneliness, anger, irritability, fatigue, and timidity, and lower levels of relaxation and confidence. Extraversion is broadly related to mood terms that lie at the very core of the positive affect dimension, such as happy, cheerful, enthusiastic, and lively (Watson, 2000). In fact, happiness has been considered “a thing called stable

Extraversion” (Francis, 1999; Schimmack, Radhakrishnan, Oishi, Dzokoto, & Ahadi, 2002). As a possible explanation to this regularity, Watson (2000) has suggested that Neuroticism and Extraversion are associated with significant affect-producing life circumstances. More specifically, maladaptive personality characteristics of those high in Neuroticism may actively generate stressful events (and adverse life circumstances are at least partly responsible for their elevated levels of negative mood); Extraversion, on the other hand, is related to greater socializing and engaging in more pleasurable activities (Watson, 2000). The pattern of associations between affect and personality domains is also generalizable across languages and cultures. The general associations between Neuroticism and NA and between Extraversion and PA appear to be truly universal and independent of any particular language and culture (Allik & Realo, 1997).

However, the connection between personality dispositions and affect is more diverse than the nearly self-explanatory Neuroticism–NA and Extraversion–PA associations. The affective nature of the other three FFM personality dispositions is somewhat less obvious. For example, research has indicated that low Agreeableness is related to negative emotionality, such as trait anger, hostility, and anger expression (Kuppens, 2005), meaning that agreeable individuals experience lower levels of anger, irritability, and scorn than do those who are more antagonistic. Conscientiousness is correlated with attentiveness, which is part of PA: conscientious individuals report higher levels of determination, concentration, and alertness (Watson, 2000). Finally, individuals who score high on Openness to Experience seem to be more emotionally sensitive to art and beauty, and according to some studies also tend to experience a wider range of feelings and emotions than people low on this trait. Higher openness could thus also be related to emotional differentiation (McCrae, 2007; McCrae & Sutin, 2009). Other research has, however, shown that Openness to Experience appears to stay apart from human emotions and feelings, because only a very small amount of its content can be predicted from all measures of affect (Allik & Realo, 1997; Watson, 2000).

Besides being closely related to discrete emotions and affective dimensions, personality differences also help to explain emotional complexity. In **Study II**, where the co-occurrence of momentary happiness and sadness was examined, it was found that all Big Five traits, except Agreeableness, predict the tendency to experience mixed momentary positive and negative emotions. At the level of specific facets, mixed emotions were positively related to N3: Depression, N5: Impulsiveness, and O4: Openness to actions, whereas negatively to C3: Dutifulness. In other words, people who reported mixed emotions were more likely to act on cravings, need environmental stimulation, tend to be open to new experiences on a practical level, find it irrelevant to fulfill moral obligations, and have lower levels of floating anxiety (**Study II**). As personality traits involve individual differences in patterns of thoughts, they are, together with emotional experience, closely related to other cognitive processes, such as

the functioning of episodic memory. In **Study III** we examined the relationship between personality and the most characteristic feature of episodic memory – the feeling of re-experiencing memories and mental time-travel into the past (Tulving, 2002). Memory re-experiencing was explored at the most specific (evaluating a concrete episode from one’s personal past) and the most abstract level (assessing one’s overall tendency to relive autobiographical memories). In the case of single episode reliving, it was surprisingly found that specific personality traits had an even stronger influence on the feeling of re-experiencing than retrospective reports of PA and NA. It was shown that, in addition to emotion-related traits, personality facets which were also tied to self-regulation and shyness (such as N4: Self-Consciousness, N5: Immoderation, A5: Modesty, C2: Orderliness, and C5: Self-Discipline) can make relevant contributions to the tendency to vividly re-experience personal memories (**Study III**). This finding demonstrates that even the retrieval of very specific information about one’s personal past is influenced by constructions of the self, including self-image, goals, and expectations (Conway & Pleydell-Pearce, 2000).

Most of the data reported above have mainly dealt with direct and explicit connections between personality and emotions. However, in **Studies I** and **IV**, the less straightforward influence of personality on different individual processes was examined. Multilevel modeling was used in order to consider individual differences in personality as person-level moderators of other emotion-related psychological processes. The idea behind these analyses was to explore if weather influences the affective experience of different individuals in similar or dissimilar ways (**Study I**) and whether differences in national mean levels of personality traits affect the relevance of recent emotional experience in forming life satisfaction judgments across different countries (**Study IV**). In **Study I**, personality traits of students and elderly people were analyzed as between-subject moderators of weather’s effect on the within-subject emotional experience. As a result, personality was found to explain only a slight portion of variance in weather’s impact on affective states. Conscientiousness in particular appeared to moderate some relationships between emotional experience and weather indicators; however, the effects were marginal in magnitude. All in all, the age of participants seems to have a much greater impact on the weather–affect relationship than differences in basic personality domains. In **Study IV**, the moderating influence of personality on life satisfaction judgments was examined at the level of European countries. We explored if countries’ aggregated scores of Neuroticism and Extraversion influence the individual-level relationship between life satisfaction and emotional experience. It was shown that national scores of Extraversion and Neuroticism significantly influenced the connection between having recently experienced mixed emotions and being satisfied with one’s life. The connections between PA and NA on the one hand and life satisfaction on the other were, however, not moderated by national-level personality scores. Therefore, the way in which citizens of a country on the average tend to describe themselves (in terms of how extraverted

and neurotic they are) influences the weight of emotional complexity in life satisfaction judgments, but has no impact on the separate effects of positive and negative emotions.

In conclusion, personality traits are connected to emotions in several ways and on different levels, making the relationship between personality and emotional experience rather complex.

3. Emotions and Memory Recall

Emotions and cognitive processes coexist, interact with one another and contribute to experience in every moment of our lives (Hektner, Schmidt, & Csicszentmihalyi, 2007). Although scientists are used to thinking about cognitive events (such as thoughts, memories, and beliefs) as separate from emotional events, this distinction is probably phenomenological rather than causal and does not seem to be respected by the brain (Barrett et al., 2007). The tight interconnectedness of emotions and memory, in particular, has probably received the most attention in literature. In their review, Kensinger and Schacter (2008) recognize that there are at least three broad influences of emotion on memory: the amount of accurate detail remembered about prior experiences, the number (quantity) of events remembered, and the subjective vividness (quality) of the remembered events (Kensinger & Schacter, 2008). In **Study III**, we focused on the last influence – our aim was to examine the phenomenology or quality of memory experiences, instead of accurateness or event contents.

It is widely known and also scientifically demonstrated that emotionally intense events are often more likely to be remembered than non-emotional ones, and that the amygdala appears to be critical for this quantitative memory boost. Emotional memories are often re-experienced with tremendous vividness. But in addition to intensity or arousal, the valence of an event (whether it elicits positive or negative affect) also seems to have an impact on whether and how the episode is remembered. In general, the literature suggests that negative affect focuses attention on intrinsic sensory details, leading to the retention of more accurate details, whereas positive affect involves conceptual processes and increases the likelihood that the gist of an event is remembered, but that its details are forgotten (Kensinger & Schacter, 2008). Individuals appear to differ dramatically in how well they remember emotional events, and one important contributor to this difference may be how individuals regulate their emotions (Richards & Gross, 2006). **Study III** demonstrated that the overall feeling of reliving episodes from the personal past is significantly related to emotional experience, whether in the form of shorter-range retrospective evaluations (PA of past few weeks) or as relatively stable personality traits (N3: Depression, O3: Emotionality, E6: Cheerfulness). These three personality facets can be thought of as dispositional mood measured as personality attributes of the individual. To sum up, a larger range and richness of emotional experiences enhance the feeling of reliving personal memories.

3.1. Memory biases related to emotions

A human memory is never a perfect record of a life experience (Richards & Gross, 2006). After more than one century, advances in psychology and neurobiology show that we memorize only parts of the experience; we interpret them and we associate them with previous similar situations. Memory distortions are one of the most well-known errors in our information processing (Hektner et al., 2007). While emotional memories are reconstructed at the time of retrieval, they are prone to memory biases and inconsistencies (Holland & Kensinger, 2010). Emotion affects the information that becomes a part of the memory trace, as well as the information that is accessible for recall. The emotion that we feel at retrieval, or that we want to feel, can have a particularly strong influence on the way in which we reconstruct past experiences and past emotions. Those affective characteristics that have been suggested to influence how vividly a memory is remembered are arousal, personal importance, and valence (Holland & Kensinger, 2010).

Research has revealed several memory biases related to emotional experience that either enhance or impair the recall of a memory, or that alter the content of a reported memory. First, people evaluate certain kinds of past affective experience by referencing to just a few selected moments. That is to say, on many occasions, global evaluations of past emotional events are well predicted by a simple average of two privileged moments: the most intense affective moment of that experience (the peak affect) and the affect experienced at its end (the final experienced affect that concluded the experience). Empirical support for the peak-and-end rule is robust (Fredrickson, 2000; Fredrickson & Kahneman, 1993; Redelmeier, Katz, & Kahneman, 2003). Second, positive mood has been associated with more memory reconstruction errors than negative mood, most likely because individuals in a happy mood rely on gist-based information or on heuristics, while individuals in a negative mood are more likely to focus on the specific details of information (cf. Kensinger & Schacter, 2008). Third, people's recollections of the past are often positively biased. People perceive events in their lives to be pleasant more often than unpleasant. The affect associated with unpleasant events fades faster than the affect associated with pleasant events (although dysphoria or mild depression disrupts such bias) (Walker, Skowronski, & Thompson, 2003). According to some studies, positivity bias might characterize information processing, especially in the elderly (Goeleven, De Raedt, & Dierckx, 2010) – aging often involves a decrease in the experience of negative affect and is associated with stabilization, or even a slight increase, in the experience of positive affect (Mroczek & Kolarz, 1998). Positivity bias is also manifested in the process of autobiographical recollection – it appears that positively-valenced memories are accompanied by a greater feeling of re-experiencing (**Study III**).

And fourth, mood states are known to influence memory and judgment in a mood-congruent manner. Namely, people more easily learn and remember material that is in an emotional tone that is congruent with their current mood

than material that is incongruent with their mood, because mood-congruent concepts have been activated in the memory (see Bower, 1981, for the network theory of affect). Positive mood states are therefore thought to increase the tendency to make positive judgments and retrieve positive memories; negative mood states should increase the tendency to make negative judgments and retrieve negative memories (Rusting, 1999). In **Study III**, participants rated the emotional valence of a recollected memory episode, as well as their experience of PA and NA during the past few weeks. Results showed that recent PA was indeed significantly related to the positive valence, and NA to the negative valence, of the memory episode, but these relationships were rather weak ($r = .17, p < .001$, and $r = .10, p < .05$, respectively). There are at least two possible explanations for this weak association: (1) experiences of PA and NA were rated for the past few weeks, not for the current moment; and (2) at times, people retrieve positive memories even in negative moods – the phenomenon of thinking of positive memories while being sad has been termed mood-incongruent memory or mood repair (Parrott & Sabini, 1990).

3.2. Recalling past emotional experience

In emotion research, it must also be asked if retrospective self-reports of affective experience are reliable. People often remember past experiences – and their emotional reactions to those experiences – through a distorted lens (Holland & Kensinger, 2010). Distortions in emotion-memory are most likely to be observed when marked changes have occurred in people's emotions, goals, and beliefs in the meantime. Under these conditions, people appear to use their current feelings about and appraisals of past experiences to infer how they must have felt when these experiences first took place (Levine & Safer, 2002). Global evaluations of past affective experiences are not merely perceived or felt; they are constructed (Fredrickson, 2000). Failing to adjust for post-event experience leads to inaccuracies in retrospective (and also prospective) judgments of emotion (Levine & Safer, 2002). Biases in memory for emotion occur as a function of current emotions, appraisals, and coping efforts, as well as of personality. Such biases have been found for both positive and negative emotions, for everyday emotional experiences, and for intense emotions associated with surprising and personally-consequential events (Levine & Safer, 2002). However, some of the pitfalls associated with traditional self-reports, such as memory biases and the use of global heuristics, can be avoided by using ESM experiments.

ESM (also called ecological momentary assessment) was proposed as a tool to separate on-line experiences from recall and global biases (Larson & Csikszentmihalyi, 1983; Scollon et al., 2003; Stone & Shiffman, 1994). This is possible because, in ESM, not much room for recall bias exists between the signal and the response, because of the shortness of the time lag between the two moments. In short, ESM refers to a method of data collection in which

participants respond to repeated assessments at different moments over the course of time, while functioning within their natural settings (Barrett & Barrett, 2001; Csikszentmihalyi & Larson, 1987; Hektner et al., 2007; Scollon et al., 2003). In **Studies I and II**, ESM was employed to examine momentary ratings of affective states over a two-week period. In **Study II**, we measured the extent of two specific emotions (happy and sad) in two ways. In addition to the momentary ratings from the ESM experiment, participants also filled in the PANAS at the end of the experiment, thereby retrospectively assessing the same emotions for the last couple of weeks (i.e., the exact interval of the experiment). When the momentary (ESM) ratings of emotions were averaged for each person and then compared with the retrospective assessments, rather good agreement resulted. The correlations were $r = .52$ and $.60$, for happiness and sadness, respectively ($p < .001$), meaning that retrospective ratings did contain accurate information about momentary emotions. But it also means that there was about 70% of variance in emotional experience that was not in common between the two types of ratings. This example from **Study II** clearly indicates the significance of sampling specific moment-to-moment experiences in emotion research. Nevertheless, bias in memory for emotion is natural, because the primary function of memory is not to serve as an undying record of the past, but rather to guide goal-directed action (Levine & Safer, 2002).

Another relevant advantage of ESM is that it takes psychology out of the laboratory and into real-life situations, thus increasing its ecological validity (Scollon et al., 2003; Stone & Shiffman, 1994). ESM has the unique ability to capture daily life as it is directly perceived from one moment to the next, affording an opportunity to examine fluctuations in the stream of consciousness and the links between the external context and the contents of the mind (Hektner et al., 2007). Involving questions about external circumstances was especially important in **Study I**, where the influence of weather on affective experience was analyzed. Taking into account the individuals' whereabouts at the time of signal was essential, because nowadays people spend a lot of their time indoors, where there is no direct contact with atmospheric phenomena. Altogether, the main strength of experience sampling lies in its ability to provide fine-grained, detailed pictures of human experience (Scollon et al., 2003).

4. The Emotional Component of Subjective Well-Being

Subjective well-being (SWB), a key component of quality of life, is a broad category of phenomena that includes people's emotional responses, domain satisfactions, and global judgments of life satisfaction (Diener, Suh, Lucas, & Smith, 1999). SWB can be considered an umbrella term used to describe the level of well-being people experience according to their subjective evaluations of their lives. These evaluations, which can be both positive and negative, include judgments and feelings about life satisfaction, interest and engagement,

affective reactions such as joy and sadness in relation to life events, and satisfaction with work, relationships, health, recreation, meaning and purpose, and other important domains (Diener & Ryan, 2009).

Definitions of SWB distinguish a cognitive and an affective (or hedonic) component of SWB. The cognitive component is an individual's life satisfaction (LS) – evaluations of one's life according to subjectively-determined standards (Schimmack et al., 2002). According to the cognitive approach to well-being, a theoretical model called AIM (abbreviation of Attention, Interpretation and Memory; Diener & Biswas-Diener, 2008), the way in which people interpret (evaluate, appraise) the world has as much, or even more, to do with their happiness than what is actually going on in their world. The processes of attending to some events and not others, of interpreting ambiguous events in positive rather than negative ways, and of tending to recall the good times instead of the bad times from the past are about the internal processes of being happy. Our daily interpretation of things determines our feelings of well-being (Diener & Biswas-Diener, 2008; cf. Diener & Ryan, 2009).

The affective component is an individual's (actual or perceived) hedonic balance (i.e., the balance between pleasant affect and unpleasant affect). When respondents form an LS judgment, they retrieve past pleasant and unpleasant events from memory. The ratio of pleasant memories to unpleasant memories is used as one source of information in judging LS (Schimmack et al., 2002), and SWB researchers therefore include measures of both pleasant and unpleasant affect in their research (Diener et al., 1999). Kuppens, Realo, and Diener (2008) demonstrated that, across nations, positive and negative emotions contribute independently to satisfaction with life: positive emotions are positively and negative emotions negatively related to LS. In **Study IV**, the same was found for the twenty-one countries participating in the European Social Survey (Round 3 in 2006). However, while in the Kuppens and colleagues' (2008) study the experience of positive emotions was twice as strongly related to LS judgments as negative emotions, the difference between the effects of PA and NA on LS was less remarkable in **Study IV**.

4.1. The role of mixed emotions in SWB

The essential role of positive emotions in SWB has been widely acknowledged, but is it necessary for people to be euphorically happy all of the time in order to achieve a better life? Research says no: constant euphoria is not a desired outcome. Endless striving for higher levels of well-being could also lead an individual to more risk-seeking and potentially dangerous behaviors (Diener & Ryan, 2009). Whereas much theory and research motivated by positive psychology has focused on the beneficial effects of positive emotions on health outcomes, it has been proposed that coping with severe stressors requires not only experiencing positive emotions but also experiencing and grappling with the negative feelings associated with the stressor (Larsen, McGraw, &

Cacioppo, 2001). Studies on emotion regulation strategies have indicated that experiencing negative emotions can also contribute to psychological well-being. North and colleagues (2011) speculate that accepting one's negative emotions (psychological acceptance) and then trying to seek out positive aspects (positive reappraisal) might be an optimal strategy for building happiness (North et al., 2011). And as we know from **Study II**, at many times people do report experiencing linguistically opposite emotions (happiness and sadness) even simultaneously.

In **Study IV**, we therefore also examined the role of emotional complexity (meaning a non-linear interaction between positive and negative emotions) in well-being. For that purpose, a correlation between experiencing PA and NA (over the past week) was calculated for each individual (using Asendorpf's formula; see Asendorpf, 1992, for details), resulting in an index of mixed emotions. It was demonstrated that retrospective mixed emotions had a positive effect on LS judgments, meaning that the more an individual is inclined to experience both types of affect within a time period, the higher his or her LS; however, this effect was weaker than in the case of analyzing PA and NA independently. In sum, **Study IV** supports the idea of Oishi and colleagues (Oishi, Diener, & Lucas, 2007), who stated that there is more to psychological well-being than just high levels of happiness; it is also an intense and multifaceted emotional life that makes people satisfied with their lives.

5. Emotions across Cultures and Languages

5.1. Cultural moderators of SWB

The contribution of differently-valenced feelings to SWB is not invariable throughout the world – how the experience of positive and negative emotions relates to the good life depends on the values that characterize one's society (Kuppens et al., 2008). The relation between hedonic balance and life satisfaction has been shown to be significantly stronger in individualistic cultures than in collectivistic cultures (Suh, Diener, Oishi, & Triandis, 1998), because individualistic cultures place more importance on emotions (Schimmack et al., 2002). In the study by Kuppens and others (2008), individualist countries seemed to have a heightened sensitivity precisely to negative emotions, which means that individualist cultural values emphasized the minimization of displeasure and negative feelings for attaining satisfaction with life more, compared to collectivist cultural values (although positive emotions show a stronger overall relation with life satisfaction than do negative emotions). However, in **Study IV**, individualism had no statistically significant direct influence on LS; likewise, it did not moderate the relationship between the cognitive and affective components of SWB. This could be explained by the relatively individualistic nature of most European countries, compared to many other parts of the

world – Kuppens et al (2008) used data from, altogether, 46 countries, including African, Asian, and Middle East nations.

Additionally, while it has been demonstrated that, in nations that emphasize self-expression values (Inglehart, 1997), positive emotional experiences were more strongly related to life satisfaction than in nations in which members are focused on daily survival (Kuppens et al., 2008), **Study IV** showed the contrary. We found that, with increasing survival values (and at the same time with the decreasing level of human development, which is strongly related to survival/self-expression), the effect of PA (as well as mixed emotions) on life satisfaction became stronger. This discrepancy in the results from **Study IV** and Kuppens et al (2008) could be explained by sample composition. The former had a representative sample of 40,487 people across 21 European countries, whereas the latter employed merely young student samples (from the International College Survey 2001). Hence, **Study IV** emphasizes the importance of employing representative samples in cross-cultural research as the age and status variance of participants can have a profound impact on results.

5.2. Equivalence in emotion research

Conducting cross-cultural research on emotional experience requires establishing a degree of equivalence in emotion terms (**Study V**) as well as measurement scales (**Study IV**). Understanding emotional experience across different cultures, nations, and languages is therefore complicated. People cannot describe their feelings and emotional states without using emotion words. Those words, however, may carry different meanings in different cultures or even within one culture. In fact, there seems to be no word-for-word match in the emotion lexicons of various languages (Ogarkova, Soriano, & Lehr, 2012). Therefore, an interesting question is whether an emotion word is translatable from one language or cultural context to another. The concept of equivalence in lexical research on emotions largely resides on the idea that two emotion words/expressions should share the same meaning to be considered equivalent (cf. Ogarkova et al., 2012).

Study V was part of the international GRID project, which is a worldwide study of the semantics of emotion terms using a componential approach. By means of the translation/back-translation procedure, the original English GRID instrument was translated into many world languages, including Estonian and Finnish, which are two culturally and linguistically related Finno-Ugric languages. Estonian- and Finnish-speaking participants were asked to evaluate prototypical emotion terms on many different features that covered all six of the major components of emotion: appraisals of events, psycho-physiological changes, motor expressions, action tendencies, subjective experiences, and emotion regulation (Ellsworth & Scherer, 2003). It was found that emotion terms in English are not always easily translatable into other languages. More specifically, in Estonian and Finnish, the boundary between close emotions

anger and *hate* is not drawn in exactly the same place as in English. The meaning of the term *anger* is very similar in Estonian and Finnish, but emotion meaning profiles are even more similar for the word “viha”, which means *anger* in Estonian, but *hate* in Finnish (**Study V**). In sum, it is important to take into account the richness and variability of word meaning across even similar languages.

Further, in cross-cultural research, it is essential to ask if respondents from different cultures interpret a given measure in a conceptually similar manner (Vandenberg & Lance, 2000) and whether members of different cultures ascribe the same meanings to scale items (Milfont & Fischer, 2010). When comparing nations, an assumption is made that an instrument measures the same psychological construct in all nations. If this assumption holds, the comparisons are valid and differences/similarities between groups can be meaningfully interpreted. However, if this assumption does not hold, comparisons and interpretations may not be meaningful. Therefore, researchers should explicitly evaluate the equivalence of measures (or measurement invariance) and then distinguish between different levels of similarity or equivalence (Milfont & Fischer, 2010; **Study IV**). Psychological constructs, such as the subjective experience of emotion, constitute latent variables that cannot be measured directly. For example, in **Study IV**, the latent factors of interest were NA and PA. As a result, psychological measures function as indicators of the latent construct. The indicators of NA in our study were four negative mood adjectives – depressed, lonely, sad, and anxious; indicators of PA were four positive states – happy, peaceful, enjoying life, and having a lot of energy. In order to meaningfully compare latent constructs across groups, each observed indicator must relate to the latent variable in the same way across all groups (i.e. the 21 European countries in **Study IV**). In establishing the comparability of countries, the most important question is whether the constructs exist at all in every nation of interest (known as functional invariance). Thereafter, it has to be gradually determined if the measurement scales have the same structure (configural invariance), the same factor loadings (metric invariance), and eventually, the same item intercepts (scalar invariance) across countries (Milfont & Fischer, 2010). In **Study IV**, these models were examined using Confirmatory Factor Analysis (CFA) which is one of the most widely used methods to test for measurement invariance, and is becoming increasingly popular (Milfont & Fischer, 2010). But more specifically, a multilevel CFA (MCFA) was conducted, because the ESS data consisted of two levels: the level of individuals (within countries) and level of the twenty-one countries. MCFA decomposes the total sample covariance matrix into pooled within- and between-group covariance matrices and uses these two matrices in the analyses of the factor structure at each level. After consecutively running all necessary models, support for the scalar invariance model was found – the goodness-of-fit index, RMSEA, was 0.034 ($\chi^2 = 827.73$, $df = 35$), indicating a good fit. Thus, it was demonstrated that the item intercepts of NA and PA were invariant at the

levels of within and between countries and we were permitted to make comparisons across the twenty-one European countries.

In sum, it is necessary to explore emotional experience across cultures, but differences in cultural values, languages, and levels of human development complicate the interpretation of results. Therefore, such research can only be conducted on the condition that a reasonable degree of equivalence is met in how the specific terms and broader scales of emotion are understood from one cultural group to another.

CONCLUSIONS

To sum up, the main conclusions of this dissertation are the following:

- Weather has a relatively small impact on people's emotions. While PA is to some degree enhanced by sunlight and both PA and NA are slightly intensified by temperature, weather has a significantly greater impact on the physiologically-based feelings of sleepiness and tiredness. Fatigue appears to decrease as temperature and luminance rise (**Study I**).
- People rarely experience both great happiness and sadness simultaneously, but low levels of one emotion are more compatible with any level of the other emotion. For some people, it is indeed possible to be happy and sad at the same time. Momentary mixed emotions are more likely to be felt by people who score lower in Conscientiousness and higher in Neuroticism, Extraversion, and Openness to Experience (**Study II**).
- Retrospectively-rated mixed affect influences people's subjective well-being (SWB), but the separate effects of PA and NA on life satisfaction are considerably higher. Thus, when forming a life satisfaction judgment both the presence of positive and absence of negative emotional experiences are important, but emotional complexity also makes a small contribution to overall SWB (**Study IV**).
- A rich affective life, which is represented by emotion-related personality traits and retrospective affective experience, has a relevant impact on recollecting one's past. Both emotional intensity (O3: Emotionality) as well as positive (E6: Cheerfulness and retrospective PA) and negative (N3: Depression) valence are related to the increased reliving of personal memories; reliving is also subject to positivity bias (**Study III**).
- Emotional experience is not equally important in life satisfaction judgments across different countries, because, depending on cultural factors, people might put unequal emphasis on positive and negative emotions. For example, PA and mixed emotions enhance life satisfaction judgments across Europe, but especially in countries where survival is valued more highly. Therefore, it is essential to examine the emotional component of subjective well-being cross-culturally, whereas all countries under study need to be representatively sampled as well (**Study IV**).
- Cross-cultural emotion research might be subject to different equivalence concerns – one of them being the comparability of emotion-word meanings. Emotion terms in English are not always unequivocally translatable into other languages. Considering the appearance of slight meaning differences in a common emotion word (*anger*) even across two linguistically close languages (Estonian and Finnish), it is important to take into account the richness and variability of word meaning (**Study V**).

ACKNOWLEDGEMENTS

First of all, I would like to warmly thank my supervisors Jüri Allik and Anu Realo. To Jüri I am indebted for sharing his stimulating ideas and having (at times ungrounded) faith in my abilities. I am grateful to Anu for taking me under her wing about eight years ago, and for offering me her time, guidance, and trust since then. Thank you both immensely for giving me this opportunity.

Colleagues from the Department of Psychology – I appreciate all the kind words, valuable discussions and help throughout the past decade of my psychology studies. I sincerely acknowledge every person who has participated in the studies of this dissertation, and each student for assisting me with the data collection. For their patience and support I am also grateful to my colleagues from the Tartu University Hospital.

I am terribly thankful to my dear parents and grandmothers for all the unconditional caring over the years. I also want to say thank you to Evi Männik whose teaching once upon a time ignited my initial interest in psychology. My closest friends deserve my gratitude for offering vital and enjoyable distractions when needed. And my most special thanks belong to Siim for his encouragement, love and understanding, and to Felix for sunshine.

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SUMMARY IN ESTONIAN

Emotsionaalne kogemus: Seosed isiksuse, subjektiivse heaolu, meenutamise ja välisteguritega

Väitekiri käsitleb inimeste emotsionaalset kogemust erinevatest vaatenurkadest, otsides sealjuures teaduslikku põhjendust ka mõnele populaarsele tõekspidamisele. Lähtutakse peamiselt kolmest teoreetilisest postulaadist: (1) emotsioonide tekkimise aluseks on olukordadele kognitiivsete hinnangute-tähenduste omistamine (Scherer, 2001), (2) positiivsed ja negatiivsed emotsioonid võivad olla üksteisest suhteliselt sõltumatud (Watson & Clark, 1992), ja (3) isiksuse üks paremaid kirjeldamisviise on viie-faktoriline mudel (Costa & McCrae, 1992). Väitekirjas uuritakse esmalt erinevate ilmastikutingimuste mõju positiivsetele ja negatiivsetele emotsioonidele ning ka väsimusega seotud tunnetele (**Uurimus I**) – päikesepaiste positiivne ning vihma ja sombuse ilma negatiivne mõju meeleolule on tavauskumustes laialt levinud. Järgnevalt võetakse vaatluse alla kahe lingvistiliselt vastandliku emotsiooni, rõõmu ja kurbuse, üheaegselt kogemise võimalikkus (**Uurimus II**). Kahes esimeses uurimuses on kasutatud kogemuse väljavõtte meetodit, mis võimaldab subjektiivseid kogemusi uurida reaalses, sõltumata erinevatest mäluksalliketest, ning nende loomulikus toimimiskeskkonnas (**Uurimused I ja II**). Järgmises uurimuses käsitletakse emotsionaalse kogemuse ja isiksuse mõju episoodilise mälu fenomenoloogiale – täpsemalt mälestuste taaskogemise ja vaimse ajarände tundele (**Uurimus III**). Edasi analüüsitakse subjektiivse heaolu erinevate koostisosade, afektiivse ja kognitiivse komponendi, omavahelisi seoseid. Eriliselt on vaatluse all afektiivse kogemuse ja eluga rahulolu hinnangute seosed, ning analüüsitakse ka seda, kuidas erinevad kultuurilise tasandi tegurid neid seoseid mõjutavad. Uuringus kõrvutatakse 21 riiki, kasutades selleks esinduslikku Euroopa Sotsiaaluuringu andmestikku (**Uurimus IV**). Emotsionaalseid kogemusi ei ole teatavasti võimalik ilma sõnadeta kirjeldada, kuid emotsioonisõnade tähendused võivad keeleli ja kultuuriti mõnevõrra erineda. Viimases uuringus analüüsitaksegi konkreetse emotsioonisõna (*viha*) tähendusruumi erinevusi ja sarnasusi kahes lingvistiliselt lähedases keeles (**Uurimus V**).

Väitekirja peamised tulemused ja järeldused on järgmised:

- Ilmastikutingimuste mõju inimeste prototüüpsetele emotsioonidele on suhteliselt väike. Positiivseid emotsioone suurendab mõningal määral päikesepaiste ning nii positiivset kui negatiivset afekti intensiivistab temperatuuri tõus, kuid tunduvalt olulisem mõju on ilmal siiski füsioloogilise aluspõhjaga seisunditele, nagu unisusele ja väsimusele. Nimelt väheneb väsimus seoses õhusoojuse ja päikesevalguse hulga suuremisega (**Uurimus I**).

- Inimesed kogevad suurt rõõmu ja suurt kurbust üheaegselt väga harva. Samas, kui ühte emotsiooni kogetakse nõrgal tasemel, on samal ajal hetkel võimalik teist emotsiooni ükskõik millise tugevusega tunda. Seega on mõned inimesed võimelised olema korraga nii rõõmsad kui kurvad. Hetketasandi segaemotsioone kogevad suurema tõenäosusega inimesed, kes saavad madalama tulemuse meelekindluse ning kõrgemad tulemused neurootilisuse, ekstravertsuse ja avatus kogemusele skaaladel (**Uurimus II**).
- Retrospektiivselt hinnatud segaemotsioonid mõjutavad inimeste eluga rahulolu hinnanguid, kuid eraldiseisvana on positiivse ja negatiivse afekti toime siiski märgatavalt suurem. Seega lähtuvad inimesed oma eluga rahulolu hinnates nii positiivsete emotsioonide rohkusest kui negatiivsete emotsioonide vähesusest. Samas annab üldisesse heaolusse oma väikese lisapanuse siiski ka emotsionaalne keerukus ehk segaemotsioonide kogemise määr (**Uurimus IV**).
- Emotsioonide sügavus ja variatiivsus (mida **Uurimuses III** mõõdeti nii isiksuseseadumuste kui retrospektiivselt kogetud afektina) mõjutab oluliselt seda, kuidas inimesed meenutavad oma minevikku. Seda, kuivõrd rännatakse mõtetes tagasi möödunud aegadesse ning elatakse uuesti läbi erinevaid sündmusi, mõjutab ühelt poolt emotsioonide intensiivsus (O3: Tundelisus), aga ka inimese seadumus kogeda nii positiivse (E6: Rõõmsameelsus ja retrospektiivne positiivne afekt) kui negatiivse (N3: Masendus) valentsiga emotsioone. Mälestuste taaskogemist iseloomustab ilmselt ka positiivsuse kalle – mida positiivsemaks hinnatakse mälestust, seda suuremal määral seda subjektiivselt taaskogetakse (**Uurimus III**).
- Emotsionaalne kogemus ei ole erinevates riikides eluga rahulolu hinnangute andmisel võrdselt oluline, sest olevalt kultuurilistest teguritest võivad inimesed positiivsetele ja negatiivsetele tunnetele ebavõrdset kaalu omistada. Näiteks, **Uurimuses IV** selgus, et positiivsed ja segaemotsioonid võimendavad eluga rahulolu hinnanguid üle kogu Euroopa, kuid eriti just riikides, kus väärtustatakse pigem ellujäämise kui eneseväljendusega seotud väärtuseid. Seega on afekti ja subjektiivse heaolu analüüsimine erinevates kultuurides väga oluline, kasutades sealjuures kindlasti ka riigiti esinduslikke valimeid.
- Kultuuridevahelistes emotsiooniuringutes võivad tekkida mitmed sama-väärsust või ekvivalentsust puudutavad probleemid. Ühena neist keerdküsimustest võib välja tuua emotsioonisõnade tähenduste võrreldavuse, mis kerkib eriti esile siis, kui rahvusvaheliste uuringute tarbeks tõlgitakse termineid otse ühest keelest teise. Inglisekeelsed emotsioonisõnad ei ole aga alati üheselt teistesse keeltesse tõlgitavad. Arvestades seda, et isegi eesti ja soome keeles sõna „viha“ tähendused veidi erinevad (**Uurimus V**), ilmestub, kui oluline on sõnatähenduste rikkust ja variatiivsust arvesse võtta ka lingvistiliselt väga sarnaste keelte raames.

PUBLICATIONS

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