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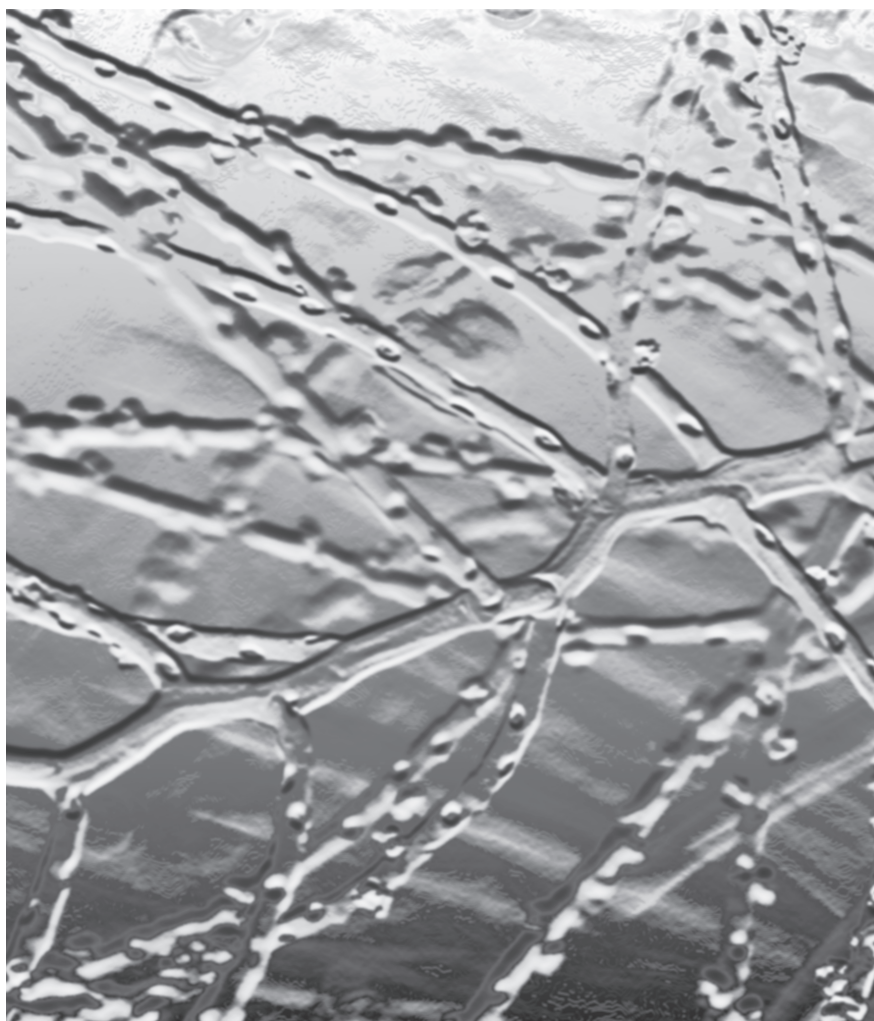


LATVIJAS UNIVERSITĀTE



*Baltic*

**JOURNAL OF PSYCHOLOGY**



2013, Vol. 14, No. 1, 2

ISSN 1407-768X

**BALTIC JOURNAL OF PSYCHOLOGY**  
**BALTIJAS PSIHOLOĢIJAS ŽURNĀLS**

2013, Volume 14, Number 1 & 2

EBSCO database *Academic Search Complete*

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*Layout and cover design:* The University of Latvia Press

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## REPORTS OF EMPIRICAL STUDIES

### Mindfulness – a Time Perspective? Estonian Study

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#### **Abstract**

This article examines if mindfulness measured with the MAAS (Brown & Ryan, 2003) has characteristic components of the time perspective construct measured with the ZTPI (Zimbardo & Boyd, 1999) in Estonian. Study 1 assessed the reliability and validity of the Estonian scales used with adult students at different levels of education ( $N = 610$ ). Factor analyses with combined items of these two scales showed MAAS to be the first factor. Multidimensional scaling indicated that the ZTPI and MAAS together reflect attitude and orientation towards time. Our results showed that mindfulness ratings are higher for those with Balanced Time Perspective. Study 2 in a clinical sample with people in psychotherapy ( $N = 49$ ) confirmed that subjective well-being, mindfulness and time perspectives are related. Mindful attention and awareness of current perceptions seems to be complementary to Future/conscientiousness. We propose that possibly, paradoxically, mindfulness is both a time perspective, and also awareness of one's own time perspectives.

**Keywords:** *mindfulness; time perspectives; awareness of time; self-esteem; subjective well-being*

#### **Introduction**

The human mind is capable of 'mental time travel' that allows people to project themselves at different points on a time continuum (*Tulving & Kim, 2007*). Zimbardo and Boyd (2008) have argued that people differ in whether they spend more time on thinking about the past, present or future, and whether their thoughts are positive or negative during this process. They called these mostly unconscious attitudes, beliefs, and values that people have related to time – time perspective (TP) (Zimbardo & Boyd, 1999; Boyd & Zimbardo, 2005).

In order to investigate whether people's cognitive temporal 'bias' is primarily past, present or future oriented with positive, negative, fatalistic or hedonistic attitudes, Zimbardo and Boyd (1999) devised a scale, the Zimbardo Time Perspectives Inventory, ZTPI. The ZTPI measures a time perspective profile, and consists of five subscales:

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Past Positive (PP), Past Negative (PN), Present Hedonistic (PH), Present Fatalistic (PF) and Future (F).

Several studies have shown that the time perspective is connected with subjective well-being, self-esteem and depression. The strongest, although negative, association has been found between subjective well-being and the Past Negative time perspective (Boniwell, 2005; Drake, Duncan, Sutherland, Abernethy, & Henry, 2008; Sircova & Mitina, 2008; Boniwell, Osin, Linley, & Ivanchenko, 2010). A link was found between subjective well-being and both the Past Positive and the Present Hedonistic time perspective (Drake et al., 2008; Boniwell et al., 2010; Zhang & Howell, 2011). The Future perspective was not related to well-being (Drake et al., 2008; Boniwell et al., 2010). At the same time Romero and Uomoto (2009) found that Future and Present Fatalistic TP were consistent predictors of lower well-being and Present Hedonistic TP did not predict higher positive well-being.

Time perspective and self-esteem research has shown that Past Positive and Future perspectives are associated with high self-esteem, whereas Past Negative and Present Fatalistic perspectives with low self-esteem (Zimbardo & Boyd, 1999; Sircova, Sokolova, & Mitina, 2008; Anagnostopoulos & Griva, 2012). There is no association between Present Hedonistic perspective and self-esteem (Zimbardo & Boyd, 1999).

Investigations have shown that Past Negative perspective is correlated with depression (Zimbardo & Boyd 1999; Roseanu, Marian, Tomulescu, & Pusta, 2008; Roseanu et al., 2008; Sircova, Sokolova, & Mitina, 2008; Anagnostopoulos & Griva, 2011). Positive perception of the past is inversely correlated with depression (Zimbardo & Boyd 1999; Anagnostopoulos & Griva, 2011), as is Future time perspective (Zimbardo & Boyd 1999; Anagnostopoulos & Griva, 2011). Individuals with Present Fatalistic trait (Zimbardo & Boyd, 1999; Roseanu et al., 2008, Anagnostopoulos & Griva, 2011) and Present Hedonistic trait (Roseanu et al., 2008) have more frequent depression.

Different research demonstrates that the combination of moderate to high scores on PP, PH and F subscales and relatively low scores on PN and PF indicate the healthiest TP profile (Boyd & Zimbardo, 2008; Drake et al., 2008; Sircova & Mitina, 2008; Boniwell, et al., 2010; Zimbardo, Sword, & Sword, 2012). Authors have called this special combination of 'biases' a Balanced Time Perspective (BTP). Drake and colleagues (2008) found that BTP participants were not only significantly happier, but also more mindful.

Zimbardo and Boyd (2008) discuss that mindfulness is a type of time perspective which they call Holistic Present. Mindfulness is originally a Buddhist concept that has spread in Western psychological science, and there have been several attempts to connect this concept to already existing psychological concepts (Schmidt, 2011). Zimbardo and Boyd (2008) have suggested that mindfulness could be a healthy time perspective. However, they have not performed any empirical studies on this relationship.

The main purpose of this study was to test the idea that mindfulness could be an aspect of time perspective. More specifically we assessed if mindfulness measured with the MAAS (Brown & Ryan, 2003) has characteristic components of the time perspective construct as measured with the ZTPI (Zimbardo & Boyd, 1999) in Estonian language. Our aim was to explore the relationship between mindfulness, time perspective, BTP and well-being indicators.

## Time perspectives and mindfulness

In the case of mindfulness there are components that are characteristic of time perspective – orientation to time and attitude about time. Brown and Ryan (2003) have described mindfulness as open or receptive awareness and attention to what is taking place in the present. Zimbardo and Boyd (2008) discuss that mindfulness has orientation towards the present, but contains the past and future with a fully open attitude. Self-regulating attention to the present helps to be aware of mind-wandering toward past experiences and potential future paths for reaching personally important goals (Smallwood & Schooler, 2006).

Mindful attention and awareness as a personality trait varies in strength among people. Low trait mindfulness means that a person pays attention and awareness to the present moment infrequently and operates more on unconscious 'automatic pilot'. Such mode of mind is related with depression. High trait mindfulness means that mindful states are more frequent or continuous, and this is positively related to subjective well-being (Segal, Williams & Deasdale, 2002; Brown & Ryan, 2003; Brown, Ryan & Creswell, 2007).

To date little research has been conducted on the relation between mindfulness and time perspective. Brown and Vansteenkiste (2006) (as cited in Brown, Ryan & Creswell, 2007) have suggested that mindfulness is inversely related to hedonism, fatalism, and a lack of consideration of future consequences. Drake and colleagues (2008) found mindful attention and awareness correlated positively with PP and negatively with PN, PH, and PF. In their study the relationship between F and MAAS was positive, but not significant.

The connection between TP and mindfulness is important in relation to well-being and goal attainment. Researchers have questioned whether orientation toward the present or the goal directed and future oriented behaviour is more adaptive, or maybe even complementary (Sternberg, 2000; Brown & Vansteenkiste, 2006, as cited in Brown, Ryan & Creswell, 2007). Gruber, Gunningham, Kirkland and Hay (2012) argue that people need to consider the past and future to make adaptive long-term decisions, and being 'stuck in the present' is a core problem associated with mania.

One aim of the current study was to investigate if the most popular measure of mindfulness, namely the MAAS (Brown & Ryan, 2003), measures both components of time perspective – attitude as well as orientation to time. Brown and Ryan (2004) have stated that the scale focuses on the construct of presence, but subsumes an acceptance of what occurs. Still, there are authors who think that the MAAS is an instrument only focusing on attention and awareness, without assessing acceptance (Trousselard et al., 2010). There are even authors who doubt that the MAAS measures orientation to the present moment (Grossman & Van Dam, 2011).

Prior to addressing our research question we set out to adapt and validate the Zimbardo Time Perspectives Inventory (ZTPI, Zimbaro & Boyd, 1999) in Estonian. The original ZTPI translated into Estonian had been used once previously in a cross-cultural study (White, Valk, & Dyalmy, 2011), however, reliability and validity of the Estonian ZTPI translation had not been confirmed.

## Method

### Process of adaptation

Adaptation of the ZTPI took place as part of a larger project. The original 56 items (Likert scale) Zimbardo Time Perspectives Inventory (ZTPI; Zimbardo & Boyd, 1999) was translated from English to Estonian by four linguists, and by one author of the current article, together with an independent scholar. Two individual linguists translated the Estonian versions back into English. R. Valk granted permission to use their translated version of the ZTPI as one possible translation. Russian version of the ZTPI (Sircova, Sokolova, & Mitina, 2008) was also taken into consideration. Experts' meetings were carried out to compare the translations, back translations and the originals, and to adapt the questionnaire. The Estonian questionnaire was reviewed by an independent Estonian philologist.

*Pilot studies* Pilot studies featuring a sample of a total of 117 adult students from different educational levels ( $N_s = 32, 42$  and  $43$ ) were conducted to ascertain the grammatical and psychological fitness of the expressions used in the scale. In addition to filling in the questionnaires the respondents were asked to provide a written feedback on the comprehensibility of the items and their linguistic correctness. Group and individual interviews were performed. Based on respondents' feedback, modifications were made to the wording after each pilot study.

### Study 1

Study 1 reports results of the ZTPI validation performed on a large sample of adult students at different levels of education. We explored the question of whether mindfulness is a time perspective, and assessed the levels of subjective well-being, mindfulness and self-esteem of the BTP group.

*Sample and procedure* The ZTPI scale was completed by 892 students from different cities in Estonia of whom 407 (39.8%) were acquiring higher education, 344 (33.6%) professional higher education, 129 (12.6%) vocational education and 12 persons (1.3%) who did not state their educational status. The majority of participants (76.4%) were female. Respondents' ages were 18 – 54 years ( $M = 23.3$  years,  $SD = 6.1$ ).

The self-report measures were administered primarily through an internet survey. Some participants completed the measures on paper during class time.

### Measures

*Estonian Mindful Attention Awareness Scale* (E-MAAS; Seema et al., submitted). The 15-item MAAS was used to measure trait mindfulness: the frequency of open or receptive awareness and attention to what is taking place in the present (MAAS; Brown & Ryan, 2003). The respondents' scores of the adapted version were in reverse to the original, (6 *almost always* – 1 *almost never*), such that higher scores indicated lower mindfulness. Thus all items were reversed before analysis to permit comparability to the original scale. The internal consistency was ( $\alpha = .89$ ).

*Self-esteem* The 10-item *Estonian Rosenberg Self-Esteem Scale* (ERSES; Pulmann & Allik, 2000) was used to measure one's overall evaluation of one's worth or value

(Rosenberg, 1989) on a 5-point scale ranging from *strongly disagree* to *strongly agree*. The internal consistency in this sample was  $\alpha = .89$ .

*Psychological well-being* The *WHO-Five Well-being Index (WHO-5)* (Estonian adaptation by Sisask, Värnik, Kõlves, Konstabel, & Wasserman, 2008) was used to measure positive mood, vitality, and interest in things with five statements on a 6-point scale (*never* to *always*). Higher values indicate higher psychological well-being (sample  $\alpha = .82$ ).

## Results

*Factorial Structure of the Estonian ZTPI.* Factor analysis was performed on one part of the randomly split sample ( $N = 447$ ). According to Zimbardo and Boyd (1999) the ZTPI scale contains five factors. In our analyses we left out all items that loaded on two or more factors, and also items with factor loadings below .4. The short 25 item version explained 52.08% of the variance, and the KMO indicator was 0.79.

This structure of the 25 items was further confirmed with confirmatory factor analyses. The CFA was performed via maximum likelihood estimation with robust standard errors and Satorra-Bentler scaled chi-square statistical test using EQS 6.1. The results indicated that the model had an acceptable fit to the data:  $S-B\chi^2 (N = 447, 262) = 486.098$ ;  $RMSEA = .044$ ;  $CFI = .90$ ;  $NNFI = .886$ . Therefore in our following analysis we used the short 25 items ZTPI.

*Reliability.* In this sample the scale internal consistency (Cronbach's alphas) for the E-ZTPI subscales were as follows: PN = .83, F = .74, PH = .73, PP = .69, PF = .68. The test-retest reliability of the Estonian version of the ZTPI subscales was assessed with 54 adult students over a 2-week period. The correlations were as follows: PN .83; F .64; PH .62; PP .88; PF .71, all  $p < .001$ .

*Correlations between Estonian ZTPI, MAAS, self-esteem and psychological well-being.* Correlations between the ZTPI subscales, MAAS, WHO-Five Well-being Index, and the Estonian Rosenberg Self-Esteem Scale are shown in Table 1. The MAAS was significantly negatively related to PN, PH and PF and positively related to F. At the same time self-esteem was positively related to F, PP and MAAS, but negatively related to PN and PF. Well-being was positively related to F, PH, PP, and MAAS, but negatively correlated with PN and PF.

**Table 1. Pearson Correlations between ZTPI, MAAS, and Well-Being Scales in the Adult Students' sample ( $N = 610$ )**

|                  | <i>PN</i> | <i>F</i> | <i>PH</i> | <i>PP</i> | <i>PF</i> | <i>MAAS</i> |
|------------------|-----------|----------|-----------|-----------|-----------|-------------|
| MAAS             | -.32**    | .23**    | -.12**    | .02       | -.21**    |             |
| RSES self-esteem | -.50**    | .26**    | .07       | .18**     | -.26**    | .34**       |
| WHO-5 well-being | -.32**    | .27**    | .20**     | .19**     | -.14**    | .27**       |

*Notes.* The Zimbardo Time Perspective Inventory (ZTPI); Mindful Attention Awareness Scale (MAAS); Estonian Rosenberg Self-esteem Scale (RSES); WHO-Five Well-being Index (WHO-5) \*\*  $p < .01$ .

*Factor structure of combined items from the ZTPI and the MAAS scales.* Zimbardo & Boyd (2008) argue that mindfulness is a type of time perspective. We combined items of the adapted short ZTPI and the MAAS scales into one data set (see also Baer, Smith, Hopkins, Krietemeier, & Toney, 2006) to test for the empirical existence of six factors or dimensions, and to explore the order of these dimensions (Table 2). The Oblimin rotation test indicated that the factors were not tightly correlated ( $-0.256 \leq r \leq 0.193$ ). The MAAS was the first factor. Varimax rotation showed that all items in each factor are with factor loadings over .40. Only one item loaded on two factors at the same time with a factor loading over -.3. The MAAS item 'I get buried so deep in thought about the past or future, that I do not notice what is happening around me' loaded also into the PN factor with factor loadings -.32. For the combined item pool KMO indicator was 0.85. The 40 items model explained 47.2% of the variance.

*Table 2. EFA factor structure of combined items from the ZTPI and the MAAS scales in the adult student's sample (N = 697)*

| <i>Subscales and items</i>  | <i>Factor loadings</i> |
|---|------------------------|
| <b>Subscale: MAAS mindful attention and awareness</b>   | <b>Factor 1</b>        |
| 8. I rush through activities without being really attentive to them.  | .757                   |
| 10. I do jobs or tasks automatically, without being aware of what I'm doing.                                    | .751                   |
| 12. I move places on "automatic pilot" and then wonder why I went there.  | .694                   |
| 7. It seems I am "running on automatic," without much awareness of what I'm doing.                              | .684                   |
| 14. I do things without paying attention to them.   | .654                   |
| 9. I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there. | .645                   |
| 3. It is difficult for me to stay focused on what's happening in the present.                                   | .581                   |
| 15. I snack without noticing what I am eating or how it tastes.   | .580                   |
| 13. I get buried so deep in thought about the past or future, that I do not notice what is happening around me. | .548                   |
| 1. I could be caught up in some emotion and not be conscious of it until some time later.                       | .540                   |
| 6. I forget a person's name almost as soon as I've been told it for the first time.                             | .482                   |
| 4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.   | .461                   |
| 2. I break or spill things because of carelessness, not paying attention, or thinking of something else.        | .455                   |
| 11. While listening to someone with one ear, I am doing something else at the same time.                        | .451                   |
| 5. I do not notice feelings of physical tension or discomfort until they become really strong.                  | .429                   |
| <b>Subscale: Past Negative</b>  | <b>Factor 2</b>        |
| 50. I think about the bad things that have happened to me in the past.  | .803                   |
| 16. Painful past experiences keep being replayed in my mind.  | .802                   |
| 34. It's hard for me to forget unpleasant images of my youth.   | .799                   |
| 25. The past has too many unpleasant memories that I prefer not to think about.                                 | .781                   |
| 4. I often think of what I should have done differently in my life.   | .549                   |

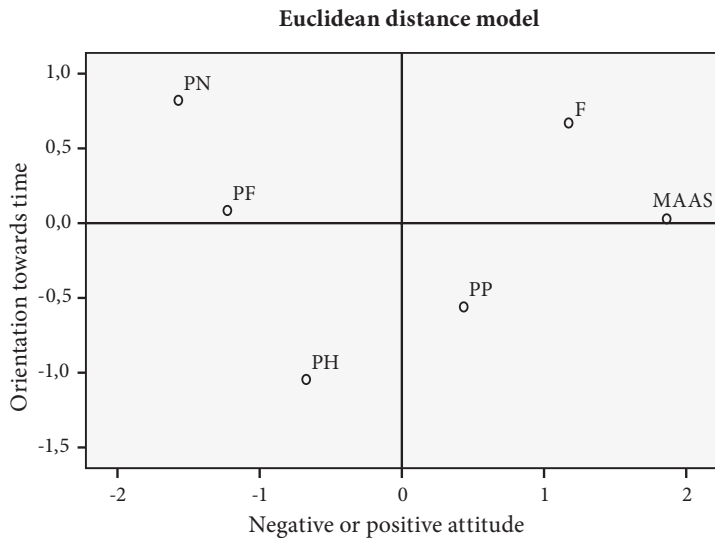


| <i>Subscales and items</i>   | <i>Factor loadings</i> |
|--|------------------------|
| <b>Subscale: Future</b>  | <b>Factor 3</b>        |
| 40. I complete projects on time by making steady progress.   | .733                   |
| 56. There will always be time to catch up on my work.  | – .689                 |
| 13. Meeting tomorrow’s deadlines and doing other necessary work come before tonight’s play.                | .686                   |
| 45. I am able to resist temptations when I know that there is work to be done.                             | .676                   |
| 10. When I want to achieve something, I set goals and consider specific means for reaching those goals.    | .649                   |
| <b>Subscale: Present Hedonistic</b>  | <b>Factor 4</b>        |
| 42. I take risks to put excitement in my life.   | .833                   |
| 31. Taking risks keeps my life from becoming boring.   | .760                   |
| 26. It is important to put excitement in my life.  | .686                   |
| 17. I try to live my life as fully as possible, one day at a time.   | .558                   |
| 8. I do things impulsively.  | .509                   |
| <b>Subscale: Past Positive</b>   | <b>Factor 5</b>        |
| 29. I get nostalgic about my childhood.  | .740                   |
| 2. Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories.               | .686                   |
| 7. It gives me pleasure to think about my past   | .678                   |
| 20. Happy memories of good times spring readily to mind.   | .665                   |
| 49. I like family rituals and traditions that are regularly repeated.                                      | .485                   |
| <b>Subscale: Present Fatalistic</b>  | <b>Factor 6</b>        |
| 39. It doesn’t make sense to worry about the future, since there is nothing that I can do about it anyway. | .738                   |
| 38. My life path is controlled by forces I cannot influence.   | .720                   |
| 14. Since whatever will be will be, it doesn’t really matter what I do.                                    | .686                   |
| 37. You can’t really plan for the future because things change so much.                                    | .529                   |
| 3. Fate determines much in my life.  | .474                   |

*Two dimensions reflected by the Estonian MAAS and ZTPI scales* We tested the hypothesis – both the MAAS and the ZTPI reflect characteristic components of the time perspective – orientation to time, and positive or negative attitude. Multidimensional scaling (MDS) was used to visualize the two underlying dimensions of the MAAS and ZTPI subscales (Figure 1). The scales as points are closer together the more positively they are correlated or the more similar they are (Borg & Groenen, 2010). Euclidean distances were created from the standardized interval data. Stress value for the matrix was .066, RSQ = .97, that means a good fit (Kruskal & Wish (1978) (as cited in Giugère, 2006). One of the dimensions (*x* axis) reflects positive versus negative attitude or valence (see also Anagnostopoulos & Griva, 2012). The other dimension (*y* axis) is more complicated, and seems to be diagonally mirrored between the left and right side of the figure. On the positive affect side the *y* axis expresses the time continuum from the past to the present to the future. The MAAS reflects orientation towards the present, as it is located between the positive past and future. Concurrently the time continuum

expressed with the y axis on the left or negative affect side seems to be upside down. PN is located at the left upper corner, PH at the bottom corner, and PF is located between them. PH scale is diagonally mirrored by F. This MDS analysis seems to indicate that the scales reflect two dimensions, but in an idiosyncratic sense in that the time orientation depends on attitude or vice versa.

**The Estonian MAAS and ZTPI subscales in two dimensional space**



**Figure 1. Euclidian distance model; representation of (dis) similarities of the ZTPI sub-scales and MAAS scale in two-dimensional space. For matrix Stress = .09; RSQ = .93. Adult student’s sample (N = 697)**

*The BTP group and their mindfulness, well-being, and self-esteem* To explore if mindfulness is a component of the BTP we entered the ZTPI, mindfulness, well-being and self-esteem data to k-means cluster analysis, as our sample was large (Table 3).

**Table 3. K-Means Cluster Groups with ANOVA Results in the Adult Students’ Sample (N = 598)**

|                    | Cluster groups    |         |         |                | F        |
|--------------------|-------------------|---------|---------|----------------|----------|
|                    | Non-BTP<br>N = 57 | N = 219 | N = 114 | BTP<br>N = 208 |          |
| Past Negative      | 3.9               | 2.9     | 3.0     | 2.1            | 123.6*** |
| Future             | 2.6               | 3.1     | 3.7     | 4.0            | 100.7*** |
| Present Hedonistic | 2.8               | 3.4     | 2.4     | 2.9            | 56.6***  |
| Past Positive      | 3.6               | 4.0     | 3.6     | 4.0            | 18.5***  |
| Present Fatalistic | 3.0               | 2.6     | 2.5     | 2.2            | 30.2***  |
| MAAS               | 2.5               | 3.9     | 3.5     | 4.4            | 71.9***  |
| Self-esteem        | 1.7               | 3.3     | 2.3     | 3.7            | 215.5*** |
| Well-being         | 3.3               | 3.7     | 3.9     | 4.4            | 225.4*** |

Note. (p < .001\*\*\*)

Further, this analysis means assuming the number of clusters in the variables based on a priori knowledge (Corunescu, 2011). Like in the Boniwell, Osin, Linley and Ivanchenko (2010) study, a four-cluster model was chosen, as one of those groups showed the balanced ZTPI profile. Our aim was to identify the group of individuals with balanced ZTPI scores as suggested by Wiberg, Sircova, Wiberg and Carelli (2012), and to assess their mindfulness, self-esteem and subjective well-being levels. We also tested for two-, three- and five-cluster models, and found that despite the fact that these analyses show different numbers of cluster-groups with different number of individuals in each group, people with the highest MAAS, self-esteem and subjective well-being scores, had also lowest PN and highest F. At the same time the groups with lowest MAAS, self-esteem and subjective well-being levels, had opposite results; they had the highest PN and lowest F. The PP, PF and PH had lower ability to distinguish between groups.

The results of this study showed that the short Estonian ZTPI has a clear factor structure; however, the internal consistency of PP and PF, and test-retest reliability of F and PH scales are not high. As predicted the ZTPI scale showed several significant correlations with mindfulness, self-esteem and subjective well-being, and the BTP group had high scores of the well-being indicators. The factor analyses with combined items of the ZTPI and the MAAS scales showed empirical existence of six latent traits. The ZTPI and MAAS together express two dimensions – attitude and, idiosyncratically, orientation towards time.

## Study 2

Study 2 explored the relation between mindfulness, time perspective, BTP, and subjective well-being in another purposefully chosen sample of people who have turned to psychotherapy. It further addressed the issue of mindfulness being a time perspective. The approval to conduct the study was granted by the Tallinn Medical Research Ethics Committee (application nr. 1022, resolution adopted 20 Dec. 2010).

### Sample

The sample for this study consisted of 49 people who had started some form of psychotherapy (e.g. Cognitive-Behavioural therapy, Psychodrama, Family therapy, NLP, Breathing therapy or Gestalt-therapy). At the moment there are no mindfulness-based therapies in Estonia. Fortyfive respondents were females and 4 were males. The average age was 41.1 years ( $SD = 10.6$ ). These people were working with various problems and issues: depression, anxiety, burn-out, woman's role, relationships, eating problems, trauma and self-growth. For treating emotional problems 11 people were taking medications. Most of the participants had engaged in psychotherapy before. Previous therapy had continued for more than a year for 19 people.

### Measures

The same measures as in the Study 1 were used. One additional scale was introduced due to the specifics of the sample (psychotherapy clients).

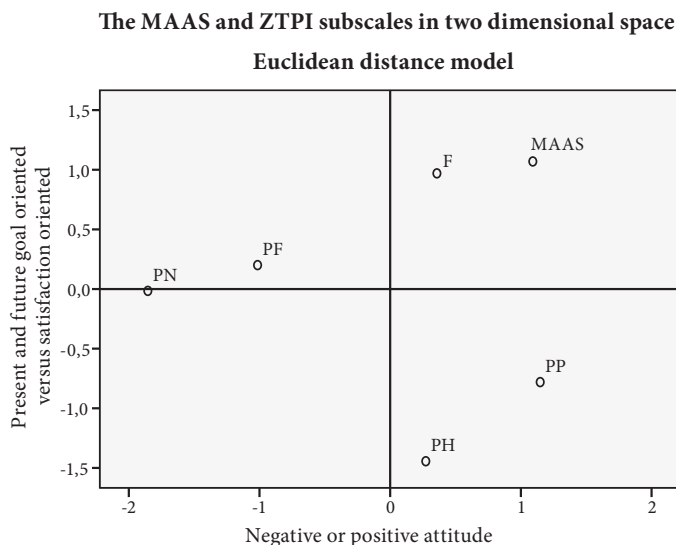
*Depression Scale* (DEPS; Salokangas, Poutanen, & Stengard, 1995) in the Estonian language (Aluoja, Shlik, Vasar, Luuk, & Leinsalu, 1999) is a 10-item self-rating scale for screening of depression. The symptoms of experiencing depression during the past month are rated on a 4-point scale (not at all to extremely).

## Results

*Correlations between the Estonian ZTPI, MAAS and well-being indexes in the clinical sample.* Most of the correlations between these scale scores in the clinical sample were similar to those in Study 1. The PN was highly positively correlated with depression ( $r = .62, p < .01^{**}$ ), and negatively correlated with well-being ( $r = -.43, p < .01^{**}$ ), self-esteem ( $r = -.50, p < .01^{**}$ ), and the MAAS ( $r = -.34, p < .05^*$ ). In the clinical sample, self-esteem as well as well-being was more related to the PP than in the non-clinical sample.

*The BTP cluster group in the psychotherapy sample* Four-group k-means cluster analysis showed that in the psychotherapy sample 11 persons out of 49 had the BTP profile proposed by Wiberg, Sircova, Wiberg, and Carelly (2012). They had high self-esteem, mindfulness, and well-being scores and low depression scores. At the same time 23 people in this psychotherapy sample qualified for diagnosis of depression as measured with the DEPS (Aluoja, 2002). People with the highest PN and PF and the lowest PP, self-esteem and mindfulness had the highest depression scores ( $p < .05^*$ ) The PH and F traits did not differentiate groups in this sample.

*Two underlying dimensions of the MAAS and ZTPI subscales* Multidimensional scaling analysis (MDS) was used to test the hypothesis that mindfulness has two components characteristic of time perspective – orientation to time, and negative or positive attitude. The euclidean distances were created from the standardized interval data (Borg & Groenen, 2010). The analysis revealed two dimensions as seen in Fig 2.



**Figure 2. Euclidian distance model; representation of (dis) similarities of the ZTPI subscales and MAAS scale in two-dimensional space. For matrix Stress = .09; RSQ = .93. Psychotherapy sample (N = 49)**

One of the dimensions clearly reflects positive versus negative attitude or valence. The nature of the other dimension is not so obvious. It seems to convey mindful present and/or future orientation versus present satisfaction orientation (see also Anagnostopoulos & Griva, 2012). The MAAS and F scale are located in the right upper corner of the plot, and together they represent positive, future goal oriented behaviour. The PN and PF are located on the left and middle region, and probably reflect negative attitude towards present and future based on negative past experiences. The PP and PH time perspectives are situated in the lower part of the right corner of the plot, and expressing the wish to get present satisfaction either with doing exciting things or remembering positive experiences. The Stress value for matrix was .09, RSQ = .93, that means a good fit (Kruskal & Wish (1978) (as cited in Giugère, 2006).

## Discussion

The current research explored the relationships between mindfulness, time perspective, BTP, and well-being. In this article we present findings of two Estonian studies that examined the hypothesis that mindfulness could be an aspect of time perspective.

As the first step we assessed the reliability and validity of the Estonian ZTPI. The ZTPI has been adapted in many countries, and the variability of its structure cannot be ignored. For example, Kolesovs (2009) found seven factors for the Latvian version and seven factors for the Russian version of the ZTPI in Latvia completed by the Russian ethno linguistic group. Nevertheless, the original 5 factor ZTPI seems to have some amount of core items that show a similar factor structure between 24 countries (Sircova et al., submitted). In the current study we substantially shortened the ZTPI to get a clear model of five latent traits, as our further goal was to explore how mindfulness relates to the original 5 factor theory of time perspective (Zimbardo & Boyd, 2008). We took as an example those studies which have used a shorter version of the ZTPI scale (Adelabu, 2007; Yu-Jing, 2011). Most of the Estonian ZTPI sub-scales had good to acceptable internal consistency. However, the fact that we shortened the scale raised the question if the adapted ZTPI measures the TP construct as theoretically defined. We assessed the construct validity, and found that the Estonian ZTPI subscales had correlations with other well-validated scales, mostly in expected directions. Similarly, like in all previous studies, we have shown that the highest, but negative, correlation exists between PN and the well-being indicators. As the focus of this article is on the relationship between TP and mindfulness, we were especially interested in the relationship between the ZTPI and MAAS. We found that PN, PH, and PF have negative correlations with mindfulness similarly as in earlier studies (Brown and Vansteenkiste, 2006, as cited in Brown, Ryan & Creswell, 2007; Drake et al., 2008). We did not find a correlation between PP and MAAS, but we found a significant positive correlation between F and MAAS. We further assessed not only the validity of the Estonian ZTPI, but also of the Estonian MAAS (Brown & Ryan, 2003), while exploring the relationships between TP and mindfulness in several ways.

Since Zimbardo and Boyd (2008) have stated that mindfulness is a holistic aspect of time perspective containing the past and future, we explored if the MAAS measures a



latent trait that is separate from the other TP subscales. The EFA analysis of the adapted ZTPI and the MAAS together showed existence of six latent traits (see Table 2). At the same time the MAAS mindfulness items made up the first factor. This first factor explained the greatest proportion of variance from the entire data set (Haynes, Smith & Hunsley, 2011). This implies that mindfulness explains the biggest variance in time perspectives. This result is in line with the concept that individual differences in how we explore our memory of the past, our experience of the present and our anticipation and freedom to imagine the future, is a function of mindfulness (Siegel, 2009). PN as the second extracted factor explained the most variance remaining after the shared variance from the first factor was removed (Haynes, Smith, & Hunsley, 2011). The third factor in our analysis was Future. Problem solving and the imagining of events in the future implies memory of the past (Tulving, 2005; Toomela, 2010). It may be counterproductive when thoughts about negative past experience impede one's ability to find solutions for a better future, and are processed unconsciously. Being aware of and relating with the acceptance to one's thoughts and feelings is vital for better mental health (Segal, Williams, & Teasdale, 2002).

The correlational analysis between the ZTPI and MAAS, and the combined EFA analysis showed that mindfulness and time perspectives seem to be conceptually related, but separate at the same time. Next we explored similarities and differences between these constructs and scales. We examined if both scales reflect characteristic components of time perspective: orientation to time and positive or negative attitude. We used the multidimensional scaling analysis (MDS) for visualizing the complex data of the MAAS and ZTPI in two dimensional spaces. Still, MDS means simplification, it is useful for exploring, but it is not possible to make strong interpretations based on this analysis (Giugère, 2006). The analysis performed on the students' sample showed that the scales together reflect two dimensions; positive or negative attitude and orientation towards time (see Figure 1). The MAAS mindfulness, as a present orientation, was located between positive past and future. Interestingly, depending on the positive or negative attitude, the direction of the time orientation seemed to be inverted; on the negative attitude side the PN was located at the left upper corner, while in the positive attitude side the F was at the right upper corner. Still, the MDS analysis does not allow identifying the causal relationship between the time orientation and attitude or valence. Smallwood and O'Connor (2011) experimentally studied the relationship between unhappy mood and the temporal focus of mind wandering, and they found that an unhappy mood leads the mind to wander to the past. Via the induction of a positive mood a small increase in future thought was observed in individuals low on depression scores.

Our multidimensional scaling analysis showed that Present Hedonistic was diagonally mirrored by F (Figure 1) Interestingly, Arnold, Dermott, and Szpunar (2010) found that the Present Hedonistic subscale, as a pleasure-seeking, risk-taking orientation, predicted differences in the phenomenological experience underlying remembering and episodic future thinking even more than the ZTPI Future subscale. At the same time the Present Hedonistic and Future were negatively related ( $r = -.35$ ). If we compare results shown by Arnold, Dermott, and Szpunar (2010) with our results in the Figure 1, we can see the Future scale is inherently almost opposite the Present Hedonistic.

With MDS we explored once more the relationship between the MAAS and ZTPI subscales, and tested to examine if mindfulness reflects characteristic components of time perspective in a small and heterogeneous psychotherapy client sample. In this psychotherapy sample the *x*-axis again showed positive or negative attitude or valence, and the *y*-axis reflected either present satisfaction orientation or mindful future orientation. Our MSD analyses showed that the MAAS mindfulness located quite high on the positive attitude dimension. Mindfulness has been considered as an open and accepting awareness (Brown & Ryan, 2003), therefore, we expected a neutral position. This location in the positive dimension can be explained by the fact that mindfulness has been found to be closely related to positive emotions, higher self-esteem and subjective well-being (Brown & Ryan, 2003).

Based on the literature mindfulness has been considered to be present oriented (Brown & Ryan, 2003). In our second MDS analysis the MAAS mindfulness was located close to the Future scale (see the Figure 2). The F scale measures future related behaviour or personal strategies (Boniwell, Osin, Linley, & Ivanchenco, 2010), not only future related thoughts. Nevertheless, Tulving (2005) has proposed that between future related behaviour and future oriented thought (cognition) there should be a clear conceptual distinction. To measure thoughts about the future, the items should be connected to either episodic memory or predictions about the future enriched by characteristics such as temporality, contextuality and affective richness (Vandekerckhove & Panksepp, 2009) (e.g. "I often imagine that several bad things will happen to me in the future"; "I frequently dream about my happy future"). As with the PN and PP subscales, Future time perspective subscales should measure how often a person imagines the future, and if these thoughts are positive or negative (see also Carelli, Wiberg, & Wiberg, 2011). The current Estonian Future subscale is similar to the conscientiousness construct. Crockett, Weinman, Hankins and Marteau (2009) came to a similar conclusion with their London study: based on factor analysis they named one part of the original F scale of the ZTPI as 'conscientiousness'. The F scale was found to be highly positively correlated with conscientiousness (Zimbardo & Boyd, 1999; Kairys, 2010; Zhang & Howell, & 2011).

In our studies mindfulness was related to the Future/conscientiousness scale. Based on the literature, mindfulness is related to conscientiousness (Thompson & Waltz, 2007; Hollis-Walker & Colosimo, 2011). Atance and Meltzoff (2007) have stated that one of the most adaptive features of future thinking in humans is that we can experience in the present a desire or goal state and work tirelessly to achieve it. Mindfulness directs attention to present experiences and events, including one's thoughts, feelings and desires at a given moment (Segal, Williams, & Teasdale, 2002). Thus, mindful attention and awareness of current perceptions seems to be complementary to the Future/conscientiousness orientation. Sobol-Kwapinska (2009) also found that active focus on the present is associated with formulating and achieving goals, whereas Present Fatalistic and Hedonistic Present time orientations are associated with limiting the temporal perspective to the present. Our results indicate that mindfulness reflects a very different attitude towards the present and future compared to the PH or PF. Being mindful means having a positive attitude towards the present as well as the future, while the Present Hedonistic perspective means focusing towards immediate gratification and not considering future consequences. The Present Fatalistic perspective shows

a negative attitude towards one's present as well as future. We agree with Brown and Ryan (2004) that the MAAS scale stresses the present construct and also subsumes an accepting and open attitude.

If we look at time holistically and take into consideration the Balanced Time Perspective theory, the meaning of the previous MDS figures becomes clearer. The analysis based on BTP theory shows connections between all of the time perspectives, mindfulness and subjective well-being. The BTP group had the highest levels of subjective well-being, self-esteem and mindfulness, high scores on PP, a moderately high F, moderate PH and low scores on PN and PF. In both Estonian samples, the ZTPI scores of the BTP group were in the ranges proposed by Wiberg, Sircova, Wiberg and Carelli (2012). However, in our sample the BTP group was larger compared to the other studies (Table 3).

So far there have been several attempts to operationalize BTP (Drake et al., 2008; Sircova & Mitina, 2008; Boniwell et al., 2010; Wilberg, Sircova, Wilberg & Carelli, 2012; Zhang, Howell & Stolarski, 2013), and different methods result in different group sizes. Nevertheless, all studies so far have shown that despite differences between languages, cultures and measurement methods the BTP pattern predicts well-being. We could conclude that time perspective together with mindfulness, self-esteem and subjective well-being are functional universals; meaning that the shape of the relationship between variables is the same, even if the strength of the patterns differs across cultures (Norenzayan & Heine, 2005). We showed that it is important to incorporate mindfulness within the TP and BTP model; the MAAS expresses components of the time perspective, explains the biggest variance in the factor analysis of MAAS and TP scores, and differentiates the BTP and non-BTP groups even better than the PH, PP or PF subscales. Our study indicates that mindfulness is a Holistic Time Perspective, containing the past and the future (Zimbardo & Boyd, 2008), and it helps to understand the (B)TP construct. A primarily positive, accepting and open attitude towards one's past, present and future is healthy. Psychological well-being is related to mindful attention and awareness towards the present that is related to conscientious and future goal oriented behaviour.

## Conclusions

Our studies showed that 1) Mindfulness measured with the MAAS fits well as a separate factor in the TP construct in combination with data from the ZTPI 2) Mindfulness is complementary to the future orientation; 3) Mindfulness has a very different attitude towards the present and future compared to the present hedonistic or the present fatalistic perspectives; 4). Mindfulness ratings are higher for those with Balanced Time Perspective We propose that mindfulness as a holistic time perspective is paradoxically a time perspective and also awareness of one's time perspectives.

The present research offers evidence for the validity of the adapted MAAS and the ZTPI scales in healthy as well as clinical populations in Estonia. This research carried out in a small cultural and language group, represents a unique possibility to demonstrate the relationship between mindfulness, time perspectives, BTP and well-being for testing criterion validity of these constructs.

*Limitations and Future Research.* The current studies are limited by their cross-sectional nature and by the fact that respondents were mostly female. The psychotherapy sample was small. Future research focusing on the time perspective, BTP, mindfulness and mental health relationships should use longitudinal designs in the psychotherapy context. Future research to design positive and negative future episodic imaginations scales in Estonian is recommended.

## Acknowledgments

We thank Arno Baltin for technical, administrative and supervisory activities. We thank translators Külli Nõmme and Dr Glenn Hogan, Anne Leius and Estonian philologist Kristina Kask. We also thank consultants Mare Pork, Andres Sild, Velli Parts, Mare Vennik and Pille Isat.

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# Indicators of Creative Potential in Drawings: Proposing New Criteria for Assessment of Creative Potential with the Test for Creative Thinking – Drawing Production

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## **Abstract**

The Test for Creative Thinking – Drawing Production (TCT-DP; Urban & Jellen, 2010) is an open-ended drawing test for measuring creative potential. The original version of the TCT-DP consists of 14 criteria which form the total score. Various criteria as indicators of creative potential makes this test eligible for utilization in Structural Equation Modelling (SEM), which requires appropriate indicators with good psychometric properties. A number of studies have confirmed cultural fairness, good reliability and validity of TCT-DP. However, there is no clear evidence of factor validity, and two of the criteria – Humour/Affectivity and Unconventionality B – previously have shown insufficient inter-rater reliability. The present study explores the problems of reliability of these two criteria and offers a solution. It also proposes 10 new criteria for assessment of creative potential in drawings, and provides empirical evidence that they can be added to the original criteria. The results were obtained with TCT-DP from 316 students, ages 18 to 34 years, 71% females. Assessment of test criteria was done by three experts thus providing possibility to use SEM methodology for precise calculation of reliability and convergent validity of both improved and new criteria. The results suggest that insufficient reliability of the two problematic criteria of the TCT-DP can be improved by dividing them into sub-criteria. All of the proposed new criteria had high inter-rater reliability and good convergent validity making them valuable for future research.

**Keywords:** *creative potential, indicators of creative potential, assessment, reliability, validity*

## **Introduction**

The assessment of creativity in the context of individual differences is one of the most challenging tasks in psychometric science because a creative person cannot be defined by a few specific traits or abilities. This could be the reason why psychometric approaches that concentrate solely on a specific ability (e.g. divergent thinking) or a narrow definition of the creative person usually are accompanied by serious problems in regard to low reliability, unstable estimates and insufficient validity (Baer, 2011, Silvia et al., 2008). In the context of assessment it is more appropriate to concentrate on creative

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potential (Piffer, 2012; Ivcevic, 2009) instead of the creative person, since creativity in the person is difficult to localize – it seems ambiguously scattered among personality traits (Fiest, 1998; Barron & Harrington, 1981), abilities (e.g., Mednick & Mednick, 1967; Guilford, 1959), cognition (e.g., Zabelina & Robinson, 2010; Schmajuk, Aziz, & Bates, 2009) and values (e.g., Kasof, Chen, Himsel, & Greenberger, 2007; Runco & Nemiro, 2003) involving different approaches of psychological research. The term *creative potential* might also sound somewhat ambiguous and obscure, and although not new in the field of creativity research, it is necessary to explain its meaning and use in the context of this research. Runco (2006) describes creative potential as a creative capacity constituted by traits and abilities of a person, which is widely distributed in the population. He points out that, by definition, creative potential has not yet been expressed, or else it becomes creative performance. Creative potential can be assessed with various instruments, i.e., divergent thinking tasks or personality inventories which focus on personality features necessary for creative production. It is reasonable to distinguish potential and actual observed performance which requires motivation, ego strength and a knowledge base.

Moreover, manifestation of creative potential in creating the creative product happens almost solely under favourable circumstances, thus marking its dependence on situations (Amabile et al., 1996). The best way to assess creative potential seemingly is to use many indicators that cover its different aspects. This kind of attempt is embodied in the Test for Creative Thinking – Drawing Production (TCT-DP) elaborated by Klaus Urban and Hans Jellen (Urban & Jellen, 2010). Based on a componential model of creativity developed by Urban & Jellen (2010), it contains a series of different qualitative and quantitative indicators of creative potential measured through the use of a drawing task. The purpose of the test is to provide a culturally-fair, easily administrable measure applicable to wide range of age. A number of independent studies have affirmed the proposed qualities of the test, showing evidence of culture-fairness, good validity, high reliability and applicability to various populations (Karwowski & Gralowski, 2012; Dollinger, Urban, & James, 2004; Rudowicz, 2004; Chae, 2003; Cropley & Cropley, 2000; Wolanska & Necka, 1990). However, some drawbacks pertaining to the reliability of some indicators (Rudowicz, 2004) and factorial validity (Kalis, Roke, & Krumina, 2013) have been noted. The factor structure of the TCT-DP is described as being ambiguous. The authors of the test have proposed a structure of six factors that explain the relationships between criteria. Nonetheless, other researchers have found different factor structures (Lubart, Pacteau, Jacquet, & Caroff, 2010; Dollinger, Urban, & James, 2004; Rudowicz, 2004; Cropley & Cropley, 2000). Thus, further efforts to examine its construct validity are needed.

The test material consists of a frame drawn on an A4 paper sheet with 5 incomplete stimuli inside the frame and one outside of it. The first part of the instruction directs the test taker in an intriguing way to continue the incomplete drawing. Remaining instructions encourage the test taker to be free in the form of action.

Originally the TCT-DP provided a composite score that drew upon fourteen criteria (Urban & Jellen, 2010) that were applied to the completed drawing: Continuations (1), Completions (2), New elements (3), Connections made with a line (4), Connections made to produce a theme (5), Boundary breaking that is fragment dependent (6), Boundary breaking that is fragment independent (7), Perspective (8), Humour and

affectivity (9), Unconventionality A (10), Unconventionality B (11), Unconventionality C (12), Unconventionality D (13), Speed (14). The number of evaluation categories varies depending on specific criterion. Criteria 1, 2, 3, 4, 5, 8, 9 and 14 have seven categories with values ranging from 0 to 6. Criterion 13 has four categories with values ranging from 0 to 3. Criteria 6 and 7 have three categories with following possible values: 0, 3 and 6. Criteria 10, 11 and 12 have two categories with following possible values: 0 and 3.

Using the test guidelines proposed by the authors, both criteria scores and the total score of the TCT-DP show high inter-rater reliability in studies from different cultures (Rudowicz, 2004; Chae, 2003; Croyley & Croyley, 2000; Wolanska & Necka, 1990), with the exception of two criteria (9 and 11). They have the lowest inter-rater reliability ( $r = .615$  and  $.675$ ), thus decreasing the reliability for the composite score (Rudowicz, 2004).

The present study examines issues related to the reliability of the criteria Humour-Affectivity (9) and Unconventionality B (11) and proposes solutions, as well as introduces additional criteria that capture different aspects of creative potential and thus may improve the measurement of creative potential.

### **Problematic Criteria of the TCT-DP**

The adaptation of the TCT-DP in Latvia (Kalis, Roke, & Krumina, 2013) identified problems in reference to the same two criteria (9 and 11) as was found in a study in Hong Kong (Rudowicz, 2004). Criterion 9 originally was defined as a drawing that elicits a humorous response, shows affection, emotion, or strong expressive power. Criterion 11 was defined as having “surrealistic, fictional and/or symbolic elements, themes or drawings” (Urban & Jellen, 2010). We found some similar characteristics for these criteria, for example, both of them have a subjective nature (Rudowicz, 2004), and both are defined with more than one feature, thus making them ambiguously perceived by evaluators, leading to an increase in the possibility of error caused by subjective interpretations. A possible solution to the problem is to separate corresponding criteria into sub-criteria.

It was proposed to separate criterion 9 into three sub-criteria: 9-1 (Humour), 9-2 (Emotions), and 9-3 (Expressiveness). The test taker receives up to six points in Humour if a drawing or its separate elements are created in a funny, witty, surprising, paradoxical or ironic way or if the test taker's title is unexpected, thus making the drawing laughable, witty, or paradoxical. Zero points are given if there is no hint of humour in the drawing. Criterion 9-2 relates to emotions and affective states which the test taker assigns to the units. The test taker receives up to six points if the theme of the drawing is permeated with emotions or if units of the drawing express some emotional state (e.g., anger, joy, surprise), one or two points are given when minor signs of this criterion are observed (e.g., smiling faces). In regard to the sub-criterion Expressiveness, the test taker receives points if a drawing effectively demonstrates special expressive power and delivers the author's idea by affecting the evaluator's feelings or thoughts. Zero points are given if the drawing is completely inexpressive. One or two points are given if some expressive elements become central units of the drawing or if the complete drawing has a central idea but not sufficiently elaborated for the evaluator to be affected by it. Three to



four points are given if the drawing has a common theme or prominent unit(s) and is elaborated in such a way that affects the evaluator's feelings or thoughts. Five to six points are given when the expressive features of the drawing are more pronounced and the evaluator can grasp a clear, intense, and effective message created by the author.

Criterion 11 was separated into three sub-criteria: 11-1 (Symbolism), 11-2 (Surrealism), and 11-3 (Fiction/fantasy). The test taker receives zero or three points in these sub-criteria. In Symbolism (11-1), three points are given if the test taker deliberately has utilized a symbolic theme that helps reveal the deepest meaning of the drawing. In Surrealism (11-2), three points are awarded if the test taker deliberately depicts units in a surrealist, odd, and/or stylized way as well as if the portrayed units form a joint theme in an odd and intuitive way. In Fiction/fantasy (11-3), test taker receives three points if he or she depicts unrealistic themes, things, creatures, as well as images from fairy tales, myth, or one's own imagination.

### **New Criteria for the TCT-DP**

The score of the TCT-DP could be interpreted as the sum of the various manifestations of creative potential expressed by a person engaged in the specific task. Therefore, we assumed that the inclusion of additional relevant creativity indicators could contribute to the validity and precision of the instrument, thus leading to a better understanding of the creativity construct. The idea of additional criteria originally came as a result of scrutinized analysis of several hundred drawings of 9<sup>th</sup> grade students and university students, by integrating the expert's observations with theoretical assumptions from different approaches to creativity. The ten additional criteria we propose are based on the components model of creativity (Urban & Jellen, 2010) and prior efforts in the assessment of creative potential (e.g., Goff & Torrance, 2002): synthesis of stimuli (N1), an image interrupted by border (N2), manipulation with the frame (N3), abstractness of the title (N4), agglutination (N5), realistic effects (N6), richness of imagination (N7), exaggeration (N8), movement (N9), personification (N10). The following section includes a brief description of each proposed criterion. More information about these criteria and examples for evaluation can be obtained by contacting the authors.

**Synthesis of stimuli in one complete gestalt (N1)** could be interpreted as an attribute of the creative personality (e.g., Schmajuk, Aziz, & Bates, 2009; Baughman & Mumford, 1995; Rothenberg, 1986) since it embodies a tendency to discern something whole and meaningful in seeming chaos and thus to make synthesis possible. This tendency is assessed also with the Abbreviated Torrance Tests for Adults (ATTA; Goff & Torrance, 2002). This criterion also points to the person's tendency to recognize an integral picture instead of concentrating on details (Barron, 1955, 1957). In contrast to criterion 5 (Connections made to produce a theme) which is similar in some respect, this new criterion deals with connections made to compose one object, not to unite several separate objects or images into one composition. Indications for evaluation are as follows: one point is given for each stimulus that is united in a joint image. When following this principle the smallest score for joined stimuli would be two therefore the one point should be subtracted from the total score of this criterion. Thus, the minimal value for this criterion is one, but the maximum value is five. It is not necessary to

connect all stimuli with lines in order to create a joint image. A test taker may receive five points for this criterion even in cases when none of stimuli are joined with a line. Points are not given if the stimuli are united in one image but the image is too abstract, incomprehensible or without concrete character (e.g., all stimuli combined create an abstract road or river).

**An image interrupted by the border (N2)** refers to imagery as an important characteristic of creative potential (Houtz & Patricola, 1999). It also reflects a tendency to go beyond the border of the frame, thus releasing space for additional manipulation with stimuli. In this sense the criterion is somewhat similar to the original criterion 7 and could be treated as its minor expression that illustrates stimulus freedom (Dacey & Lennon, 1998) but without its unconventional nature. Indications for evaluation: three points are given if a test taker draws an image that is interrupted by the frame as if the rest of it continues beyond it or exists in his imagination. Points are awarded only if the border of the frame interrupts an essential part (or more than half) of the image. Points are not given in this category if an interrupted image is too abstract, incomprehensible, or without concrete character.

**Manipulation with the frame (N3)** reflects an important quality of the creative person, namely, an alternative application of a given element originally meant for another purpose. This criterion assumes the use of the big frame as a stimulus (in addition to the given six stimuli). It is associated with freedom from functional fixedness (Dacey & Lennon, 1998), and courage to overcome the traditional use of the frame as a line which should not be crossed. Indications for evaluation: the test taker receives three points if he or she employs the frame as a stimulus and makes it a part of the drawing (e.g., creates an image from it or uses it as part of the larger image).

**Abstractness of the title (N4)** could indicate an attempt to elaborate on the theme and/or a tendency to assign deeper meaning to the drawing. This criterion is adapted from the ATTA (Goff & Torrance, 2002). Indications for evaluation: the test taker receives zero points if the drawing has no title or is very simple and concrete (e.g., a dog, a house). One point is given if the title is applied in order to name some attribute of the illustrated object or to describe what is depicted in the drawing (e.g., charming house; a boy is going to the school). The test taker is awarded two points if the title is somehow abstract but not enough to be categorized as fully abstract. Three points are given if the title is abstract, and complements and enriches the drawing by revealing its deepest and covert meaning (e.g., “The time of my life”).

**Agglutination (N5)** reflects a direct manifestation of imagination that indicates an ability and tendency to connect completely different things in one united image (Rothenberg, 1999).

Indications for evaluation: the test taker receives three points if he or she connects two or more completely different things in one joint image (e.g., a human being with wings; a dog house with wheels, running flower). Points are not given for minor manifestations of this criterion (e.g., sun or flower is depicted with simple human-like face).

**Realistic effects (N6)** in drawings could be considered as indicators of creative potential since a tendency to elaborate an image as if it were real involves certain aspects

of imagery (Houtz & Patricola, 1999). Indications for evaluation: the test taker receives up to six points if the drawing impresses the evaluator by making him or her feel that the depicted things are real because they touch one's senses (e.g., taste, smell, vision). It could also be described as an ability to revive things with realistic effects. Zero or one point is given when the drawing is made in a very schematic or plain way. Two to four points are given when some images have pronounced qualities of this criterion. Five or six points are given when the complete drawing or specific units resemble things as they are in reality.

**Richness of imagination (N7)** illustrates significant characteristic of creative potential since it involves a tendency to change conventional thing into salient ones through the effects of vivid elements and odd attributes (Singer, 1999), to create objects and images which are enriched with unique features. Indications for evaluation: the test taker receives up to 6 points if an image or complete drawing is impressive by its uniqueness, singularity and vividness. Zero or one point is given when an image or objects are depicted in a traditional and stereotypical way. Two to four points characterize drawings with partial manifestation of vividness and uniqueness. Five and six points are given to drawings that are clearly salient due to pronounced attributes of this criterion. A high score in this category is possible even if a low score is obtained on the criteria of realistic effects (N6).

**Exaggeration (N8)** in drawings is interpreted as an unconventional way of displaying imaginative expressions or emphasizing some idea, mainly by stressing or highlighting some part of the drawing or some of its qualities. Indications for evaluation: the test taker receives three points if she or he applies a principle of exaggeration (i.e., deliberately diminishing or increasing some detail of the image or the complete image in relation to other parts of the image or other objects). Exaggeration could be attributed also to other phenomena (e.g., a man screams so loud that dishes break; a girl's tears create a river).

**Illustration of movement (N9)** in drawings is the aspect of elaboration that emphasizes action and thus makes the drawing more expressive, dynamic and alive. Illustration of movement is an indicator included also in the ATTA (Goff & Torrance, 2004). Indications for evaluation: the test taker receives three points if an illustration of movement is profound (e.g., jumping dog, falling rocks). One point is given when some minor sign of movement is discerned or some process is depicted. If more processes are depicted the test taker receives 1 point for each process (e.g., raining, snowing, glowing light-bulb or smoking chimney) but no more than three points can be received.

**Personification (N10)** is an aspect of imagination also related to fantasy and agglutination, yet is autonomous since it implies a specific view of things, animals or even natural phenomena, attributing human qualities to them. Indications for evaluation: the test taker receives three points if he or she ascribes human qualities to things, animals or phenomena, making them human-like (e.g., the Republic of Latvia is represented in the image of a woman dressed in a national costume). Points for this criterion are not given for stereotypically depicted faces in the sun or flower.

The purpose of this study was to examine the inter-rater reliability and convergent validity for the proposed criteria while employing structural equation modelling (SEM).

SEM allows one to divide observed values into true variance and error variance that is essential for accurate calculation of reliability (Raykov & Marcoulides, 2011) and estimation of correlation between constructs in order to gain better evidence of their validity.

## Method

### Participants

Three hundred sixteen students, ages 18–34 ( $M = 20.87$ ,  $SD = 1.96$ ), 71% female, from 25 subgroups representing various university study programs and high schools of Latvia participated in the study. In order to involve students in the research we contacted heads of study programmes and asked them to organize some time before or after lectures for addressing students about participation in the study.

### Measures

Test for Creative Thinking – Drawing Production (Urban & Jellen, 2010). Test has two forms (A and B) but only one form was used in the study. In the test adaptation study in Latvia a very high interrater reliability was found ( $\rho = .972$ , 99% confidence interval .963-.980, lowest factorial weight (WLSMV method) was .949) as well as very high stability of obtained scores (Friedman  $\chi^2(2, N = 212) = 2.197$ ,  $p = .333$ ) in the total result of test (Table 2). Interrater reliability was suitably high also in the separate criteria:  $\rho = .830 - .986$  (Kālis, Krūmiņa, & Roķe, 2012).

### Procedure

A short instruction was given before the testing: “Today you will have an opportunity to participate in the study of adaptation of a psychological test. Please work individually – it is very important for us to have your individual work”. After this introduction every participant received a form A of the TCT-DP and instructions were read aloud.

Three trained researchers in the field of creativity evaluated each criterion of TCT-DP for 316 cases. Criteria Humour/Affectivity (9) and Unconventionality B (11) were calculated from 3 sub-criteria representing relevant features of each criterion. In order to adhere to the original computation of total score of the test, the score in corresponding criteria was obtained as a maximum value of its sub-criteria. We assumed that this strategy which employs maximum value provides similar results as the original evaluation since points for these criteria are given if any of its features are apparent. The same number of cases as in the reliability study were used to establish convergent validity of sub-criteria of 9 and 11 and new criteria by correlating them with total score of the TCT-DP.

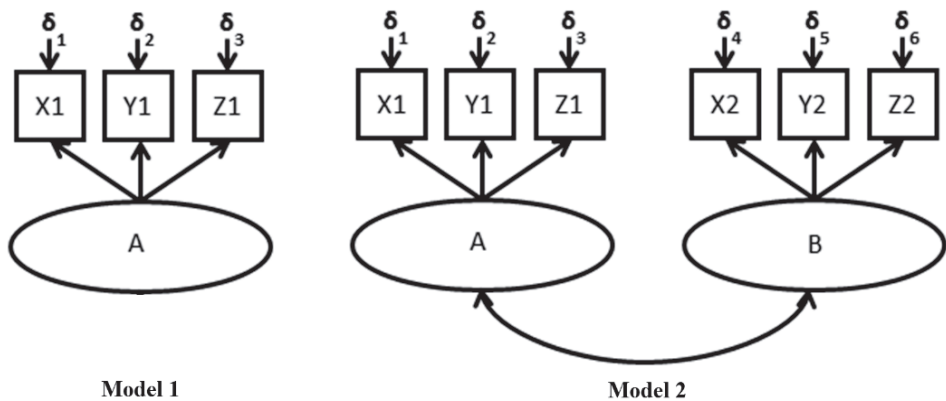
### Strategy for analyses

Reliability usually is defined as a proportion of true variance in relation to observed variance of measurement, thus indicating precision of an instrument (Brown, 2006). Cronbach's coefficient alpha (Cronbach, 1951) is often used as the estimate of reliability irrespective of strong assumptions supposing that the errors of items are uncorrelated

as well as that all items are uniformly and highly related to the construct. If these assumptions are not met, then Cronbach's alpha can markedly underestimate composite reliability (Raykov & Marcoulides, 2011). An alternative way to estimate reliability is to base calculations on estimates of a factor model. This approach was initiated by McDonald (1978, 1999) who proposed two kinds of omega ( $\omega$ ) coefficients as estimates of reliability in case of several factors ( $\omega_i$ ) and in case of a general factor ( $\omega_h$ ). Raykov & Marcoulides (2011) offer indications for calculation of reliability employing (MLR) estimation procedure in Mplus. The approach suggested by them is appropriate when variables are continuous. When variables are categorical the most effective approach for calculation of estimates is to use a robust weighted least squares estimator using diagonal weight matrix (WLSMV) that operates with tetrachoric or polychoric correlation matrixes (Flora & Curran, 2004). As squared factor loadings calculated with WLSMV estimator in completely standardized solution represent proportion of variance explained by factor, these can be used for calculation of reliability. The reliability was calculated with WLSMV estimator, following the procedure suggested by Stone, Otten, Ringlever, & Hiemstra (2013). Three estimates of reliability are provided in this study for illustration purposes, but only coefficient  $\omega$  calculated with WLSMV is considered to be the most appropriate estimate of reliability since all criteria are evaluated with 2 to 7 categories.

All data were structured according to the measurement model where each evaluator represents an indicator of latent variable and correlations between errors equal 0 (see figure 1).

Estimation of reliability was done according to Measurement model 1 depicted in Figure 1. Correlations between sub-criteria of criteria 9 and 11 were estimated according to the Measurement model 2 illustrated in Figure 1 where latent variable A represents one facet of the original criteria 9 or 11, while latent variable B represents other aspect of relevant criteria. Calculation of correlations between other criteria and the total score of the TCT-DP was accomplished in a similar way following Model 2 in Figure 1.



Note. X1, Y1, Z1 represents indicators of latent variable A (e.g., total score of TCT-DP) which are assessments of three evaluators but X2, Y2, Z2 correspondingly represents indicators of latent variable B (e.g., criterion humour (9-1)) assessed by the same evaluators.

Figure 1. Measurement Model for Estimation of Correlation between Constructs.

As correlations are calculated by employing the model approach, it is important to evaluate how well the model fits for observed data since the estimates resulting from model with poor fit could be implausible. The evaluation of model fit used various fit indices – root mean square error approximation (RMSEA; Browne & Cudeck, 1992; Steiger & Lind, 1980), comparative fit index (CFI; Bentler, 1990), tucker-lewis index (TLI; Tucker & Lewis, 1973) and weighted root mean square residual (WRMR; Muthén, 1998-2004). The WRMR is an alternative to the standardized root mean square residual (SRMR) and is appropriate for use with categorical data. Hu and Bentler (1999) proposed following cutoff values minimizing type I and type II errors: for TLI and CFI > .95, for RMSEA < .06. Simulation studies have shown that the same cutoff values are appropriate for models with categorical variables (Muthén, 1998-2004). For WRMR cutoff value is less or equal than 1 (Yu, 2002).

All estimates of measurement models were calculated with Mplus version 7 (Muthen & Muthen, 2012).

## Results

Criteria 9 and 11 consist of different aspects that represent one measure. Thus, it is important to test whether these different aspects are related to each other within relevant categories. All facets of criteria 9 are significantly related to each other (see Table 1). Nonetheless, correlation of sub-criterion 9-3 with other two facets could be considered as too small for making a parcel (Graham & Tatterson, 2000). The same problem but more pronounced was observed for criterion 11 where sub-criterion 11-1 was not significantly related to other two sub-criteria.

*Table 1. Correlations between Sub-criteria*

|                   | <i>Humour<br/>(9-1)</i> | <i>Emotions<br/>(9-2)</i> | <i>Symbolism<br/>(11-1)</i> | <i>Surrealism<br/>(11-2)</i> |
|-------------------|-------------------------|---------------------------|-----------------------------|------------------------------|
| Emotions (9-2)    | .83 (.03)***            | -                         | -                           | -                            |
| Expression (9-3)  | .46 (.06)***            | .26 (.06)***              | -                           | -                            |
| Surrealism (11-2) | -                       | -                         | -.06 (.08)                  | -                            |
| Fantasy (11-3)    | -                       | -                         | .28 (.31)                   | .54 (.12)***                 |

*Note.* \*\*\*  $p < .001$ . In parentheses standard error of an estimate is shown.

Analysis of reliability (see Table 3) using Cronbach’s alpha and  $\omega_h$  coefficient calculated with MLR estimator shows that almost all criteria except criterion N8 reach a generally accepted level of reliability (i.e., .7) (Kline, 2000). When WLSMV estimator for categorical variables is applied estimates essentially increase indicating high reliability for all criteria.

Table 2 provides information about models fit (Model 2 in Figure 1) where correlations between criteria and the total score of the TCT-DP are investigated. Data on comparative fit indices (CFI, TLI) and absolute fit index (WRMR) suggest that all models have good fit. RMSEA index which incorporates penalty function for poor parsimony (Brown, 2006) suggests that one model for criteria 9-3 has some problems with fit. Considering the fact that all remaining fit indices give evidence of good fit



and also that we are not interested to evaluate parsimony of model we assumed that estimates of this model are not substantially biased.

Table 2. Goodness of Fit Indices

| Categories                       | $\chi^2$ | df | p   | RMSEA | Cfit | CFI  | TLI  | WRMR |
|----------------------------------|----------|----|-----|-------|------|------|------|------|
| <i>Separated criteria:</i>       |          |    |     |       |      |      |      |      |
| 9-1) Humour                      | 5.58     | 8  | .70 | .00   | .95  | 1.00 | 1.01 | .24  |
| 9-2) Emotions                    | 13.00    | 8  | .11 | .04   | .53  | 1.00 | 1.00 | .41  |
| 9-3) Expression                  | 29.94    | 8  | .00 | .09   | .02  | .99  | .98  | .45  |
| 11-1) Symbolism                  | 10.59    | 8  | .23 | .03   | .69  | .99  | .99  | .46  |
| 11-2) Surrealism                 | 12.23    | 8  | .14 | .04   | .58  | .99  | .98  | .50  |
| 11-3) Fiction                    | 14.09    | 10 | .17 | .04   | .67  | .99  | .99  | .55  |
| <i>New criteria:</i>             |          |    |     |       |      |      |      |      |
| Synthesis of stimuli (N1)        | 18.11    | 9  | .04 | .06   | .34  | 1.00 | 1.00 | .33  |
| Image interrupted by border (N2) | 6.46     | 8  | .60 | .00   | .92  | 1.00 | 1.00 | .25  |
| Manipulation with the frame (N3) | 13.57    | 8  | .09 | .05   | .49  | .99  | .99  | .50  |
| Abstractness of the title (N4)   | 13.01    | 8  | .11 | .04   | .53  | 1.00 | .99  | .37  |
| Agglutination (N5)               | 12.58    | 10 | .25 | .03   | .76  | .99  | .99  | .48  |
| Realistic effects (N6)           | 9.28     | 8  | .31 | .02   | .77  | 1.00 | 1.00 | .24  |
| Richness of imagination (N7)     | 16.90    | 8  | .03 | .06   | .31  | .99  | .98  | .31  |
| Exaggeration (N8)                | 4.13     | 8  | .85 | .00   | .98  | 1.00 | 1.02 | .16  |
| Movement (N9)                    | 20.45    | 10 | .03 | .06   | .32  | .99  | .99  | .52  |
| Personification (N10)            | 4.06     | 8  | .85 | .00   | .98  | 1.00 | 1.01 | .15  |
| 9-2) Emotions <sub>2</sub>       | 11.08    | 8  | .20 | .04   | .66  | 1.00 | .99  | .44  |
| 9-2) Emotions <sub>3</sub>       | 10.70    | 8  | .22 | .03   | .68  | .99  | .99  | .46  |
| 9-2) Emotions <sub>4</sub>       | 5.04     | 8  | .75 | .00   | .96  | 1.00 | 1.02 | .20  |

Note. Cfit (Closeness of model fit) is probability that RMSEA is greater than .05; In models with 9 and 10 degrees of freedom, an additional degree of freedom was obtained specifying equal factor loadings for two or all three evaluators. Additional restriction to the model was done in the case of negative latent variable covariance matrix due to correlation greater than 1. Restrictions were retained if problem of negative psi matrix was solved and the model had good fit.

Correlations between criteria and the total score of the TCT-DP could be considered as an indicator of convergent validity. Criteria in the context of this test are indicators of one general measure of creative potential. Thus, correlation coefficients between them should be statistically significant. Criteria of Emotions (9-2) and Symbolism (11-1) that are sub-criteria of criteria 9 and 11 did not meet these requirements (Table 3).

Deeper investigation of criterion 9-2 revealed that the reason for low correlation with the TCT-DP could be the shortcomings of indications for evaluation that assign one or two points if the test taker identifies in the drawing weakly pronounced features of this criterion, such as faces with a stereotypical smile. The low correlations led us to look at this criterion more critically, assuming that such minor signs in regard to emotion expression was rather related to a stereotypical way of drawing humans or animals than to a deliberately elaborated expression of emotions of the depicted

subjects. Therefore, we recoded the rating categories of this criterion in three ways in order to test for the most appropriate approach.

The first modification of this criterion, denoted as *emotions<sub>2</sub>*, was done by merging the first two categories 0 and 1 and assigning them the meaning that no sign of the criterion is observed. The remaining two modifications were made similarly, merging the first three (*emotions<sub>3</sub>*) and first four (*emotions<sub>4</sub>*) categories (see the last rows of Table 2 and Table 3). When the first two (*emotions<sub>2</sub>*), three (*emotions<sub>3</sub>*) or four (*emotions<sub>4</sub>*) categories of criterion were merged, correlations became greater and statistically significant (see last rows in Table 3), thus providing empirical support that such minor expressions of emotions were inappropriate for separate scoring. All three alternative approaches had significant correlations with the total score of the TCT-DP, with the highest correlation for criterion *emotions<sub>4</sub>* in which categories 0, 1, 2, 3 were merged into one category with value 0. Both convergent validity (see Table 3) and frequencies of categories were utilized in order to choose the most appropriate approach (see Table 4). If the evaluation starting only from category 4 (*emotions<sub>4</sub>*) is included in the analysis, then only 1% of sample receives points in this criterion. Thus, the selection of the category with value 3 as the starting point for evaluation seems reasonable so as to provide opportunity for about 3% of sample to receive points.

Table 3. Reliability and Convergent Validity for Sub-criteria and New Criteria

|                                  | $\alpha$   | $\omega_h$ MLR | $\omega_h$ WLSMV<br>(CI 95%) | corr. with TCT-DP<br>(SE) |
|----------------------------------|------------|----------------|------------------------------|---------------------------|
| <b>N</b>                         | <b>316</b> | <b>316</b>     | <b>316</b>                   | <b>316</b>                |
| <i>Separated criteria:</i>       |            |                |                              |                           |
| 9-1) Humour                      | .71        | .73            | .86 (.81-.90)                | .28*** (.06)              |
| 9-2) Emotions                    | .87        | .90            | .94 (.93-.96)                | .10 (.06)                 |
| 9-3) Expression                  | .88        | .88            | .90 (.88-.92)                | .76*** (.02)              |
| 11-1) Symbolism                  | .70        | .73            | .95 (.89-.99)                | .09 (.16)                 |
| 11-2) Surrealism                 | .73        | .74            | .91 (.86-.96)                | .29*** (.09)              |
| 11-3) Fiction/fantasy            | .72        | .72            | .90 (.80-.99)                | .30*** (.10)              |
| <i>New criteria:</i>             |            |                |                              |                           |
| Synthesis of stimuli (N1)        | .93        | .93            | .99 (.97-.99)                | .43*** (.06)              |
| Image interrupted by border (N2) | .87        | .87            | .97 (.95-.99)                | .32*** (.07)              |
| Manipulation with the frame (N3) | .79        | .79            | .97 (.94-.99)                | .50*** (.08)              |
| Abstractness of the title (N4)   | .87        | .87            | .95 (.93-.97)                | .34*** (.07)              |
| Agglutination (N5)               | .75        | .76            | .96 (.90-.99)                | .43*** (.12)              |
| Realistic effects (N6)           | .83        | .85            | .88 (.85-.91)                | .56*** (.04)              |
| Richness of imagination (N7)     | .78        | .79            | .87 (.84-.90)                | .68*** (.04)              |
| Exaggeration (N8)                | .66        | .67            | .89 (.83-.96)                | .23** (.12)               |
| Movement (N9)                    | .83        | .85            | .93 (.91-.95)                | .38*** (.06)              |
| Personification (N10)            | .80        | .80            | .98 (.95-.99)                | .36** (.09)               |
| 9-2) Emotions <sub>2</sub>       | .76        | .83            | .90 (.86-.95)                | .21*** (.06)              |
| 9-2) Emotions <sub>3</sub>       | .63        | .67            | .82 (.81-.96)                | .34*** (.08)              |
| 9-2) Emotions <sub>4</sub>       | .65        | .66            | .91 (.82-.99)                | .44*** (.10)              |

Note. \*\*  $p < .05$ ; \*\*\*  $p < .001$ . CI – confidence interval; SE – standard error.

Counting the frequencies of categories for each criterion provides a way to analyse the quality of criteria. Frequency in each category of criteria shows how many respondents have the corresponding value, thus giving approximate information about the difficulty of this category or the criterion itself (see Table 4). We calculated them as the rounded-off average evaluation from all three evaluators in order to gain more reliable frequencies. Sub-criterion *11-1*, and new criteria *N3* and *N5* is received by less than 5% of sample.

*Table 4. Percentage of Sample Who Received the Following Scores in Regard to Each Criterion*

| <i>Categories</i>                          | <i>0</i> | <i>1</i> | <i>2</i> | <i>3</i> | <i>4</i> | <i>5</i> | <i>6</i> | <i>&gt;0*</i> |
|--|----------|----------|----------|----------|----------|----------|----------|---------------|
| <i>Separated criteria:</i>                 |          |          |          |          |          |          |          |               |
| <i>9-1) Humour</i>                         | 80       | 8        | 8        | 3        | 2        | 0        | 0        | 20            |
| <i>9-2) Emotions</i>                       | 61       | 18       | 17       | 2        | 1        | 0        | 0        | 39            |
| <i>9-3) Expression</i>                     | 14       | 15       | 28       | 21       | 13       | 7        | 1        | 86            |
| <i>11-1) Symbolism</i>                     | 98       | -        | -        | 2        | -        | -        | -        | 2             |
| <i>11-2) Surrealism</i>                    | 88       | -        | -        | 12       | -        | -        | -        | 12            |
| <i>11-3) Fiction</i>                       | 95       | -        | -        | 5        | -        | -        | -        | 5             |
| <i>New criteria:</i>                       |          |          |          |          |          |          |          |               |
| <i>a) Synthesis of stimuli (N1)</i>        | 82       | 12       | 2        | 2        | 2        | 0        | 0        | 18            |
| <i>b) Image interrupted by border (N2)</i> | 83       | -        | -        | 17       | -        | -        | -        | 17            |
| <i>c) Manipulation with the frame (N3)</i> | 98       | -        | -        | 2        | -        | -        | -        | 2             |
| <i>d) Abstractness of the title (N4)</i>   | 73       | 11       | 11       | 5        | 0        | 0        | 0        | 27            |
| <i>e) Agglutination (N5)</i>               | 99       | -        | -        | 1        | -        | -        | -        | 1             |
| <i>f) Realistic effects (N6)</i>           | 58       | 15       | 11       | 9        | 4        | 2        | 1        | 42            |
| <i>g) Richness of imagination (N7)</i>     | 58       | 20       | 14       | 5        | 2        | 1        | 0        | 42            |
| <i>h) Exaggeration (N8)</i>                | 95       | -        | -        | 5        | -        | -        | -        | 5             |
| <i>i) Movement (N9)</i>                    | 63       | 25       | 9        | 3        | -        | -        | -        | 37            |
| <i>j) Personification (N10)</i>            | 94       | -        | -        | 6        | -        | -        | -        | 6             |

*Note:*\* – this column shows percentage of sample who received more points than zero.

## Discussion

The results of this study are two-fold. They affirm the convergent validity of the new criteria. They also provide useful evidence as to the validity of the TCT-DP itself. All of the new criteria, representing various theoretically based indicators of creative potential, had positive and strong relationships with the TCT-DP total score, thus providing additional information about the measure's satisfactory convergent validity.

Analysis of correlations between sub-criteria (*Humour, Emotions, Expressions* and *Symbolism, Surrealism, Fantasy*) suggests that facets of criteria *Humour/Affectivity* and *Unconventionality B* are better evaluated separately as they barely represent one common measure. Thus, the measurement error can increase due to an obscure evaluation process. This explains why the problem of low reliability of these criteria was

met both in our previous research (Kalis, Roke, & Krumina, 2013) and in research of TCT-DP adaptation in Hong Kong (Rudowicz, 2004).

High estimates of reliability indicate that both the sub-divided and the new criteria have clear instructions and are similarly understood by evaluators. With respect to convergent validity, the insufficient strength of correlations was found between the TCT-DP total score and two sub-criteria (*Emotions and Symbolism*).

Additional analysis of the sub-criterion *Emotions* led to the conclusion that correlation with the TCT-DP total score increases when only very pronounced signs of emotional expression are scored. Such findings suggest that in future studies a seven category approach (as in original scoring) could be substituted with a two category approach where only the presence or absence of the criterion is evaluated.

No significant correlation was found between the sub-criterion *Symbolism (11-1)* and the TCT-DP total score. This finding could be partly explained by the fact that only 2% of the sample received points on this criterion, thus lowering the estimate by chance. If this criterion indeed is an indicator of creative potential and is evaluated properly, then the variance of the one factor model that stems from the original instruction, summing all criteria into total score, may not account for specific variance related to this criterion. Possibly criterion *11-1* would have a high and relevant factor loading if the relationships between the criteria of the TCT-DP were explained by a two or more factor model, rather than with the one factor model.

With respect to frequency analysis, some of the new criteria (*Symbolism, Manipulation with the frame, Agglutination*) were identified very rarely (less than 5%), but this does not necessarily mean that these criteria are not relevant since the full psychometric information of this item is yet unknown. The full information of these criteria could be estimated in a two parameter factor model. However, such research would require a larger sample size and reliable factor structure of the TCT-DP. If these criteria were found to have high correlation with the factor, they could serve as a valuable information source for the evaluation of individuals with high scores on the latent variable. Hence we suggest retaining these criteria until the factor structure of the TCT-DP is identified, thus making possible a more in-depth evaluation of the psychometric properties of all of the criteria.

While the true factor structure of the TCT-DP is unknown, the proposed solutions for the evaluation of the problematic criteria and the newly developed criteria could be applied under the assumption of general factor of the TCT-DP.

The findings from this study can hasten future research on the factor structure of criteria of the TCT-DP. The true factor structure of the TCT-DP will give an opportunity to specify a measurement model of creative potential based on an expanded number of criteria (indicators), thus allowing to separate error variance from true measurement variance. Such research is topical in the field of creativity in order to gain more reliable, valid, and objective measurements of creative potential.

## Acknowledgments



This work has been supported by the European Social Fund within the project “Support for the implementation of doctoral studies at Daugavpils University, 2<sup>nd</sup> stage” Agreement Nr. 2012/0004/1DP/1.1.2.1.2./11/IPIA/VIAA/011

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# The Lithuanian Version of the Global Motivation Scale: Testing Its Reliability and Factorial Validity

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## **Abstract**

This study focuses on the construct of global motivation. Vallerand (2000) portrays motivation as a three-level construct, manifesting at the global, life domains, and situational levels. Contrary to context-specific motivation, global motivation is described as a general tendency to base one's actions on intrinsic/extrinsic motives. This hierarchical model of motivation is grounded on Self-Determination Theory (Deci & Ryan, 2000), which suggests that motivation to undertake certain activities ranges from externally controlled to self-determined and, thus, may be placed on the external-internal motivation continuum. This study aimed to test the psychometric properties of the Lithuanian version of the Global Motivation scale (GMS-28; Guay, Mageau & Vallerand, 2003). It has seven subscales and is designed to measure global motivational orientations. Moreover, it can be used as a basis when developing other context-specific motivation measures.

The sample for this study was drawn from the Lithuanian population ( $N = 382$ ). In order to test scale factorial validity, four alternative models were built. Confirmatory factor analysis has shown that a slightly modified 7-factor model fits the data best (RMSEA = .06; CFI = .90; TLI = .88). Item analysis has revealed that all items have high loadings ( $> .40$ ) in their factors; moreover, adequate item-total correlations were obtained. Finally, scale internal consistency analysis has shown all the subscales to have acceptable reliability coefficients. Based on these results it is concluded that the Lithuanian version of the scale is suitable for use in further Lithuanian studies.

**Keywords:** *global motivation, self-determination theory, hierarchical model of motivation, psychometric properties*

## INTRODUCTION

**Recent trends in investigating motivation.** Motivation and self-regulation of behaviour has probably been one of the most widely investigated topics in the past few decades. The question of motivation addresses important issues both in fundamental

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psychology (e.g. understanding motivation as part of personality self-regulation mechanisms) and within applied settings (e.g. evaluating and, possibly, enhancing motivation in school or work contexts).

It is not surprising, therefore, that there have been numerous attempts to define, explain, and assess this construct in a variety of ways. Traditionally, research on motivation has included the analysis of one or more of the following components: psychological needs satisfaction, internal and external incentives of individual actions, beliefs about one's inner qualities, expectancies related to certain (un)favourable external conditions, etc. Self-Determination Theory (henceforth – SDT; Deci & Ryan, 2000, 2008a; Ryan & Deci, 2000, 2006) is a recent theoretical approach integrating most of the above-mentioned aspects and offering a novel and broad outlook on human functioning.

SDT, as defined by its authors, is a macro-theory (Deci & Ryan, 2008a). In order to explain human motivation, it encompasses a variety of phenomena, such as personal factors, self-regulation, basic psychological needs, social factors, etc. Numerous empirical research studies prove it to be applicable in a variety of settings. For example, it is used in investigating motivational factors in educational settings (Deci, Koestner & Ryan, 2001; Ratelle, Guay, Vallerand, Larose & Senécal, 2007; Vansteenkiste, Sierens, Soenens, Luyckx & Lens, 2009; Vansteenkiste, Simons, Lens, Sheldon & Deci, 2004), in work contexts (Deci, Connell & Ryan, 1989; Gagné & Deci, 2005), in counselling and mental health services (Ryan & Deci, 2008; Markland, Ryan, Tobin & Rollnick, 2005), or in research on psychological or social well-being (Deci & Ryan, 2008b; Schmuck, Kasser & Ryan, 2000; Ryan, Huta & Deci, 2008; Sheldon, Ryan, Deci & Kasser, 2004).

**Motivation and behaviour regulation in SDT.** A significant feature of SDT lies in its focus on the intrinsic and extrinsic sources of motivation as portrayed by the continuum of autonomous vs. controlled types of behaviour regulation. This notion is important both from the theoretical and from the measurement perspective. According to Deci and Ryan (2008a) many earlier theoretical approaches preferred to measure the strength (or 'magnitude') of motivation when analyzing individual actions. Whereas within SDT it is implied that the type of behaviour regulation (controlled vs. autonomous) should be a better predictor of different behavioural outcomes. As a result, its evaluation should be more informative than the generic score of motivation strength.

According to SDT referring to the type of behaviour regulation that lies behind motivation can be labelled as autonomous motivation, controlled motivation, or amotivation (in detail, see Gagné & Deci, 2005; Deci & Ryan, 2000; 2008a; Ryan & Deci, 2006; Deci, Eghrari, Patrick, & Leone, 1994). These are broad categories basically reflecting the underlying incentives of human actions.

Based on the principles of SDT (Deci & Ryan, 2008a; Ryan & Deci, 2006), autonomous motivation can be treated as intrinsic, since when autonomously motivated, one's actions are based on his/her own intrinsic incentives and volition. Controlled motivation is described as being more or less based on extrinsic regulation (i.e. extrinsic rewards and punishments). In this case, engaging in certain behaviours is related to one's attempt to gain approval, to avoid shame, to maintain self-esteem, and the like (Deci & Ryan, 2008a). Finally, both autonomous and controlled types of motivation are substantially different from amotivation which means the absence

of purposefulness (Deci & Ryan, 2008a; Gagné & Deci, 2005) and, therefore, can be thought of as a relatively static condition. Nevertheless, as emphasized by Gagné and Deci (2005), SDT is not a stage theory, i.e., one need not go through all the sequence of regulation types to reach autonomy.

Although SDT employs a much more complex classification of motivational types and behaviour regulation processes than presented above, in conceptualizing motivation it focuses on the distinction of intrinsic and extrinsic motives. To be more precise, motivation can be pictured as a continuum where behaviour regulation ranges from completely autonomous (hence, called the true self-regulation) to externally controlled (Gagné & Deci, 2005; Ryan & Deci, 2006; Deci & Ryan, 2000). SDT pays particular attention to explaining the processes of controlled and partially autonomous behaviour regulation, further categorizing behavior as *externally regulated*, *introjected*, *identified*, or *integrated*. External regulation can be placed at the extreme end of the motivation continuum and reflects the dependency of one's actions on external factors, whereas integrated regulation means that one's motives of certain actions are well integrated into his/her system of values and beliefs (Ryan & Deci, 2000). Therefore, those activities that are based on either identified or integrated regulation can be considered as relatively autonomous (despite the fact that they would fall under the label of 'extrinsic motivation'), whereas those activities that are extrinsically regulated or based on introjected regulation are considered to be non-autonomous (Deci & Ryan, 2008a; Ryan & Deci, 2000).

As far as motivational types are concerned, SDT has accumulated substantial empirical support. Many research studies and critical reviews (e.g., Vallerand, Pelletier, & Koestner, 2008; Lavigne, Vallerand, & Miquelon, 2007; Lin, Tsai, & Chiu, 2009; Hagger & Chatzisarantis, 2009; Vansteenkiste, Lens, de Witte, & Feather, 2005; Vansteenkiste, Smeets, Soenens, Lens, Matos, & Deci, 2010; Weinstein, DeHaan, & Ryan, 2010) support the idea that investigation of the above-mentioned motivational continuum provides a solid basis for explaining and predicting human behaviour. At this point it is important to note that SDT does not focus solely on the discussion of intrinsic and extrinsic motivation – this conceptualization is an integral part of broader theoretical considerations of human functioning that fall beyond the scope of this article. What SDT does is that it offers a framework for measuring motivation with regard to different types of behaviour regulation. The measurement issues are further discussed by introducing the Hierarchical Model of Motivation proposed by Vallerand (1997; 2000), and the Global Motivation Scale which is based on it.

**Evaluation of motivational types in the Hierarchical Model of Motivation.** The hierarchical model of intrinsic and extrinsic motivation proposed by Vallerand (1997) complements SDT and provides a promising approach for investigating motivation. In this model motivation is portrayed as a three-level (hierarchical) construct, manifesting at the global, life domains, and situational levels (Vallerand, 1997; 2000; Vallerand & Ratelle, 2002). Two important points have to be made referring to the evaluation and measurement of motivation.

First, according to this model, the above-mentioned levels of motivation and their measurement differ in specificity, the situational level to be considered the most specific. The analysis of motivation within the situational level mainly addresses the question

of why people do behave in one or another way in a *specific situation*. However, it is presumed that situational motivation is not a stable phenomenon, as it is influenced by many contextual factors. Furthermore, the life-domains level encompasses *relatively stable* motivational orientations manifesting in different domains of activity (a variety of domains may be listed, however, research studies point out learning, leisure and interpersonal relationships to be the most important for young adults). Although relatively stable, motivation at this level may nevertheless fluctuate depending on various (social) factors that vary according to each domain. Finally, at the global level, motivation is thought to be a relatively stable construct (in relation to the other levels) characterizing general motivational orientations of an individual (Vallerand & Ratelle, 2002; Vallerand, 2000). The latter is one of the most intriguing and yet somewhat challenging part of the model, both theoretically and methodologically. Holding to an assumption that motivation is a hierarchical construct, one may imply that, besides investigating motivation for specific activities, it is equally possible to determine one's global motivational orientation. In other words, the hierarchical view on motivation suggests a framework in which motivation might be analyzed as a relatively stable personal characteristic.

The second notion refers to the concept of intrinsic and extrinsic motivation. In accordance with SDT, the hierarchical model discusses a range of motivational subtypes (the so-called motivational orientations, which essentially correspond to the range of behaviour regulation subtypes in SDT). In total, seven subtypes are identified, as described in Table 1.

*Table 1. Motivational Orientations in the Hierarchical Model of Motivation (taken from Vallerand & Ratelle, 2002, p. 42–43)*

| <i>Title</i>                       | <i>Description</i>  |
|------------------------------------|---|
| <b><i>Intrinsic motivation</i></b> |   |
| To know (IMK)                      | <i>Implies engaging in activities because of the pleasure and satisfaction derived from learning, exploring, and understanding new things</i>   |
| To accomplish (IMTA)               | <i>Refers to engaging in activities because of pleasure and satisfaction derived from trying to surpass oneself, creating, or accomplishing something</i>   |
| To experience stimulation (IMES)   | <i>Operates when one is engaged in an activity because of the stimulating sensations associated with it</i>   |
| <b><i>Extrinsic motivation</i></b> |   |
| External regulation (EMER)         | <i>Acts are performed to attain a positive end state, which are separate from the activity itself. It is the least self-determined type of extrinsic motivation</i>   |
| Introjected regulation (EMIN)      | <i>The first stage of the internalization process, where individuals start to internalize the reasons for their behaviour. However, motivation is still not self-determined because this type of regulation deals with past external contingencies that have now been internalized. The person acts out of obligation, in order to avoid feeling of shame and internal pressure.</i>  |
| Identified regulation (EMID)       | <i>The behaviour is regulated through the identification with the activity: the reasons to engage in an activity are internalized such that the activity is judged valuable by the person; the person performs the activity with a sense of choice. Although identification implies choice, the choice to engage in some activities is not necessarily coherent with other self-structures. The person acting out of identified reasons is said to be relatively self-determined.</i> |
| Amotivation (A)                    | <i>Relative absence of motivation</i>   |

Motivational orientations mentioned above can be measured by various instruments, depending on the context within which motivation is analyzed (i.e. which level is taken into account). In order to measure motivation at the global level, the Global Motivation Scale (GMS-28) was proposed by Guay et al. (2003).

**The Global Motivation Scale (GMS-28).** Initially constructed in French language and followed by its English equivalent, this scale has been widely used in various research studies (Guay et al., 2003). In terms of application it has shown to be quite universal. For example, the Global Motivation Scale was used to collect empirical data aimed at testing the validity of the Hierarchical Model of Motivation (Guay et al. 2003), as well as to analyze coping processes (Amiot, Blanchard & Gaudreau, 2008), stress experiences among young adults (Julien, Guay, Sénécal & Poitras, 2009), and satisfaction with retirement (Stephan, Fouquereau & Fernandez, 2008), etc.

The Global Motivation Scale is a Likert-type scale including a variety of items that reflect possible motives for engaging oneself in certain actions. The structure of the scale corresponds to the conceptual definition of motivation provided in the Hierarchical Model of Motivation (Vallerand & Ratelle, 2002; Vallerand, 2000). It consists of seven subscales aimed at measuring the motivational subtypes identified in the model – three subscales measure intrinsic motivation, three subscales measure extrinsic motivation, and one subscale is aimed to measure amotivation.

The scale has proven to have adequate psychometric properties, such as good construct and concurrent validity, as well as high internal consistency (for details, see Guay et al., 2003; Julien et al., 2009). However, reports on scale psychometric properties are mainly based on the original study by Guay and colleagues (2003) and there is little data so far on how it may work in different cultures.

The aim of this study is to test the psychometric properties of the Global Motivation Scale and to discuss its applicability in the Lithuanian context. Doing this serves two purposes. First, by introducing the Lithuanian version of GMS-28, this study addresses the issue of lack of valid Lithuanian language instruments measuring motivational constructs. Second, it provides some empirical data on the cross-cultural applicability of the scale

## Method

**Participants.** The sample consisted of 382 Lithuanian residents: 111 were male (29.1%), 270 were female (70.7%), one respondent's gender was undisclosed. The age of the respondents varied from 19 to 75 years ( $M = 32.2$ ;  $SD = 12.5$ ). A more detailed description of respondent distribution across gender and age groups is provided in Table 2.

The sample consisted of respondents from the following occupational groups: employed, self-employed, retired, and students. They came from various regions in Lithuania, the majority of them residing around two major Lithuanian cities, Vilnius and Klaipeda. The student subsample consisted of students pursuing their studies at Vilnius University, Lithuanian University of Educational Sciences, and Klaipeda University.



Table 2. Respondent distribution across age and gender groups

| Age group | Distribution | Gender |         |         |
|-----------|--------------|--------|---------|---------|
|           |              | Male   | Female  | Total   |
| 19        | Frequency    | 6      | 19      | 25      |
|           | %            | 24.00% | 76.00%  | 100.00% |
| 20-29     | Frequency    | 64     | 113     | 177     |
|           | %            | 36.20% | 63.80%  | 100.00% |
| 30-39     | Frequency    | 18     | 49      | 67      |
|           | %            | 26.90% | 73.10%  | 100.00% |
| 40-49     | Frequency    | 15     | 44      | 59      |
|           | %            | 25.40% | 74.60%  | 100.00% |
| 50-59     | Frequency    | 8      | 41      | 49      |
|           | %            | 16.30% | 83.70%  | 100.00% |
| 60-69     | Frequency    | 0      | 3       | 3       |
|           | %            | .00%   | 100.00% | 100.00% |
| 70-79     | Frequency    | 0      | 1       | 1       |
|           | %            | .00%   | 100.00% | 100.00% |
| Total     | Frequency    | 111    | 270     | 381     |
|           | %            | 29.10% | 70.90%  | 100.00% |

**Measures.** The Global Motivation Scale (GMS-28; Guay et al., 2003) was used in the study. With the author's permission the scale was translated from English into Lithuanian. In order to ensure the quality of translation, it was concurrently made by two translators and then one final translation was agreed upon.

The original version of the Global Motivation Scale consists of 28 items, which are to be rated on a seven-point Likert type scale. It has seven subscales that measure the following types of motivation: intrinsic motivation to know, intrinsic motivation toward accomplishment, intrinsic motivation to experience stimulation, external motivation-identified, external motivation-introjected, external regulation, and amotivation.

The scale is based on the propositions of both Self-Determination Theory (Deci & Ryan, 2000) and the Hierarchical Model of Motivation (Vallerand, 2000; Vallerand & Ratelle, 2002). It is aimed at measuring the global level of motivation which is described in detail in Vallerand and Ratelle (2002).

**Procedure.** Confirmatory factor analysis using MPLUS 3 software was conducted in order to check the structure (factorial validity) of the scale. This method was regarded as the most appropriate, as the structure of the GMS-28 had already been established in previous studies and the main goal of the current study was to replicate it in the Lithuanian sample. In addition, internal consistency coefficients (Cronbach alphas), item-total and subscale intercorrelations (using Pearson correlation coefficient) were computed.

## Results

Four models of global motivation were constructed and analyzed in parallel in order to determine the optimal structure of the Lithuanian version of the scale. The first model consisted of seven factors and was identical to the structure of Global Motivation Scale proposed by Guay and colleagues (Guay et al., 2003). This was considered to serve as the base model when comparing all four models.

Furthermore, two alternative models were constructed, both of them based on the concept of motivation described in Self-Determination Theory (Deci & Ryan, 2000) and the Hierarchical Model of Motivation (Vallerand & Ratelle, 2002). To be more specific, both of these alternative models encompassed the intrinsic-extrinsic motivation continuum, but had fewer factors. In turn, the factors they included were somewhat broader than those in the base model.

The first alternative model consisted of three factors. Factor 1 referred to intrinsic motivation, factor 2 referred to extrinsic motivation, and factor 3 referred to amotivation. The second alternative model consisted of four factors. Factor 1 referred to the upper tier of intrinsic motivation (motivation to know and motivation toward accomplishment referring to the base model), factor 2 referred to the 'margin' between intrinsic and extrinsic motivation (motivation to experience stimulation and identified motivation referring to the base model), factor 3 referred to the lower tier of extrinsic motivation (introjected motivation and external regulation referring to the base model), and factor 4 referred to amotivation.

Finally, a corrected base model was the last model included in the comparative analysis. In this model, several item residuals were correlated, moreover, two items (item 2 and item 19) were shifted from their original subscales to another one. See Table 3 for the above-described model fit indices.

Table 3. GMS-28 model fit indices

| <i>Model</i>                           | <i>Chi-square</i> | <i>df</i> | <i>p</i> | <i>RMSEA</i> | <i>CFI</i> | <i>TLI</i> | <i>Chi-square significance test</i>                      |
|--|-------------------|-----------|----------|--------------|------------|------------|--|
| <b>7-factor model<br/>(base model)</b> | 931.85            | 329       | <.001    | .07          | .86        | .84        |  |
| <b>3-factor model</b>                  | 1713.41           | 347       | <.001    | .10          | .68        | .65        | $\Delta\chi^2 = 781.56; \Delta df = 18;$<br>$p < .001^*$ |
| <b>4-factor model</b>                  | 1314.43           | 344       | <.001    | .09          | .77        | .75        | $\Delta\chi^2 = 382.58; \Delta df = 15;$<br>$p < .001^*$ |
| <b>Corrected<br/>7-factor model</b>    | 746.71            | 324       | <.001    | .06          | .90        | .88        | $\Delta\chi^2 = 185.14; \Delta df = 5;$<br>$p < .001^*$  |

Note: \*compared to the base model

As shown in Table 3, the seven factor model has only satisfactory fit indices, they cannot be considered as good enough. First, Chi-square is statistically significant ( $p < .001$ ) indicating that the model poorly fits the data. On the other hand, it is often stated that Chi-square is very sensitive to the sample size (Hooper, Coughlan, & Mullen, 2008), therefore, it is not surprising that in relatively large samples it is statistically significant.

RMSEA index in the base model is higher than .05, which is again only satisfactory. Ideally, the RMSEA index should be  $< .05$ , although values lower than .08 are still considered to be acceptable (Byrne, 2001; Hooper et al., 2008).

Finally, the values of CFI = .86 and TLI = .84 obtained in the base model indicate lack of model fit. According to the literature, CFI and TLI indices should be closely approaching 1, or at least should exceed .90 (Byrne, 2001; Hooper et al., 2008).

A comparative analysis of the base model and two alternative models (three factor and four factor models described above) has shown the alternative models to have even lower fit indices than the base model. Furthermore, Chi-square significance test has revealed differences between the base model and both alternative models to be statistically significant (see Table 3).

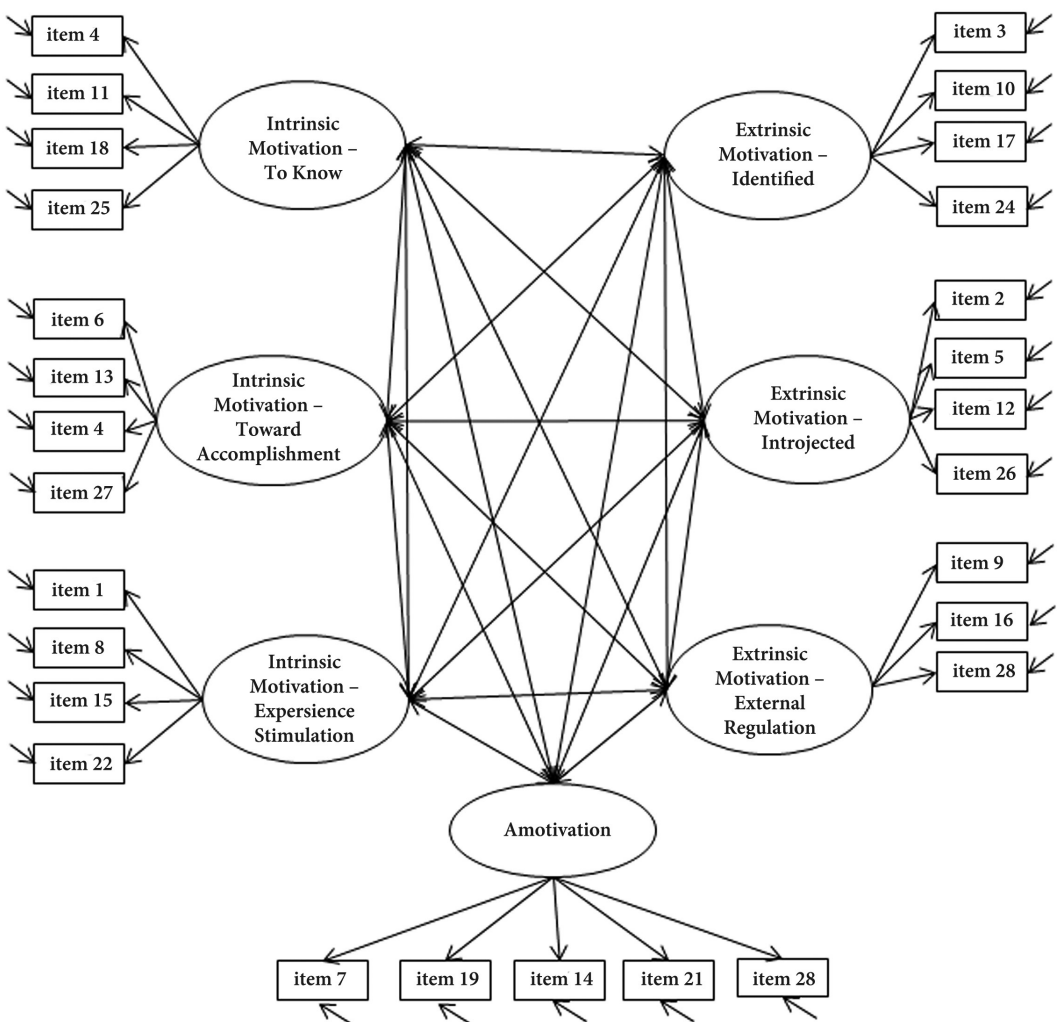


Figure 1. Graphical representation of the GMS-28 corrected 7-factor model. Correlated residual errors are not represented.

Based on the initial results, the most appropriate solution was to drop the alternative models from the subsequent analysis keeping the base model only, and to check whether it was possible to modify it to better fit the data. In order to do this, a corrected version of the base model (see Figure 1) was constructed: five residual correlations were added and two items were moved from their original factors to other ones.

The following item residuals were correlated: item 10 x item 17, item 1 x item 2, item 8 x item 12, item 4 x item 13, item 7 x item 23. All of the above-mentioned items, with the exception of item 1 and item 2, have similar meanings. For instance, item 10 is worded ‘...because I chose them as a means to attain my objectives’ and item 17 is worded ‘...because I chose them in order to attain what I desire’. Both these items fall into the Extrinsic Motivation–Identified subscale. However, they express goal seeking motives more clearly than the rest of the items in the subscale.

Residual correlation between item 1 and item 2 was included despite that these items are not very similar in their meaning. This choice was based on the logic that respondents may have marked similar responses due to the fact these were the very first items in the scale they read and subjectively they might have seemed similar to the respondents.

Furthermore, two items were dropped from their original factors and included into the other ones. Item 2 ‘...because I do not want to disappoint certain people’ was moved from the Extrinsic Motivation–External Regulation subscale to the Extrinsic Motivation–Introjected subscale; item 19 ‘...because I force myself to do them’ was moved from the Extrinsic Motivation–Introjected subscale to the Amotivation subscale. These changes were made based on modification indices in CFA, after evaluating whether they logically fit into their new subscales.

The corrected model had better fit indices compared to the base model (RMSEA = .06; CFI = .90; TLI = .88), the difference between these two models being statistically significant ( $\Delta\chi^2 = 185.1$ ;  $\Delta df = 5$ ;  $p < .001$ ). Factor loadings and residual correlations in the corrected model are shown in Table 4. According to the results, all items have high loadings in their factors with the lowest value of .43.

Table 4. Estimates of the corrected GMS-28 model and corrected item-total correlations

| Factor and item number                                     | Standardized factor loading | Corrected item-total correlations |
|--|-----------------------------|-----------------------------------|
| <i>Intrinsic Motivation – To Know (IMK)</i>                |                             |                                   |
| IMK1 (item 4)  | .59                         | .53                               |
| IMK2 (item 11)   | .81                         | .72                               |
| IMK3 (item 18)   | .85                         | .76                               |
| IMK4 (item 25)   | .84                         | .74                               |
| <i>Intrinsic Motivation – Toward Accomplishment (IMTA)</i> |                             |                                   |
| IMTA1 (item 6)   | .68                         | .54                               |
| IMTA2 (item 13)  | .73                         | .59                               |
| IMTA3 (item 20)  | .54                         | .46                               |
| IMTA4 (item 27)  | .58                         | .48                               |

| <i>Factor and item number</i>                               | <i>Standardized factor loading</i> | <i>Corrected item-total correlations</i> |
|---|------------------------------------|--|
| <i>Intrinsic Motivation – Experience Stimulation (IMES)</i> |                                    |  |
| IMES1 (item 1)  | .59                                | .53                                      |
| IMES2 (item 8)  | .55                                | .50                                      |
| IMES3 (item 15)   | .84                                | .70                                      |
| IMES4 (item 22)   | .76                                | .63                                      |
| <i>Extrinsic Motivation – Identified (EMID)</i>             |                                    |  |
| EMID1 (item 3)  | .62                                | .34                                      |
| EMID2 (item 10)   | .43                                | .44                                      |
| EMID3 (item 17)   | .57                                | .56                                      |
| EMID4 (item 24)   | .38                                | .30                                      |
| <i>Extrinsic Motivation – Introjected (EMIN)</i>            |                                    |  |
| EMIN1 (item 5)  | .72                                | .50                                      |
| EMIN2 (item 2)*   | .59                                | .64                                      |
| EMIN3 (item 12)   | .84                                | .71                                      |
| EMIN4 (item 26)   | .72                                | .62                                      |
| <i>Extrinsic Motivation – External Regulation (EMER)</i>    |                                    |  |
| EMER1 (item 9)  | .77                                | .61                                      |
| EMER2 (item 16)   | .70                                | .61                                      |
| EMER3 (item 23)   | .71                                | .61                                      |
| <i>Amotivation (A)</i>                                      |                                    |  |
| A1 (item 7)   | .64                                | .54                                      |
| A2 (item 19)*   | .54                                | .61                                      |
| A3 (item 14)  | .70                                | .44                                      |
| A4 (item 21)  | .72                                | .62                                      |
| A5 (item 28)  | .67                                | .57                                      |
| <i>Correlated residual errors</i>                           |                                    |  |
| item10 x item17   |                                    | .26                                      |
| item1 x item2   |                                    | .18                                      |
| item8 x item12  |                                    | -.11                                     |
| item4 x item13  |                                    | .10                                      |
| item7 x item23  |                                    | -.11                                     |

Note: \* items that were moved from their original factors

The final part of the analysis included scale internal consistency test. Table 5 shows Cronbach's alpha coefficients of each subscale and subscale intercorrelations; corrected item-total correlations are provided in the right handside column in Table 4.

Table 5. GMS-28 subscale Cronbach's alpha Coefficients and Subscale Intercorrelations

|   | Cronbach's<br>$\alpha$ | 2      | 3      | 4      | 5      | 6      | 7      |
|---|------------------------|--------|--------|--------|--------|--------|--------|
| 1 Intrinsic Motivation – To Know                | .85                    | .69*** | .47*** | .42*** | .08    | .16**  | .00    |
| 2 Intrinsic Motivation – Toward Accomplishment  | .72                    |        | .62*** | .53*** | .21*** | .37*** | .07    |
| 3 Intrinsic Motivation – Experience Stimulation | .78                    |        |        | .47*** | .21*** | .28*** | .02    |
| 4 Extrinsic Motivation – Identified             | .62                    |        |        |        | .16**  | .41*** | -.02   |
| 5 Extrinsic Motivation – Introjected            | .80                    |        |        |        |        | .36*** | .47*** |
| 6 Extrinsic Motivation – External Regulation    | .77                    |        |        |        |        |        | .34*** |
| 7 Amotivation                                   | .78                    |        |        |        |        |        |        |

Note: \*\*correlation statistically significant when  $p < .01$ ; \*\*\*correlation statistically significant when  $p < .001$

According to Steiner (2003), for basic research tools the minimum alpha level of .80 is recommended, however, alphas from .50 to .60 are acceptable for the early stages of research. Based on the results of our study, all the subscales can be considered to have adequate internal consistency, their Cronbach alphas varying from satisfactory (Extrinsic Motivation–Identified subscale) to high (Intrinsic Motivation–To Know subscale) (see Table 5). Moreover, as seen in Table 4, corrected item-total correlations are all positive, ranging from .30 (EMID4 – item 24) to .76 (IMK3 – item18).

Subsequently, the results have shown that subscale intercorrelations range from nearly zero to .69. In this case, a specific pattern can be discerned – subscales tend to intercorrelate more strongly in their own category (i.e. intrinsic-intrinsic, extrinsic-extrinsic). It is important to note that all of the intrinsic motivation subscales have rather high correlations with the Extrinsic Motivation–Identified subscale. While this subscale is categorized under the extrinsic motivation label, the above-mentioned results are not unexpected, as this subscale can be considered to be 'transitional' on the intrinsic-extrinsic motivation continuum. Finally, the Amotivation subscale is correlated with the Extrinsic Motivation–Introjected and Extrinsic Motivation–External Regulation subscales, which is quite logical as well.

## Discussion

The findings of this study are relevant both from the practical and from the scientific point of view. First of all, this study has confirmed the seven factor solution of the Lithuanian version of the GMS-28, providing proof that this scale can be used without major modifications to measure motivation in Lithuanian studies.

Looking from a cross-cultural perspective this is an important finding because not all research instruments are easily transferred from one culture to another. As the worldwide practice shows, a number of corrections might be necessary before an



instrument developed in a foreign culture and/or language can be applied in a different context (Van de Vijver & Hambleton, 1996). This is often the case in Lithuanian psychological research – a number of recognized research instruments (e.g., NEO-FFI; Bagdonas & Kairys, 2012; HEXACO-PI-R; Truskauskaite, Kaniusonyte, Krataviciene & Krataviciute-Alisauskiene, 2011; ATTS; Skruibis, Gailiene & Labanauskaite, 2008) had to be modified to obtain acceptable reliability and validity indicators of their Lithuanian versions before they could be used in research or practice.

GMS-28 is aimed to measure motivation. Based on the concept of motivation as a complex and multi-layered construct, it is logical to presume that it might manifest slightly differently in the different regions of the world. Moreover, although aimed at measuring the motivational continuum, GMS-28 has a quite rigorous structure encompassing seven types of motivation (or behaviour regulation). Therefore, comparing the structure of the Lithuanian version of the GMS-28 to the original scale and an attempt to replicate it is of the utmost importance before applying it in further research.

According to the results, the initial seven factor scale structure was retained in the Lithuanian sample and it makes the Lithuanian version similar to the original French and English scales (Guay et al., 2003). However, the results of this study are not easily comparable to other findings. Despite that the GMS-28 is based on a well-recognized Self-Determination Theory (Deci & Ryan, 2000; 2008a) and the Hierarchical Model of Motivation (Vallerand & Ratelle, 2002; Vallerand, 2000), empirical evidence on wider applicability of this scale is rather scarce.

The seven factors obtained in this study are not absolutely ‘clean’ (see Table 4), but this is quite natural and could reflect peculiarities in the manifestation of motivation (behavioural regulation) in the analyzed sample. The most interesting finding concerns the Extrinsic Motivation–Identified subscale. In theory this motivational type would be classified as reflecting the extrinsic motives. However, in this study the Extrinsic Motivation–Identified is more strongly and significantly correlated to the ‘intrinsic’ motivational types (see Table 5) and could not be strictly placed on the ‘extrinsic’ side of the continuum. Looking at the findings of this study it would probably be most accurate to call it a ‘transitional’ type of motivation, reflecting the transition point from intrinsic to extrinsic motives.

Moreover, the Extrinsic Motivation–Identified subscale has the lowest internal consistency score (see Table 5) and relatively small item-total correlation coefficients. Again, this could be explained by item phrasing within the subscale – it is plausible that in the Lithuanian version these items reflect both intrinsic and extrinsic motives of behaviour and, therefore, are not very consistent.

The rest of the factors (Intrinsic Motivation–To Know, Intrinsic Motivation–Toward Accomplishment, Intrinsic Motivation–Experience Stimulation, Extrinsic Motivation–Introjected, Extrinsic Motivation–External Regulation, Amotivation) are quite clearly distinguished, adequately inter-correlated and internally consistent. In terms of internal consistency, Cronbach alphas obtained in the current study ranged from .62 to .85 (in the original study by Guay et al., 2003, the reported coefficients ranged from .75 to .91). The structural model fit indices in the Lithuanian study were

quite acceptable too ( $\chi^2 = 931.85$ ;  $df = 329$ ;  $p < .001$ ; RMSEA = .07; CFI = .86 for the base model;  $\chi^2 = 746.71$ ;  $df = 324$ ;  $p < .001$ ; RMSEA = .06; CFI = .90 for the final model). In their original study, Guay et al. (2003) report them as follows:  $\chi^2 = 1088.38$ ;  $df = 329$ ;  $p < .001$ ; RMSEA = .05; CFI = .95. Therefore, it can be stated that the preliminary psychometric properties of the Lithuanian GMS-28 are acceptable and the scale should adequately reflect the range of motivational types as described in SDT (Deci & Ryan, 2000; 2008a) and the Hierarchical Model of Motivation (Vallerand & Ratelle, 2002; Vallerand, 2000). However, a comparison between the current and the original study mentioned above should be made with extreme care as the latter contained a much larger sample ( $N = 1039$ ); moreover, the findings in the Lithuanian study are based on the corrected model.

Findings of this study are particularly relevant in the methodological sense. GMS-28 measures global motivation and could be used as a basis for development of other, possibly more specific, motivation measures (in the Hierarchical Model of Motivation, the concepts of global, life domains, and situational motivation are based on the same internal-external behaviour regulation framework). Moreover, regarding the increasing popularity of SDT it is extremely important to have valid tools to measure motivational constructs. If proven that the propositions of SDT work in the Lithuanian context and that Lithuanian SDT-based motivation scales have good psychometric properties, this could serve as a basis for further research in the field. Therefore, we consider this study and its findings as a little step further in the application of theoretical self-determination models in Lithuanian research.

*Limitations and further research implications.* Inevitably, findings of this study have limitations and should be interpreted with caution. Although the results have shown the Lithuanian GMS-28 to have adequate psychometric properties (i.e. factorial validity and scale reliability) it should be noted that these findings are preliminary and might be bound to the analyzed sample. In order to cross-validate the scale, it should be retested in other samples in the future. A more detailed validity check, such as testing convergent and / or discriminant validity, would be desirable as well. Due to the lack of adequate measures, these forms of validity were not analyzed in this study.

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# Predictors of Cognitive Appraisal of Job Loss among the Unemployed Aged over 45 Years

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## **Abstract**

The aim of the present study was to explore the formation of cognitive appraisal of job loss by socio-demographic, contextual factors and beliefs. Coping self-efficacy, the general and personal belief in a just world, cognitive appraisal dimensions (*challenge, loss, threat, reversibility*) of the unemployment situation, as well as socio-demographic variables were measured in a sample of 209 unemployed people aged over 45 years. The results showed that 13% of the variance in *loss* appraisal is explained by the duration of unemployment, monthly income per family member and coping self-efficacy. Seventeen % of the variance in *threat* appraisal is explained by the duration of unemployment, monthly income per family member and self-efficacy of emotion-focused coping. The variance of 25% in *challenge* appraisal is explained by the general belief in a just world, age and relationship status. The 9% of variance in *reversibility* is explained by age and the duration of unemployment. Implications for interventions based on cognitive restructuring, drawn from these results, are discussed.

**Keywords:** *depression, cognitive appraisal of unemployment situation, coping self-efficacy, belief in just world*

## **Introduction**

During a time of economic crises (e.g., 2009–2011 in Latvia), unemployment affects a substantial portion of the population. Job loss is a life event that is closely associated with depression and other mental health consequences in both the theoretical literature and empirical research (McKee-Ryan, Wanberg, & Kinicki, 2005), however, not all thus affected become depressed. What helps some people to cope better than others under relatively similar circumstances?

Researchers who study unemployment have looked for the answer to this question among different social and demographic variables (Creed & Klisch, 2005; McKee-Ryan, Wanberg, & Kinicki, 2005; Paul & Moser, 2009). Scant research has dealt with cognitions as the main determinant of mental health risks in the unemployed (McKee-Ryan, Wanberg, & Kinicki, 2005). This is surprising since the mechanism of the development of mental disorders, including the role of both personality and environment, has been generally explained by the widely recognized cognitive vulnerability – stress model

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(Beck, 1976; Ingram, Miranda, & Segal, 1998; Monroe, & Simons, 1991). Awareness of the cognitions involved in stress reactions to job loss would certainly help to tailor interventions that are focused on cognitive restructuring and are appropriate for unemployed people as well as for clients who face other kinds of critical life events.

Even though studies of the cognitive vulnerability within a community sample of the unemployed are scarce, in a relatively recent meta-analytical study (McKee-Ryan, Wanberg & Kinicki, 2005) authors come to the conclusion that psychological variables are of greater consequence to mental health than socio-demographical or contextual ones. Authors propose the transactional stress perspective (Lazarus, & Folkman, 1984) as a promising theoretical ground for studying the psychological mechanism involved in stress reaction following job loss.

Similar to the cognitive vulnerability – stress models, the transactional stress theory (Lazarus, & Folkman, 1984; Lazarus, 2000) places an emphasis on cognitions as a crucial element in the chain of stress reactions following a critical life event. Cognitive appraisal can be most readily understood as the process of categorizing the encounter and its various aspects, with respect to its significance for well-being (Lazarus, & Folkman, 1984, p. 31). Lazarus makes a distinction between primary and secondary cognitive appraisal. Primary appraisal refers to an evaluation of the potential danger of a situation, it relates to such questions as: “Am I in trouble... and in what way (Lazarus, & Folkman, 1984, p. 31)?” Secondary appraisal includes an evaluation of one’s coping capacity and can be summarized by the question: “What if anything can be done about it (Lazarus, & Folkman, 1984, p. 31)?” Lazarus (Lazarus, 2000) refers to *loss*, *threat* and *challenge* as the basic dimensions of stressful primary cognitive appraisal. *Loss* can be understood as an appraisal of harm already suffered by individual; *threat* as harm which may or may not be reversible; *challenge* refers to the assumption that even though there are obstacles on the way to one’s goal, those may be overcome with persistence and confidence.

Cognitive appraisal depends on the situation and personal resources. Basically, cognitive appraisal is an interaction point between stress (situation, event, circumstance) and individual personality dispositions. Situations differ in their novelty, predictability, event uncertainty, imminence, duration, temporal uncertainty, ambiguity and the timing of stressful events in the life cycle (Lazarus, & Folkman, 1984). In this study situational differences are measured in terms of different social, demographic and contextual variables, which distinguish one “job loss” from another. Among personality factors Lazarus and Folkman (Lazarus, & Folkman, 1984) mention goals and their hierarchy, and personal beliefs. Personal beliefs are more stable cognitions than cognitive appraisals, and thus more descriptive of the personality disposition.

The concept of cognitive appraisal as defined by Lazarus and Folkman (Lazarus, & Folkman, 1984) allows for the role of personality and situation to be assessed in the appraisal of a stressful life event. Even though the main assumption of the cognitive vulnerability – stress model is that, for example, in order for depression to occur both a certain level of cognitive vulnerability and a stressful life event must be present. Research related to the stress component or to the interaction of different levels of cognition (Hankin, Fraley, & Abela, 2005) is scarce.

This study helps to identify the kinds of situations and personality-related aspects which have the greatest influence on several dimensions of cognitive appraisal of job



loss. It helps to understand the reasons why the loss of a job may pose a major threat for some people, yet be seen as a challenge by others. This article is a partial description of the results obtained in a study of Latvian unemployed people aged over 45 years, conducted from November 2011 through March 2012.

To provide an overview of several important aspects of this study, including the sample choice, the main variables are described below.

### **The unemployed aged over 45 years**

The unemployment rate among the general population of Latvia shrank from 16% in 2009 to 11.5% at the end of 2011; however the proportion of unemployed people over 45 years of age grew significantly (NVA, 2012, *Izvērstā statistika par bezdarba situāciju Latvijā un reģionos/ Statistics about unemployment in Latvia from State Agency of employment in Latvia*).

It has been shown that various physical and cognitive abilities decline with age (Craik & Jennings, 1992; Czaja & Sharit, 1993; Forteza & Prieto, 1994). However, the assumptions about the impact of age on working capacity tends to be exaggerated (Hedge, Borman, & Lammlein, 2006). That may be a reason for discrimination of the older work force. When analyzing the situation in Latvia, it is important to keep in mind that people who are now over 45 were raised, received their education and started their careers in a different social and economic system. That might be an important reason why a part of this group is less successful at adjusting to the different demands of the labor market, especially with increasing competition in the work force during an economic crisis.

Developmentally, a new period of life begins after 40, characterized by such aims as becoming stable in most areas of life and demonstrating a clear professional field of competence (Mallinckrodt, & Fretz, 1988), which is hard to achieve for the unemployed. Thus, it is not surprising that the unemployed at the period of pre-retirement are one of the groups with a particularly serious risk of becoming depressed (Liwowsky, Kramer, Mergl, Bramesfeld, et al., 2009).

The preceding arguments indicate that job loss can be considered as a critical life event for people over 45 in Latvia during the period from 2011 to 2012.

### **Cognitive appraisal of job loss**

There have been several studies considering cognitive appraisal as a key factor in stress reactions following a job loss (Feather & Davenport, 1981; Gowan, Riordan, & Gatewood, 1999; Leana & Feldman, 1990; 1991), however, in previous research cognitive appraisal of the unemployment situation has not been assessed in terms of *loss*, *challenge* and *threat*, the dimensions which Lazarus and Folkman (Lazarus, & Folkman, 1984; Lazarus, 2000) refer to as being the main dimensions of primary stress appraisal. *Reversibility*, as it has been measured in previous studies (Gowan, Riordan, & Gatewood, 1999; Leana and Feldman, 1992), however, is rather similar to the secondary cognitive appraisal as defined by Lazarus and Folkman (Lazarus, & Folkman, 1984). As far as the authors of the current study are informed, there have been no studies in which *challenge* has been measured as a potential dimension of primary cognitive appraisal, however, as with any crisis, job loss may also prove to be beneficial.

In the study by Gowan, Riordan and Gatewood (1999) education, financial resources and social support were assessed as potential determinants of *reversibility*, however, only education was significantly and positively related to *reversibility*, whereas financial resources and social support were not.

The current study expands the extant research not only by adding previously uninvestigated determinants to the list of the potential predictors of cognitive appraisal (beliefs and other social demographic variables), but also by including different dimensions of cognitive appraisal, which have not been inspected in previous unemployment studies.

## Beliefs

Two kinds of individual beliefs are mentioned by Lazarus and Folkman (Lazarus, & Folkman, 1984) as being particularly relevant to the critical life events appraisal process. The first are beliefs related to control and the second are existential beliefs.

One of the important beliefs about control is self-efficacy. Self-efficacy (Bandura, 1977; 1997) is one's belief in his or her abilities to perform certain tasks. When facing a job loss an individual encounters a number of different unemployment-related stressors, among them – potential financial hardships, harm to family and marital life, social contacts, future career, etc. (Fryer, 1997; Jahoda, 1982), so various coping activities are needed to deal successfully with this critical life event. That is why coping self-efficacy in a broader sense will be measured in this study. Coping self-efficacy (Chesney et al, 2006) is the belief about one's ability to perform specific coping tasks, and previous studies confirm that it is an important determinant associated with depression among people who face life threatening illness (Chesney et al., 2003) as well as in the general population in the United Kingdom (Colodro et al., 2010).

Belief in a just world means believing in a world in which people get what they deserve and deserve what they get (Lerner, 1980). In recent decades there has been much research demonstrating that the belief in a just world is an important resource both when dealing with daily problems (Dalbert, & Schneider, 1995; Dalbert, 2001; Ritter, Benson, & Snyder, 1990), as well as after encountering such critical life events as natural disasters, accidents, rape and job loss (Bulman & Wortman, 1977; Dalbert, 1997; Dalbert, 2002; Lerner & Somers, 1992; Otto et al., 2006).

People who strongly believe in a just world are motivated to maintain this belief even when facing seemingly unjust events (Dalbert, 2002). They strive to reestablish justice either in real life or psychologically. As research on the belief in a just world as a coping resource has been advanced, general and personal beliefs have been divided, the first being defined as the belief that events in one's own life are just, while the general belief in a just world reflects the belief that, basically, the world is a just place (Dalbert, 1999; Dzuka & Dalbert, 2002; Otto et al., 2006). The personal belief in a just world has been more closely related to successful coping than the general belief in a just world in previous studies (Dalbert, 1999; Dzuka & Dalbert, 2002).

## Social, demographic and contextual variables

Based on the findings of previous studies (Creed & Klisch, 2005; McKee-Ryan, Wanberg & Kinicki, 2005; Paul & Moser, 2009), in this study such variables as the

duration of unemployment, the duration of employment in the last job, relationship status, monthly income per family member, gender, education level and age were measured and included as potential determinants of the dimensions of cognitive appraisal.

Based on the preceding considerations, the **research question** is: Which socio-demographic factors and beliefs predict each of the cognitive appraisal dimensions (*challenge, loss, threat, and reversibility*) of job loss?

## Method

### Participants

The research was conducted based on 209 completed questionnaires (the faulty ones were disregarded), filled out by respondents conforming to all of the following conditions: over 45 years of age, with high-school education (or higher), with sufficient knowledge of Latvian language to complete the questionnaire. The respondents were aged 45 to 61, with an average age of 51 ( $SD = 4.70$ ), 23% (49) were male, 77% (160) were female. Out of all respondent 70% had a high-school or a technical secondary education, 1% were university students, and 29% had a university education. The duration of employment among the participants varied from 1 to 43 years, with the average of 27.55 years ( $SD = 8.05$ ; Mode 30 years). The respondents had been unemployed for a period of less than 1 month to 60 months. The average duration of unemployment was 9 months. Among the respondents who had specified their marital status ( $n = 160$ ), 26% were single, 3% had been in a relationship for less than 3 years, 64% had been in a relationship for more than 3 years, and 6% had been divorced.

### Measures

Demographic indicator survey assessed the respondents' age, gender, educational level, duration of previous employment (in years), duration of unemployment (in months), relationship status (single; partnership for less than 3 years, partnership for more than 3 years; divorced), the monthly income per family member, the time period spent at the last job position.

Coping Self-Efficacy Scale (Chesney, Neilands, Chambers, Taylor, & Folkman, 2006; Colodro et al., 2010) consists of 26 items that also measure 3 sub-factors of coping self-efficacy: self-efficacy for problem-focused coping (SEPFEC; 12 items), which assesses perceived self-efficacy concerning the use of coping strategies aimed at solving or eliminating situations that generate stress; self-efficacy for emotion-focused coping (SEEFEC; 9 items), which assesses perceived self-efficacy concerning the use of coping strategies aimed at the regulation of cognitive and affective responses linked to stress; and self-efficacy for social support (SESS; 5 items), which assesses perceived self-efficacy of seeking and using social resources for coping with problems and mitigating or eliminating stress. Reliability index  $\alpha$  of the English version of the general coping self-efficacy scale is .94 (Colodro et al., 2010), while for the Latvian version .93 (Ludāne, 2013). Reliability index  $\alpha$  for subscales varies from .8 – .9 (Colodro et al., 2010) for the English version and .63 – .9 for the Latvian version.

Adaptation results of Coping Self-Efficacy Scale in detail have been described elsewhere (Ludāne, 2013). As the reliability for the subscale self-efficacy for social support did not reach satisfactory internal consistency level (.63), potential causes of it were analyzed. It was detected that exclusion of one culturally difficultly perceivable item would increase internal consistency for subscale from .63 to .71, which is still less than for the original, however, at least a satisfactory reliability coefficient. However, the unsatisfactory reliability of this subscale would not influence the validity of this study, as it will not be used separately in any of the analyses. At the same time, this issue must be addressed before application of this scale in other studies.

The Belief in a Just World was assessed by the use of the General Belief in a Just World scale (Dalbert et al., 1987), which consists of 6 statements ( $\alpha = .78$ ), and the Personal Belief in a Just World scale (Dalbert, 1999), which consists of 7 statements ( $\alpha = .86$ ). These methods were adapted during the course of the master's thesis of Maruta Ludāne (2008). Cronbach's  $\alpha$  for the General Belief in a Just World is .78 ( $n = 243$ ). Cronbach's  $\alpha$  for the Personal Belief in a Just World scale is .81 ( $n = 243$ ).

Cognitive appraisal of job loss. The measurement of cognitive appraisal in this study was developed upon the basis of Lazarus' (Lazarus & Folkman, 1984) approach to the dimensions of stressful primary cognitive appraisal (threat, loss and challenge) and classification of the primary and the secondary appraisal. Similarly as in other studies (Gall, 2000; Gowan, Riordan, & Gatewood, 1999; Leana & Feldman, 1990; 1991), the dimensions of cognitive appraisal were measured with ratings on 1 to 5 statements for each dimension of cognitive appraisal. The statements were related to various aspects of unemployment, such as the financial situation, partner relationships, social status and social contacts, which have been noted as significant for the mental health of the unemployed in both theory and previous researches (Jahoda, 1982; Warr, 1987; McKee-Ryan, Wanberg & Kinicki, 2005; Paul & Moser, 2009).

The cognitive appraisal of *reversibility* of job loss, applied in previous research related to job loss (Leana, & Feldman, 1990; Gowan, Riordan, & Gatewood, 1999) was also used in this study, and is considered to be a secondary appraisal. Finally, four dimensions of cognitive appraisal of the unemployment situation included such aspects as *threat* (4 statements, Cronbach's alpha .79; e.g., "It threatens my family life/personal relationships"), *loss* (5 statements, Cronbach's alpha .70; e.g., "I have lost my social status along with my job"), *challenge* (4 statements, Cronbach's alpha .82; e.g., "My current unemployment might have positive implications for my future"); *reversibility* of unemployment (3 statements, Cronbach's alpha .54; e.g., "My previous work experience provides me with a good chance of finding a new job."). The respondents were asked to assess the statements on the scale of 1 to 6 (1 – totally disagree; 6 totally agree). The reliability of the reversibility dimension is not satisfactory, which probably is due to the minimal amount of items in the scale. This may endanger the internal validity of the results and must be taken into the account when analyzing the generalizability of results.

## Procedure

The respondents completed the questionnaires individually or in small groups on the premises of the Riga branch office of the National Employment Office from November 2011 through March 2012. It took approximately 15 minutes to complete the questionnaire.

## Results

Descriptive statistics are shown in Table 1.

**Table 1. Means and Standard Deviations of Socio-demographic variables, Beliefs and Dimensions of Cognitive Appraisal of Job Loss**

|   | <i>M</i> | <i>SD</i> |
|---|----------|-----------|
| Age   | 52.11    | 4.71      |
| Length of Service (Years)                                       | 27.55    | 8.05      |
| Duration of Unemployment (in Months)                            | 9.41     | 12.10     |
| Time Period Spent in Last Position                              | 131.61   | 112.52    |
| Coping Self-Efficacy (Full Scale)                               | 15.22    | 47.56     |
| Self-Efficacy for Emotion-Focused Coping                        | 50.44    | 19.18     |
| Self-Efficacy for Problem-Focused Coping                        | 71.01    | 22.30     |
| Self-Efficacy for Social Support                                | 29.25    | 12.06     |
| Personal Belief in a Just World                                 | 3.57     | .95       |
| General Belief in a Just World                                  | 3.69     | .92       |
| Loss (Cognitive Appraisal of Unemployment Situation )           | 3.77     | 1.21      |
| Threat ( Cognitive Appraisal of Unemployment Situation )        | 3.70     | 1.18      |
| Challenge ( Cognitive Appraisal of Unemployment Situation )     | 3.75     | 1.07      |
| Reversibility ( Cognitive Appraisal of Unemployment Situation ) | 3.31     | .95       |

Correlation analysis was carried out among dimensions of cognitive appraisal of job loss, coping self-efficacy, general and personal belief in just world and social, demographic variables (see Table 2).

**Table 2. Correlation Coefficients of Socio-demographic variables, Beliefs and Dimensions of Cognitive Appraisal of Job Loss**

|  | <i>Cognitive appraisal of job loss</i> |               |                  |                      |
|--|--|---------------|------------------|----------------------|
|  | <i>Loss</i>                            | <i>Threat</i> | <i>Challenge</i> | <i>Reversibility</i> |
| Age                                      | .10                                    | .09           | -.23**           | -.23**               |
| Length of Service (Years)                | -.03                                   | -.04          | -.15*            | -.14*                |
| Duration of Unemployment (in Months)     | .19**                                  | .25**         | -.17*            | -.10                 |
| Monthly Income per Family Member         | -.32**                                 | -.34**        | .25**            | .20**                |
| Time Period Spent in Last Position       | .12                                    | .11           | -.06             | .14*                 |
| Relationship Status                      | -.18*                                  | -.16*         | .31**            | .19*                 |
| Personal Belief in a Just World          | -.12                                   | -.14*         | .34**            | .20**                |
| General Belief in a Just World           | -.08                                   | -.1           | .38**            | .15*                 |
| Coping Self-Efficacy (Full Scale)        | -.21**                                 | -.21**        | .23**            | .12                  |
| Self-Efficacy for Problem-Focused Coping | -.16*                                  | -.17*         | .19**            | .12                  |
| Self-Efficacy for Emotion-Focused Coping | -.21**                                 | -.22**        | .17*             | .10                  |
| Self-Efficacy for Social Support         | -.21**                                 | -.16*         | .23**            | .08                  |

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

To establish which socio-demographic variables and beliefs predict specific dimensions of the cognitive appraisal of job loss, hierarchical multiple regression analysis was carried out separately for the threat, loss, challenge and reversibility dimensions as dependent variables. Predictors for regression analysis were chosen based on results of the correlation analysis.

For the *loss* dimension as a dependent variable, the duration of unemployment and the income per family member were included, as they had statistically significant correlations with the loss dimension. Such a model was statistically significant, explaining 12% of variance in loss appraisal.  $R^2 = 0.13$ , adjusted  $R^2 = 0.12$  ( $F(2.183) = 13.48$ ;  $p < 0.001$ ), as both variables were statistically significant contributors. In the next step, coping self-efficacy was included. Such a model was statistically significant and explained an additional 2% of loss variance,  $R^2 = 0.15$ , adjusted  $R^2 = 0.13$  ( $F(3.182) = 10.37$ ;  $p < 0.001$ ), however coping self-efficacy contribution was marginally significant. The largest part of variation in the cognitive appraisal of *loss* in this model was explained by the monthly income per family member (see table 3.).

**Table 3. Hierarchical Multiple Regression Analysis of Loss Cognitive Appraisal as Dependent Variable**

|   | <i>Models</i>                        | <i>B</i> | <i>SE B</i> | $\beta$ |
|---|--------------------------------------|----------|-------------|---------|
| 1 | (Constant)                           | 4.18***  | .21         |         |
|   | Duration of Unemployment (in Months) | 0.02     | .005        | .21**   |
|   | Monthly Income per Family Member     | -0.21    | .06         | -.25**  |
| 2 | (Constant)                           | 4.64***  | .31         |         |
|   | Duration of Unemployment (in Months) | 0.01     | .005        | .20**   |
|   | Monthly Income per Family Member     | -0.18    | .06         | -.21**  |
|   | Coping Self-Efficacy                 | -0.003   | .002        | -.14*   |

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

To determine the predictors of the *threat* dimension of cognitive appraisal, the length of unemployment and income per family member were included in the first step of the regression analysis. This model was statistically significant and explained 16% of threat,  $R^2 = 0.17$ , adjusted  $R^2 = 0.16$  ( $F(2.183) = 18.31$ ;  $p < 0.001$ ). In the next step emotion-focused coping self-efficacy was included, as it has a higher correlation with threat than the full scale of coping self-efficacy. Such a model was statistically significant, explaining an additional 2% of *threat* variance,  $R^2 = 0.19$ , adjusted  $R^2 = 0.17$  ( $F(3.182) = 13.96$ ;  $p < 0.001$ ), all the independent variables being statistically significant determinants. The widest variation of *threat* was explained by the monthly income per family member (see table 4.).

**Table 4. Hierarchical Multiple Regression Analysis of Threat Cognitive Appraisal as Dependent Variable**

|   | <i>Models</i>                            | <i>B</i> | <i>SE B</i> | $\beta$ |
|---|--|----------|-------------|---------|
| 1 | (Constant)                               | 4.18***  | .19         |         |
|   | Duration of Unemployment (in Months)     | .02      | .005        | .23**   |
|   | Monthly Income per Family Member         | -.23     | .06         | -.28*** |
| 2 | (Constant)                               | 4.59***  | .27         |         |
|   | Duration of Unemployment (in Months)     | .02      | .005        | .22**   |
|   | Monthly Income per Family Member         | -.22     | .06         | -.27*** |
|   | Self-Efficacy for Emotion-Focused Coping | -.01     | .004        | -.14*   |

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

For the *challenge* dimension as a dependent variable, the age, monthly income per family member and the relationship status were included. Such a model was statistically



significant, explaining 12% of the variance in the *challenge* appraisal,  $R^2 = 0.14$ , adjusted  $R^2 = 0.12$  ( $F(3,137) = 7.10$ ;  $p < 0.001$ ), however, only age and relationship status were statistically significant contributors in this regression model. In the next step, the general belief in a just world and coping self-efficacy were included. This model was statistically significant and explained an additional 15% of challenge variance,  $R^2 = 0.28$ , adjusted  $R^2 = 0.25$  ( $F(5,135) = 10.54$ ;  $p < 0.001$ ). Statistically significant determinants of challenge appraisal in this regression model are the general belief in a just world, age and the relationship status, the largest part of variation being explained by the general belief in a just world (see table 5.).

**Table 5. Hierarchical Multiple Regression Analysis of Challenge Cognitive Appraisal as Dependent Variable**

|   | <i>Models</i>                    | <i>B</i> | <i>SE B</i> | $\beta$ |
|---|----------------------------------|----------|-------------|---------|
| 1 | (Constant)                       | 4.71***  | 1.03        |         |
|   | Monthly Income per Family Member | .11      | .06         | .15     |
|   | Relationship Status              | .53      | .19         | .24**   |
|   | Age                              | -.04     | .02         | -.18*   |
| 2 | (Constant)                       | 3,19**   | 1,00        |         |
|   | Monthly Income per Family Member | .05      | .06         | .08     |
|   | Relationship Status              | .48      | .17         | .21**   |
|   | Age                              | -.04     | .02         | -.19*   |
|   | General Belief in a Just World   | .38      | .08         | .35***  |
|   | Coping Self-Efficacy             | .003     | .002        | .14     |

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

To detect which model predicts the *reversibility* dimension of the cognitive appraisal of job loss, in the first step of regression analysis, the age, the duration of unemployment and the monthly income per family member were included. This model explained of 8% of the variance in the *reversibility* dimension,  $R^2 = 0.09$ , adjusted  $R^2 = 0.08$  ( $F(3, 179) = 6.07$ ;  $p < .01$ ), and all of the independent variables were statistically significant determinants. In the second step, the personal belief in a just world was included, explaining an additional 2% of the variance of reversibility,  $R^2 = .11$ , adjusted  $R^2 = 0.09$  ( $F(4, 178) = 5.45$ ;  $p < .001$ ), however, the monthly income per family member and the personal belief in a just world were not statistically significant contributors to the model (see table 6.).

**Table 6. Hierarchical Multiple Regression Analysis of Reversibility cognitive Appraisal as Dependent Variable**

|   | <i>Models</i>                        | <i>B</i> | <i>SE B</i> | $\beta$ |
|---|--------------------------------------|----------|-------------|---------|
| 1 | (Constant)                           | 4.87***  | .69         |         |
|   | Age                                  | -.03     | .01         | -.18*   |
|   | Duration of Unemployment (in Months) | -.01     | .004        | -.18*   |
|   | Monthly Income per Family Member     | .10*     | .05         | .15*    |
| 2 | (Constant)                           | 4.46***  | .72         |         |
|   | Age                                  | -.03     | .01         | -.18**  |
|   | Duration of Unemployment (in Months) | -.01     | .004        | -.16*   |
|   | Monthly Income per Family Member     | .09      | .05         | .14     |
|   | Personal Belief in a Just World      | .13      | .07         | .14     |

\*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$

## Discussion

As the aim of this study was to illuminate the point of interaction between the situation and the person, or stress and cognitive vulnerability in the formation of stress reactions, cognitive appraisal of job loss was chosen as the potential area of interaction. The purpose of this study was to assess which are the strongest predictors of each dimension of the cognitive appraisal of job loss.

Results showed that the lower one's income per family member was and the longer the unemployment period was, the greater the *loss* seemed. Coping self-efficacy also slightly shaped the *loss* appraisal – the greater one's belief in his/her capacity to cope with stress, the lesser the individual's tendency to appraise unemployment as a loss. Similarly, the monthly income per family member and the length of unemployment determined *threat* appraisal. Additionally, people who believed in their capacity to cope with negative thoughts and emotions (self-efficacy for emotion-focused coping) were less prone to appraise job loss as a threat.

While in the case of loss and threat appraisal socio-demographical and contextual factors played a more significant role, it was a completely different situation with *challenge* appraisal. The general belief in a just world was the strongest determinant of the challenge appraisal. Unemployed people who believed that in general situations are fair and law-governed, also tended to see the potential gain of current unemployment, appraising it as a challenge. In addition, it was easier to appraise job loss as a challenge for those who were in a relationship and who were relatively younger.

Regarding the reversibility appraisal of unemployment, the younger the unemployed person and the shorter the period of unemployment, the greater was the individual's tendency to appraise a job loss as reversible. Taking into account that the reversibility dimension has been analyzed in previous studies (Gowan, Riordan, & Gatewood, 1999; Leana & Feldman, 1990; 1991), it is important to note that in this case there were no significant correlations between reversibility and the education level as it had been established in a previous study (Gowan, Riordan, & Gatewood, 1999). However, in the current study only respondents with a high school degree or a higher education degree were included, therefore the variance of education was probably too restricted to see any differences based on the educational level, whereas the link between reversibility and the length of unemployment and age had not been assessed previous research. A limitation to generalizability of the findings regarding the reversibility dimension is the unsatisfactory internal consistency of this scale. Probably this is due to the few items used for this scale, even if a similar practice was used also in other studies (Gowan, Riordan, & Gatewood, 1999; Leana & Feldman, 1990; 1991). In the future studies the cognitive appraisal dimension of reversibility must be reevaluated and items added or reformulated to increase the internal validity of the findings. Otherwise, it is not unequivocal that the reversibility measure in this study actually comprises the appraisal of the reversibility of job loss.

In general, these results have shown how different socio-demographic, contextual factors and general beliefs are related to cognitive appraisal of job loss. Appraisal of job loss is not one-dimensional, and different aspects of appraisal are influenced by the interaction of various factors. Similarly as the emotional and somatic reactions to job

loss are rather diverse, the results demonstrate that so are the cognitions related to the appraisal of unemployment. The unique combination of socio-demographic factors and beliefs forms a unique appraisal of job loss in each specific case. Speculations about the possible influence of the cognitive appraisal on emotional and somatic reactions of the unemployed is beyond the scope of this article and even the study, however, the findings of the present study certainly confirm the importance of evaluating the cognitive appraisal of critical events. It shows why social, demographic and contextual characteristics of the unemployed are not always the best determinants of stress reactions after a job loss: the mental health of the unemployed is probably influenced neither by the duration of unemployment nor income per se but rather by the cognitive appraisal of the situation, shaped by these factors.

Several specific findings of the study might have some rather practical implications. It has been discovered that loss and threat appraisals, for instance, can be better explained by such contextual factors as the length of unemployment and the material wealth of an individual, whereas the *challenge* appraisal depends more on the belief in a just world than on any of the socio demographic or contextual variables. In addition, coping self-efficacy predicts (reversely) *threat* and *loss* appraisal, however it does not determine the appraisal of challenge and reversibility. Consequently, these findings shed light on potential directions for cognitive restructuring of job loss appraisal. It is usually difficult or even impossible to change most socio-demographic variables, but as appraisal depends also on the individual's belief system, it is possible to strengthen coping self-efficacy and the belief in a just world, thus facilitating challenge appraisal and reducing the perceived loss and threat of job loss.

It is still an open question if belief in a just world is changeable in the therapeutic process since studies demonstrate its stability in time even after traumatic incidents (Dalbert, 2001; Dalbert & Schneider, 1995; Overcash, Calhoun, Cann & Tadeschi, 1996). However, understanding the role of beliefs about justice certainly may help to predict reactions of individuals who are facing critical life events. On the other hand, knowledge of the role of coping self-efficacy, when dealing with critical life events, allows very specific therapeutic interventions, as the main sources of self-efficacy are clear (Bandura, 1997), and coping self-efficacy as a resource has already been demonstrated in its role in therapy (Chesney et al., 2003). According to the results of this study job loss can be appraised as less of a threat and a loss by facilitating the belief in one's personal ability to cope and one's sense of control (coping self-efficacy), whilst strengthening the belief in a just world may help to perceive a job loss as a challenge.

### **Limitations and future directions**

It is important to note that this branch of research would benefit if additional determinants of cognitive appraisal would be included, as it would allow explaining an even broader part of the cognitive appraisal variance. The models of the current study explained only 9-25% of different dimensions of cognitive appraisal, therefore, most probably, there are different socio-demographic, contextual and cognitive variables, which explain the cognitive appraisal of job loss, but were not included in this study. In addition, in regard to personality factors, in this study only beliefs were assessed, however, individual goals and their hierarchy are, most probably, equally important

contributors, since Lazarus (Lazarus, 2000) described them as personality factors that influence cognitive appraisal along with the individual belief system.

One specific danger to the internal validity of the study was the unsatisfactory reliability of the measure of *reversibility* cognitive appraisal dimension. In the future the measure must be reevaluated and reformulated to increase validity of conclusions regarding appraisal of reversibility of job loss.

## Conclusions

The cognitive appraisal of job loss is shaped by socio-demographic and contextual factors as well as by the individual belief system. The appraisal of *loss* and *threat* is determined mostly by income and the duration of unemployment, while the main determinant of *challenge* appraisal is the belief in a just world. Facilitation of coping self-efficacy in therapeutic interventions might help to decrease the perceived threat and loss; however, challenge appraisal might be facilitated by strengthening of belief in a just world. As the models in the current study explained only a portion of the different dimensions of cognitive appraisal, this field of research would benefit if additional variables were evaluated as potential predictors of cognitive appraisal. In the future also the measure of the reversibility dimension of cognitive appraisal must be improved, as currently its internal consistency is unsatisfactory.

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This work has been supported by the European Social Fund within the project «Support for Doctoral Studies at University of Latvia».



# Pooling Unshared Information: Comparing Computer-Mediated Group Discussion with Face-to-Face Group Discussion and Examining Differences between Writing and Talking during Interaction in Small Groups

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## **Abstract**

The main aim of the study was to examine effects of computer-mediated information on the use of unshared information during group discussion. In Experiment 1, the participants ( $N = 77$ ) were psychology students (37 men and 40 women with a mean age of 28.4) that were randomised into three different conditions, IT based on writing, IT based on talking and face-to-face interaction. The result indicate that IT based on writing affects the use of unshared information but not IT based on talking, as compared to face-to-face interaction. In Experiment 2, participants ( $N = 72$ ) were randomised in three conditions, writing only, talking only and combining writing and talking during group discussion. Result indicate that writing only enhances information sharing during group discussions. Discussion of these results is provided.

**Keywords:** *Interpersonal Communication; Technology Communication; Human Computer Interaction; Group Performance; Group Discussion; Virtual teams.*

In virtual group meetings, people tend to communicate differently using text as compared to voice. For example, based on observations, students may communicate more directly and a bit braver when writing instead of talking. The study was conducted in order to find out whether the communication medium (writing versus talking) could affect group performance.

## **The aim of the study**

The use of information technology is increasing at the workplace and in education. As information and communication technologies are introduced for a widening range of activities in the workplace and the home, we need research to understand how complex processes such as coordination and collaboration are achieved, and how information technology (IT) systems should be designed to support them effectively (see e.g. Olson, Finholt, & Teasley, 2000; Olson, Malone, & Smith, 2001; Schrum & Benson, 2002).

There exist a large body of research systems designed to support group writing, group editing, command and control applications and program meetings. In preparing

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this paper the literature search was, however, limited to research within the field of psychology or to that outside this field if the research had direct relevance to the subject of unshared information.

There exists a relatively large body of research on comparisons between electronic brainstorming (EBS) and face-to-face (FTF) brainstorming (see e.g. Derosa, Smith & Hanula, 2007; Valacich, Dennis, & Nunamaker, 1992), and specific methods to increase group performance, GDSS (see e.g. Vathanophas & Liang, 2007; Lam & Schaubroeck, 2000), but there are fewer studies comparing interaction based on information technology (IT) outside the domain of brainstorming and group support systems. The present study was conducted with the purpose of further understanding how knowledge communication or information exchange is affected by the use of information technology.

### **Unshared information, the common knowledge effect**

One possible resource for groups, compared to single individuals, is the diverse store of knowledge held by group members, due to differences in background and experience. But this resource will only come to good use if the group manages to pool the unique information that their members hold. However, evidence suggests that the information which group members choose to mention during discussion is influenced by the information which other members have already mentioned (see e.g., Fisher & Ellis, 1990). The common knowledge effect (Stasser & Titus, 1985) is a well documented bias, groups have been found to be deficient at bringing out the unshared information. This tendency to make use of the information that is available to every member of the group more than information which is available only to one group member has been found in several studies (see e.g. Stasser & Stewart, 1992). The main theoretical basis for the present study concerns the concept of shared information (common knowledge) and unshared information (unique knowledge). Some of the more important studies on this topic are described in detail below.

Stasser and Titus (1985) designed a study that would control for both informational and normative influence. The design, known as the hidden profile, is created when a set of information is developed such that, when considered as a whole, it points to an optimal solution. However, information is distributed across members such that some of the information is shared (i.e., given to all members) and the remainder is unshared or unique (i.e., given to just one member), and the information each member receives (which consists of both shared and unique units) points to a suboptimal solution. Thus, the design produces an initial distribution of preferences that would lead members to make a poor choice if there were no subsequent discussion. The unique information, which in combination with the unique information from other group members points to the optimal solution or away from the suboptimal ones, would influence deliberations by permitting the group to develop complete assessments of each of the decision alternatives. That is, it increases the likelihood that the group will select the best choice. The groups in Stasser and Titus's (1985) study performed poorly. Especially noteworthy are the findings from the conflict condition (in which the hidden profile created two subgroups, each favoring a different suboptimal decision), where groups not only failed

to discover the hidden profile but also failed to choose the optimal solution. For research on group support systems and hidden profiles, see Mennecke (1997).

Subsequent research (Stasser, Taylor, & Hanna, 1989) investigated the content of discussion, reporting that shared information was mentioned and repeated more frequently than was unique information (see also e.g. Larson, 1997; Wittenbaum, 1999).

Following a model proposed by Zajonc and Smoke (1959), Tindale and Sheffey (2002) assessed the effects of information assignment redundancy and group interaction on group memory performance. Participants (college students) in 5-person groups either received a full list of consonant-verb-consonant trigrams to memorize, or a partial list with each trigram distributed to 2 group members. Groups recalled the trigrams as either coacting or interacting groups. In terms of correct recall, coacting groups outperformed interacting groups, and partial redundancy produced better recall than total redundancy. However, intrusion errors were greatly reduced by group interaction and/or a reduction in the cognitive load on the individual group members (i.e. partial redundancy). Groups in the partial redundancy condition tended to perform near optimal levels (Tindale & Sheffey, 2002). This result indicates that the use of unshared information is essential for group performance.

Wittenbaum and Park (2001) have also found that decision-making groups prefer to discuss shared information which all members already know instead of unshared information that a single member knows. This preference for discussing shared information may stem from group members' positive evaluations of each other's task capabilities when shared information is communicated. Members who already are perceived as capable (i.e., those high in status, experts, and leaders) need not bolster their image by communicating shared information. Instead, they discuss unshared information more often than members perceived as less capable. As members low in status gain respect by communicating shared information, they may risk mentioning unshared information later during discussion. Assigning group leaders, informing members of their expert roles, and allowing ample time for discussion may increase the group's discussion of unshared information (Wittenbaum & Park, 2001).

Stasser, Vaughan and Stewart (2000) designed an experiment whereby three-person groups read descriptions of three hypothetical candidates for the student-body president. Each member of the group received more information about one of the candidates, making him or her relatively expert about that candidate. The identity of this candidate was revealed to members in half of the groups before they read the materials (expertise forewarning). For half of the forewarned and the not-forewarned groups, members' expertise was publicly identified at the onset of discussion (expert-role assignment). During collective recall, groups mentioned substantially more shared than unshared information. This sampling bias favouring shared information was reduced by expert-role assignment but not by forewarning. However, forewarning did increase the likelihood that unshared information would be retained on a written protocol once it was mentioned during discussion. Past research attributed the role-assignment effect to coordinated recall prompted by expert-role enactment, but the authors found no evidence of this kind of division of labour. Other possible mediating processes for these effects were explored (Stasser, Vaughan & Stewart, 2000).

To summarize, research on shared and unshared information have showed that it is common in groups to focus too much on shared information and that this unwarranted bias can have harmful effects on performance.

### **Explanations of the common knowledge effect**

Researchers have offered three general explanations for the failure of members to mention unique information (Stasser & Titus, 2003; Wittenbaum, Hollingshead & Botero, 2004). The first is the collective information sampling model (CIS), in which it is assumed that shared information is more likely to be discussed by the group because of its distributional advantage over unique information. Imagine that all four members of a four-person group know (or have been given to memorize) information Item A, and that information Item B has been given to just one member. Assuming random sampling, Item A is more likely to appear in discussion because there are more opportunities for it to be selected. As Wittenbaum et al. (2004) noted, the CIS is meant to show that probability can account, to some extent, for the tendency of groups to discuss shared information.

The second explanation for the shared information bias is preference consistency. The hidden profile, by design, creates an initial preference that favors a suboptimal decision, and that shared information, again by design, is instrumental in developing the initial preference. It is reasonable to assume then that members more positively evaluate knowledge that is consistent with their initial preferences, and that members will present such knowledge during discussion as evidence or support for their claims. Because unique information is designed to contradict initial preferences, it is less likely to be produced; members tend to make arguments in favor of their positions, not against them. That is, because shared knowledge is largely consistent with initial preferences, it has a built-in advantage over unique information in terms of being mentioned more often. Finally, the social comparison explanation posits that the discovery that one has information in common with others grant a sense of legitimacy and credibility on that knowledge, as well on the persons who mentions it (e.g., Wittenbaum, Hubbell, & Zuckerman, 1999). Those who present unique information, however, because such information cannot be verified, incur some type of social cost (Stasser & Titus, 2003). The social cost could be that the bearer of unique information is perceived as less credible, which in turn results in caution to speak again, or a general disinclination for other members to provide that member with more speaking turns, or both.

### **Information technology and unshared information**

Studies on the pooling of unshared information that included IT have been conducted within two major frameworks, group decision support system (GDSS) and electronic brainstorming (EBS). A Group Decision Support System (GDSS) is an interactive, computer-based system that helps teams to make decisions or solve problems (see e.g., DeSanctis and Gallupe, 1987; Huber, 1984). It is a computerized version of the manual brainstorming technique. It can be supported by an electronic meeting system (EMS) or make use of simpler techniques such as email or internet chat systems.

There is some evidence that EBS is superior to face-to-face brainstorming but the support of the hypothesis that it is superior to nominal brainstorming is weak

(Pinsonneault, Barki, Gallupe, & Hoppen, 1999). Within the framework of comparing group decision support system (GDSS) with face-to-face (FTF) group discussion, Lam and Schaubroeck (2000) found that participants given conflicting information tended to share more of their unique data when using GDSS than when meeting FTF. But GDSS is created for the purpose of enhancing performance between interacting group members. Perhaps GDSS should be compared with techniques with the purpose of making FTF meetings more effective (e.g. NGT, see for example Fox, 1989). To my knowledge this particular comparison has not been done within the common knowledge framework.

Within the framework of group idea generation tasks studies have been conducted with the purpose of examining differences between electronic brainstorming (EBS) and traditional face-to-face (FTF) brainstorming. In general, EBS groups have been shown to be more productive and more satisfied with interaction processes than FTF groups. But while large EBS groups outperform nominal groups, small nominal groups outperform EBS groups (DeRosa, Smith & Hantula, 2007).

Gallupe and colleagues (Gallupe et al., 1991) compared the performance of traditional brainstorming groups with that of electronic brainstorming groups and found that the performance of the latter greatly exceeded that of the former. Electronic brainstorming groups are probably more similar to nominal groups than interacting groups; hence we might expect better performance (Pennington & Hastie, 1993). However Dennis & Valacich (1993) reported that electronic brainstorming increased creativity compared to nominal groups for 12-person groups but not 6-person groups.

The differences between EBS and FTF can be explained by the loss of productivity as found in studies on brainstorming groups (Stroebe & Diehl, 1994). In electronic brainstorming each member of the group can input his or her own ideas without waiting to speak or take turns and then send these ideas to the others in the group. The screen then displays all the other group members' ideas as well as the individual operating the computer.

To better understand differences between communication based on information technology and face-to-face communication it is important to compare IT other than GDSS and EBS with different kinds of face-to-face interaction. Bonito (2003) examined whether features of mediated group discussion were related to participatory judgements. Discussion was coded for units that constituted shared or unique information. Bonito (2003) investigated two different kinds of computer text environments (Chat Circles and basic text) but didn't compare IT with FTF.

## **Purpose and hypotheses**

Experiment 1 of the present study examined information exchange with and without IT, without any technique designed to improve the interaction process. The aim of Experiment 1 was to examine if computer-mediated information exchange affects the use of unshared information during group discussions. The writing vs. speaking variable was included in the study because the effects of the medium have been neglected in this line of research.

Based on own observations of text based communication during group discussions and previous literature review, the following hypotheses were examined:

There is a difference in the use of unshared information during group discussion between IT-based interaction and face-to-face interaction.

There is a difference in the use of unshared information during group discussion between the “talking medium” as compared to the “writing medium”.

## Experiment 1

### Method

In a pilot study with 23 participants, the use of unshared (unique) versus shared information during IT interaction and face-to-face interaction was examined. The main purpose of the pilot study was to test the rating procedure, that is, the rating of the amount of shared versus unshared information during interaction.

### Participants

Students ( $N = 77$ ) were asked to participate in the study during a course on research methods. The sample consisted of 37 men and 40 women with a mean age of 28.4. In the population the gender proportion was not the same as in the sample, but about 65% women and 35% men. That is, more men than women volunteered to take part in the study.

### Material and design

The experimental design consisted of three conditions: IT based on writing ( $n = 26$ ); IT based on talking ( $n = 26$ ); and face-to-face interaction ( $n = 25$ ). The information technology used in the study was the MSN chat program. The participants were told to interact only by writing or talking, respectively.

The dependent variable was the number of utterances scored as unshared (unique) information. Unshared information was determined by each group members presumed knowledge of three main type of research methods: experiment, interview and observation.

The tests on research methods were of equivalent length.

### The coding procedure

One briefly trained observer who took part in the same bachelor course as the raters transcribed all information discussed during the interaction in the face-to-face groups. Two raters read independently the transcribed conversations from all groups without knowing whether the data come from face-to-face groups or net based discussion groups. The raters scored the number of utterances which they estimated as being unique for each group member. That is, the raters simply counted the number of statements that they scored as being unique from each single group member (unshared information) and statements regarded as not unique (shared information).

### Procedure

The participants were asked to read a text about research methods. A general text was the same for all participants. A specific text was unique for each member of each



three-person group. The unique text was about one of three research methods, one text about experiment, one text about interview, and one text about observation. After reading this text alone in a classroom, the participants were formed into three-person groups.

The participants were randomised in three different experimental conditions, IT writing, IT talking and FTF. Groups in the face-to-face interaction were seated together around a small table with three chairs. Groups in the two IT conditions were seated in three different computer rooms and separated from each other. Groups using the writing medium were told to communicate only in writing without talking. Groups using the talking medium were instructed only to talk without writing.

All group members were informed that the group task was to discuss different research methods' advantages and disadvantages, a task that was a scheduled course assignment. After all groups completed the discussion, participants were seated in one classroom and informed about the purpose of the study.

For the purpose of avoiding too cumbersome transcriptions a time limit of 20 minutes was set for all groups.

In the post-experiment phase, the participants were asked about the group work from their personal perspective. That is, they were asked to briefly evaluate their own contribution to the group work.

## Results

The scoring of unshared information by the two independent raters had an overall inter-rater reliability of .69, and the scoring of shared information had an inter-rater reliability of .54. Descriptive statistics for the three dependent variables are reported in Table 1.

The hypotheses testing was analysed by a simple one-way ANOVA. There were no differences between the IT-based interaction and face-to-face interaction either for unshared or shared information. For unshared information, there was a significant difference between the communication medium  $F 6.36 (2, 74), p = .003$ . The Tukey B post hoc test showed that it was the writing condition that made use of more unshared information than both IT talking and face-to-face interaction. That is, hypothesis one was not supported but the second hypothesis was.

*Table 1. Descriptive Statistics for the Two Dependent Variables across Three Conditions.*

| <i>Dependent variables</i> | <i>Conditions</i> |                   |                                 |
|----------------------------|-------------------|-------------------|---------------------------------|
|                            | <i>Writing IT</i> | <i>Talking IT</i> | <i>Face-to-face interaction</i> |
| Shared information         | M 13.05           | M 13              | M 12.4                          |
|                            | SD 3.77           | SD 3.40           | SD 3.67                         |
| Unshared information       | M 6.4             | M 4.96            | M 5.2                           |
|                            | SD 1.62           | SD 1.1            | SD 1.86                         |

Hypotheses one was not supported: there was no difference in the use of unshared information during group discussion between IT-based interaction and face-to-face

interaction. Hypotheses two was supported: there was a difference in the use of unshared information during group discussion between the talking medium as compared to the writing medium.

Post-experimentally the participants were asked if they tired to contribute to the discussion by adding information about “their” research method, that is, the research method they had a responsibility to read about prior to thegroup interaction. Almost all of the participants said that they tried, but also mentioned that it is was difficult to keep focus on the specific task. There were no differences across conditions in this feedback from participants.

## Discussion

One alternative hypothesis was that writing is more simultaneous than speaking, and, therefore, the writing groups may outperform talking groups. That is, the writing medium can add something to the interaction, e.g. simultaneity. But it is also possible that writing has a positive effect on interaction because it reduces some potential negative effects of talking, e.g. dominant group members or evaluation anxiety. To further investigate effects of the medium, writing vs. talking, a second experiment was conducted.

## Experiment 2

Experiment 2 was conducted with the purpose of examining differences between the writing and the talking medium. The hypothesis put forward was that writing during group discussion in virtual groups would increase performance.

## Method

### Participants and design

The participants were 72 (52 men and 19 women) with a mean age of 28.3 (SD 10.9), chess players who volunteered to take part in the study, and were randomised in three conditions. In one condition the participants communicated to each other only by writing during the fulfilment of the group task ( $n = 24$ ), in another condition they only talked during interaction ( $n = 24$ ), and in the third condition the participants combined writing and talking ( $n = 24$ ). Each group consisted of three members. Dependent variables were the number of generated ideas, unshared information and shared information.

### Material

The information technology used in Experiment 2 was the same as in Experiment 1: the MSN chat program. The material in Experiment 2 was an idea-generation task. Different chess positions were selected to fit the task of generating ideas. These (4 different) chess positions were to be evaluated collectively by each group. Transcriptions were made during group interaction. Independent raters counted the

number of ideas generated by each group member, statements by participants which were scored as shared information, and statements scored as unshared information.

## Procedure

The participants were recruited from an internet chess community (*www.playchess.com*), and they volunteered to take part in the study. After all participants were randomised in the three conditions and three-person groups were created, each group agreed upon a time to meet and fulfil the task. The experiment leader observed all groups during their meeting without interrupting, besides telling the participants when the next chess position to be evaluated appeared on the screen.

The participants viewed the chess positions and were told that their task was to come up with as many ideas for both players (white and black) that could be expressed verbally. That is, not simply suggesting single moves but expressed ideas on how to play the game.

Each group member was prior to interaction individually given instructions on each of three different aspects of chess theory: pawn structure; piece activation; and field control (e.g. centre control). The participants were told that they had personal responsibility for one of these aspects during group interaction. That is, each group consisted of one member responsible to give information about pawn structure, one about piece activation, and one about field control.

After all groups completed the experiment the participants were informed about the purpose of the study.

## Results

The scoring of unshared information by the two independent raters had an overall inter-rater reliability of .69, the scoring of shared information had an inter-rater reliability of .52, and the reliability of the scoring of generated ideas was  $r = .61$ . Descriptive statistics for the three dependent variables are reported in table 2.

*Table 2. Descriptive statistics for the three dependent variables across three conditions.*

| <i>Dependent variables</i> | <i>Conditions</i> |                  |                            |
|----------------------------|-------------------|------------------|----------------------------|
|                            | <i>Writing</i>    | <i>Talking</i>   | <i>Writing and talking</i> |
| Shared information         | M 11.7<br>SD 2.9  | M 13.7<br>SD 5.7 | M 14.4<br>SD 2.8           |
| Unshared information       | M 5.6<br>SD 0.9   | M 4.8<br>SD 0.8  | M 4.6<br>SD 0.5            |
| Generated ideas            | M 4.6<br>SD 1.2   | M 2.9<br>SD 0.3  | M 3.2<br>SD 0.5            |

The inferential analysis was made with one-way ANOVA statistics. There were no significant differences regarding shared information. For unshared information and generated ideas there were significant differences between the three conditions,  $F(2, 68) = 12.6, p < .0001$  and  $F(2, 68) = 31.6, p < .0001$  respectively. For both dependent

variables, post hoc analyses with Tukey B showed that it was the writing condition that was different from the two other conditions (talking and writing & talking).

Thus the hypothesis was confirmed: writing had a positive effect on performance in virtual groups both regarding unshared information and number of generated ideas.

## General discussion

The result of Experiment 1, that interacting with IT writing was different from the two talking conditions, but no differences were found between IT talking and face-to-face interaction was interesting and important. However, there are many different explanations to this finding. The writing medium constitutes interaction that is characterized by a slower speed. However, the writing medium minimizes production blocking (see e.g. Nijstad, Stroebe, & Lodewijk, 2003) since all group members can participate simultaneously, and in the third group making it possible to alternate between writing and reading. Although the group members were aware of each other's names (through the student login identity), the writing medium evokes a certain feeling of anonymity. Since anonymity lessens evaluation anxiety (see e.g. Valacich, Jessup, Dennis, & Nunamaker, 1992) it has a potential positive effect on group performance. Thus, there are at least three different explanations to the result found in the present study.

Experiment 2 was conducted with the purpose of examining these different explanations, although a single experiment not is enough to rule out any one explanation. The result that the writing only condition was different from both the talking only condition and writing plus talking condition, provides a hint in the direction toward explanations that emphasise decrease of production blocking (see e.g. Nijstad, Stroebe, & Lodewijk, 2003). This is because in the writing plus talking condition the group members also work simultaneously. It seems that talking during interaction simply reduces team effectiveness. However, it could very well be that a combination of writing and talking is better if people make use of both medium in an optimal way, for example writing first and then discuss vocally. This is indeed one of the main objectives for future research together with exploring different types of information technology.

The everyday use of IT is a neglected area within group performance research which constitutes the reason for the design of the present study. Future research will nevertheless be done with the aim of making full comparisons between FTF with or without different techniques with the purpose of enhancing group performance (e.g. NGT, stepladder) with IT with and without use of techniques (e.g. GDSS, EB).

To conclude, despite the weaknesses of the present study it added valuable knowledge and evoked many ideas for future research.

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# The Problematic Nature of Culture-Fair Testing: Training Effect Differences Among Czech and Roma Children

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## Abstract

Performance on intelligence tests is generally considered to be influenced by the environment, however, some tests are referred to as culture-fair (CF). These tests endeavour to eliminate culture influence as far as possible. One of the most popular tests is the Raven's Progressive Matrices (RPM). Unfortunately, some authors use CF tests for cultural comparison, and this can lead to misleading results. In this preliminary study we have examined the potential of RPM to measure native culture-independent cognitive ability using two groups of children coming from different socio-cultural backgrounds (Czech and Roma). This CF potential was evaluated using a dynamic testing approach (i.e., pretest, training phase, and retest). Czech children were on the average more successful both at pretest and retest. However, the level of improvement (i.e., retest minus pretest) was significantly higher in the group of Roma children. These results seem to reflect factors such as socio-cultural background. In summary, these preliminary data indicate that RPM success is determined by multiple factors. Thus the performance on intelligence tests, including CF tests, must be considered within the context of the specific socio-cultural background of the participants.

**Keywords:** *Matrices, fluid intelligence, culture-fair test, Roma children, dynamic testing*

## Introduction

The matrices tests are well-known and widely used tests of analytic reasoning. They can be used separately, like the Bochumer Matrizen-test, or as a part of an intelligence scale battery, such as the Stanford–Binet Intelligence Scales. No doubt the most famous separate intelligence test is Raven's Progressive Matrices (RPM), originally developed by John C. Raven in 1936. The RPM are available in three different forms based on participant ability. In addition to the Standard Progressive Matrices (SPM), two others forms of the RPM have been developed. The Coloured Progressive Matrices were designed for younger children, elderly persons and people with learning difficulties, and the Advanced Progressive Matrices (APM) were designed for adults and adolescents of above average intelligence.

The RPM are a convenient measure of *g*. Spearman himself declared RPM as likely the best measurement of *g* (Spearman, 1946). Traditionally RPM are also one of the best measurements of fluid intelligence (Carpenter, Just, & Shell, 1990; Gray & Thompson, 2004; Kane & Engle, 2002). Cattell (1967) defined the term fluid intelligence (*G<sub>f</sub>*) as the

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innate cognitive ability to solve novel problems independent of acquired knowledge. According to Cattell (1987/1971) the development of *Gf* depends mainly on biological factors (i.e., genetic factors, diet quality and health; Baltes, Staudinger, & Lindenberger 1999; Gray & Thompson, 2004). In addition to *Gf* exists crystallised intelligence (*Gc*), which is defined as the ability to use experience and knowledge. *Gc* is in contrast to *Gf* more influenced by the environment. According to theory of culture-fair testing, RPM measure an innate culture-independent ability to solve cognitive tasks. Cattell and Horn have extended the *Gf-Gc* theory to include seven additional factors: visual processing abilities (*Gv*), short-term comprehension and retrieval (*Gsm*), long-term storage and retrieval (*Glr*), speed processing (*Gs*), auditory processing (*Ga*) and quantitative ability (*Cq*). Tusing and Ford (2004) add the factor reading/writing ability (*Grw*). Currently, the most influential theory is the Cattell-Horn-Carroll theory that connects Cattell and Horn's *Gf-Gc* theory with Carroll's three-stratum theory (McGrew, 2005).

The interpretation of the performance on RPM is influenced by the theoretical approach to innateness of intelligence and *g*. Many contemporary researchers (the first group) have adopted RPM to measure innate intelligence and evaluate culture-independent cognitive ability (e.g., Klauer, Willmes, & Phe, 2002; Shaunessy, Karnes, & Cobb, 2004). Although some authors have criticised this approach, more than 1,000 studies have used RPM as an intelligent test (Raven, Raven, & Court, 1998). In addition, some research teams have adopted the matrices in cultural comparison of intelligence assuming that they are culturally fair. For example, Rushton, Čvorovič and Bons (2007) examined whether the Roma people of Serbia scored lower on IQ tests than other Europeans using the SPM. They found that the average IQ score of the Roma people in Serbia was approximately 70, and they speculated on the impact of the culturally disadvantaged conditions of Roma children. However, an item analysis revealed that this test measured the same construct in both groups (i.e., the same items were either easy or difficult for both groups). These authors concluded that the lower IQ scores of the Roma people reflected *g* more than culturally specific ways of thinking. Many studies assert that *Gf* predicts income (Lynn, 2010), education (Lynn, 2010), health (Reeve & Basalik, 2009) and religiosity (Reeve & Basalik, 2009, Rhuston & Čvorovic, 2009). Therefore, some researchers equate performance on the matrices with many aspects of life. In other words, IQ determines the environmental context but not vice versa. These authors predominantly contend that intelligence is an unchangeable quantity. This type of research is equivalent to various cross-cultural investigations accomplished in the last century (Cole, 2000).

Naturally, there is also a group of researchers with a different opinion (i.e., the second group). Although these authors do not deny the relationship between some aspects of life (e. g. income, education, health) and IQ performance, they do not agree that IQ is a predictor of life conditions. Their view is opposite in that they explain lower IQ performance as a consequence of different life conditions such as the inaccessibility of quality education (Felice & Giugliano, 2011; Tzuriel, 2000) or the lower level of mediated experiences from child-adult interactions (Cole, 2000; Málková; 2008, Vygotsky, 1986). In addition, recent researchers have argued that certain interventions can increase performance on *Gf* tasks. These authors assume that basal cognitive function training can cause transfer to higher cognitive processes. This transfer has been shown

between *Gf* and working memory (WM) (Büchel, 2006; Shelton, Elliott, Matthews, Hill, & Gouvier, 2010; Unsworth & Engle, 2006; 2007) and between *Gf* and executive functions (Banich, 2009; Friedman et al., 2006; Miyake, Friedman, Emerson, Witzki, & Howerter, 2000). Klingberg, Forssberg and Westerberg (2002) were among the first to study this topic when they investigated whether a new type of computerised cognitive training could improve WM capacity and whether the prospective improvement of WM influenced performance on the progressive matrices. An improvement in WM capacity and increased performance on the progressive matrices was demonstrated and subsequently confirmed by other researchers (Jeaggi, Buschkuhl, Jonides, & Perrig, 2008; Klingberg, et al., 2005; Olesen et al., 2004).

Clearly, the attitude towards performance on RPM differs across groups of researchers and is connected with the researchers' respective approaches to intelligence and its theory. In short, the first group interprets RPM performance in terms of cultural independence. According to this view, the RPM measure a culture-independent cognitive ability and thereby this is a culture-fair test. Conversely, the second group considers RPM performance to be influenced by the environment. According to this view, the RPM are similar to other intelligence tests in that this is not a culture-fair test.

Therefore, the aim of this study was to verify whether children from a lower level socio-cultural background can improve their RPM performance by dynamic training. In case the gains of these children are higher than the gains of children coming from higher levels of socio-cultural background, this will indicate that the use of RPM as a culture-fair test is problematic; i.e. the poorer performance of children coming from the lower socio-cultural background will not imply a cognitive inferiority, but rather will be a reflection of their background.

To test this hypothesis, we compared the RPM performances of children of two different backgrounds – Czech and Roma children. In addition, we compared the benefits of the dynamic training phase in both groups.

## Methods

### Study design

Two sets of analogical matrices were chosen from SPM and APM. The first set was used as a pretest (i.e., the static test), and the second was used as a retest. In addition, we designed three sets of matrices based on the analogical principles used in the SPM and APM matrices (i.e., the principles of operation matrices: addition, subtraction, supplement, and supplemental breakthrough; and the principles of collection matrices: different matrix complexities according to the number of parameters and their values). These sets were employed during the dynamic training phase. The order of the study was (1) pretest, (2) three days of training sessions (ca. 0.5 hour per day) and (3) retest.

The participants were tested in small groups according to the SPM manual (Raven's progressive matrices manual, 1991).

Each child completed the training phase individually. During the training phase, the children were asked to say or draw the missing item in an empty matrix field. The

children were provided feedback for correct solutions. When an answer was incorrect or missing, children received a clue at the lowest level (e. g. the contents of the matrices were enumerated); as necessary the clue level was increased, based on the child's performance.

## Participants

Forty children were recruited from primary schools (17 females, 23 males). The age of the children were approximately 13 year ( $M = 13.2$  and  $SEM = 0.43$ ). Twenty-two children were Roma<sup>1</sup>, and 18 children were Czech. There were no significant between-group age differences.

We included Roma children in the study because the socio-cultural background and social exclusion levels of Roma families are the lowest of all the minorities in the Czech Republic (Pekárková, Lábusová, Rendl, & Nikolai, 2010): they generally perform lower on intelligent tests (Bakalář, 2004; Pekárková et al., 2010; Rushton et al. 2007), and are the most discussed and most numerous minority in the Czech Republic (Jakoubek & Hirt, 2004).

## Analyses

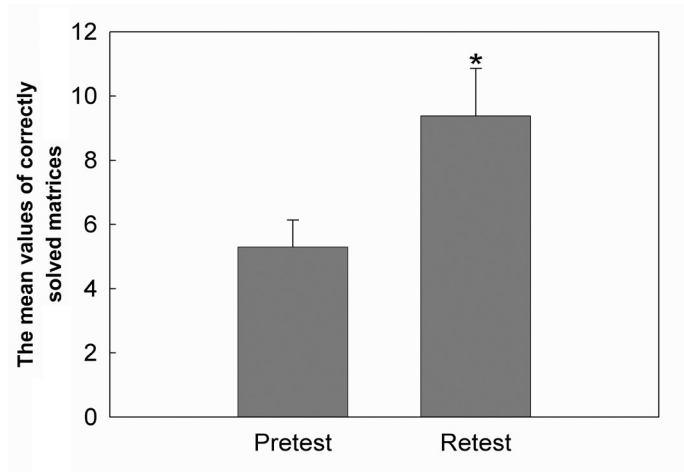
The Shapiro-Wilk  $W$  tested data normality. A normal distribution was not found; therefore, nonparametric methods were used. The Mann-Whitney  $U$  test was used to examine the differences between Roma and Czech children. The Wilcoxon paired test was used to evaluate the difference between pretest and retest performances. A value of  $p < .05$  was considered significant.

## Results

Children were asked to solve 15 matrices (in two analogical forms) at pretest and retest. As shown in Fig. 1, the mean values of correctly solved matrices were  $M = 5.30$  and  $SEM = 0.84$  (40) at pretest and  $M = 9.38$  and  $SEM = 1.48$  (40) at retest. The gain score (retest minus pretest) was  $M = 4.10$  and  $SEM = 0.65$  (40). The effect of training was significant ( $p < .05$ ).

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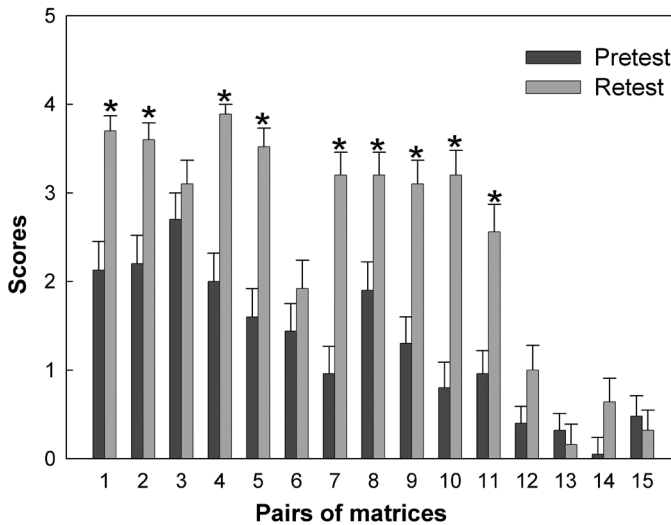
<sup>1</sup> Most Roma families in the Czech Republic do not claim Roma nationality. The primary inclusion criterion for the Roma group was a teacher's comment. We are aware of the restrictions that this procedure implies; however, we assume that the stereotypes (e.g. skin colour) did not influence teachers, and they identified the children correctly. Children in our study were recruited from smaller schools, and the teachers knew the families.



**Figure 1. Improvement in solving matrices after the dynamic training phase**

The data summarize the mean values of correctly solved matrices in the pretest and after the dynamic phase (retest). The data are given as the means  $\pm$  SEM of 40 children.  $p < 0.05$ .

Because the matrices in the retest and pretest contained analogical principles (first matrices, second matrices etc.), the analogical pairs of matrices could be combined and compared with regard to how they were solved. A significant effect ( $p < .05$ ) of training was found on performance in 9 of 15 pairs at retest. The analysis of matrix complexity revealed that the training effect was predominantly in pairs with moderate level of complexity.



**Figure 2. Improvement in solving analogical pairs of matrices.**

The pretest and retest matrices were coupled to analogical pairs and compared mutually. The significant effect ( $p < 0.05$ ) of dynamic training phase on performance in retest was found in 9 pairs of 15. The data are given as the means of gain point in the concrete matrix  $\pm$  SEM of 40 children.

At pretest, Czech children were able to solve on average  $M = 6.72$  and  $SEM = 0.80$  (18) matrices correctly, whereas Roma children solved only  $M = 4.09$  and  $SEM = 0.66$  (22) correctly. In other words, the Czech children solved 1.64 more problems than the Roma children ( $p < .05$ ).

At retest Czech and Roma children on average solved  $M = 10.28$  and  $SEM = 0.46$  (18) and  $M = 8.64$  and  $SEM = 0.58$  (22) matrices correctly, respectively. In other words Czech children solved 1.19 more problems than the Roma children ( $p < .05$ ).

Although the Czech children solved significantly more problems at pretest and retest than the Roma children, the difference at retest was only marginally significant (retest:  $p = .04$ ; pretest:  $p = .01$ ). The benefits of the training phase were greater for Roma children than for Czech children.

*Table1. The significance of individual benefits in group of Roma children*

| <i>Participant</i> | <i>Pretest</i> | <i>Retest</i> | <i>p</i> |
|--------------------|----------------|---------------|----------|
| R_1                | 1              | 6             | .09      |
| R_2                | 5              | 6             | .59      |
| R_3                | 2              | 9             | .02*     |
| R_4                | 1              | 5             | .07      |
| R_5                | 1              | 7             | .05*     |
| R_6                | 6              | 7             | .93      |
| R_7                | 6              | 14            | .01**    |
| R_8                | 1              | 9             | .01**    |
| R_9                | 1              | 8             | .02*     |
| R_10               | 3              | 10            | .02*     |
| R_11               | 1              | 7             | .03*     |
| R_12               | 0              | 8             | .01**    |
| R_13               | 9              | 11            | .39      |
| R_14               | 5              | 12            | .02*     |
| R_15               | 1              | 4             | .11      |
| R_16               | 6              | 10            | .21      |
| R_17               | 7              | 9             | 0.11     |
| R_18               | 4              | 12            | 0.03*    |
| R_19               | 5              | 9             | 0.21     |
| R_20               | 10             | 12            | 0.37     |
| R_21               | 9              | 11            | 0.36     |
| R_22               | 6              | 4             | 0.53     |

\* $p < 0.05$ , \*\*  $p < 0.01$



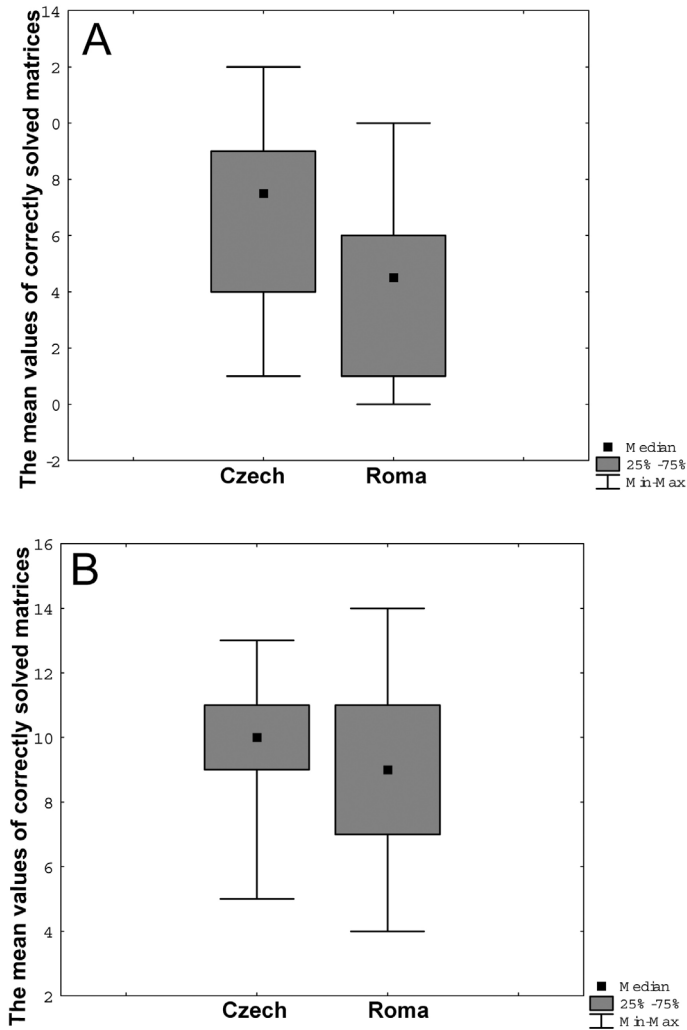
Table 2. The significance of individual benefits in group of Czech children

| <i>Participant</i> | <i>Pretest</i> | <i>Retest</i> | <i>p</i> |
|--------------------|----------------|---------------|----------|
| C_1                | 2              | 10            | .01**    |
| C_2                | 2              | 10            | .01**    |
| C_3                | 2              | 9             | .02*     |
| C_4                | 8              | 10            | .36      |
| C_5                | 9              | 11            | .45      |
| C_6                | 8              | 11            | .11      |
| C_7                | 7              | 8             | .69      |
| C_8                | 12             | 10            | .78      |
| C_9                | 4              | 10            | .59      |
| C_10               | 6              | 12            | .04*     |
| C_11               | 8              | 11            | .11      |
| C_12               | 7              | 9             | .46      |
| C_13               | 5              | 11            | .03*     |
| C_14               | 12             | 13            | .67      |
| C_15               | 10             | 13            | .46      |
| C_16               | 9              | 9             | .48      |
| C_17               | 1              | 5             | .14      |
| C_18               | 9              | 13            | 0.14     |

This conclusion is confirmed by the statistical analysis of individual benefits. As shown in Tables 1 and 2, significantly increased individual benefits ( $p < .05$ ) were found for the Roma children (by 50%). It was also found that the percentage level of improvement of Roma children was 262%, while only 119% in the group of Czech children<sup>1</sup>. The effect sizes between Czech and Roma children in pretest and retest were calculated using Cohen's  $d$  (with pooled standard deviation). The effect size was 1.01 in pretest, whereas only 0.53 in retest, it means that the large effect size was changed to medium one by training. This finding confirms that the training benefits were higher in Roma than Czech children.

It was also tried to compare effect sizes between Czech and Roma children in pretest and retest. The effect sizes were calculated using Cohen's  $d$  (with pooled standard deviation). It was found, that the effect size was 1.01 in pretest, whereas only 0.53 in retest. The large effect size was changed to medium effect size by training. This fact also confirms that the training benefits were higher in group of Roma children.

<sup>1</sup> Percentage level of improvement was found by the formula  $100/\text{pretest score} \times (\text{retest} - \text{pretest score})$ .



*Figure 3. A comparison of the training benefit between Czech and Roma children.*

The originally lower performance of the Roma children in the pretest (A) was compensated in retest (B) due to dynamic training phase.

In summary, the data indicate that the training gains of Roma children were higher than in the group of Czech children. It appears that the performance in RPM is not influenced only by innate factors, but it is also influenced by other factors, mainly socio-cultural background. We discuss this point in detail below.

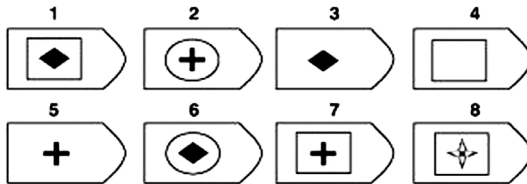
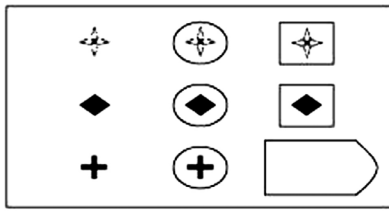


Figure 4. An example of the collection matrices. The matrix is the example of the collection of two parameters – big and small shapes. Each of the parameter is created by three values.

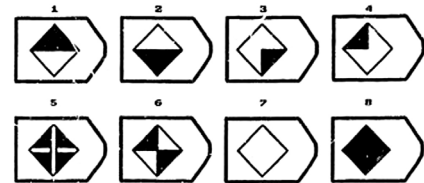
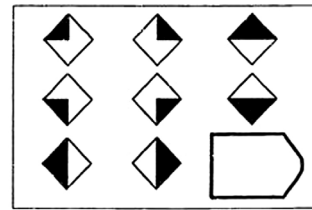


Figure 5. An example of the operational matrices. The matrix is the example of the additional matrix. The final shape is created by the addition of two preceding shapes.

## Discussion

This study demonstrated that training significantly improved performance on progressive matrices. Several principles are contained in the study matrices. The progressive matrices can be divided into two groups (DeShon et al., 1995; Páčová & Rendl, 2013; Páčová, 2009; Rendl, 2002): the collection matrices and the operation matrices. Parameters (e.g., colour or shape) and their values (e.g., black or circle) characterise the collection matrix elements (Fig. 4). Solving these types of matrices requires the classification of values. On the other hand, solving operational matrices requires mathematical operations (e.g., addition) within whole elements (Fig. 5). These matrix principles are general principles that occur in our daily lives. In Euro-American scholastic society children encounter these principles in their families as well as at kindergarten and primary school (Pekárková et al., 2010). Parents implicitly or explicitly stimulate the abilities that their children use to deal successfully with the demands of school and intelligence tests. The cognitive abilities of typical Euro-American child are trained constantly. Parents provide their children with different cognitive tasks, teach them to categorise (e.g., colours, shapes, and numbers), buy them numerous didactic toys, talk with them, correct their understanding of word meaning and their pronunciation, explain how the world works, and so on. Clearly, adult mediation is not identical in all families. Generally, children from families of lower socio-cultural background levels have fewer mediated experiences. Many Roma children in the Czech Republic come from low socio-cultural backgrounds. Many of these families live in social exclusion (Pekárková et al., 2010). Parents of these children often only have a

primary-level education and are unemployed<sup>1</sup>. Compared with the typical Euro-American child, children from families of low socio-cultural backgrounds generally do not receive the same cognitive stimulation. Their parents do not provide them with different cognitive tasks, teach them to categorise, or buy them many didactic toys. They might talk with them, but they do not correct their understanding of word meaning or pronunciation, they do not explain how the world works and so on (Pekárková et al., 2010). They do not perform these tasks because they do not consider them important (Jakoubek & Hirt, 2004). These aspects limit the performance of Roma children in school and on intelligent tests. Their experience with matrix principles is less frequent than that of the average Euro-American child.

Given the level of improvement in performance due to training and the differential experiences with matrix principles in these groups of children, it follows that children from families with lower sociocultural backgrounds (e.g., Roma children) are disadvantaged at solving RPM.

The performance at pretest was significantly lower in Roma than Czech children, however, it was still unclear whether the Roma children had potential for improvement.

We analysed, therefore, the dynamic training benefits and showed that the improvement of the Roma children was higher. This indicates that Roma children compensated for their baseline performance. We presume, therefore, the connection of test performance to the socio-cultural background differences described above. Institutionalised pre-school education cannot eliminate these disadvantages because most Roma children are not enrolled (Ministry of Education, 2010); furthermore, there is a high rate of primary-education absences among Roma children (Ministry of Education, 2010). The poor progressive matrix performance of the Roma children probably is not connected with cognitive inferiority as some authors have supposed (Bakalář, 2004; Herrnstein & Murray, 1994; Lynn, 2002, 2010; Rushton et al., 2007; Rushton & Čvorovič, 2008); rather, it is due to their lack of experience with the matrix principles (Cole, 2000; Felice & Giugliano, 2011; Málková, 2008; Tzuriel, 2000; Vygotsky, 1986). We assume that Roma children have a higher level of unrealised potential with regard to the zone of the proximal development due to a lack of mediated experiences (Vygotsky, 1986). For example, imagine two children: one Roma and one Czech. The performance of both children is similar at pretest, but their experience with general cognitive principles differs. The improvement of the child without such experiences will be higher because of his or her higher level of unrealised potential with regard to the zone of the proximal development.

In summary, the results of this study imply that both innate cognitive ability and participant's level of experience with general cognitive principles determined his or her original performance in our group of participants. Our preliminary study showed that the progressive matrices do not measure a culture-independent ability. Regarding Cattell and Horn's *Gf-Gc* theory (Tusing & Ford, 2004), the progressive matrices measure not only *Gf* (Carpenter et al., 1990; Gray & Thompson, 2004; Kane & Engle,

<sup>1</sup> These facts were typical also in our group of Roma children. Only two fathers of Roma children were apprenticed (the rest of parents had achieved only primary-level education), while only one mother of the Czech Children had not reached apprenticeship certificate or secondary school-leaving exam.

2002) but also *G<sub>c</sub>*. Further experiments with more participants must be done to verify the factors playing a role in the performance. Although our conclusions are based on preliminary results and is difficult to generalise, it seems to be evident that use of RPM as a culture-fair test can lead to misleading conclusions.

## Conclusion

*We found that* RPM performance is modulated by factors of different quality. We assume that apart from *G<sub>f</sub>* an important factor is socio-cultural background. It was shown, that cognitive enrichment is higher in children from lower socio-cultural background because they have a higher unrealised potential with regard to the zone of the proximal development. The finding indicates the problematic nature of RPM use as a culture-fair test.

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## Internal Consistency and Factorial Validity of the Beliefs about Psychological Services [BAPS] Scale in Latvia

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### *Abstract*

Two studies were conducted to examine some psychometric properties of the Beliefs About Psychological Services [BAPS] scale (Ægisdóttir & Gerstein, 2009) on a Latvian undergraduate students' sample. The participants were 312 students from several universities in Latvia ( $M = 22.26$ ,  $SD = 3.32$ ; 84.94% female) matched by age, gender, years of study at the university and psychological counseling experience to the original sample. Forward and backward translation was used to develop the Latvian version of the BAPS scale. Based on the results of the Study 1, which revealed low reliability of the Expertness factor, the scale was revised and complemented with additional items to be better suited for people in the Latvian cultural context. In Study 2, exploratory factor analysis revealed a three-dimensional solution similar to that found in the original English version. Reliability coefficients for the BAPS subscales ranged from .67 to .86 (Cronbach alpha). Confirmatory factor analysis and several model fit tests demonstrated a reasonably good fit.

**Keywords:** beliefs, psychological services, Beliefs About Psychological Services scale, Latvian language, adaptation

### Introduction

Attitudes toward seeking psychological services have been found to significantly predict willingness to seek psychological help (Vogel & Vester, 2003), counseling avoidance (Meyer, 2001), and also counseling satisfaction (Constantine, 2002). Therefore, they have been widely researched in the past decades (e.g., Chang, 2007; Hamid, Simmonds, & Bowles, 2009; Koydemir-Ozden, 2010; Masuda, Suzumura, Beauchamp, Howells, & Clay, 2005; Nam, et al., 2010; Turkum, 2005). In Latvia because of political, social and economic changes, psychological services have become available relatively recently. During the Soviet period counseling services were virtually non-existent due to political and ideological reasons. Very few people received training in psychological counseling, and their services were not accessible to the general public. Latvia regained its independence after the dissolution of the Soviet Union in 1991, and before that time in Latvia there were no more than 40 psychologists (Renge, 2003). In the last 20 years the availability of professional psychological help has increased rapidly. Now there are approximately 1500 active psychologists (with master's degree or higher) in the country (Renge & Draguns, 2012). However, no official statistics have been collected to date.

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Because of the lack of research in this domain do not have information about attitudes towards psychologists in Latvia in general, or about the specific reasons why people are willing or not to use psychological services. Therefore, the attitudes of society toward mental health professionals has to be investigated in Latvia by using an appropriate and objective research tool.

One of the most popular instruments for measuring psychological help seeking attitudes is the Attitudes Toward Seeking Psychological Help (ATSPPH; Fischer & Turner, 1970) scale. The short version of this instrument, which includes 10 items, is also widely used (Fischer & Farina, 1995). However, the ATSPPH measure has a number of weaknesses, for example, some terms are outdated, items have been generated only by the developers of the scale and clinical psychologists, but not by potential help seekers. And most important – it has questionable factorial validity. Because of all of the reasons mentioned above, Ægisdóttir & Gerstein (2009) have constructed a new scale – Beliefs About Psychological Services (BAPS), which is an alternative instrument designed for measurement of attitudes toward psychologists and their services. While some of the items have been taken from the ATSPPH, the new scale is updated with new items obtained from interviews with undergraduate students and psychologists.

BAPS is a reliable and valid 18-item instrument including three subscales: Intent, Stigma Tolerance and Expertness. This structure is based on Ajzen's (1985, 1987) Theory of Planned Behavior. The Stigma Tolerance factor corresponds to the normative beliefs component, and can be characterized as a person's perception of the barriers in society and negative views toward seeking psychological services, as well as their ability to overcome these barriers. The Intent factor represents the intention component of planned behavior. Finally, the Expertness factor is similar to Ajzen's general attitude construct. It has to be noted that the latter dimension did not appear in the previously developed instruments (e.g., ATSPPH, Ægisdóttir & Gerstein, 2009).

Although the construct is quite new its adaptation has already taken place in several countries – Iceland (Ægisdóttir & Einarsdóttir, 2012), Turkey (Ægisdóttir & Cinarbas, in preparation), and South Korea (Ægisdóttir & Choi, in preparation). Because of the critique of other instruments assessing beliefs about psychological services, and the more thorough development and acceptable reliability of BAPS, we chose this instrument for adaptation in Latvia.

In this article we present the psychometric properties of the BAPS adaptation in Latvia. The process of the adaptation was done following the recommendations of Hambleton, Merenda, and Spielberger (2005).

## Study 1

### Method

#### *Participants*

The sample for Study 1 consisted of 100 students (85% female) from the University of Latvia enrolled in various study programs with ages ranging from 18 to 44 years ( $M = 22.5$ ;  $SD = 4.2$ ). The sample was matched by age, gender, years of study at the

university and psychological counseling experience to the original sample used for developing the scale in the USA (Ægisdóttir & Gerstein, 2009). We used  $\chi^2$  to test the equivalence of the matched samples in terms of gender, years of study and counseling experience and t-test for age. The results confirmed the similarity in these demographic characteristics in both samples ( $p > .05$ ). Table 1 shows the frequency distribution of the sample's demographics.

*Table 1. Demographic information of the participants in the Study 1 and 2*

|                        | <i>Study 1 (N = 100)</i> |          | <i>Study 2 (N = 213)</i> |          |
|------------------------|--------------------------|----------|--------------------------|----------|
|                        | <i>n</i>                 | <i>%</i> | <i>n</i>                 | <i>%</i> |
| Sex                    |                          |          |                          |          |
| Men                    | 15                       | 15       | 32                       | 15       |
| Women                  | 85                       | 85       | 180                      | 84       |
| Year in university     |                          |          |                          |          |
| Freshman               | 23                       | 23       | 30                       | 14       |
| Sophomore              | 31                       | 31       | 71                       | 33       |
| Junior                 | 24                       | 24       | 76                       | 35       |
| Senior                 | 22                       | 22       | 35                       | 16       |
| Counselling experience |                          |          |                          |          |
| Yes                    | 33                       | 33       | 69                       | 32       |
| No                     | 67                       | 67       | 143                      | 67       |

### *Instrument*

Beliefs About Psychological Services (BAPS; Ægisdóttir & Gerstein, 2009) scale was translated to Latvian using the committee approach and the forward and backward translation technique described by Brislin (1986). Five English and Latvian speaking experts translated the original English scales into Latvian using a committee approach. This version was translated back into English and re-evaluated by two other English and Latvian speaking experts. Translators were asked to verify the conformity of the both versions. Item wordings can be found in Table 2.

*Table 2. Wording of BAPS original, revised and additional items*

| <i>No</i> | <i>Wording of the item</i>  |
|-----------|---|
|           | <b>Intent</b>   |
| 1         | If a good friend asked my advice about a serious problem, I would recommend that he/she see a psychologist. |
| 2         | I would be willing to confide my intimate concerns to a psychologist.                                       |
| 3         | Seeing a psychologist is helpful when you are going through a difficult time in your life.                  |
| 4         | At some future time, I might want to see a psychologist.  |
| 6         | If I believed I were having a serious problem, my first inclination would be to see a psychologist.         |
| 12        | I would see a psychologist if I were worried or upset for a long period of time.                            |

| <i>No</i>               | <i>Wording of the item</i>  |
|-------------------------|---|
| <b>Stigma Tolerance</b> |   |
| 5                       | I would feel uneasy going to a psychologist because of what some people might think.                                    |
| 8                       | Going to a psychologist means that I am a weak person.  |
| 10                      | Having received help from a psychologist stigmatizes a person's life.   |
| 10 <sub>revised</sub>   | Having received help from a psychologist makes the person who asked for it feel ashamed.                                |
| 11                      | There are certain problems that should not be discussed with a stranger such as a psychologist.                         |
| 13                      | Psychologists make people feel that they cannot deal with their problems.   |
| 15                      | Talking about problems with a psychologist strikes me as a poor way to get rid of emotional conflicts.                  |
| 17                      | It is difficult to talk about personal issues with highly educated people such as psychologists.                        |
| 17 <sub>revised</sub>   | It is difficult to talk about personal issues with a psychologist because you begin to feel that he "sees through you". |
| 18                      | If I thought I needed psychological help, I would get this help no matter who knew I was receiving assistance.          |
| 18 <sub>revised</sub>   | If I needed psychological help, I would get this help no matter what other think.                                       |
| <b>Expertness</b>       |   |
| 7                       | Because of their training, psychologists can help you find solutions to your problems.                                  |
| 7 <sub>revised</sub>    | Professional training allows psychologists to help others find solutions to their problems.                             |
| 9                       | Psychologists are good to talk to because they do not blame you for the mistakes you have made.                         |
| 14                      | It is good to talk to someone like a psychologist because everything you say is confidential.                           |
| 14 <sub>revised</sub>   | It is good to talk to a psychologist because maintaining confidentiality is his professional duty.                      |
| 16                      | Psychologists provide valuable advice because of their knowledge about human behavior.                                  |
| 19 <sub>new</sub>       | Due to his or her professional skills, a psychologist is able to make contact with different people.                    |
| 20 <sub>new</sub>       | Due to his or her education, a psychologist has deep and comprehensive knowledge about human behavior and emotions.     |

BAPS is an instrument which assesses beliefs about psychologists and psychological services. It consists of 18 items that are evaluated on a 6-point Likert-type scale (1 – Strongly Disagree, 2 – Moderately Disagree, 3 – Rather Disagree, 4 – Rather Agree, 5 – Moderately Agree, 6 – Strongly Agree). Seven items are negatively worded (e.g., "Going to a psychologist means that I am a weak person") and have to be reversed by subtracting the accorded value from 7. The higher score represents more positive beliefs about psychological services.

BAPS consists of three subscales: Intent (6 items), Stigma Tolerance (8 items) and Expertness (4 items). The Stigma Tolerance subscale can be characterized as a person's perception of the barriers in society and negative view toward seeking psychological services (e.g., "Having received help from a psychologist stigmatizes a person's life"), the Intent subscale refers to behavioral intent (e.g., "I would see a psychologist if I were worried or upset for a long period of time."), and Expertness subscale refers to positive and negative characteristics about psychologists and their services (e.g., "Because of their training, psychologists can help you find solutions to your problems").

## Procedure

The Latvian adaptation of the BAPS scale was coordinated with the authors of the original instrument (Ægisdóttir & Gerstein, 2009). Participants were recruited using the mailing list of the university. All respondents were informed that participation in the study was voluntary and confidential, and it could be discontinued at any time. The BAPS questionnaire together with the demographic questionnaire (questions about age, gender, years of study, study program, and psychological counseling experience), detailed instructions and basic information about the researchers and purpose of the study was administered online using the Google Forms service. Students received no compensation for participation in the study.

## Results and Discussion

All items of the translated BAPS scale demonstrated acceptable item-total correlations. However, there was a tendency for several items to demonstrate extreme values (see Table 4). Specifically, items 8 and 10 (please see Table 2 for the full wording of the items) demonstrated the floor effect with very few participants choosing a response other than “Strongly Disagree”. Item 18 demonstrated the opposite, ceiling effect, with most participants choosing to respond “Strongly Agree”. It can be suggested that the problematic items had been very categorically formulated and thus prompted respondents to choose extreme values. To solve this issue, it was suggested that these items be rephrased using less extreme and emotionally saturated words.

Table 4. Item Statistics for the Latvian Version of the the BAPS Scale in Study 1

| Items | Factors                           |                  |            | M    | SD   |
|-------|-----------------------------------|------------------|------------|------|------|
|       | Intent                            | Stigma Tolerance | Expertness |      |      |
|       | Corrected item-total correlations |                  |            |      |      |
| 1     | .65                               |                  |            | 3.78 | 1.30 |
| 2     | .71                               |                  |            | 3.91 | 1.46 |
| 3     | .55                               |                  |            | 4.54 | 1.18 |
| 4     | .52                               |                  |            | 4.52 | 1.45 |
| 6     | .61                               |                  |            | 2.66 | 1.35 |
| 12    | .50                               |                  |            | 3.65 | 1.29 |
| 5     |                                   | .34              |            | 4.78 | 1.36 |
| 8     |                                   | .51              |            | 5.41 | 1.00 |
| 10    |                                   | .23              |            | 5.70 | 0.83 |
| 11    |                                   | .37              |            | 4.39 | 1.52 |
| 13    |                                   | .54              |            | 4.96 | 1.33 |
| 15    |                                   | .33              |            | 4.73 | 1.35 |
| 17    |                                   | .40              |            | 4.57 | 1.35 |
| 18    |                                   | .36              |            | 5.07 | 1.16 |
| 7     |                                   |                  | .44        | 4.47 | 0.99 |
| 9     |                                   |                  | .50        | 4.57 | 1.22 |
| 14    |                                   |                  | .23        | 4.59 | 1.40 |
| 16    |                                   |                  | .20        | 4.07 | 1.47 |

<sup>a</sup>items have been reversed



The internal consistencies of the three factors in Study 1 were .82, .69 and .54, respectively. The Cronbach's alpha value for the first factor, Intent, corresponds to that reported by Ægisdóttir & Gerstein (2009) (cf., .82-.83). However, internal consistencies for the latter two factors were considerably lower than in the original study (cf., .78-.81 for Stigma Tolerance and .69-.72 for Expertness). This finding points to the weakness of the Expertness factor obtained in this study.

Eighteen items of the translated BAPS scale were submitted to a preliminary confirmatory factor analysis using a principal component method and rotated to simple structure using Varimax rotation (orthogonal solution) with Kaiser normalization (see Table 3).

Table 3. Confirmatory Factor Analysis of the BAPS Scale in Study 1

| Items                   | Factors <sup>a</sup> |                  |            |
|-------------------------|----------------------|------------------|------------|
|                         | Intent               | Stigma Tolerance | Expertness |
| Intent items            |                      |                  |            |
| 1                       | <b>.73</b>           | .10              | -.09       |
| 2                       | <b>.80</b>           | .21              | .00        |
| 3                       | <b>.62</b>           | .19              | .16        |
| 4                       | <b>.58</b>           | .10              | .19        |
| 6                       | <b>.67</b>           | .19              | -.20       |
| 12                      | <b>.69</b>           | -.15             | -.01       |
| Stigma Tolerance items  |                      |                  |            |
| 5                       | -.06                 | <b>.76</b>       | .14        |
| 8                       | .30                  | <b>.64</b>       | .20        |
| 10                      | -.12                 | <b>.74</b>       | -.26       |
| 11                      | <b>.41</b>           | .20              | -.39       |
| 13                      | <b>.44</b>           | <b>.46</b>       | .16        |
| 15                      | <b>.55</b>           | .10              | -.06       |
| 17                      | .38                  | .29              | -.01       |
| 18                      | .30                  | <b>.41</b>       | .11        |
| Expertness items        |                      |                  |            |
| 7                       | <b>.73</b>           | .20              | .24        |
| 9                       | <b>.45</b>           | .24              | <b>.52</b> |
| 14                      | .28                  | <b>.42</b>       | -.11       |
| 16                      | -.03                 | .05              | <b>.83</b> |
| Eigenvalues             | 4.63                 | 2.49             | 1.46       |
| Percentages of variance | 25.72                | 13.83            | 8.12       |
| Number of items         | 6                    | 8                | 4          |
| M                       | 23.06                | 39.61            | 17.70      |
| SD                      | 5.84                 | 5.65             | 3.32       |
| Cronbach's alpha        | .82                  | .69              | .54        |

<sup>a</sup> loadings greater than .4 are shown in bold

The determinant of the three-factor model was  $t = .002$ , the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is  $.82$ , and the Barlett's test of Sphericity is  $\chi^2(153) = 553.59, p < .001$ . Altogether, these results demonstrate that the relationship among variables is strong enough to proceed with a factor analysis for the data. Three factors explained 47.67% of the total variance (25.72%, 13.83%, and 8.12%, respectively). These results are similar to those reported by Ægisdóttir & Gerstein (2009). The authors of the scale also found a three-factor solution in which each factor accounted for 35.21% (Intent), 6.74% (Stigma Tolerance), and 5.25% (Expertness), respectively.

However, the structure observed in this study was considerably different from the solution shown by Ægisdóttir & Gerstein (2009) with one Expertness item loading on the Intent factor (item 7) and one on the Stigma Tolerance factor (item 14), and three Stigma Tolerance items loading on the Intent factor (items 11, 15 and 17). This resulted in a very weak Expertness factor consisting only of two items. It could indicate that the original items do not describe the expertise of psychologists in a way suitable for Latvian culture due to differences in perceptions of the profession and the qualification involved. It might be possible that the confidentiality of conversations with a psychologist, and the extensive training involved are not commonly known features of the profession in Latvia, due to the novelty of this field.

Thus, it was decided that different items should be developed to be included in the Expertness scale. Although the factorial structure was acquired in a small sample of only 100 respondents, the inability to demonstrate similar structure to the one originally reported by the authors of the scale (Ægisdóttir & Gerstein, 2009), suggests that several items might work differently in the Latvian culture. However, this finding should be replicated in a bigger sample.

To summarize, the obtained results suggested that the original structure of the American version of the BAPS scale was not replicated in a sample of Latvian students. Therefore, the problematic items should be rephrased and additional items should be developed to strengthen the weak Expertness factor. To improve the scale, we conducted the Study 2.

## Study 2

### Method

#### *Participants*

Two hundred and thirteen students (84.51% female) from several universities in Latvia and different study programs participated in this study. The ages of the participants ranged from 19 to 41 years ( $M = 22.3, SD = 3.3$ ). The sample was matched by age, gender, years of study at the university and psychological counseling experience to the original sample used for developing the scale in the USA (Ægisdóttir & Gerstein, 2009). Inferential statistical tests revealed no differences between the samples in terms of demographic variables ( $p > .05$ ). Table 1 shows the frequency distribution of the sample's demographics.

### *Instrument*

The Latvian translation of the BAPS scale (Ægisdóttir & Gerstein, 2009) obtained in the Study 1 was enriched with 4 additional items designed to complement the Expertness factor as it demonstrated the weakest internal consistency in the Study 1. Items were developed using a committee approach based on beliefs typical for Latvian culture (e.g., Item 19. “Due to his or her education, a psychologist has deep and comprehensive knowledge about human behavior and emotions.”). In addition, seven of the original items were rephrased to avoid floor or ceiling effects, as well as to better suit Latvian culture. For example, as the profession of the psychologist in Latvia is not typically considered particularly intellectually demanding and requiring special knowledge, item 17, “It is difficult to talk about personal issues with highly educated people such as psychologists,” was rephrased as item 17<sub>revised</sub>, “It is difficult to talk about personal issues with a psychologist because you begin to feel that he ‘sees through you.’” The new and revised items that were included in the final model (7 items in total) are shown in the Table 2.

### *Procedure*

Participants were recruited from several higher education institutions in Latvia by contacting the administration, which forwarded the advertisement about the study to students. The procedure was identical to the procedure reported for the Study 1.

## **Results and Discussion**

Twenty seven items including 14 items used in Study 1, 9 revised and rephrased items from the original BAPS scale (7, 8, 10, 11, 14, 15, 17 (two versions), and 18) and 4 newly developed items were used in the exploratory factor analysis using the principal component method with Varimax rotation. Inspection of the loadings revealed that several items had loadings lower than .35 on their common factor and/or substantial secondary loadings. In order to increase factorial validity of the instrument, these items were removed. From two similar items (e.g., 10 and 10<sub>revised</sub>) with slightly different wordings, the one with the lowest loading was removed.

The remaining 18 items (including 11 original items, 5 rephrased items and 2 completely new items) were again submitted to a principal component analysis and rotated to simple structure using Varimax rotation (orthogonal solution) with Kaiser normalization. The determinant of the three-factor model was  $t = .002$ , the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is .85, and the Barlett's test of Sphericity is  $\chi^2(153) = 1321.77, p < .001$ . Thus, the relationship among variables was strong enough to proceed with a factor analysis for the data. The results of the second exploratory factor analysis can be seen in Table 5. The three obtained factors together explain 51.66% of the total variance (21.24%, 17.27%, and 13.18%, respectively). These results correspond and even slightly exceed those of the original three-factor solution in the American sample which explained 47.24% of the total variance (Ægisdóttir & Gerstein, 2009).

Table 5. Exploratory Factor Analysis of the Revised BAPS Scale in Study 2

| Items                   | Factors <sup>a</sup> |            |                  |
|-------------------------|----------------------|------------|------------------|
|                         | Intent               | Expertness | Stigma Tolerance |
| 2                       | <b>.81</b>           | .14        | -.04             |
| 3                       | <b>.78</b>           | .18        | .07              |
| 4                       | <b>.76</b>           | .19        | .11              |
| 1                       | <b>.73</b>           | .11        | -.07             |
| 6                       | <b>.70</b>           | .16        | .11              |
| 12                      | <b>.62</b>           | .27        | .22              |
| 19 <sub>new</sub>       | .11                  | <b>.82</b> | .05              |
| 20 <sub>new</sub>       | .36                  | <b>.76</b> | .01              |
| 16                      | .38                  | <b>.71</b> | -.01             |
| 9                       | .11                  | <b>.64</b> | -.07             |
| 14 <sub>revised</sub>   | .01                  | <b>.59</b> | .13              |
| 7 <sub>revised</sub>    | .38                  | <b>.59</b> | -.05             |
| 5                       | -.05                 | .08        | <b>.70</b>       |
| 10 <sub>revised</sub>   | .15                  | -.11       | <b>.66</b>       |
| 17                      | -.02                 | .01        | <b>.65</b>       |
| 8                       | .28                  | -.02       | <b>.61</b>       |
| 17 <sub>revised</sub>   | -.13                 | -.02       | <b>.55</b>       |
| 18 <sub>revised</sub>   | .13                  | .18        | <b>.50</b>       |
| Eigenvalues             | 3.82                 | 3.11       | 2.37             |
| Percentages of variance | 21.24                | 17.27      | 13.18            |
| Number of items         | 6                    | 6          | 6                |
| M                       | 20.55                | 26.1       | 28.43            |
| SD                      | 6.49                 | 5.34       | 4.97             |
| Cronbach's alpha        | .86                  | .81        | .67              |

<sup>a</sup> loadings greater than 0.4 are shown in bold

The subscales obtained in the Study 2 are similar to the structure observed by Ægisdóttir & Gerstein (2009), so we retained the original factor names. The Intent factor contained the same items as the original Intent factor (items 1, 2, 3, 4, 6, and 12); the Expertness factor consisted of two original items (9 and 16), two rephrased items (7<sub>revised</sub> and 14<sub>revised</sub>) and two additional items (19<sub>new</sub> and 20<sub>new</sub>); the Stigma Tolerance consisted of three original items (5, 8, and 17) and three rephrased items (10<sub>revised</sub>, 17<sub>revised</sub> and 18<sub>revised</sub>).

Cronbach's values were .86 for the Intent subscale, .81 for the Expertness subscale and .67 for the Stigma Tolerance subscale. These results indicate acceptable to good reliability for the developed instrument. The internal consistency value for the Intent factor is comparable to that reported by Ægisdóttir & Gerstein (2009) (cf., .82-.83), however, value for the Stigma Tolerance is lower than in the original study (cf. .78-.81). Due to strengthening the Expertness factor with two additional items, its reliability is considerably higher than in the original study (cf. .69-.72).

The problem with obtaining the ceiling effect for some items was mostly solved in Study 2 (see Table 6). Only item 8 was prone to extremely low values (most of the participants reported that they strongly disagree with this statement). However, this item showed even higher values (after recoding the item) in the original study ( $M = 5.19-5.40$ ) and was retained by the authors of the original scale. It should be noted that the sample used in this study consisted of a younger generation with potentially more positive attitudes towards psychological services. According to several previous studies older adults compared to younger adults have more negative attitudes towards mental health help-seeking (Dupree, Herrera, Martinez Tyson, Jang, & King-Kallimanis, 2010; ten Have et al., 2010), and in a recent study conducted in Latvia it was found that older adults compared to younger adults hold more negative stereotypes about psychologists (Katšena & Dimdiņš, 2013). Therefore, in a sample with generally more negative attitudes we expect to observe higher general agreement with this statement.

*Table 6. Item Statistics for the Revised Latvian Version of the the BAPS Scale in Study 2*

| <i>Items</i>          | <i>Factors</i>                           |                   |                         | <i>M</i> | <i>SD</i> |
|-----------------------|--|-------------------|-------------------------|----------|-----------|
|                       | <i>Intent</i>                            | <i>Expertness</i> | <i>Stigma Tolerance</i> |          |           |
|                       | <i>Corrected item-total correlations</i> |                   |                         |          |           |
| 2                     | .70                                      |                   |                         | 3.32     | 1.50      |
| 3                     | .69                                      |                   |                         | 4.09     | 1.34      |
| 4                     | .68                                      |                   |                         | 4.08     | 1.48      |
| 1                     | .62                                      |                   |                         | 3.37     | 1.37      |
| 6                     | .62                                      |                   |                         | 2.39     | 1.35      |
| 12                    | .59                                      |                   |                         | 3.29     | 1.43      |
| 19 <sub>new</sub>     |  | .66               |                         | 4.58     | 1.15      |
| 20 <sub>new</sub>     |  | .74               |                         | 4.47     | 1.20      |
| 16                    |  | .67               |                         | 4.35     | 1.20      |
| 9                     |  | .48               |                         | 4.08     | 1.25      |
| 14 <sub>revised</sub> |  | .39               |                         | 4.33     | 1.36      |
| 7 <sub>revised</sub>  |  | .56               |                         | 4.31     | 1.25      |
| 5                     |  |                   | .48                     | 4.60     | 1.59      |
| 10 <sub>revised</sub> |  |                   | .45                     | 4.94     | 1.17      |
| 17                    |  |                   | .43                     | 4.61     | 1.30      |
| 8                     |  |                   | .44                     | 5.14     | 1.24      |
| 17 <sub>revised</sub> |  |                   | .32                     | 4.20     | 1.37      |
| 18 <sub>revised</sub> |  |                   | .32                     | 4.94     | 1.37      |

CFA of the developed instrument was conducted using IBM SPSS Amos v.20.0. The parameter estimates of the standardized solution can be seen in Figure 1. All factor loadings are higher than .35. Factor variances were fixed. Factor covariances were estimated. Model fit was tested statistically via the  $\chi^2$  test (Bollen, 1989). We also considered the Comparative Fit Index (CFI; Bentler, 1990), the Tucker-Lewis Index (TLI; McDonald & Marsh, 1990), and the Root Mean Square Error of Approximation (RMSEA; Hu & Bentler, 1998). For the CFI and TLI, values equal to or higher

than .90 indicate acceptable fit. For the RMSEA values equal to or lower than .08 can be interpreted as good fit (Browne & Cudeck, 1993; Hu & Bentler, 1998; Jöreskog & Sörbom, 1996). Results of the model fit test were as follows:  $\chi^2(132) = 223.12, p < .001$ ; CFI = 0.93, TLI = 0.91, RMSEA = .06. These results indicate that the model fits the data reasonably well.

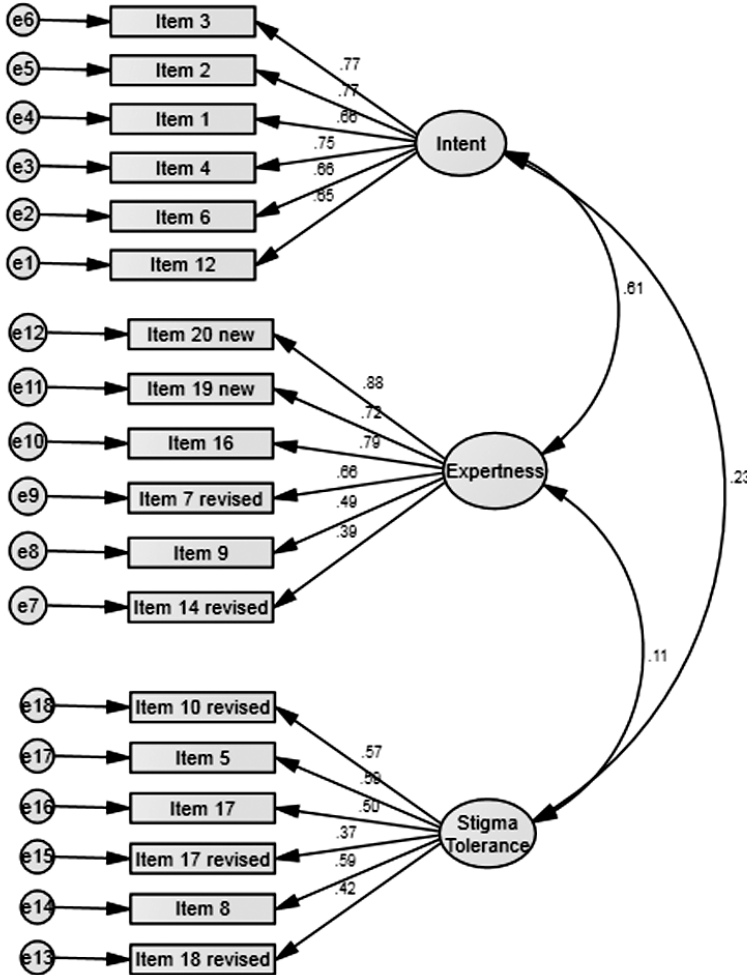


Figure 1. Confirmatory factor analysis

## General Discussion

The purpose of the two studies described in this paper was to adapt the Beliefs About Psychological Services [BAPS] scale developed by Ægisdóttir & Gerstein (2009) in the USA to the Latvian cultural context, as well as to evaluate some psychometric properties of the scale in Latvian sample. Two successive studies involving the total of 312 participants were conducted to evaluate the factorial validity and reliability of the Latvian version of the BAPS scale.



The factorial validity of the developed instrument was analyzed via exploratory and confirmatory factor analyses. The results revealed a slightly different structure of the Latvian version of the instrument. Study 1 resulted in a structure that did not replicate the original structure reported by Ægisdóttir & Gerstein (2009), and demonstrated a number of problems, including a weak Expertness factor and several items that showed very little response variation. Therefore, the wording of several items was improved and additional items were introduced in Study 2 in order to stabilize the Expertness and the Stigma Tolerance factors, as well as to avoid the ceiling effect of several items. The final model, consisting of 18 items (6 per each subscale), demonstrated good internal consistency for all factors and a reasonably acceptable model fit. Factorial structure obtained in this study (Intent, Expertness and Stigma Tolerance factors) corresponded to the structure reported by Ægisdóttir & Gerstein (2009). To sum up, the construct as demonstrated in the Latvian cultural context is similar to the construct demonstrated in the American study, and the psychometric properties of the Latvian version of the BAPS confirm that it is a reliable instrument for use in Latvia.

However, it should be kept in mind that the population validity of the current findings is limited by the low frequency of male participation. Furthermore, all of the participants were students, and most of them were young adults. Because of this the current results should be interpreted with caution, as they may not accurately reflect the attitudes toward seeking psychological help of other social groups (e.g., males, older people).

We wish to point out that adapting a scale aimed at measuring beliefs and attitudes towards psychological counseling has high relevance in Latvia. As psychological counseling was underdeveloped during the Soviet period, professional psychological help in Latvia can be considered a relatively new service. Therefore, attitudes towards any kind of psychological services or psychotherapy were not studied before, which leads to the lack of information about the current situation in Latvian society as a whole, as well as within specific social groups (e.g., older generation). Further research of this construct could shed light on possible barriers and negative stereotypes preventing people from getting the necessary professional help. As attitudes towards psychological services have been shown to predict help-seeking behavior (Meyer, 2001; Vogel & Vester, 2003), adapting the BAPS scale can be considered an important first step on the way of clarifying and improving the current situation.

Further research with Latvian samples will have to deal with the test-retest reliability of the BAPS scale, which was not tested in the current study. Additional studies are also needed to replicate the findings in samples different than the undergraduate student samples. In our samples a relatively large number (32% to 33%) of respondents admitted having some kind of psychological counseling experience. In Latvia students at several universities have excellent access to psychological services (e.g., free psychological counseling regarding life crisis or other issues). This opportunity to receive free counseling at their institutions of higher education distinguishes students from other social groups, for whom exposure to psychological services is much more limited. Especially in Latvia, due to various historical reasons, a considerable generation gap is expected to be observed in terms of attitudes and beliefs about psychological services.

Due to the historical reasons described above, the older generation in Latvia had no access to any kind of psychological services for the major part of their lives. This experience could be a reason to expect a strikingly different structure of beliefs about psychological services within the older generation, therefore, we strongly encourage further research in this population.

To summarize, the adapted instrument shows reasonably good psychometric properties in an undergraduate student sample. It is the first instrument of its kind to be adapted in Latvia, as attitudes or beliefs towards seeking psychological services have never been researched before in this country. We hope that the BAPS will be further used for research in the Latvian cultural context exploring attitudes of the general public and of different social and clinical groups, as well as used in cross-cultural research.

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## Girls' Emotional and Behavioral Problems in Early Adolescence: Differences between Pubertal Timing and Perceived Pubertal Timing

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### **Abstract**

This research aims to investigate pubertal timing and self-perceived pubertal timing, comparing one's pubertal processes with those of one's peers, and associations with internalizing and externalizing symptoms in early adolescence. A non-clinical group of 11-13 year-old girls ( $N = 205$ ) participated in the research. The results showed that the perceived pubertal timing is associated with the internalization and externalization of symptoms. Ratings of perceived pubertal timing were shown to have more associations with girls' self-reported emotional problems in early adolescence, than self-reported ratings of pubertal timing. Girls who perceive their puberty as occurring earlier or later than most adolescents in comparison to those, who perceive their puberty to be the same as others, reported having more internalizing symptoms, such as depression, withdrawal, anxiety and somatic complaints, as well as thought, attention and social problems.

**Key words:** *emotional and behavioral problems, early adolescence, pubertal timing, perceived pubertal timing*

Adolescence is a period of major and relatively fast physical, cognitive and emotional change. A major change in early adolescence is puberty. It is a universal biological event, although the process may vary significantly across the population. One of the characteristics of puberty is pubertal timing. Marshall and Tanner (1969) define it as a "variation in the chronological age at which adolescence begins and different stages of physical maturity are reached" (Marshall, & Tanner, 1969, p. 291).

The timing of puberty and its association with behavioral and emotional problems in adolescence has attracted the attention of many researchers. Different studies have shown that girls' early pubertal timing is linked with internalizing difficulties such as depressive symptoms (Mendle et al., 2010, Ge et al., 2006), anxiety (Ge et al., 2006) and body dissatisfaction (Crockett & Petersen, 1987, Siegel et al., 1999, Dorn et al., 1988). Moreover, early maturing girls present more difficulties with self-esteem, are more concerned with their appearance, and are less satisfied with their weight (Dorn et al., 1988).

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There have been various attempts to explain connections between pubertal timing and internalizing difficulties. One of these is the maturational disparity hypothesis which postulates that the gap between physical and psychological maturation places early-maturing adolescents at risk of psychopathology (Ge & Natsuaki, 2009). Since girls mature earlier than boys, the earlier maturing girls are in the most vulnerable position of entering puberty unprepared. The risk of difficulties may also implicate impaired social skills of early maturing girls, due to the fact that they enter puberty with less time to develop the skills needed to cope with the challenges of adolescence. However, this hypothesis could explain only the effects of early puberty on internalizing symptoms.

In contrast to the maturational disparity hypothesis, there are many findings that late puberty, as well as early puberty, is associated with adaptation difficulties. For example, early maturing girls and late maturing boys show more depressive symptoms and are less satisfied with their bodies (Siegel et al., 1999). Since girls mature earlier than boys, the earlier maturing girl and the later maturing boy deviate most widely from their overall peer group (Petersen & Crockett, 1985). It is possible that they may feel the most out of sync with their peers and this may create additional distress during adolescence. This is called the off-time hypothesis. According to this hypothesis we might postulate that the way in which an adolescent perceives and evaluates their pubertal timing may be the key to understanding the links between pubertal timing and emotional problems. However, feeling out of sync with one's peers is a subjective interpretation of one's pubertal timing. To separate the objective pubertal timing from the adolescent's evaluation of it, the construct of *perceived pubertal timing* has been developed. Perceived pubertal timing reflects the pubertal timing as evaluated by the adolescent, comparing oneself to his/her peers (Dorn et al., 2006). This construct seems to be closely linked with actual pubertal timing, since it is assumed that the adolescent evaluates his or her own perceived pubertal timing based on objective characteristics of one's pubertal status. However, it seems that many other variables might influence this evaluation, so it may differ significantly from pubertal timing.

If feeling out of sync with one's peers regarding one's puberty has a considerable effect on emotional problems, we assume that the perceived pubertal timing would have a stronger connection with such problems, compared to actual pubertal timing. Moreover, both early and late perceived pubertal timing would be linked to additional distress. Previous researchers have not addressed these issues, therefore, our study aims to investigate the significance of perceived pubertal timing and its effects on emotional problems in adolescence.

Pubertal timing has some connection with behavioral problems as well as emotional ones. Early puberty is associated with higher risk of conduct problems, symptoms of ADHD (Ge et al., 2006), aggression and delinquency for both males and females (Lynne et al., 2007). Early maturing girls show significantly higher rates of disruptive behavior disorders and elevated antisocial personality traits in young adulthood (Graber et al., 2004).

Explanations of the associations between early pubertal timing and externalizing problems are mostly based on early matures' adult-like appearance. This hypothesis

states that early maturers look older than their same-age peers and because of this they are more likely to be treated differently and may initiate behaviors perceived as typical to older adolescents. This might lead to disruption of social networks with same-age peers, and increase the risk of affiliation with older delinquent groups of adolescents. This explanation has some support, since it was found that early maturers are significantly more likely to affiliate with delinquent peers (Ge et al., 2002; Lynne et al., 2007). Moreover, earlier studies report that girls, who perceive their pubertal timing to be earlier, are more likely to engage in such behaviors as alcohol drinking and smoking if their pubertal status is relatively high (Bratberg et al., 2006). Another study also highlights the importance of including perceived pubertal timing, since it was found to be the key factor to understanding early pubertal timing associations with externalizing behavior (Carter et al., 2011). However, it remains unclear whether the association between pubertal timing and externalizing symptoms is present in early adolescence, and whether it is more closely linked to adolescent's perception of oneself as maturing early. Our study may partly answer these questions by establishing different links between externalizing symptoms and pubertal timing as well as externalizing symptoms and perceived pubertal timing.

Patterns of internalizing problems differ significantly among adolescent girls and boys. Research shows that adolescent girls report having more depressive symptoms than boys (Siegel et al., 1999), they also report more anxiety and somatic complaints (Žukauskienė & Malinauskienė, 2008). Studies of connections between the process of puberty and its links with various aspects of adaptation also reveal significant differences between male and female respondents (Crockett & Petersen, 1987, Mendle et al., 2010, Blumenthal et al., 2011, Dorn et al., 1988). For these reasons we decided to examine only the girls' population.

The main question is as follows: which – pubertal timing or perceived pubertal timing is more strongly associated with the emotional and behavioral problems of early adolescent girls. This research aims to investigate the emotional and behavioral problems in early adolescent girls, and their relation with pubertal timing and perceived pubertal timing. To establish the difference between these constructs, we also examine the associations between perceived pubertal timing and pubertal timing, and investigate whether these associations depend upon the age of the adolescent.

## **Method**

### **Participants**

Participants in this study were 205 girls, ages 11-13 ( $M = 12.01$ ,  $SD = .795$ ), recruited from three urban schools. The number of participants according to age was as follows: 30.7% ( $n = 63$ ) – age 11; 37.1% ( $n = 76$ ) – age 12; 21.2% ( $n = 66$ ) – age 13.

Most participants (79.5%,  $n = 163$ ) reported living in a full family; meanwhile 13.17% ( $n = 27$ ) reported living with single mother; 6.34% ( $n = 13$ ) living with mother and stepfather; and .98% ( $n = 2$ ) living with single father. Of the participants 24.4% ( $n = 50$ ) had at least one older sister; and 25.9% ( $n = 53$ ) had a younger sister or sisters.



## Measures

*Pubertal status and timing.* A self-administered rating scale for pubertal development (Carskadon & Acebo, 1993) was used to gather the information about the pubertal status of participants. Research has shown that the correlation between adolescents' self-reports and medical examination of pubertal development indicators vary between .72 and .82 (Brooks-Gunn et al., 1987), thus the self-report measure can be considered as an adequate index of pubertal status. The self-administered rating scale for pubertal development consists of closed questions about secondary sexual characteristics (breast development, pubic and underarm hair), growth spurt, skin changes and menarche. On a 4-point scale, ranging from 1 (*has not begun*) to 4 (*development completed*), girls indicated the extent to which they had experienced pubertal growth. Classification of the responses allows one to divide the participants into five stages of development: pre-pubertal, early pubertal, mid-pubertal, late-pubertal and post-pubertal.

Pubertal timing was established through the standardization of the pubertal status by age (11, 12 and 13 years old) within the sample, and the trichotomization of timing (i. e. early, on-time, late), based on conventional cut-offs ( $\pm 1 SD$ ). Values of greater than 1 *SD* above the mean within the age group were classified as early ( $n = 37$ ), and values less than 1 *SD* ( $n = 32$ ) below the mean were classified as late (according to Ge et al., 2006, Blumenthal et al., 2011). Pubertal timing between these cut-off points were classified as on-time ( $N = 136$ ).

Carskadon and Acebo (1993) reported Cronbach alpha coefficient at .70 (Carskadon & Acebo, 1993) of the scale. According to our sample, Cronbach alpha coefficient is .724, indicating acceptable reliability.

*Perceived pubertal timing.* This variable was measured by ratings on a 5-point Likert scale in answer to the question: "Would you say that your puberty, compared to most girls your age, would be: much earlier / a little earlier / the same as others / a little later / much later".

To evaluate the possible differences between different age groups and their perceived pubertal timing, Kruskal-Wallis index was used. No differences were found between the age groups (Chi-square .012,  $p > .05$ ).

*Emotional and behavioral problems.* The Youth Self Report, YSR 11/18, was used to evaluate emotional and behavioral problems (Achenbach & Rescorla, 2001). The questionnaire consists of 112 statements, participants are asked to evaluate every statement. Each statement is on a 0-2 scale, and items within each scale are summed, the higher score indicating greater problems. Internalizing and externalizing symptom scales each consist of several subscales, where anxiety/depression, withdrawal/depression and somatic complaints compose the internalizing symptom scale, and rule-breaking behavior with aggressive behavior form the externalizing symptom scale. Additionally, social problem, thought problem and attention problem subscales are included. The YSR demonstrated good reliability in the current sample (Cronbach Alpha ranging from .74 to .90 for the different subscales).

## Procedure

The study was conducted at the schools. Girls were contacted and provided with information about the study, and those who agreed to participate were given written parental consent forms to be signed by their parents/guardians. In this way parental consents were obtained, and the partners/guardians were provided with full information about the study, its aims and procedure.

Participants completed the questionnaires in small groups, with the researcher being available at any time for questions. Duration of the procedure varied from 45 to 60 minutes.

## Results

### Pubertal timing and perceived pubertal timing

Considering that pubertal timing represents the classification of timing according to pubertal status within the age group, and perceived pubertal timing – girls' evaluations comparing one's pubertal timing to that of one's peers, we aimed to reveal the strength of the links between these constructs.

Table 1 presents Spearman correlations between pubertal timing and the perceived pubertal timing in the different age groups. The results show that pubertal timing correlates with perceived pubertal timing in the 12 and 13 year-old girls' groups, and the correlation is moderate. In the group of 11 year-olds, the association between these constructs is not statistically significant.

*Table 1. Spearman correlation between pubertal timing and perceived pubertal timing in different age groups*

|                 |                         | <i>Perceived pubertal timing</i> |               |               |
|-----------------|-------------------------|----------------------------------|---------------|---------------|
|                 |                         | <i>Age 11</i>                    | <i>Age 12</i> | <i>Age 13</i> |
| Pubertal timing | Age 11 ( <i>N</i> = 63) | .23                              |               |               |
|                 | Age 12 ( <i>N</i> = 76) |                                  | .36**         |               |
|                 | Age 13 ( <i>N</i> = 66) |                                  |               | .39**         |

\*\*  $p < .01$

### Pubertal timing and perceived pubertal timing connections with emotional and behavioral problems.

To evaluate the pubertal timing and perceived pubertal timing connections with symptom scales, one-way ANOVA was used. Table 2 presents the results.

The total symptom score did not differ for the different pubertal timing groups. However, the five perceived pubertal timing groups differ significantly on the total symptom score ( $F = 12.57$ ,  $df = 4$ ,  $p < .001$ ): post hoc test revealed that the lowest mean of the symptom score is observed in the group of girls, who perceive their puberty as on-time ( $M = 36.28$ ). It differs significantly from the "much earlier" ( $M = 75.90$ ) and "much later" ( $M = 65.90$ ) perceived pubertal timing group ( $p < .01$ ).

Table 2. Comparison of Emotional and Behavioral Problem Means between Groups

|                        | Pubertal timing   |                      |                  |                             | Perceived pubertal timing       |                                    |                               |                        | F                |       |         |
|------------------------|-------------------|----------------------|------------------|-----------------------------|---------------------------------|------------------------------------|-------------------------------|------------------------|------------------|-------|---------|
|                        | Early<br>(N = 37) | On-time<br>(N = 136) | Late<br>(N = 32) | Much<br>earlier<br>(N = 10) | A little<br>earlier<br>(N = 35) | The same<br>as others<br>(N = 123) | A little<br>later<br>(N = 26) | Much later<br>(N = 10) |                  |       |         |
| Total                  | Mean<br>(SD)      | 42.30<br>(25.84)     | 45.57<br>(25.67) | 37.66<br>(22.43)            | 75.90<br>(27.17)                | 54.60<br>(22.99)                   | 36.28<br>(22.49)              | 42.88<br>(21.63)       | 65.90<br>(25.39) | 1.35  | 12.57** |
| Internalizing          | Mean<br>(SD)      | 15.54<br>(10.92)     | 16.05<br>(10.59) | 13.68<br>(8.37)             | 31.10<br>(12.56)                | 20.51<br>(9.13)                    | 12.02<br>(7.97)               | 15.15<br>(9.31)        | 27.50<br>(12.03) | .68   | 20.08** |
| Externalizing          | Mean<br>(SD)      | 11.86<br>(9.72)      | 12.65<br>(8.48)  | 10.81<br>(10.27)            | 15.60<br>(6.22)                 | 13.77<br>(9.39)                    | 11.46<br>(9.57)               | 12.12<br>(7.11)        | 12.90<br>(6.67)  | .58   | .85     |
| Anxiety/depression     | Mean<br>(SD)      | 6.78<br>(4.41)       | 7.06<br>(5.05)   | 6.88<br>(3.77)              | 14.60<br>(5.64)                 | 9.40<br>(4.19)                     | 5.39<br>(3.63)                | 6.50<br>(4.69)         | 11.40<br>(5.13)  | .06   | 19.69** |
| Withdrawal/ depression | Mean<br>(SD)      | 3.16<br>(3.00)       | 3.44<br>(3.07)   | 2.88<br>(2.59)              | 7.60<br>(3.63)                  | 4.49<br>(2.76)                     | 2.36<br>(2.14)                | 3.23<br>(3.31)         | 6.80<br>(3.94)   | .53   | 17.17** |
| Somatic complaints     | Mean<br>(SD)      | 5.59<br>(4.73)       | 5.56<br>(3.99)   | 3.93<br>(3.27)              | 8.90<br>(4.12)                  | 6.63<br>(4.07)                     | 4.27<br>(3.59)                | 5.42<br>(3.84)         | 9.30<br>(4.81)   | 2.20  | 8.36**  |
| Rule-breaking behavior | Mean<br>(SD)      | 3.84<br>(4.59)       | 4.07<br>(5.92)   | 4.25<br>(5.09)              | 4.90<br>(2.92)                  | 4.43<br>(3.83)                     | 3.80<br>(4.34)                | 4.73<br>(4.34)         | 3.60<br>(3.06)   | .09   | .49     |
| Aggressive behavior    | Mean<br>(SD)      | 8.03<br>(5.92)       | 8.58<br>(5.92)   | 6.56<br>(5.09)              | 10.70<br>(4.40)                 | 9.34<br>(6.33)                     | 7.66<br>(6.15)                | 7.38<br>(3.89)         | 9.30<br>(4.37)   | 1.58  | 1.28    |
| Social problem         | Mean<br>(SD)      | 4.92<br>(3.28)       | 4.92<br>(3.83)   | 4.28<br>(3.02)              | 10.70<br>(4.69)                 | 6.54<br>(3.72)                     | 3.68<br>(2.75)                | 4.46<br>(3.11)         | 7.60<br>(3.86)   | .42   | 17.44** |
| Thought problem        | Mean<br>(SD)      | 4.11<br>(3.30)       | 5.22<br>(4.29)   | 3.13<br>(2.88)              | 8.60<br>(4.67)                  | 6.09<br>(4.08)                     | 3.67<br>(3.49)                | 4.50<br>(3.29)         | 8.60<br>(5.10)   | 4.16* | 9.06**  |
| Attention problem      | Mean<br>(SD)      | 5.86<br>(3.25)       | 6.71<br>(3.59)   | 5.75<br>(3.18)              | 9.90<br>(4.25)                  | 7.69<br>(3.88)                     | 5.46<br>(2.91)                | 6.53<br>(3.91)         | 9.30<br>(3.65)   | 1.56  | 8.97**  |

\*\*p < .01, \* p < .05

Statistically significant differences between early, on-time and late pubertal timing groups, were found only in thought difficulties subscale ( $F = 4.16$ ,  $df = 2$ ,  $p < .05$ ). Comparing these groups by post hoc test revealed that late pubertal timing group differs from on-time ( $p < .05$ ). The mean score of late pubertal timing group was significantly lower. No other differences were found comparing means of symptom scales scores in different pubertal timing groups.

Perceived pubertal timing groups differ significantly on the internalizing symptoms scale ( $F = 20.08$ ,  $df = 4$ ,  $p < .001$ ) and all of the subscales it consists of: anxiety/depression ( $F = 19.69$ ,  $df = 4$ ,  $p < .001$ ), withdrawal/depression ( $F = 17.18$ ,  $df = 4$ ,  $p < .001$ ) and somatic complaints ( $F = 8.37$ ,  $df = 4$ ,  $p < .001$ ). Post hoc test revealed that “much earlier” and “much later” perceived pubertal timing groups differ significantly from “the same as others” ( $p < .001$ ), but do not differ from each other. The perceived pubertal timing groups’ mean scores on the total scale range is a statistically significant quadratic trend ( $F = 27.48$ ,  $df = 1$ ,  $p < .001$ ), indicating that girls, who perceived their pubertal timing to be the same as others, had lowest symptom scores and those, who rated themselves as “much earlier” or “much later” had the highest scores. The same patterns of a quadratic trend were observed on internalizing symptoms scale ( $F = 47.25$ ,  $df = 1$ ,  $p < .001$ ), anxiety/depression subscale ( $F = 43.25$ ,  $df = 1$ ,  $p < .001$ ), withdrawal/depression subscale ( $F = 43.91$ ,  $df = 1$ ,  $p < .001$ ), somatic complaints subscale ( $F = 19.21$ ,  $df = 1$ ,  $p < .001$ ), social problems subscale ( $F = 37.39$ ,  $df = 1$ ,  $p < .001$ ), attention problems subscale ( $F = 18.35$ ,  $df = 1$ ,  $p < .001$ ) and thought problems subscale ( $F = 21.77$ ,  $df = 1$ ,  $p < .001$ ).

Mean scores of the perceived pubertal timing groups on internalizing and externalizing symptoms scales and the total score are graphically presented in figure 1.

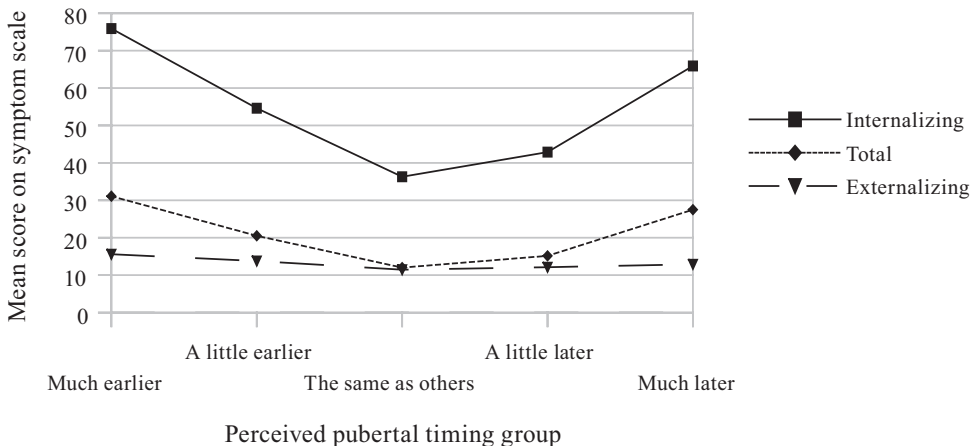


Figure 1. Emotional and behavioral problem comparison in perceived pubertal timing groups

## Discussion

This research showed that perceived pubertal timing has significant association with emotional, but not behavioral problems in girls' early adolescence. At this age the construct of perceived pubertal timing differs significantly from pubertal timing and, therefore, has to be evaluated separately when establishing the various links between pubertal timing and difficulties in early adolescence.

Earlier studies have found various pubertal timing associations with adaptation difficulties (Mendle et al., 2010, Ge et al., 2006, Crockett & Petersen, 1987, Siegel et al., 1999, Lynne et al., 2007), with the particular risk factor – early pubertal timing for girls (Graber et al., 2004). However, the construct of perceived pubertal timing has not been of particular interest in most of the research, despite the fact that it is one of the explanations about mediating effects on pubertal timing associations with emotional and behavioral problems. In particular, the maturational disparity hypothesis relies on the assumption that the perception of being out of sync with other adolescents is a risk factor. Moreover, as Dorn and colleagues (2006) have noticed, pubertal timing evaluated by the adolescent himself/herself should be referred to as perceived pubertal timing, in order to avoid the inaccuracy of the construct. We intended to clarify the difference between pubertal timing and perceived pubertal timing by measuring their associations with emotional and behavioral problems in adolescence.

The results showed that the perceived pubertal timing is associated with pubertal timing, however, the correlation was observed only in the group of older girls, and it was not very high. This indicates that perceived pubertal timing does not reflect the objective pubertal maturation, and should be evaluated as a different construct, regarding its links with various aspects of adaptation. The previous research on perceived pubertal timing in comparison to pubertal timing has reported that the self-ratings of pubertal development are very closely linked to the actual pubertal timing (Siegel et al. 1999). Our research findings partly contradict with Siegel's study and the difference might depend on the age of the participants. In the previous study, girls' age varied from 12 to 17 years old, whereas the age of participants in our study was from 11 to 13. Our findings suggest that the associations between perceived pubertal timing and pubertal timing emerge only in the 12 and 13 year old group. This corresponds to previous research which states that the subjective measure of pubertal timing is more accurate (comparing to objective measures of pubertal timing) at a later point of pubertal development (Dubas et al., 1991). It is possible that the younger the adolescent, the more the self-evaluation depends on variables other than the objective pubertal maturation. These variables might include the girls' knowledge about the pubertal maturation processes, attitudes, friends' and siblings' pubertal maturation. It seems that during the process of pubertal maturation girls acquire more information about puberty, and have more experience with evaluating one's own and others' pubertal maturation.

Our study did not confirm the association of pubertal timing or perceived pubertal timing with externalizing symptoms. This might be due to the fact that our study included only early adolescents, while the associations in previous studies were found in the group of older adolescents (Bratberg et al., 2006). Other findings about the early pubertal timing risk of externalizing symptoms for girls were based on studies with

minority groups (in particular, Lynne et al., 2007, Carter et al., 2011). The difference of the results between the latter studies and ours might be explained by the accentuation hypothesis. It states that stressful transitions accentuate behavioral problems only among predisposed individuals, and has gathered some plausible evidence (e. g. Caspi & Moffitt, 1991). Being out of sync with one's peers might be interpreted as a stressful condition, however, the externalizing symptoms may arise only in a small part of the population, together with other risk factors.

Our research showed that the perceived pubertal timing, rather than the actual pubertal timing, is linked with internalizing symptoms. We found that the girls who evaluate their pubertal timing as earlier or later than others, have more symptoms of anxiety, depression, withdrawal, and somatic complaints. Links with social, thought and attention problems were also found. The results showed that girls who perceive their pubertal timing to be the same as others have less symptoms, than those who perceive it to be either earlier or later than others. As we have mentioned, several theories have been developed to explain pubertal timing's effects on adaptation in adolescence. The first – maturational disparity hypothesis – postulates that early maturing adolescents (especially girls, because they enter puberty earlier) enter puberty less prepared to cope with the new challenges of adolescence. This explanation is based on the potential asynchrony between physical, cognitive, social and emotional maturity (Negriff & Susman, 2011). Our results do not confirm this hypothesis, since no pubertal timing effects on emotional and behavioral problems were found (except for association with thought problems). The off-time hypothesis proposes that the effect lies in the idiosyncrasy of those who are earlier or later than most adolescents. Having in mind our findings that perceived pubertal timing does not fully reflect the actual pubertal timing, but has quite strong associations with internalizing symptoms, we might postulate that perceiving one to be out of sync with others might be a stressful condition in puberty. However, previous research on the cognitive model of internalizing problems in adolescence proposes that low self-worth is associated with a vulnerability to depressive symptoms (McCarty et al., 2007). It is possible that girls with low self-worth might be prone to perceive themselves as different from others in the area of pubertal development, and also be more prone to internalizing symptoms.

Besides the relevant results shown in our study there are some limitations. The construct of perceived pubertal timing was measured by one question. Therefore, further research would be needed to clarify the beliefs underlying girls' perceived pubertal timing in early adolescence. As findings are based on a sample of Lithuanian adolescent girls living in an urban area, the results may not be generalizable across cultures and other residential areas. Further research should study the results across cultures. It would be also valuable to measure emotional and behavioral difficulties in adolescence not only by self-report measures, but include the perspectives of parents and teachers. It would be valuable to take these considerations into account in future research.



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## Relationships between Posttraumatic Negative Cognitions, Panic Attack and Posttraumatic Stress Symptoms

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### **Abstract**

Various studies have shown that both negative cognitions and panic attacks can be significant in the maintenance of posttraumatic stress disorder (PTSD) symptoms, and that there is a significant comorbidity between panic attacks and PTSD. The aim of the present study was to examine the relationship of posttraumatic negative cognitions, panic attack and PTSD symptoms. Participating in the study were 152 adult respondents who had suffered from trauma. They completed the: Posttraumatic Cognitions Inventory, PTCI (Foa, Ehlers, Clark, Tolin, & Orsillo, 1999), Posttraumatic Stress Diagnostic Scale, PDS (Foa, 1995), Panic and Agoraphobia Scale, PAS (Bandelow, 1999). The results of the study showed that panic attacks, PTSD and negative cognitions are multi-directionally interrelated. Panic attack symptoms partially mediated the effect of negative cognitions on PTSD; PTSD symptoms partially mediated the effect of negative cognitions on panic attacks; PTSD partially mediated the effect of panic attacks on negative cognition ratings. Results are discussed in relation to psychotherapy treatment approaches.

**Key words:** *trauma-related cognitions, posttraumatic stress disorder, panic attacks*

### **Introduction**

Traumatic events are an unavoidable fact of life. Everyone is subject to the possibility of a traumatic experience (a road accident; emotional, physical or sexual abuse; a life-threatening disease). As one of the more severe consequences of a traumatic event, post-traumatic stress disorder (PTSD) may develop. PTSD is a complicated condition which is related to serious health issues, a high risk of disability and hindered adaptability (Foa, Keane, & Friedman, 2000).

Post-traumatic stress disorder develops as a delayed or prolonged response to a psychotraumatic situation (short-term or long-term) of a highly threatening or catastrophic nature, capable of causing anyone a difficult emotional experience. During the period from 1980 (DSM-III, 1980) until the publication of the revised diagnostic manual in May of 2013 (DSM-5, 2013) symptoms of PTSD had traditionally been characterized by three symptom groups: intrusion of memories associated with the traumatic event; persistent avoidance of stimuli associated with the traumatic event; marked alterations in arousal and reactivity associated with the traumatic event.

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In the newly published diagnostic manual negative alterations in cognitions and mood associated with the traumatic event are included as a fourth symptom group characterizing PTSD.

According to information processing theory the traumatic event is encoded in memory as a special occurrence, and incomplete information processing of this experience becomes a risk for psychopathology. The importance of integrating the trauma-related information into the broader memory-system is accentuated (Foa & Kozak, 1986; Foa, Feske, Murdock, Kozak, & McCarthy, 1991). The development of a cognitive schema involving a significant fear network has also been suggested, implying that PTSD differs from other types of anxiety by its attribution of excessive significance to the traumatic event, thereby undermining preceding notions of safety (Foa et al., 1991). The PTSD fear network is responsible for activating emotional and somatic reactions, such as increased heart-rate, which are more pronounced in PTSD than for other anxiety disorders.

In their work with physical and sexual abuse victims Foa and colleagues expanded the fear network theory, developing it in several directions (Foa et al., 1991). The relationship between PTSD and cognitions about the self and the world which have developed before, during and after the trauma was examined in detail. Their research showed that people who have held rigid beliefs prior to the trauma are more prone to PTSD. The cognitions before, during and after the trauma were considered to interact to strengthen fundamental negative schemas, including the self-image of being an incompetent person, and a vision of the world as highly dangerous, thereby forming the cognitive basis of chronic PTSD symptoms. For people suffering from PTSD, structures of the fear network are readily activated by any trauma-related information, due to the low activation threshold of this network in response to a multitude of various stimuli from the environment which have become associated with the information incorporated in these cognitive structures. Attempts to avoid fear activation leads to the development of the avoidance symptom (Foa, Riggs, Massie & Yarczower 1995; Zoellner, Foa, & Fitzgibbons, 2004).

Explanations of the development of PTSD are enhanced by the dual representation theory of a double memory system. According to this theory two memory systems operate simultaneously, either one of which can become dominant in certain situations. In response to the trauma, an oral or written narration of the trauma becomes a part of the verbal memory system or *verbally accessible memory* (VAM), as suggested by Brewin (Brewin, Dalgleish, & Joseph, 1996; Brewin & Holmes, 2003). The VAM system reflects in its function the integration of a narrative account of the traumatic memories together with prior autobiographical memories, and this allows for these memories to be easily accessible and recollected in case of need. The VAM of a trauma presents itself in the context of the entire sequence of the autobiographical memories, including those of the past, present and envisioned future. The VAM system memories include experience and information observed by the person before, during and after the traumatic event. Such information has been sufficiently and consciously processed so that it is stored in long-term memory and can be easily and consciously recalled afterwards. These memories can be verbally communicated to others, although the content of the narration is limited to consciously processed information.

Flashbacks or intrusive memories are considered to originate from the *situationally accessible memory* (SAM) system. As a result of this memory system, certain situations which remind one of the trauma, can provoke recurrent experiences. The SAM system consists of information obtained on the sensory-perceptual level, including sights and sounds perceived too briefly or traumatically to be attended to consciously and to be registered in the VAM system. The SAM system also stores information about the somatic reaction to trauma, such as changes in heart-rate or body temperature, blushing, and pain. As a result, the recurrent memories are much brighter, more detailed and emotionally saturated than normal memories.

Due to the non-verbal nature of the SAM system, these memories are difficult to communicate to others, and they do not necessarily interact among themselves or with other autobiographical information. SAM memories are difficult to control as it is impossible for the person to constantly regulate the sights, sounds or smells in the environment that may remind him or her of their trauma.

It has been suggested on the basis of the dual representation theory, that PTSD is a hybrid disorder, potentially combining two different pathological processes: one aims to prevent negative cognitions and related emotions, the other is concerned with the prevention of flashbacks (Brewin & Holmes, 2003). Recovery depends on the results of changes within both processes. First, the intensity of the negative emotions which are experienced as the result of the cognitive assessment of the trauma, must be decreased by intentionally regaining a sense of control. Second, the automatic activation of trauma-related SAM must be prevented. It is suggested that this may be achieved by forming a new SAM, which serves to block access to the previous trauma memory. Exposure techniques and a cognitive reconstruction of the meaning of the traumatic event can facilitate the development of new SAM, which includes trauma-related sensory information, but without the traumatic experience, thereby decreasing excitability and the intensity of emotional reactions.

Discoveries from cognitive neuroscience in relation to this theory emphasize the role of the amygdala in the activation of fear reactions, and the role of the various neurotransmitter pathways which may be delivering trauma-related information to the amygdala (Taylor, 2009). Neurotransmitter pathways which allow for information-processing in the hippocampus facilitate narrative representations of the traumatic experience that are integrated, have been logically examined and are coherent within the spatial and temporal context. These representations can be consciously recalled in a manner similar to other VAM memories. Nevertheless, information can reach the amygdala directly without an involvement of the hippocampus. It is impossible to consciously recall memories which are formed on the basis of activity within these alternative neurotransmission pathways, or to place them into a broader temporal and spatial context – these memories are involuntarily activated by various reminders and especially by stimuli that are similar to those encoded in the trauma memory (Brewin & Holmes, 2003).

One of the most popular PTSD theories today is the cognitive model developed by Ehlers and Clark (Ehlers & Clark, 2000). They focused on a PTSD paradox – patients with PTSD are anxious about future, even though the trauma occurred in the past.

These researchers have suggested that pathological reactions to trauma arise when the individual processes traumatic information in a manner that provokes a constant sense of an imminent internal or external threat to their safety and future. The two main mechanisms exerting such influence are a negative cognitive assessment of the trauma and its consequences, and the character of the trauma-related memories at the sensory-perceptual level.

Ehlers and Clark have expanded on the work of other researchers (Foa & Rothbaum, 1991; Jones & Barlow, 1990) by identifying various types of trauma assessments. Some assessments focus on the traumatic event and overgeneralize the danger (“others will always perceive me as a victim”), some focus on a negative self-evaluation (“I deserve all the bad things that have happened to me”). Other assessments are related to the consequences of the trauma, such as emotional numbing (“I will never experience mutual understanding”), other people’s reactions (“they all think that I am too weak to manage on my own”), or future prospects (“my body is forever damaged”). The various assessments of trauma and its consequences explain the wide range of emotions reported by PTSD patients. The emergence of negative assessments is facilitated by the cognitive processes which take place during and after the trauma, as well as by previous convictions and experience. As a consequence of the trauma other physical and psychological disorders can also develop, such as addictions, vegetative disturbance and panic attacks (Feldner et al., 2009).

Panic disorder by definition involves frequently occurring panic attacks. A panic attack is initiated with a sudden intense fear in anticipation of danger and a whole range of unpleasant physical sensations. These may include shortness of breath, palpitation, chest-pain, suffocation, vertigo, tingling sensation in hands and feet, hot and cold flashes, asthenia, shivers and detachment from reality (Dattilio & Kendall, 2010). People are normally aware of the source of such frightening somatic sensations, but in the case of panic attacks they become prominent without a discernible cause, are inexplicable and often the panic attack ends in despondency. Signs of panic can constitute the primary disorder or may accompany and complicate other disorders, such as PTSD (Roy-Byrne, Grasko & Stein, 2006).

The main etiological explanations of panic attacks are both physiological and cognitive. Irrespective of which mechanism (physiological or cognitive) is dominant, several studies have been based on the main assumption that panic attacks are affected by a positive feedback loop whereby the somatic symptoms become associated with threat or danger, and as a result there is an increase in anxiety, which then increases the somatic symptoms (Clark et al., 1997). Individual predispositions and situational factors are among the probable developmental agents. Some authors also ascribe importance to childhood experiences, for example, attachment disorder, traumatic childhood events, the illness of a family member (Ehlers, 1993; Fava & Morton, 2009; Pilecki, Arentoft, & McKay, 2011). Panic attacks can greatly aggravate social, professional and physical problems. People with panic attacks or panic disorder make use of medical services much more often than people without the disorder.

Cognitive factors, including beliefs, thoughts, interpretations and assessments are very important in their contributions to the development of both PTSD and panic attacks. Research has shown that a negative assessment of external circumstances or



internal feelings may maintain symptoms of both PTSD and panic attacks. According to the Panic attack – PTSD model proposed by Hinton and colleagues, panic attacks occur when somatic sensations generate dysphoric associations, which in turn can be linked to fear networks of traumatic memories, catastrophic cognitions, metaphoric associations to trauma, or by conditioning to a sense of fear (Hinton, Hofmann, Pitman, Pollack, & Barlow, 2008). Upon the activation of any part of these fear networks, anxiety increases significantly, resulting in a panic attack, which, in turn, can increase the severity of PTSD. The treatment of panic attacks with cognitive behavioral therapy can have a partial mediatory effect during the treatment of PTSD, whereby the treatment and minimization of panic attack severity leads to improvement and minimization of PTSD severity (Hinton et al., 2008).

Several researchers have stated that the interrelation of PTSD and panic attacks needs to be studied more completely (Cogle, Feldner, Keough, Hawkins, & Fitch, 2010; Hinton et al., 2008). Also, although there have been a series of studies involving negative cognitions in relation to PTSD, there has been little study of negative cognitions in relation to panic attacks, nor have there been studies of these three phenomena in relationship to each other. The study by Hinton and colleagues involved a very specific traumatic experience of Cambodian refugees. The present study involves the consequences of traumatic experience in a very different sociocultural context, Latvia.

Previous researchers have indicated that there may be a „vicious circle” (Hinton, Nickerson, & Bryant, 2011) whereby negative cognitions and PTSD symptoms have a tendency to impact and aggravate each other. It is known that the traumatic experience can result in negative cognitions about one’s self and the world, and that these negative cognitions can facilitate and uphold PTSD symptoms (Dagleish, 2004; Dunmore, Clark, & Ehlers, 2000; Ehlers & Clark, 2000; Foa et al., 1991) by activating „fear networks” and promoting hypervigilance. In turn, the same authors propose that PTSD symptoms can facilitate further negative evaluations about oneself, for example, the extent to which one is able to cope with daily challenges related to PTSD. Negative cognitions have also been consistently implicated in the „Cognitive Approach to Panic” as proposed by Clark (1986), and later confirmed in experimental studies supporting the central role of cognitive misinterpretations in the panic attack cycle (Chambles, Beck, Gracely, & Grisham, 2000; Clark, 1996; Meulenbeek, Spinhoven, Smit, van Balkom & Cuijpers, 2010). And, as mentioned above, the „Panic Attack – PTSD model” (Hinton et al., 2008), predicts that panic attacks can augment the PTSD symptoms, and when cognitive-behavioral psychotherapy results in a decrease in panic attack symptoms, then this also affects a decrease in PTSD symptoms. Nevertheless, the above implied interrelationships between negative cognitions, panic attacks and PTSD, which may be connected in a „vicious circle” manner (Hinton et al., 2011), have not been empirically validated to date. Therefore, it is pertinent to examine the interrelationships of negative cognitions, panic and PTSD, and to explore the possible mediational models including these variables in order to verify the predictive power presented by each of these models.

In this study the following research questions were posed: What are the relationships between symptoms of panic attacks, PTSD and post-traumatic negative cognitions?

In addition, on the basis of the finding by Hinton and colleagues that panic attack symptoms partially mediate PTSD symptom severity, in the present study an additional research question was posed: Are there any meditational effects between panic attacks, PTSD and post-traumatic negative cognitions?

## **Method**

### **Participants**

Questionnaires were completed fully by 152 adult research participants, all of whom had suffered from trauma and all of whom reported symptoms of PTSD. They were aged 19 to 59 years old ( $M = 32.56$ ;  $SD = 8.64$ ). The majority of participants were female (62%;  $n = 95$ ), 38% ( $n = 57$ ) were male. Higher education had been completed by 34,8% ( $n = 53$ ) of the participants, 33,6% ( $n = 51$ ) – secondary education or incomplete higher education, 30,9% ( $n = 47$ ) – vocational education, un one person (0,7%) had only primary education completed.

All of the research participants reported that they had experienced a major traumatic incident, which happened more than at least one month previously. Many of the respondents (43%) reported that the traumatic incident happened more than 5 years ago. Participant responses to questions about the type of trauma they had experienced were categorized in six groups of traumatic event types. In the first group were those who had experienced a major automobile accident, 25.7% ( $n = 39$ ). In the second group were those who had experienced physical abuse, including physical abuse from a stranger, known person or family member, 25% ( $n = 38$ ). In the third group were those who had experienced sexual abuse, including physical abuse from a stranger, known person or family member, in childhood or adulthood, 12.5% ( $n = 19$ ). In the fourth group were those who reported major emotional abuse as the most traumatic even experienced, 15.8% ( $n = 24$ ). In the fifth groups were those who marked illness and health related problems, for example, oncological illness, removal of an organ or limb, 13.2% ( $n = 20$ ). In the sixth group were people who as their most traumatic experience reported participating in a peace keeping military, 7.9% ( $n = 12$ ).

Panic attacks were reported by 91 research participants (60%). Mild PTSD symptoms were reported by 30% of the participants ( $n = 46$ ), moderate – 38% ( $n = 58$ ), moderately severe – 28% ( $n = 42$ ) and 4% ( $n = 6$ ) of the participants reported severe level of PTSD symptoms.

Research participants were recruited by distributing information about the study at several local hospital wards where there are patients who have suffered from different types of trauma, and also at several local crisis centers, and at a military base where there are soldiers who have suffered from trauma while serving abroad.

### **Measures**

Three assessment tools, previously unused in Latvia, were translated, adapted and used in this study. The measures were translated by forward-backward translation to both Latvian and Russian languages, and respondents completed the questionnaire in their preferred language.

Post-traumatic Cognitions Inventory (PTCI; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). This scale consists of 36 items which are rated using a 7-point Likert type scale from 1 (*totally disagree*) to 7 (*totally agree*). The PTCI includes three sub-scales: „Negative Cognitions about Self”, „ Negative Cognitions about the World” and „Self Blame”. Cronbach’s alpha for the PTCI scale and subscales in this study were as follows: total score,  $\alpha = .97$ , negative cognitions about the self,  $\alpha = .97$ , negative cognitions about the world,  $\alpha = .90$ , self-blame scale,  $\alpha = .84$ .

Posttraumatic Stress Diagnostic Scale (PDS; Foa, 1995). This is a 49-item self-report scale, designed to aid in the diagnosis of posttraumatic stress disorder. The PDS includes three symptom sub-scales (Reexperiencing, Avoidance, Arousal), with 17 items, that can provide the basis for a diagnosis of PTSD and measures of overall and subscale symptom severity. Respondents rate each item on a 4-point scale (0 = *not at all* to 3 = *very much*) in evaluation of their symptoms over a period of the past month. A symptom is counted as present if a score of 1 or higher is selected. Cronbach’s Alpha for the 3 subscales in this study:  $\alpha = .87 - .92$ .

Panic and Agoraphobia Scale (PAS; Bandelow, 1999). This is a 13-item scale, with the possible responses of 0 – 4, and is divided into 5 subscores (panic attacks, agoraphobic avoidance, anticipatory anxiety, restriction of activities and quality of life, and worries about health). The total score indicates the severity of the disorder. Cronbach’s Alpha for this study were  $\alpha = .96 - .97$ .

Demographic questionnaire included items concerning respondents’ age, gender, marital status, education, occupation and income level.

## Procedure

Questionnaires were completed individually in the psychologist’s office at the hospital or crisis center. All participants completed the demographic questionnaire, Posttraumatic Stress Diagnostic Scale, Posttraumatic Cognitions Inventory and the Panic and Agoraphobia Scale. Participants were informed about the nature of the study, and principles of voluntary participation and confidentiality.

## Data analysis

SPSS version 17.0 (Statistical Package for the Social Sciences) was used to process the data. The data was analysed with correlation and regression analysis; mediation effect was tested with the Sobel test.

## Results

To answer the first research question, “What are the relationships between symptoms of panic attacks, PTSD and post-traumatic negative cognitions?”, Spearman’s correlation analysis was applied. The correlation coefficients, reflected in the Table 1, indicate that statistically significant correlations are evident between all of the ratings of post-traumatic negative cognitions, panic attacks and PTSD symptoms.

**Table 1. Correlation Coefficients of Panic Attack, PTSD Symptom and Post-Traumatic Negative Cognition Ratings ( $n = 152$ )**

|                         | 1     | 2     | 3     | 4     | 5     | 6     | 7     |
|-------------------------|-------|-------|-------|-------|-------|-------|-------|
| 1. Panic Attacks        | --    |       |       |       |       |       |       |
| 2. PTSD                 | .49** | --    |       |       |       |       |       |
| 3. Reexperiencing       | .55** | .75** | --    |       |       |       |       |
| 4. Avoidance            | .40** | .88** | .55** | --    |       |       |       |
| 5. Hyperarousal         | .35** | .81** | .41** | .64** | --    |       |       |
| 6. NC <sup>1</sup> Self | .53** | .56** | .57** | .53** | .32** | --    |       |
| 7. NC World             | .25** | .41** | .36** | .34** | .33** | .55** | --    |
| 8. NC: Self-blame       | .34** | .30** | .36** | .25** | .16*  | .65** | .47** |

\*\* $p < 0.01$ ; \* $p < 0.05$

Note. N.C.Self = Negative Cognitions About Self; N.C.World = Negative Cognitions About the World

To answer the second research question, “Are there any meditational effects between panic attacks, PTSD and post-traumatic negative cognitions?” a series of regression analyses was carried out.

An initial regression model was developed to examine panic attacks as a mediator between negative cognitions and PTSD. First, regression analysis was performed with panic attack ratings as the dependent variable, and negative cognition ratings as the independent variable. In the second step regression analysis was performed with PTSD ratings as the dependent variable, and negative cognition ratings as the independent variable. And, as the third step, regression analysis was performed with PTSD as the dependent variable, predicted by panic attacks and negative cognitions as independent variables. The regression analysis indicators show that the association between negative cognitions and PTSD indicators is statistically significant both in the second ( $\beta = .52$ ;  $p < .001$ ) and the third ( $\beta = .36$ ;  $p < .001$ ) regression equation, but the association decreases upon the introduction of panic attack ratings into the analysis. This indicates the independent contribution of negative cognitions and panic attacks in the prognosis of PTSD: negative cognitions account for 27% of the variation in PTSD ratings, and panic attacks account for an additional 13% of the variation for a total of 40% ( $F = 49.60$ ;  $p < .001$ ;  $R^2 = .40$ ) of the variation explained. The application of the Sobel test to the mediation effect showed that a statistically significant change occurs upon the introduction of panic attacks into the mediation model ( $z = 2.5$ ;  $p < .01$ ). Nevertheless, negative cognitions maintain their prognosticative value, which indicates a partial meditational role of panic attack severity on PTSD symptom severity (see Figure 1).

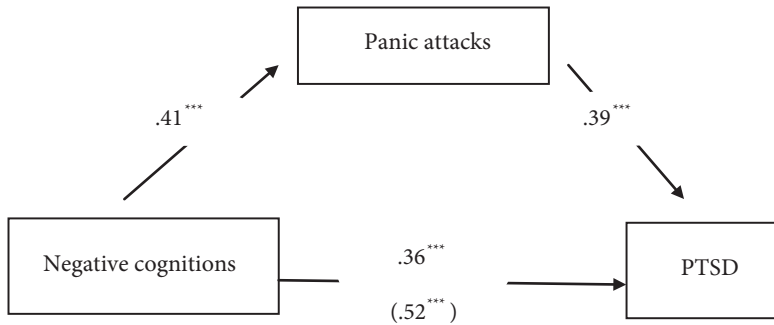


Figure 1. The partial mediation effect of panic attacks on the association of negative cognitions and PTSD ratings ( $n = 152$ ).

The second mediational analysis was to examine PTSD symptom severity as a mediator between negative cognitions and panic attack severity. First, regression analysis was performed with PTSD ratings as the dependent variable, and negative cognition ratings as the independent variable. In the second step regression analysis was performed with panic ratings as the dependent variable, and negative cognition ratings as the independent variable. And, as the third step, regression analysis was performed with panic ratings as the dependent variable, predicted by PTSD and negative cognitions as independent variables. The regression analysis indicators show that the association between negative cognitions and panic ratings is statistically significant both in the second ( $\beta = .41$ ;  $p < .001$ ) and the third ( $\beta = 0.17$ ;  $p < .001$ ) regression equation, but the association decreases upon the introduction of PTSD ratings into the analysis. This indicates the independent contribution of negative cognitions and PTSD in the prognosis of panic: negative cognitions account for 16% of the variation in panic ratings, and PTSD ratings account for an additional 15% of the variation, for a total of 31% ( $F = 33.99$ ;  $p < .01$ ;  $R^2 = .31$ ) of the variation explained. The application of the Sobel test to the mediation effect showed that a statistically significant change occurs upon the introduction of panic attacks into the mediation model ( $z = 2.75$ ;  $p < .01$ ). Nevertheless, negative cognitions maintain their prognostic value, which indicates a partial mediational role of PTSD severity on panic symptom severity (see Figure 2).

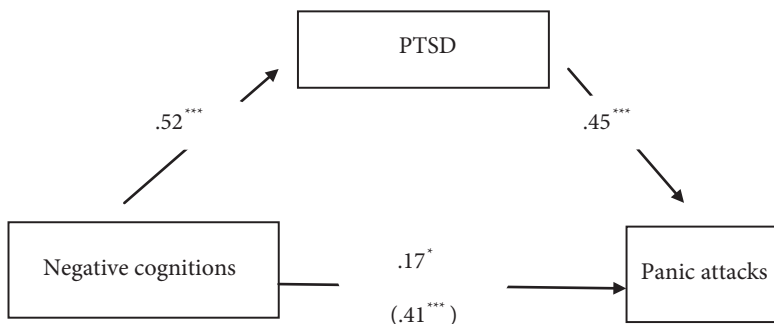


Figure 2. The partial mediation effect of PTSD ratings between negative cognitions and panic attack ratings ( $n = 152$ ).

A third mediational analysis was performed to examine mediational effects in predicting negative cognitions. Initial analysis showed that the partial mediational model was substantiated with the scale “Negative Cognitions of Self”. In the first step, regression analysis was performed with negative cognitions of self as the dependent variable and panic attack ratings as the independent variable. In the second step regression analysis was performed with PTSD ratings as the dependent variable, and panic attack ratings as the independent variable. And, as the third step, regression analysis was performed with negative cognitions of the self as the dependent variable, predicted by panic attacks and PTSD as independent variables. The regression analysis indicators show that the association between panic attacks and negative cognitions of self is statistically significant both in the second ( $\beta = .49; p < .001$ ) and the third ( $\beta = .27; p < .01$ ) regression equation, but the association decreases upon the introduction of panic attack ratings into the analysis. This indicates the independent contribution of panic attacks and PTSD in the prognosis of negative cognitions of the self: panic attack ratings account for 24% of the variation in negative cognitions of self ratings, and PTSD ratings account for an additional 12% of the variation for a total of 36% ( $F = 42.39; p < .01; R^2 = .36$ ) of the variation explained. The application of the Sobel test to the mediation effect showed that a statistically significant change occurs upon the introduction of panic attacks into the mediation model ( $z = 4.47; p < .001$ ). Nevertheless, negative cognitions maintain their prognosticative value, which indicates a partial mediational role of panic attack severity on PTSD symptom severity (see Figure 3).

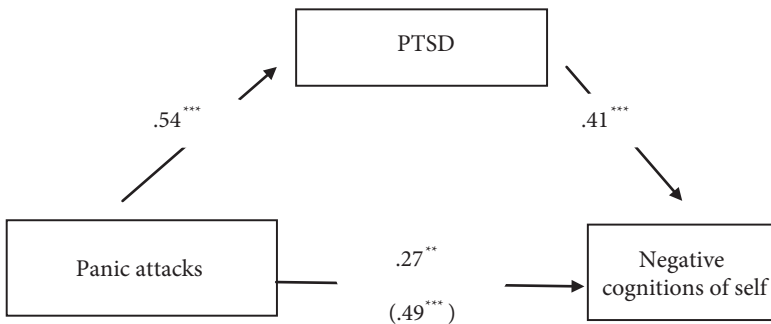


Figure 3. The partial mediation effect of PTSD ratings between panic attack and negative cognition ratings ( $n = 152$ ).

## Discussion

The interrelationship between ratings of negative cognitions, panic attack symptom severity and PTSD symptom severity was examined and confirmed. The results indicate that the three variables are interrelated as can be seen in several mediational models. Panic attack symptom severity had a partial mediational role between negative cognitions and PTSD; PTSD ratings had a partial mediational role between negative cognitions and panic attack severity; and PTSD symptom severity had a partial mediational role between panic attack severity and negative cognitions of self. This indicates that

both negative cognitions and panic attack ratings independently contribute to PTSD symptom severity; and negative cognitions and PTSD independently contribute to panic attack severity; and panic attacks and PTSD symptom severity independently contributes to negative cognitions of self. The implications of these results are that negative cognitions, panic attack symptom severity and PTSD symptom severity can serve to mutually reinforce each other.

Until now there has been only one known study of the interrelationships between panic attacks, PTSD and negative cognitions (Hinton et al., 2008), but the focus of this previous study was very specific in that it concerned the cultural peculiarities of PTSD and panic attack symptoms among Cambodian refugees. Also the cognitions examined in this study were specifically in regard to interpretations of the panic attack somatic reactions. Hinton and colleagues concluded their study by stating that these interrelationships between panic attacks, PTSD and negative cognitions should be further studied in other sociocultural contexts, as it has been done in the present study. Previous PTSD researchers typically have analyzed only the connection between PTSD and negative cognitions or between PTSD and panic attacks, but not the interrelationships of these three variables (Foa, et al., 1999; Ehlers & Clark, 2000; Elwood & Williams, 2007, Daie-Gabai, Aderka, Allon-Schindel, Foa, & Gilboa-Schechtman, 2011).

The understanding of the relationship between panic attacks, negative cognitions and PTSD can provide opportunity to develop more effective treatment strategies for people suffering from PTSD and panic attacks. The results of a previous study which examined the changes in ratings of negative cognitions and PTSD during and as a result of the process of cognitive behavioral psychotherapy, showed that the severity of PTSD symptoms is best decreased by changes in negative cognitions about the self (Karl, Rabe, Zoolner, Maercker, & Stopa, 2009). Previous research has concluded that decreasing the severity of panic attacks through cognitive behavioral therapy partially also decreases the severity of PTSD (Hinton et al., 2008). Another study has demonstrated that the use of interoceptive exposure, which is one of the basic treatment methods for panic attacks, activates the traumatic memories in people with PTSD, and as a result of habituation the anxiety threshold is decreased. Application of this method causes habituation to the memories and somatic reactions, thus reducing the severity of PTSD (Wald & Taylor, 2008). The implications of the results of the present study are that patients who are suffering both from PTSD and panic attacks would most likely benefit from a dual treatment approach, based upon the dual representation theory of memory, in order to facilitate symptom minimization or alleviation (Falsetti, Resnick, & David, 2008). That is, the results of this study imply that it would be most beneficial to engage the patients in a treatment program which would include cognitive restructuring in order to address the negative cognitions, which are a part of the VAM consciously and narratively based memory system, and also include exposure therapy in order to address the sensory-perceptual associations of panic attacks and PTSD which are part of the SAM memory system. This would then result in the greatest benefit for the patients.

One of the limitations of this study is that only self-report questionnaires were used. It is most likely that by incorporating interview methods additional information would



have been attained. An interview situation would also have allowed for the possibility to motivate and encourage the study participants to answer in a more complete and elaborated manner. In the future it would also be of benefit to conduct longitudinal studies to look at the relationships and changes in the negative cognitions, panic attack and posttraumatic stress symptoms over time.

In sum, the findings from the present study point to the interrelationships between negative cognitions, panic attacks and PTSD severity ratings. The practical implications of the study results are that both cognitive restructuring of the negative cognitions, as well as exposure techniques which target symptoms within the sensory-perceptual domain would be essential for the most beneficial treatment of PTSD symptom severity.

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This work has been supported by the European Social Fund within the project «Support for Doctoral Studies at University of Latvia».

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The “Baltic Journal of Psychology” is published by the Department of Psychology, Faculty of Education and Psychology, University of Latvia. The journal publishes original papers on current issues in psychology as well as empirical, theoretical, and practical articles on broad aspects of psychology. It will appear two times a year.

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