

Emotional Creativity: A Meta-analysis and Integrative Review

Martin Kuška^{1,2}, Radek Trnka^{1,2}, Josef Mana^{1,3}, Tomas Nikolai^{1,3}

¹Prague College of Psychosocial Studies, Czech Republic

²OUSHI, Palacky University, Czech Republic

³Charles University, Czech Republic

Abstract

Emotional creativity (EC) is a pattern of cognitive abilities and personality traits related to originality and appropriateness in emotional experience. EC has been found to be related to various constructs across different fields of psychology during the past 30 years, but a comprehensive examination of previous research is still lacking. The goal of this review is to explore the reliability of use of the Emotional Creativity Inventory (ECI) across studies, to test gender differences and to compare levels of EC in different countries. Thirty-five empirical studies focused on EC were retrieved and the coefficients required for the meta-analysis extracted. The meta-analysis revealed that women showed significantly higher EC than men (total $N = 3,555$). The same gender differences were also found when testing scores from three ECI subscales, i.e. emotional novelty, emotional preparedness and emotional effectiveness/authenticity. When comparing EC in 10 different countries (total $N = 4,375$), several cross-cultural differences were revealed. The Chinese sample showed a significantly lower average ECI total score than all the other countries. Based on the integration of results, the avenues for future research on EC and the breadth of influence of the concept of EC across different fields of psychology are discussed.

Note: This is the preprint version of the manuscript, the published article is available at <https://doi.org/10.1080/10400419.2020.1751541>

Keywords: Emotional Creativity, Review, Meta-Analyses, Meta-Analysis, Definition, Emotional Creativity Inventory, ECI, Reliability, Gender Differences, Cross-cultural, Cross-culture, Personality Traits, NEO Personality Inventory, Big Five, Extraversion, Agreeableness, Openness to Experience, Introversion, Neuroticism, Emotions, Creativity, Cognition, Cognitive Abilities, Affect, Fantasy, Coping, Alexithymia, Anhedonia, Self-understanding, Motivation, Creativeness, Innovative Performance, Creative Ability, Artistic Creativity, Creative Thinking

MeSH Headings: Emotions, Creativity, Affect, Affective Symptoms, Gender, Sex, Gender Identity, Cross-Cultural Comparison, Transcultural Studies, Temperament, Extraversion, Neuroticism, Anhedonia, Creativeness, Cognition, Cognitive Function, Artistic Creativity, Creative Ability, Creative Thinking

Emotional creativity (EC) is a pattern of cognitive abilities and personality traits related to originality and appropriateness in emotional experience (Averill, 1999; Ivcevic, Brackett, & Mayer, 2007). It significantly pervades human creative performance, because it involves one's ability to connect with the reasons for and consequences of emotional responses at the preparation stage of the creative process as well as to experience and express novel emotions at the verification stage of the creative process (Averill, 1999; Soroa, Gorostiaga, Aritzeta, & Balluerka, 2015). Therefore, it is not surprising that higher EC has been found to be related to the increased involvement of participants in creative leisure-time activities, e.g. creative writing, painting, composing music, dance improvisation, theatrical improvisation and do-it-yourself activities (Trnka, Zahradnik, & Kuška, 2016).

EC is considered to be one of three main areas of general creativity, together with nonverbal and verbal creativity and creativity in problem solving (Ma, 2009). The important feature of EC is a divergence from the ordinary emotional experience, because it involves the cognitive abilities that enable cognition to diverge from common and generate novel emotional reactions (Ivcevic et al., 2007; Trnka, Cabelkova, Kuška, & Nikolai, 2019). Emotionally creative abilities have been found to be closely related to cognitive abilities supporting innovative performance, i.e. idea generation, promotion and realization (Wang, Huang, & Zheng, 2015).

The Emotional Creativity Inventory (ECI, Averill, 1999) is the most widely used instrument for measuring EC. The ECI consists of three subscales: (1) Preparedness, comprising understanding and learning from one's own and others' emotions, (2) Novelty, referring to the ability to experience unusual emotions, and (3) Effectiveness/Authenticity, linked to the skill to express emotions adroitly and honestly

(Averill, 1999). During the past two decades, the ECI has been found to correlate with a wide spectrum of other scales and measures (for an overview, see Electronic Supplementary Material 1). For example, the ECI positively correlated with openness to experience (Averill, 1999, Study 3; Ivcevic et al., 2007; Luke & Zychowicz, 2014) and agreeableness subscales of the NEO Personality Inventory (Averill, 1999, Study 3) or with hope and positive affect (Sharma & Mathur, 2016). Among others, the ECI negatively correlated with alexithymia (Fuchs, Kumar, & Porter, 2007) and apathy accompanying cognitive deficits in late adulthood (Trnka et al., 2019).

Despite the applied significance of EC and the number of empirical studies reporting various relationships with other variables, to our knowledge, no review summarizing the evidence concerning EC has been published so far. The present review aims to summarize the existing empirical evidence that includes EC and to integrate recent knowledge on EC into a comprehensive framework.

METHOD

Eligibility criteria

The current review retrieved all empirical studies concerning EC published in peer-reviewed resources written in the English (30 papers), or Russian (5 papers) languages. The main criterion for including the paper into the review was that EC was investigated empirically in the given study (other inclusion criteria: the language of the publication is English, German or Russian; the full text is available; the paper is published in a peer reviewed source; exclusion criterion: the methodological quality of the paper is recognized as poor). The review was elaborated in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009) and recommendations of the Cochrane Collaboration (Higgins & Green, 2008).

[please, insert **Figure 1** about here]

Search strategy and extraction of findings

All the appearances of EC in peer-reviewed papers accessible via Google Scholar, EBSCO and the Web of Science were considered. The exact phrase was *emotional creativity* for Google Scholar and *emotional WO creativity* for EBSCO, respectively. The subsequent phrases were *emotion* creativ** and *emotion* WO creativ**, respectively.

As of 24 April 2018, database searches generated 1290 occurrences of EC (see Figure 1). Doctoral dissertations, MA theses and popular papers were excluded. After removing duplicates, the full-texts of 198 papers were screened for relevance. All full texts of the selected papers were then examined to exclude papers in which EC was only mentioned, without any empirical findings involving EC.

Finally, 35 empirical journal papers dealing with EC were selected (see Electronic Supplementary Material 1). Subsequently, the reference lists of the retrieved manuscripts were scanned for relevant sources, and these sources were later retrieved. *Forward* tracking was conducted with the *Times cited* tool provided by the Web of Science. This operation did not reveal any other papers relevant for inclusion into the review.

All empirical findings involving EC were independently extracted by two reviewers (TN and MK). The following information was collected: (1) a description of the results of empirical findings regarding EC, (2) the methodological quality assessed using the PRISMA-P protocols (Shamseer et al., 2015). For the purposes of meta-analysis, all the EC-relevant data were excerpted from the papers. When insufficient data were available from the papers, the authors were contacted to request missing data.

RESULTS

Disciplinary reach of the EC concept and distribution of citations in time

The disciplinary reach of Averill's (1999) fundamental paper introducing EC and the method of its measurement, the ECI, was assessed. To reveal the disciplinary reach, the method of Starr and Zurbriggen (2017) for mapping citations in time was applied. First, all citations of Averill's (1999) paper were tracked on Google Scholar, using the function *Cited by* for searching in papers containing the given reference. On the 17 January 2019, the search resulted in 224 references. Subsequently, books, theses, dissertations and conference proceedings were excluded from this sample. One-hundred-eight scientific papers containing a citation of Averill's (1999) paper were found in 86 unique journals. Second, these journals were coded for the discipline of the publication outlet.

[please, insert **Figure 2** about here]

The largest number of citations (see Electronic Supplementary Material 2) were published in the creativity/cognitive psychology journal category (10) and the same number of citations (10) were found for the category multidisciplinary psychology. Other journals with a higher number of quotations of Averill's (1999) paper were from the social psychology category (8), the personality psychology category (8) and the organizational psychology category, respectively (7). Furthermore, in order to display how the impact of Averill's (1999) concept of EC is distributed in time, a histogram by year was created (Figure 2).

Reliability generalization

To test the internal consistency of ECI and its subscales, a reliability generalization meta-analysis was conducted (Vacha-Haase, 1998). The summary statistics and its 95% confidence intervals (CIs) were estimated using an inverse-variance weighted random-

effects model. To assess possible sources of heterogeneity, meta-regression with language as a moderator was conducted. For all analyses .05 level of statistical significance was used. All analyses were performed using the *metafor* package (Viechtbauer, 2010) in the software environment for statistical computing R version 3.4.4 (R Core Team, 2018).

The sample used for the reliability generalization analysis of the ECI global scale ($N = 5,479$) consisted of fourteen studies that used the whole 30-item ECI questionnaire, two studies that used a shortened 17-item version (Soroa et al., 2015; Oriol, Amutio, Mendoza, Da Costa, & Miranda, 2016) and one study that used an abridged 13-item version (Gutbezahl & Averill, 1996). The sample used for the reliability generalization analysis of the three ECI subscales (Novelty, Preparedness and Effectiveness/Authenticity) ($N = 6,284$) consisted of fifteen studies that used the full version of the ECI, two studies that used a shortened 17-item version (Soroa et al., 2015; Oriol et al., 2016) and one study that used a shortened 28-item version (Soroa et al., 2016).

Table 1 presents descriptive statistics of the sample, estimated summary statistics with its 95% CIs and statistics assessing heterogeneity. The meta-analysis revealed acceptable alpha values for the ECI global scale ($\alpha = .84$, 95% CI [.81, .86]) and the subscales ($\alpha \geq .75$).

[please, insert **Table 1-2** about here]

Seven different languages (English, French, Spanish, Georgian, Persian, Russian and Czech) were considered as moderators for the ECI global scale and six different languages (English, Spanish, Georgian, Persian, Russian and Czech) were considered as moderators for all three ECI subscales. Table 2 presents the results of the test of moderators, heterogeneity measures of the moderator models and the amount of

heterogeneity accounted for by the models. The language did not moderate the ECI total score. In contrast, the language moderated the Novelty, Preparedness and Effectiveness/Authenticity subscales' scores. The language in which the ECI was administered predicted 2% of the reliability heterogeneity across studies when the overall scale effect size was the criterion, 73% of the reliability heterogeneity across studies when the Novelty subscale effect size was the criterion, 63% of the reliability heterogeneity across studies when the Preparedness subscale effect size was the criterion and 40% of the reliability heterogeneity across studies when the Effectiveness/Authenticity subscale effect size was the criterion.

Gender differences in EC

To find out if there is a gender difference in EC and its components, a random-effects model meta-analysis with gender as the independent and ECI and its subscales scores as the dependent variables was conducted. The sample used for the analysis of gender differences ($N = 3,555$) consisted of seven studies that used the whole 30-item ECI questionnaire and one study that used a shortened 17-item version (Soroa et al., 2015).

[please, insert **Table 3** and **Figure 3** about here]

The analysis identified significantly higher total scale ECI scores, higher Novelty subscale scores, higher Preparedness subscale scores, and higher Effectiveness/Authenticity subscale scores in women than in men (see Table 3 and Figure 3). Several studies fell behind the borders of the funnel plot (see Electronic Supplementary Material 3), however, Kendall's tau rank correlation tests and Egger's regression tests for funnel plot asymmetry did not indicate a risk of publication bias.

EC across nations

To characterize how the nationality affects EC and its components, a meta-regression with nationality of the sample as the independent and the ECI and its subscales scores as the dependent variables was conducted. Because the raw means of ECI scores are a function of the number of items in the scale, only studies using the full ECI questionnaire and/or full ECI subscales were included in the respective analyses. The sample used for the analysis consisted of 28 samples ($N = 4,375$) for total ECI score, 20 samples ($N = 2,609$) for Novelty and Preparedness, and 19 samples ($N = 2,529$) for Effectiveness/Authenticity.

The ECI total scores of ten different nations (China, Czech Republic, France, Georgia, India, Iran, Korea, Russia, the UK and the USA) were compared. After applying the Bonferonni correction for multiple comparisons, there were significantly lower total ECI scores in the Chinese sample than in samples from all the other countries ($Z = 4.47-9.68$, $ps < .001$) as well as in the Korean sample than in the samples from India ($Z = 3.96$, $p < .001$), Iran ($Z = 3.47$, $p < .001$) and Russia ($Z = 4.06$, $p < .001$). There were marginally significant lower total ECI scores in the Korean sample than in samples from Georgia ($Z = 3.19$, $p = .001$) and the USA ($Z = 3.28$, $p = .001$) and in the French sample than in samples from India ($Z = 2.47$, $p = .013$) and Russia ($Z = 2.46$, $p = .014$).

The ECI Novelty, Preparedness and Effectiveness/Authenticity scores of seven different nations (China, Czech Republic, Georgia, Iran, Korea, Russia and the USA) were compared. After applying the Bonferonni correction for multiple comparisons, there were significantly lower Novelty scores in the Chinese sample than in the samples from all the other countries, except Korea ($Z = 3.14-6.63$, $ps < .002$), as well as than in the Korean sample in the samples from Georgia ($Z = 4.46$, $p < .001$), Iran ($Z = 4.32$, p

< .001), Russia ($Z = 5.04, p < .001$) and the USA ($Z = 4.13, p < .001$). There was a marginally significant lower Novelty score in the Korean sample than in the Czech sample ($Z = 2.20, p = .028$). After applying the Bonferonni correction for multiple comparisons, there were significantly lower Preparedness scores in the Chinese sample than in the samples from Iran ($Z = 3.17, p = .002$), Russia ($Z = 3.06, p = .002$) and the USA ($Z = 3.27, p = .001$). There were marginally significant lower Preparedness scores in the Chinese sample than in samples from the Czech Republic ($Z = 2.68, p = .007$), Georgia ($Z = 2.12, p = .034$) and Korea ($Z = 2.44, p = .015$). After applying the Bonferonni correction for multiple comparisons, there were significantly lower Effectiveness/Authenticity scores in the Chinese sample than in the samples from all the other countries ($Z = 3.57-5.66, p < .001$).

[please, insert **Figure 4** about here]

Frequency of word-occurrence of EC-related terms

A quantitative content analysis was employed to reveal which words occur together in relatively close proximity to terms expressing EC in empirical papers included in the meta-analysis (Electronic Supplementary Material 1). Non-English written papers were excluded. Figure 4 shows that EC mostly co-occurred with the word *emotion* (481x). Others of the most frequently co-occurred words were *relation* (417x) and *correlation* (409x).

DISCUSSION

The present review on EC integrated findings across a wide spectrum of psychological research and showed the reach of Averill's concept of EC (1999). The analysis of journal papers referencing Averill's concept (1999) provided insights into the reach and breadth of influence of this concept. Overall, the analysis showed that the concept of EC has succeeded in reaching a relatively large audience, both

internationally and across disciplines. When considering the reach within different sub-disciplines of psychology, EC was cited mostly in cognitive psychology and creativity research, personality psychology, social psychology, organizational psychology, theoretical psychology and multidisciplinary or non-specific psychological journals. Furthermore, the distribution of citations in non-psychology journals showed the reach outside of psychology. These journals ranged from life science/environmental journals to medical, pharmacological and health service/nursing journals.

Furthermore, significant gender differences were found in EC and its subscales. The meta-analysis identified higher ECI total scores in women than in men. Furthermore, women scored higher in all three subscales – Novelty, Preparedness, and Effectiveness/Authenticity – across studies. The results make apparent that women are more emotionally creative than men. From the perspective of emotional novelty, women more often perceive their own emotions as original, unique, uncommon and improbable when compared to men. Women also think more about their own emotional reactions and emotional experiences and search for the reasons for their own feelings. They also pay more attention to other people's emotions in an effort to better understand their own feelings than men. The higher scores of women in the authenticity/effectiveness dimension, when compared to men, indicated a more effective response in situations requiring new or unusual emotional responses and the tendency to believe that emotions may help in achieving one's own life goals. These findings are also in accordance with the results of a recent meta-analysis of da Costa, Páez, Sánchez, Garaigordobil, and Gondim (2015), which revealed slightly higher cognitive creativity in women than in men.

The results of the current meta-analysis revealed excellent reliability for the ECI total score. However, the reliabilities for particular subscales were lower than for the

ECI total score, though they were still acceptable. The ECI has been proved to be a suitable research instrument for measuring EC in different cultures. The moderator analysis showed that the reliability of the ECI total score was not influenced by language adaptation of the ECI. In other words, different language adaptations of the ECI did not lead to different reliability, i.e. the psychometric properties were not altered when different language versions were used. However, the language moderated all three ECI subscales. This finding should lead to caution when interpreting the results from the ECI subscales in cross-culturally designed studies. The reliability of the Novelty subscale was identified as the most prone to be influenced by the different language adaptations of the ECI. Also, the reliability of the Preparedness subscale was found to be vulnerable to being influenced by the language adaptation. In contrast, the Effectiveness/Authenticity subscale was minimally affected by the language adaptation.

The analysis of cultural differences identified lower ECI total scores in the sample from China, in comparison to all the other countries. Furthermore, the sample from Korea showed lower ECI total scores than the Indian, Iranian, Russian, Georgian and American samples. One may ask which factors contributed to these cross-cultural differences. A possible explanation may be related to differences in emotion-related values. Emotions generally have a very low value in China (Eid & Diener, 2001). As Eid and Diener (2001) pointed out, a Chinese sample consistently showed the lowest experiences in almost all emotions, because Chinese culture considers emotions as dangerous, irrelevant or even illness-causing. Regulation strategies, such as the suppression of emotions, are generally suggested to be highly valued in East Asian cultures, and the value of a moderated emotional life can also be found in these cultures (Trnka, Šolcová, & Tavel, 2018). Future research on cross-cultural differences in

emotion-related values should provide us with further insights into various levels of EC in different countries and cultures.

The content analysis revealed the co-occurrence of words that emerged in close relation to EC in previous empirical studies focused on EC. EC was found to occur frequently with the words *relation*, *correlation*, or *significant* (Figure 4). This indicates that empirical research following the introduction of Averill's concept of EC (1999) was mostly correlational, exploring various relations of EC with other constructs or variables. In a more detailed look at the correlations that have been found to be significant in previous research, the correlations of the ECI total score (Figure 5) and correlations of the ECI subscales with other variables (Figure 6) can be distinguished. Figure 5 integrates all the known direct correlations of the ECI total score, distinguishing positive and negative correlations. The ECI total score correlated (1) positively to personality traits, such as extraversion (namely with facets of warmth and positive emotions), openness to experience (all its facets) and neuroticism; (2) positively to creative dispositions (e.g., fantasy proneness); (3) positively to the escape-avoidance coping strategy; and (4) negatively to alexithymia.

[please, insert **Figure 5-7** about here]

Furthermore, the network of relationships showing various correlations of the ECI subscales, i.e., Preparedness, Effectiveness/Authenticity and Novelty, with other variables has been revealed (Figure 6). This network integrates statistically significant correlations, both the positive and the negative, and enables us to see the embedding of EC across different, mostly personality-trait constructs. The ECI's Preparedness subscale correlated positively with social anhedonia, introversion and agreeableness. Furthermore, agreeableness also positively correlated with the Effectiveness/Authenticity subscale of the ECI. This subscale was also negatively

correlated to conscientiousness and the escape-avoidance coping strategy and positively correlated to neuroticism, as measured by the NEO-PI. The Novelty subscale of the ECI correlated positively to measures of the ability to make connections between distant areas and also to the escape-avoidance coping strategy.

Furthermore, content analysis showed that the EC occurred frequently with the word *ability* (Figure 4). Indeed, many of empirical studies reviewed in the present study (Electronic Supplementary Material 1) revealed that EC was a positive moderator for various abilities, skills and dispositions (Figure 7). Teaching efficacy, self-understanding, awareness of professional roles, innovative performance and intrinsic motivation of employees are examples of skills and abilities that have been found to be positively moderated by EC. These results may have practical implications for applied settings, where the above-mentioned skills are desirable.

REFERENCES

- Abuladze, N., & Martskvishvili, K. (2016). No words for emotions: Emotional creativity and alexithymia in art. *Problems of Psychology of 21st Century*, *10*, 62–68.
- Andreeva, I. (2011). Adaptation of Emotional Creativity Inventory (ECI). *Psichologicheskij Zhurnal*, *1-2*, 75–81.
- Averill, J. R. (1999). Individual differences in emotional creativity: Structure and correlates. *Journal of Personality*, *67*, 331–371. doi: 10.1111/1467-6494.00058
- da Costa, S., Páez, D., Sánchez, F., Garaigordobil, M., & Gondim, S. (2015). Personal factors of creativity: A second order meta-analysis. *Revista de Psicología del Trabajo y de las Organizaciones*, *31*(3), 165–173. doi: 10.1016/j.rpto.2015.06.002
- Derevyanko, S. P. (2017). The role of emotional creativity in the choice of coping strategies. [Engl. transl.]. *Vesnik Polackaga Dzyrzhavnaga Universiteta. Seriya E. Pedagogichnyja Navuki*, *7*, 87–91.
- Dyson, S. B., Chang, Y. L., Chen, H. C., Hsiung, H. Y., Tseng, C. C., & Chang, J. H. (2016). The effect of tabletop role-playing games on the creative potential and emotional creativity of Taiwanese college students. *Thinking Skills and Creativity*, *19*, 88-96. doi: 10.1016/j.tsc.2015.10.004
- Eid, M., & Diener, E. (2001). Norms for experiencing emotions in different cultures: Inter- and intranational differences. *Journal of Personality and Social Psychology*, *81*(5), 869–885. doi: 10.1007/978-90-481-2352-0_9

- Frolova, S. V. (2016). Training of emotional creativity and development of adaptive personal qualities. *International Annual Edition of Applied Psychology: Theory, Research, and Practice*, 3, 78–85.
- Frolova, F. V., & Novoselova, K. I. (2015). Emotional creativity as a factor of individual, family and psychological well-being. *International Annual Edition of Applied Psychology: Theory, Research, and Practice*, 2, 31–43.
- Fuchs, G. L., Kumar, V. K., & Porter, J. (2007). Emotional creativity, alexithymia, and styles of creativity. *Creativity Research Journal*, 19, 233–245. doi: 10.1080/10400410701397313
- Ghadiri nezhdyan, F., & Abdi, B. (2010). Factor structure of Emotional Creativity Inventory (ECI-Averill, 1999) among Iranian undergraduate students in Tehran universities. *Procedia: Social and Behavioral Sciences*, 5, 1836–1840. doi: 10.1016/j.sbspro.2010.07.374
- Golubina, J. J. (2013). The interrelation between emotional creativity and emotional intelligence. [Engl. trans.]. *Pedagogy and Psychology of Education*, 1, 80–86.
- Gutbezahl, J., & Averill, J. (1996). Individual differences in emotional creativity as manifested in words and pictures. *Creativity Research Journal*, 9, 327–337. doi: 10.1207/s15326934crj0904_4
- Higgins, J. P. T., & Green, S. (2008). *Cochrane handbook for systematic reviews of interventions*. Chichester, England: Wiley.
- Holt, N. J., Simmonds-Moore, C., & Moore, S. (2008). Benign schizotypy: Investigating differences between clusters of schizotype on paranormal belief, creativity, intelligence and mental health. In *Proceedings of presented papers: The parapsychological association 51st annual convention* (pp. 82–96). Winchester, England: Parapsychological Association.
- Humphreys, J., Jiao, N., & Sadler, T. (2008). Emotional disposition and leadership preferences of American and Chinese MBA students. *International Journal of Leadership Studies*, 3, 162–180.
- Ivcevic, Z., Brackett, M. A., & Mayer, J. D. (2007). Emotional intelligence and emotional creativity. *Journal of Personality*, 75, 199–236. doi: 10.1111/j.1467-6494.2007.00437.x
- Jenaabadi, H., Marziyeh, A., & Dadkan, A. M. (2015). Comparing Emotional creativity and social adjustment of gifted and normal students. *Advances in Applied Sociology*, 5, 111–118. doi: 10.4236/aasoci.2015.53010
- Lattifian, M., & Delavarpour, M. A. (2012). An investigation into the relationship between attachment style and mental health by the mediating role of emotional creativity. *Advances in Cognitive Science*, 2(14), 45–62.
- Luke, D., & Zychowicz, K. (2014). Comparison of outcomes with nonintentional and intentional precognition tasks. *The Journal of Parapsychology*, 78, 223–234.
- Ma, H. H. (2009). The effect size of variables associated with creativity: A meta-analysis. *Creativity Research Journal*, 21, 30–42. doi: 10.1080/10400410802633400
- Martin, E. A., Cicero, D. C., Bailey, D. H., Karcher, N. R., & Kerns, J. G. (2016). Social anhedonia is not just extreme introversion: Empirical evidence of distinct constructs. *Journal of Personality Disorders*, 30, 451–468. doi: 10.1521/pedi_2015_29_203

- Martskvishvili, K., Abuladze, N., Sordia, N., & Neubauer, A. (2017). Emotional creativity inventory: Factor structure, reliability, and validity in a Georgian speaking population. *Problems of Psychology in the 21st Century, 11*, 31-41.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *British Medical Journal, 339*, 1–8. doi: 10.1371/journal.pmed.1000097
- Moltafet, G., Sadati Firoozabadi, S. S., & Pour-Raisi, A. (2018). Parenting style, basic psychological needs, and emotional creativity: A path analysis. *Creativity Research Journal, 30*, 187–194. doi: 10.1080/10400419.2018.1446748
- Navaei, M., Hosseinaei, A., & Asadi, A. (2014). Relation between personality traits, emotional creativity, and life expectancy in divorced women and normal women of Golestan province. *International Journal of Basic Sciences & Applied Research, 3*, 29–33.
- Oriol, X., Amutio, A., Mendoza, M., Da Costa, S., & Miranda, R. (2016). Emotional creativity as predictor of intrinsic motivation and academic engagement in university students: The mediating role of positive emotions. *Frontiers in Psychology, 7*, 1243. doi: 10.3389/fpsyg.2016.01243
- R Core Team (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. Retrieved from www.r-project.org
- Roe, C. A., Martin, H., & Drennan, S. (2014). Effects of participant and target system lability upon PK performance using an I Ching task. *Journal of the Society for Psychical Research, 74*, 219–238.
- Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., ... Stewart, L. A. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: Elaboration and explanation. *Bmj, 349*, 1–25. doi: 10.1136/bmj.g7647
- Sharma, D. & Mathur, R. (2016). Linking hope and emotional creativity: Mediating role of positive affect. *The International Journal of Indian Psychology, 58*, 50–61.
- Song, C. (2016). Supervisors' paternalistic leadership influences college English teachers' teaching efficacy in China. *Social Behavior and Personality, 44*, 1315–1328. doi: 10.2224/sbp.2016.44.8.1315
- Soroa, G., Aritzeta, A., Balluerka, N., & Gorostiaga, A. (2016). Adaptation and validation of the Basque version of the Emotional Creativity Inventory in higher education. *The Spanish Journal of Psychology, 19*, 1–13. doi: 10.1017/sjp.2016.26
- Soroa, G., Gorostiaga, A., Aritzeta, A., & Balluerka, N. (2015). A shortened Spanish version of the Emotional Creativity Inventory (the ECI-S). *Creativity Research Journal, 27*, 232–239. doi: 10.1080/10400419.2015.1030313
- Starr, C. R., & Zurbriggen, E. L. (2017). Sandra Bem's gender schema theory after 34 years: A review of its reach and impact. *Sex Roles, 76*(9-10), 566–578. doi: 10.1007/s11199-016-0591-4
- Sundararajan, L., & Fatemi, S. M. (2016). Creativity and symmetry restoration: Toward a cognitive account of mindfulness. *Journal of Theoretical and Philosophical Psychology, 36*, 131–141. doi: 10.1037/teo0000027

- Trnka, R., Cabelkova, I., Kuška, M., & Nikolai, T. (2019). Cognitive decline influences emotional creativity in the elderly. *Creativity Research Journal*, *31*, 93–101. doi: 10.1080/10400419.2019.1577205
- Trnka, R., Šolcová, I. P., & Tavel, P. (2018). Components of cultural complexity relating to emotions: A conceptual framework. *New Ideas in Psychology*, *51*, 27–33. doi: 10.1016/j.newideapsych.2018.05.001
- Trnka, R., Zahradnik, M., & Kuška, M. (2016). Emotional creativity and real-life involvement in different types of creative leisure activities. *Creativity Research Journal*, *28*, 348–356. doi: 10.1080/10400419.2016.1195653
- Vacha-Haase, T. (1998). Reliability generalization: Exploring variance in measurement error affecting score reliability across studies. *Educational and Psychological Measurement*, *58*, 6–20. doi: 10.1177/0013164498058001002
- Valueva, E. A. (2009). Diagnostics of emotional creativity: adaptation of the questionnaire of J. Averill. [Engl. transl.]. In D. V. Lusin, & D. V. Ushakov (Eds.), *Social and economic intelligence: From processes to measurement*. [Engl. transl.]. (pp. 216–227). Moscow, Russia: Institute of Psychology of the Russian Academy of Sciences.
- Valueva, E. A., & Ushakov, D. V. (2010). Empirical verification of the model of the correlation of subject and emotional abilities. [Engl. transl.]. *Psychology: Journal of the Higher School of Economics*, *7*, 103–114.
- Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, *36*(3), 1–48.
- Wang, G., Huang, H., & Zheng, Q. (2015). Effect of Chinese employees' emotional creativity on their innovative performance. *Social Behavior and Personality*, *43*, 1147–1160. doi: 10.2224/sbp.2015.43.7.1147
- Zarenezhad, M., Reisy, J., Shojaei, M., Sasani, S., & Monfared, P. N. (2013). Predicting academic adjustment based on perfectionism and emotional creativity in high school students. *Journal of Life Science and Biomedicine*, *3*, 393–403.
- Zenasni, F., & Lubart, T. I. (2008). Emotion-related traits moderate the impact of emotional state on creative performances. *Journal of Individual Differences*, *29*, 157–167. doi: 10.1027/1614-0001.29.3.157

TABLES

Table 1. Reliability of Emotional Creativity Inventory (ECI)

Scale	k	N	α	95% CI	Min.	Max.	Q	I2
Global Score	17	5,479	.84	[.81, .86]	.69	.90	213.34***	92.8%
Novelty	18	6,384	.81	[.79, .83]	.74	.90	123.30***	86.5%
Preparedness	18	6,384	.75	[.70, .78]	.53	.82	284.08***	93.2%
E/A	18	6,384	.78	[.74, .81]	.57	.88	267.77***	94.1%

Notes: E/A = Effectiveness/Authenticity subscale; k = number of studies; N = pooled sample size, α = summary estimate of Cronbach's alpha coefficient; CI = confidence interval; Min. = minimal alpha in the sample; Max. = maximal alpha in the sample; Q = Cochran's Q statistic; I2 = total heterogeneity/total variability; *** p < .001.

Table 2. Moderator analyses in reliability generalization

Scale	Q_{mod}	R^2	Q_{error}	I^2
Global Score	6.74	0.02	151.99***	91.1%
Novelty	32.07***	0.73	35.96***	60.4%
Preparedness	28.06***	0.63	72.16***	81.7%
E/A	15.10***	0.40	124.36***	89.4%

Notes: E/A = Effectiveness/Authenticity subscale; Q_{mod} = test of moderators statistic; R^2 = amount of heterogeneity accounted for by the model; Q_{error} = test for residual heterogeneity statistic; I^2 = total heterogeneity/total variability; *** $p < .001$.

Table 3. Gender differences in emotional creativity (EC)

Scale	k	N	Effect size	SE	95% CI	Q	I ²
Global Score	9	3,555	-.355***	.055	[-.471, -.239]	18.500*	55.9%
Novelty	10	3,910	-.218***	.058	[-.332, -.105]	22.323**	59.5%
Preparedness	10	3,910	-.313***	.038	[-.388, -.239]	11.048	15.5%
E/A	10	3,910	-.306***	.050	[-.403, -.209]	17.070*	45.1%

Notes: E/A = Effectiveness/Authenticity subscale; k = number of studies; N = pooled sample size, Effect size = average random effect size; SE = standard error of mean; CI = confidence interval; Q = Cochrane's Q statistic; I² = total heterogeneity/total variability; * $p < .05$; ** $p < .01$; *** $p < .001$.

FIGURES

Figure 1. PRISMA flow chart of study selection

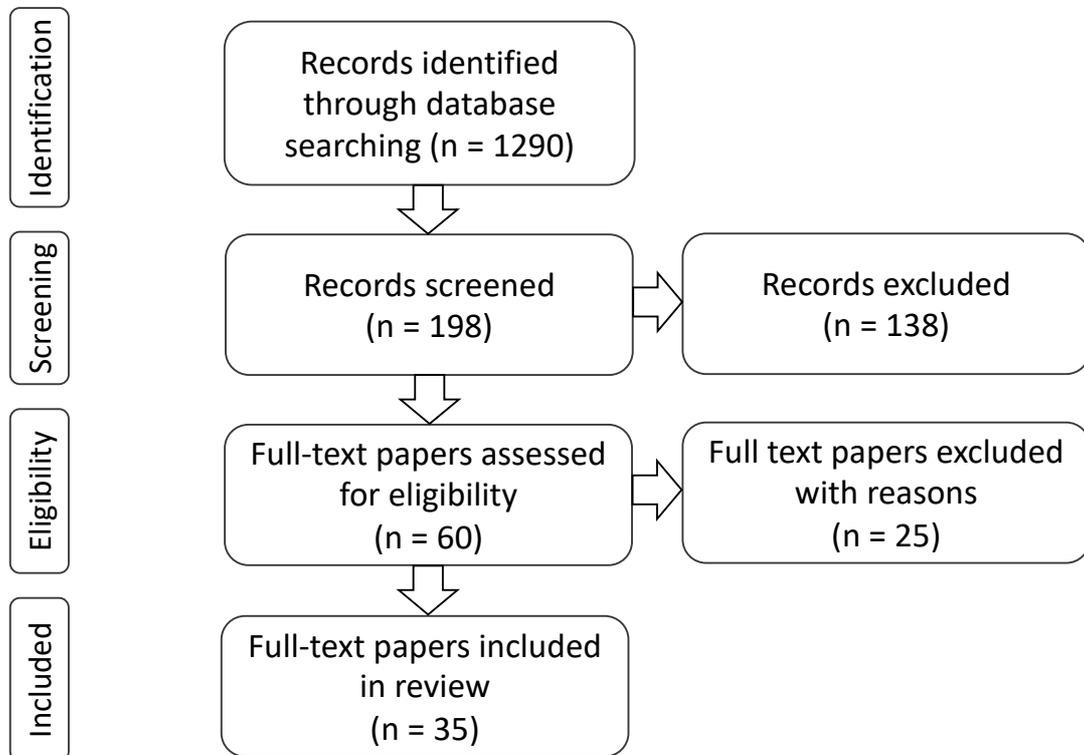
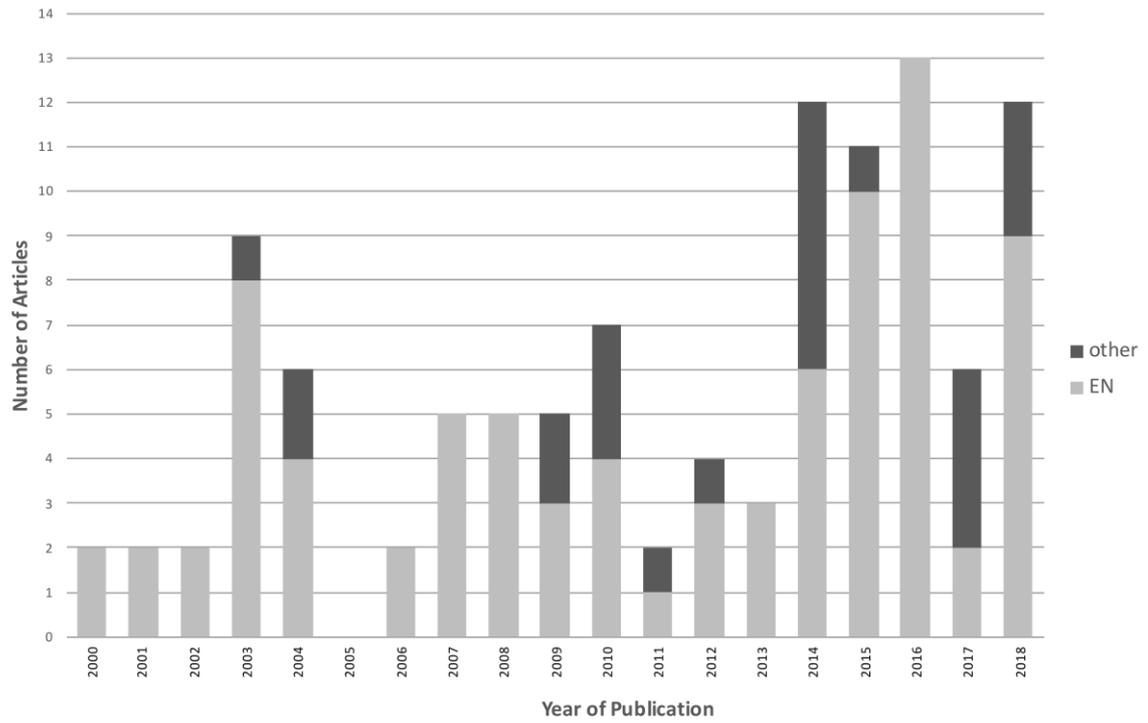


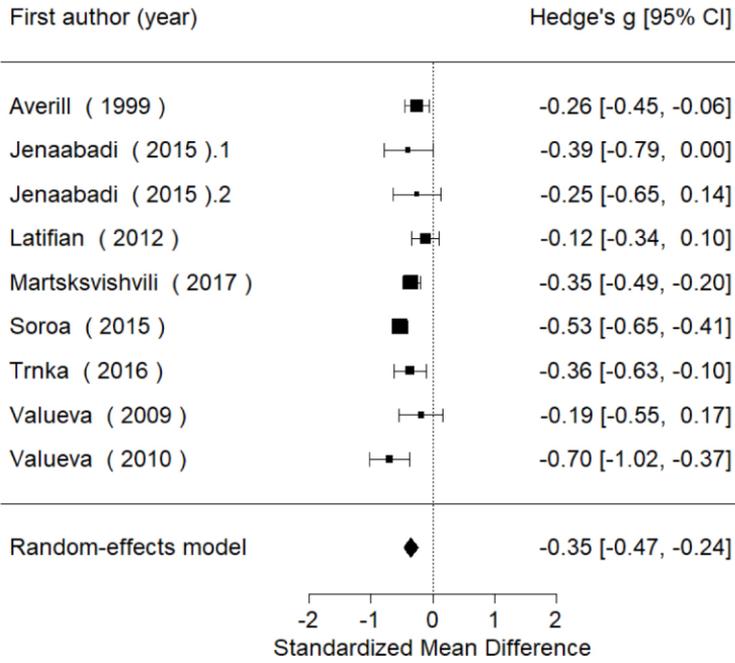
Figure 2. *Years of publication of articles citing Averill (1999)*



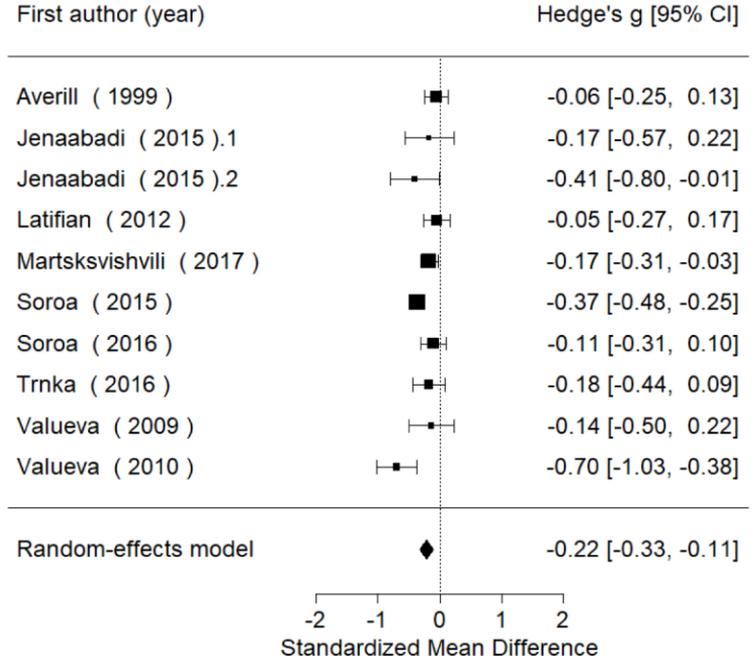
Notes: EN = English, other = other languages.

Figure 3. Forest plots for analyses of gender differences in ECI. Negative values mean higher scores in women than in men.

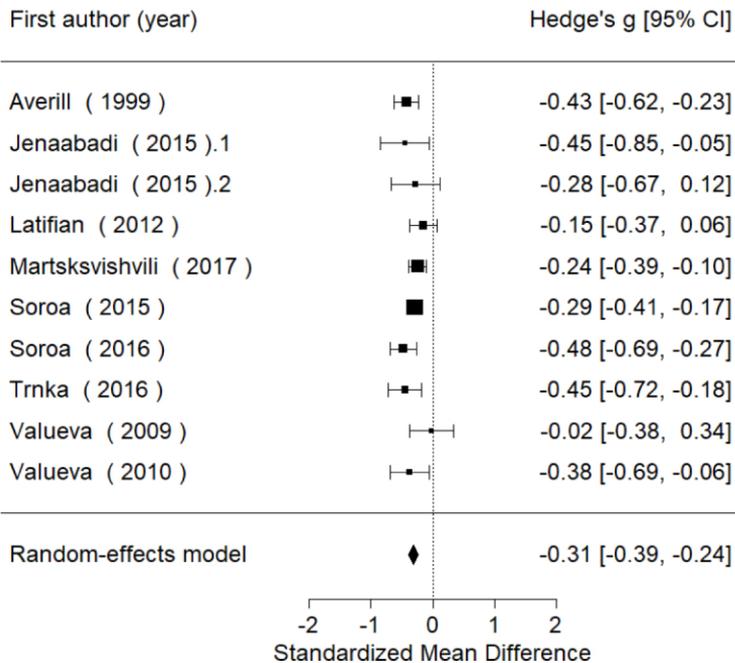
A.Global score



B.Novelty



C.Preparedness



D.Effectiveness/Authenticity

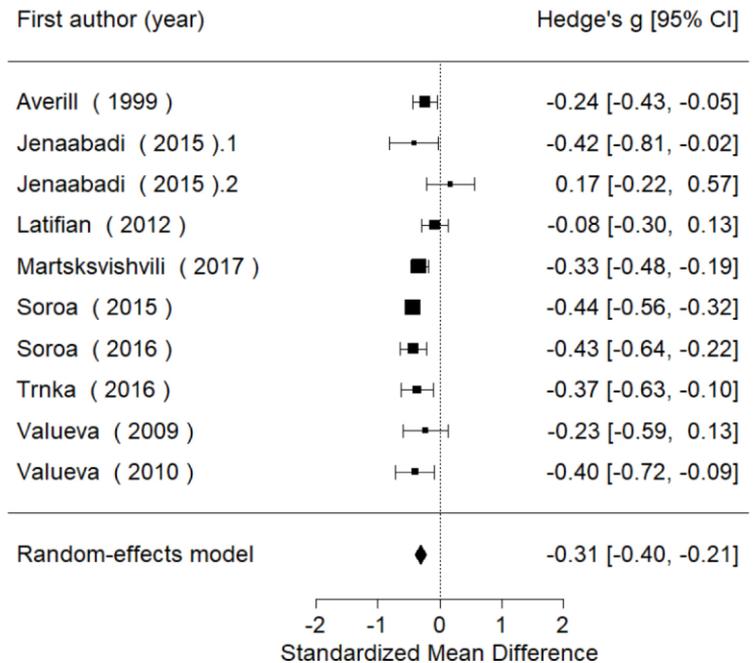


Figure 4. *The words mostly co-occurred with emotional creativity (EC) in the corpus*

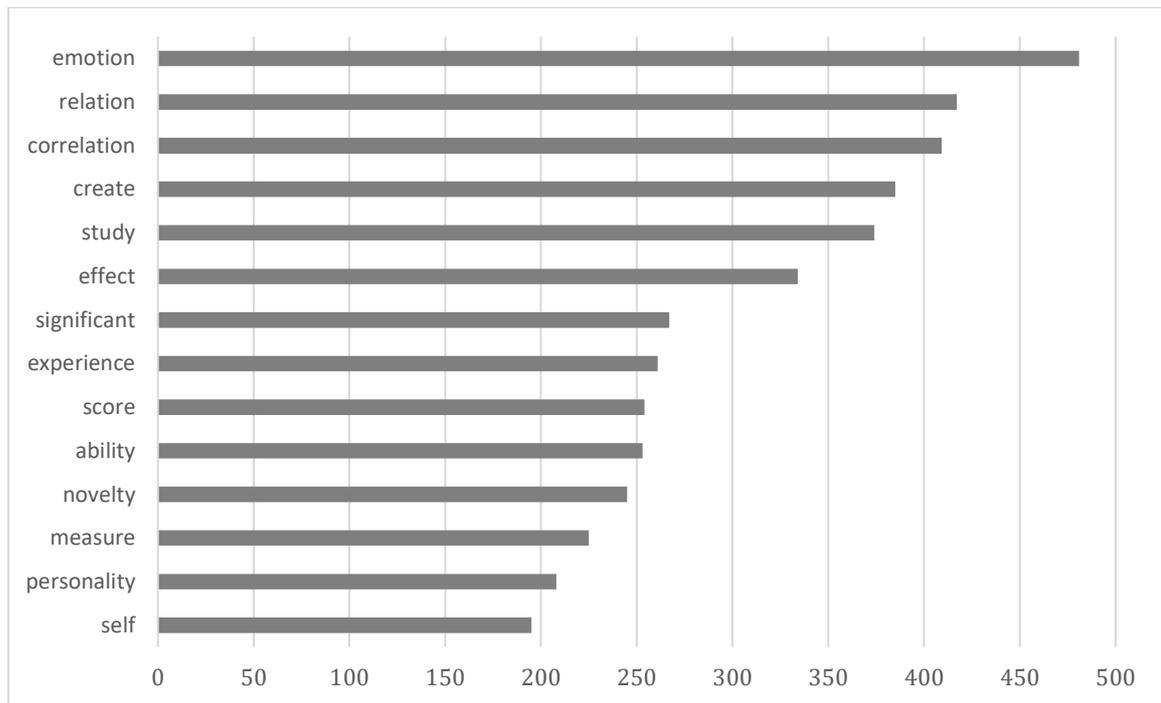


Figure 5. Relationships of the Emotional Creativity Inventory (ECI) total score with other variables

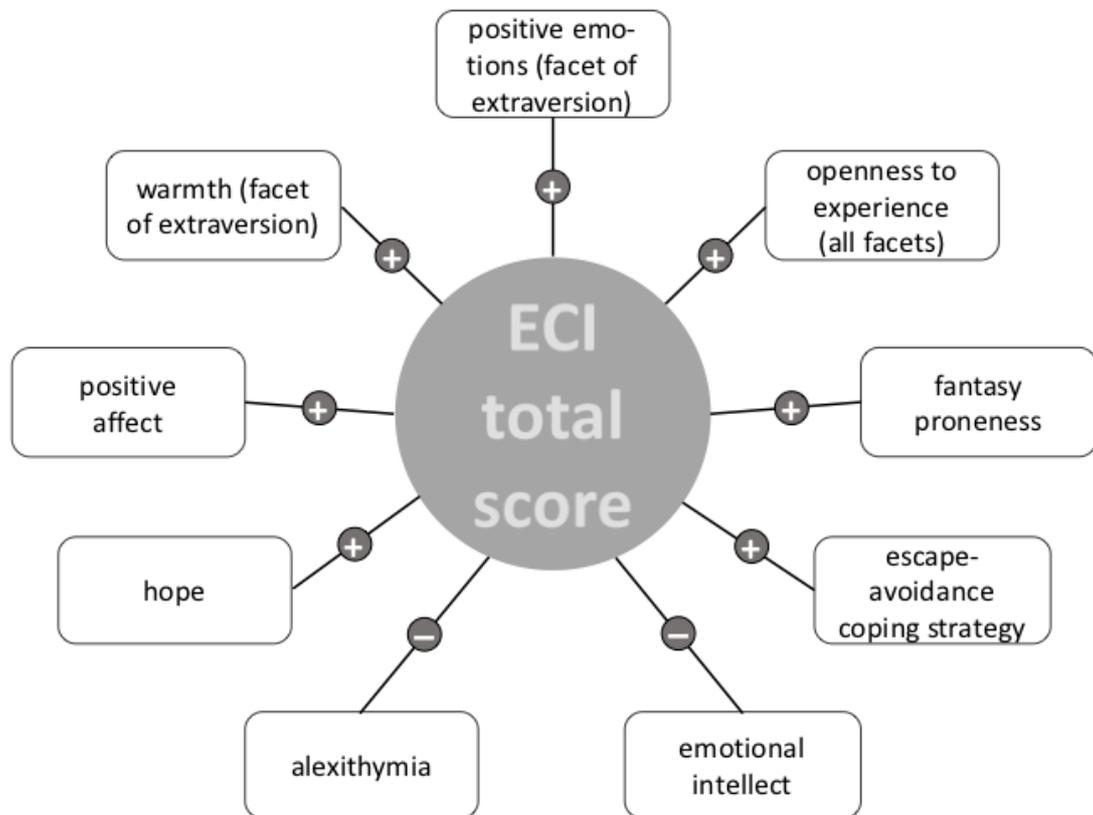


Figure 6. Relationships of the Emotional Creativity Inventory (ECI) subscales with other variables

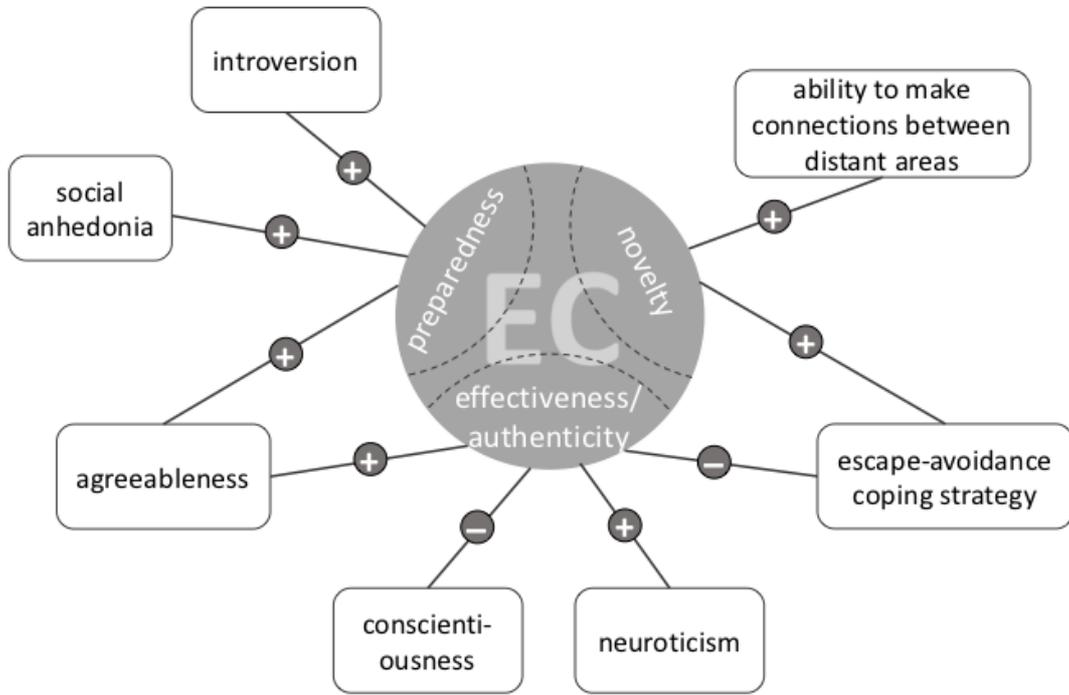
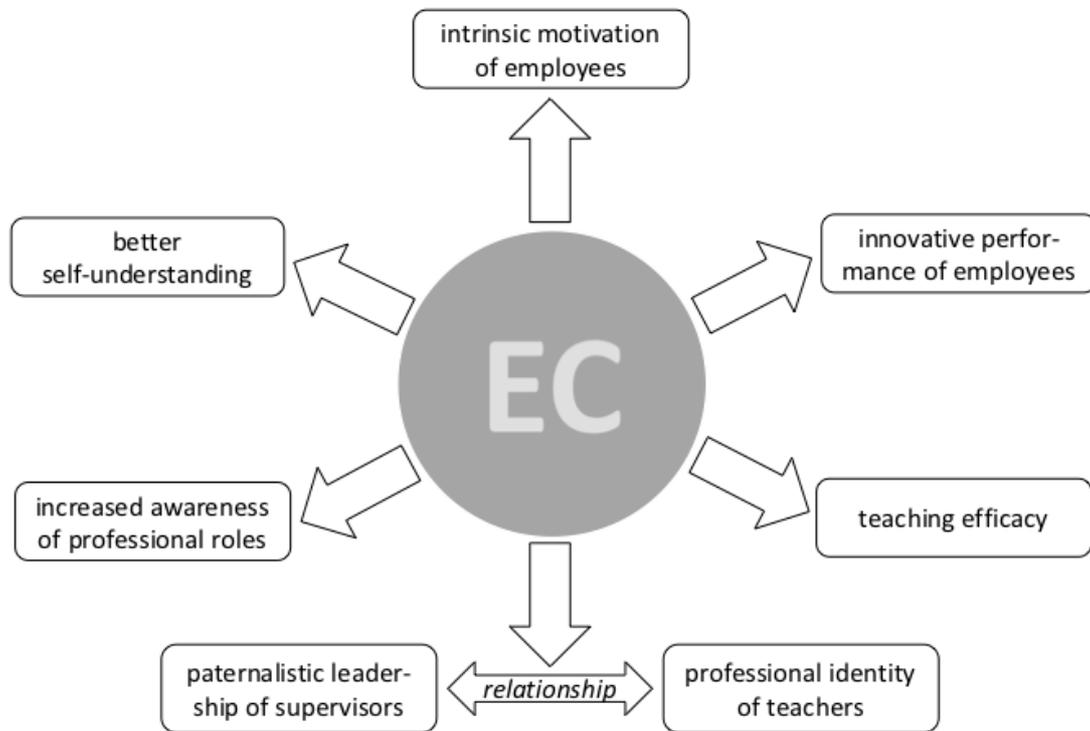


Figure 7. Moderating impacts of emotional creativity (EC) on the abilities, skills and dispositions



Electronic Supplementary Material 1. *The detailed structure of extracted data is as follows: author(s) name(s), year of publication, geographical location of data-mining, participants, sample size(s), emotional creativity (EC) measure(s) involved, and a brief overview of achieved empirical results regarding EC*

Author/s, year of publication	Country	Population	Sample size	EC measure	Key findings
Abdulaze & Martskvishvili (2016)	Georgia	Art and non-art university students	80	ECI	Art faculty students had higher ECI scores than students from other faculties. The Novelty subscale of the ECI correlated with a difficulty of describing emotions.
Andreeva (2011)	Russia	Students	48	ECI	The results showed that the Russian translation of the ECI is valid, reliable, stable, and internally consistent.
Averill (1999)	USA	Undergraduate students	489	ECI	Women scored higher than men on the Preparedness and Effectiveness/Authenticity ECI subscales (Study 1). The people who scored high on the ECI were judged by their peers as being emotionally creative (Study 2). The ECI total score correlated with an openness to experience and agreeableness from the Big Five personality inventory (Study 3). EC was associated with mystical experiences. Emotionally creative people tended to be confident in their own capabilities (Study 4). Emotionally creative people used a range of coping strategies when faced with a stressful situation. Their emotional lives differed substantially from alexithymics (Study 5). Early trauma and obstacles predisposed a person to be emotionally creative (Study 6).
Derevyanko (2017)	Ukraine	University students	80	ECI	Emotional awareness and sincerity in the expression of emotions were the most important components for the coping behavior of people with a high level of EC. In the sample of people with a low level of EC, the ability to experience unusual emotions contributed to a positive reassessment and constructive resolution of problems.
Dyson et al. (2016)	Taiwan, China	University students	39	ECI	The role-playing games were not related to EC.
Frolova (2016)	Russia	University students	30	ECI	The ECI was correlated with Frolova's method of measuring EC. EC training helped to increase EC and coping strategies.
Frolova & Novoselova (2015)	Russia	Students and their parents	200 (incl. 50 child / parent pairs)	ECI + projective/associative tool	EC was positively connected with hardiness and subjective quality of life.
Fuchs et al. (2007)	USA	Students of psychology	322	ECI	ECI and its subscales positively correlated with fantasy proneness and negatively correlated with the measure of alexithymia.
Ghadiri Nezhdyan & Abdi (2010)	Iran	Undergraduate students	650	ECI	The findings of a confirmatory factor analysis provided support for the structure of the EC construct in an Iranian community.
Golubina (2013)	Russia	Young and middle-age adults	46	Berezina test	A positive correlation between EC (Berezina test) and emotional intelligence was revealed.
Gutbezahl & Averill (1996)	USA	Introduction to Psychology students	800 (Study 1); 900 (Study 2)	ECI	Participants who scored high on the ECI were more expressionistic; those, who scored low on the ECI were more pictographic (Study 1). The ECI correlated with the creativity scores of the narrative involving a love relationship and with the composite creativity score for the story (Study 2).
Holt et al. (2008)	UK	Psychology and sociology students	183	ECI	High schizotypes reached higher scores on the ECI than low schizotypes.
Humphreys et al. (2008)	USA and China	American and Chinese MBA students	70	ECI	EC was negatively associated with the desirability of transformational leadership. The Chinese showed higher scores on the ECI compared to the Americans.

Ivcevic et al. (2007)	USA	Students (Study 1: age 17-49; Study 2: age 17-19)	107 (Study 1); 113 (Study 2)	ECI	EC and emotional intelligence have been found to be distinct abilities. EC was mostly uncorrelated with cognitive intelligence, and it was highly correlated with an openness to experience from the Big Five personality inventory.
Jenaabadi et al. (2015)	Iran	High school students	200	ECI	Gifted students scored higher on the Novelty and Effectiveness/Authenticity subscales of the ECI than normal students.
Lattifian & Delavarpour (2012)	Iran	Students	324	ECI	The ECI and its subscales played a mediating role in the relationship between attachment styles and mental health.
Luke & Zychowicz (2014)	UK	Psychology students	40	ECI	A medium-sized positive correlation was found between ECI scores and openness to experience scores. No relationship between EC and psi scores was found.
Martin et al. (2016)	World-wide	Internet study. English native speakers	664	ECI	Social anhedonia was positively associated to the Preparedness ECI subscale. Introversions was negatively associated to the Preparedness ECI subscale.
Martskvishvili et al. (2017)	Georgia	Students	834	ECI	The psychometric properties of the Georgian version of the ECI were revealed.
Moltafet et al. (2018)	Iran	Undergraduate students	375	ECI	The components of parenting style were shown to predict students' EC. The styles of parenting using warmth and structure positively predict the EC of students, and the styles of parenting using coercion and chaos negatively predict it. The dimensions of autonomy and the competence of satisfying basic psychological needs had a mediating role between parenting style and EC.
Navaei et al. (2014)	Iran	Women	240	ECI	The ECI subscales showed a difference between married and divorced women.
Oriol et al. (2016)	Chile	Students	428	ECI	Developing high levels of dispositional EC enhanced the activation of positive emotions in the classroom. EC predicted the intrinsic motivation and academic engagement of university students.
Roe et al. (2014)	UK	Students	34	ECI	The ECI was used as one of methods of differentiating participants into three groups.
Sharma & Mathur (2016)	India	Undergraduate students	300	ECI	EC was positively correlated with hope and positive affect. Positive affect mediated the pathway between hope and EC.
Singh & Kumar (2010)	India	Trainee teachers	180	ECI	On two subscales of the ECI, i.e., Preparedness and Effectiveness/Authenticity, trainee teachers of in-service courses scored higher in comparison to teachers of pre-service courses.
Song (2016)	China	Teachers of English	674	ECI	Teachers' EC positively moderated the relationship between supervisors' paternalistic leadership and teachers' teaching efficacy.
Soroa et al. (2015)	Spain	Students	1145	ECI-S (shortened Spanish version of the ECI)	The paper developed and validated a shortened Spanish version of the ECI (the ECI-S). High scores on neuroticism were related to the perception of emotional responses as being novel, but not effective, whereas people who scored high on extraversion perceived emotional reactions as effective, but not novel. The total ECI-S score of women was higher than of men.
Soroa et al. (2016)	Spain	Students	594	ECI (shortened Basque version)	This paper introduced the adaptation and validation of the ECI for the Basque-speaking population. Women scored higher than men on the preparedness and effectiveness/authenticity subscales. No differences were observed between women and men on the novelty subscale.
Sundararajan & Fatemi (2016)	Iran	University students and staff	99	ECI	EC was not found to be a function of relational cognition.
Trnka et al. (2016)	Czech Republic	University students, graduates, and young adults	251	ECI	Art students and graduates scored significantly higher on the ECI than other majors. The humanities scored significantly higher than technical/economic majors. Five creative leisure activities were significantly correlated with the ECI, namely writing, painting, composing music, performing dramas, and DIY home improvement.
Valueva et al. (2009)	Russia	Psychology students	179	ECI	The paper adapted the ECI in the Russian language sample.

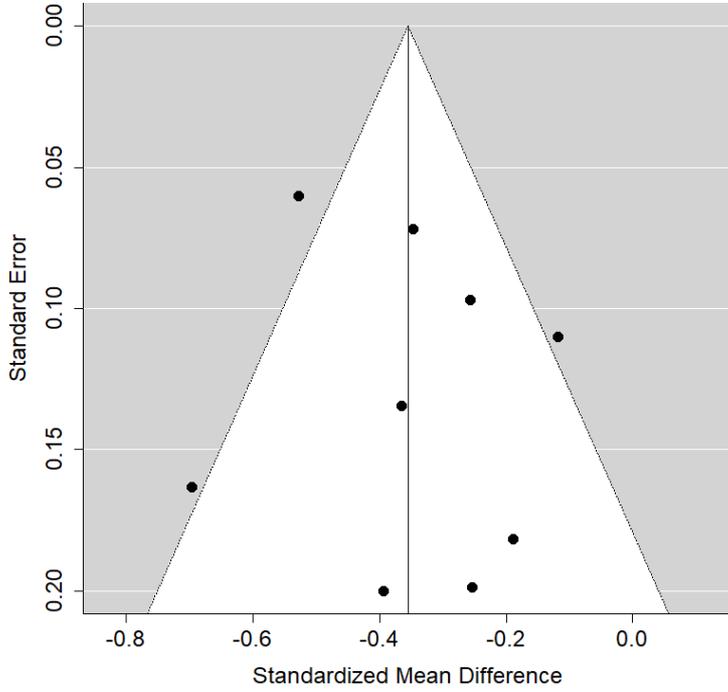
Valueva & Ushakov (2010)	Russia	High school students	162	ECI	EC was positively correlated to object creativity and negatively to emotional intellect.
Wang et al. (2015)	China	546 supervisor –subordinate dyads Employed at 18 enterprises	1092	ECI	Employees' EC had significant effects on their innovative performance. The supervisors' support for creativity acted as a moderator of the relationship between employees' EC and innovative performance.
Zarenezhad et al. (2013)	Iran	High school students	400	ECI	EC was a positive and significant predictor of educational adjustment.
Zenasni & Lubart (2008)	France	Undergraduate students	107	ECI	The ECI was used to evaluate emotional idiosyncrasy. Individuals tend to experience emotions differently than how they are reported by the majority of the population.

Electronic Supplementary Material 2. *Breadth of influence*

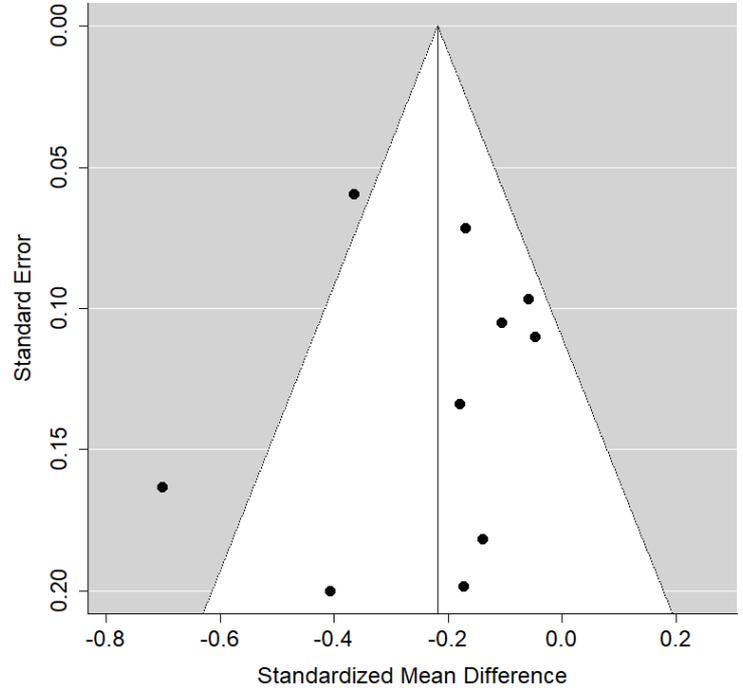
Journal Type / Discipline	All Citations	Primary Citations	Journals in Primary Citations Sample
Personality Psychology	8	3	Journal of Personality; Personality and Individual Differences; Journal of Personality Disorders
Social Psychology	8	3	Social Behavior and Personality; Elsevier Procedia - Social and Behavioral Sciences
Creativity / Cognitive Psychology	10	5	Creativity Research Journal; Thinking Skills and Creativity
Psychology - Multidisciplinary	10	5	Spanish Journal of Psychology; Journal of Modern Foreign Psychology; International Journal of Indian Psychology; Psichológia; Developmental Psychology: Journal of Iranian Psychologists
Cyberpsychology	2	0	
Educational Psychology	4	2	Frontiers in Psychology - Educational Psychology; Journal on Educational Psychology
Organizational Psychology	7	3	International Journal of Leadership Studies; Korean Journal of Health Service Management; Journal of Work and Organizational Psychology
Theoretical Psychology	6	2	Psychological Inquiry; Problems of Psychology in the 21st Century
Psychology - Other	6	2	Journal of Parapsychology; International Annual Edition of Applied Psychology: Theory, Research, and Practice
Other Non-Psychological	25	7	Advances in Applied Sociology; Bulletin of Environment, Pharmacology and Life Sciences; Korean Journal of Health Service Management; Journal of Urmia University of Medical Sciences; Journal of Urmia Nursing and Midwifery Faculty; Research in Medical Education; Journal of Life Science and Biomedicine
Total Citations	86	32	

Electronic Supplementary Material 3. Funnel plots for analyses of gender differences in ECI

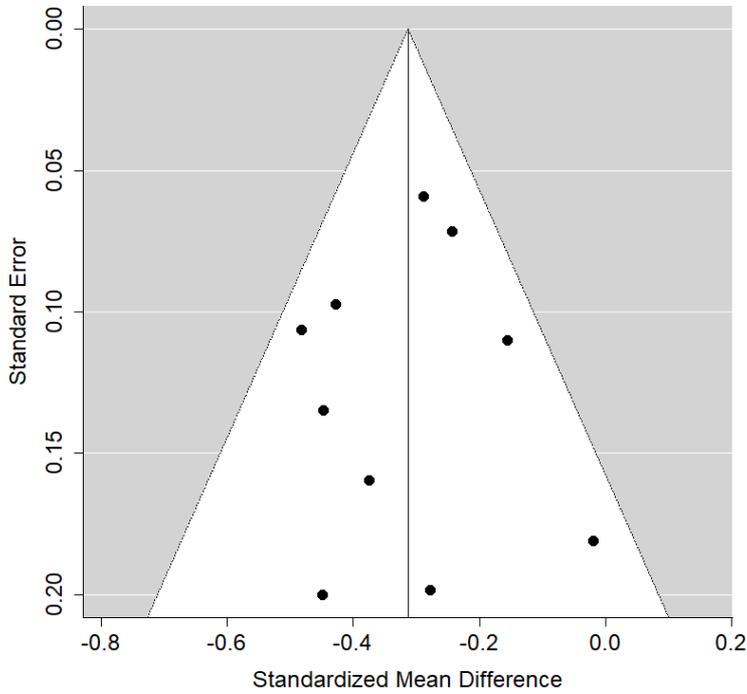
A. Global score



B. Novelty



C. Preparedness



D. Effectiveness/Authenticity

