


## An Adaptation Study of the Components of Emotion Understanding Test-24 (CEUT-24) to Turkish Context: An Investigation of the Internal Structure of the CEUT-24 at Item Level

**Mehtap Sezgin**, Assist. Prof. Dr. Ankara Social Sciences University, Türkiye, mehtap.sezgin@asbu.edu.tr  
 0000-0003-3830-6112

**Johnny R. J. Fontaine**, Prof. Dr., Ghent University, Belgium, johnny.fontaine@ugent.be  
 0000-0002-5684-0178

### Keywords

Emotional intelligence  
Emotional understanding  
Acquiescent responding  
Scenario specificity  
Confirmatory factor analysis

### Article Info:

Received : 30-09-2022  
Accepted : 22-03-2023  
Published : 22-04-2023

DOI: 10.52963/PERR\_Biruni\_V12.N1.07

### Abstract

The generalizability across cultural groups of the construct of Emotional Intelligence (EI) and its assessments has received scant attention. Most research on ability EI is done within a Western context. This study investigates whether the same internal structure of The Components of Emotion Understanding Test short 24 item version (CEUT-24) emerges also in non-Western, Turkish context with a bipolar Emotional Understanding (EU) ability factor, a unipolar (dis)acquiescent responding factor, and scenario-specific error covariances. The sample consisted of 680 (15-32 years old) participants. Three nested models (model A with only the EU factor, model B with the acquiescence factor added to model A, and model C with the scenario-specific error covariances added to model B) have tested with Confirmatory Factor Analysis. Results showed that only model C had an acceptable to good fit. An EU ability factor, an acquiescent responding factor, and scenario-specific error covariance factor accounted for the raw item responses of CEUT-24 in Turkey in the same way as in Western contexts. The current study contributes to generalizability of the CEUT-24 beyond typical western contexts.

**To cite this article:** Sezgin, M., & Fontaine, J. (2023). An adaptation study of the Components of Emotion Understanding Test-24 (CEUT-24) to Turkish context: An Investigation of the internal structure of the CEUT-24 at item level. *Psycho-Educational Research Reviews*, 12(1), 105-117. doi: 10.52963/PERR\_Biruni\_V12.N1.07

## INTRODUCTION

Since its breakthrough in the scientific literature about thirty years ago (e.g., Salovey & Mayer, 1990), a lot of validity evidence has been found for the construct and assessment of ability emotional intelligence (EI). The broad construct of EI was defined by Salovey and Mayer in 1990 as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (p. 189). Since, it has been observed that ability EI subtests are mutually positively correlated (e.g., Mayer, Salovey, Caruso & Sitarenios, 2003), that theoretically predicted factor structures could be identified with a (higher-order) EI factor (e.g. Rossen, Kranzler & Algina, 2008), and that there is a systematic nomological network of EI scores with EI ability for instance being positively related with intelligence (e.g. Fiori, 2015; MacCann, 2010), romantic relationship satisfaction (Jardine, Vannier & Voyer, 2022), social competence (Trentacosta & Fine, 2010), interpersonal relationships (e.g. Moeller, Robinson, Wilkowski & Hanson, 2012).

Despite this extensive empirical research on the concept of EI, the generalizability across cultural groups of the construct of EI and its assessment has received scant attention. Most of the research on ability EI is done within a Western context. This scant attention for cross-cultural generalizability could be attributed to the often limited embeddedness in emotion theorizing and the lack of replicable evidence for the internal structure of EI (sub)tests at item level. Without a clear theoretical framework about what emotions are, it cannot be hypothesized whether and to which extent the construct of emotional intelligence can be generalized across cultural contexts. Moreover, without a consistent internal structure at item level in Western populations an essential point of reference for studying generalizability of instruments is lacking. For a central facet of the EI construct, emotion understanding (EU) ability, both issues have been addressed with the development and validation of the Components of Emotion Understanding Test 24 item version (CEUT-24) (Huyghe, Hovasapian & Fontaine, 2022). The CEUT-24 is embedded in a strong emotion framework and shows a consistent internal structure in Western populations, which makes it suited for investigating generalizability to non-Western cultural contexts. As a first step in this endeavor, it is investigated in the current study to which extent CEUT-24 can be generalized to the Turkish cultural context.

## THE COMPONENTIAL EMOTION APPROACH

The CEUT-24 is a short 24 item version of the Components of Emotion Understanding Test which was developed on the basis of the componential emotion approach (Sekwena & Fontaine, 2018). The componential emotion approach offers a comprehensive theoretical framework that integrates a vast array of emotion theories (Scherer, 2009). In this approach, an emotion has to be defined as a synchronized reaction to goal-relevant events. The process consists of a synchronization of activity in five human subsystems or components: appraisal (e.g., positive consequences), bodily reactions (e.g., trembling), feelings (e.g., submissive), expressions (e.g., smiling), and action tendencies (e.g., wanting to attack). In extensive psycholinguistic research in 27 countries representing 23 languages, it was indeed empirically observed that emotion terms systematically refer to changes in each of these five emotion components (Fontaine, Scherer, Roesch & Ellsworth, 2007; Fontaine, Scherer & Soriano, 2013). Based on this theoretical framework and the supporting psycholinguistic research, Fontaine (2016) proposed to redefine EU ability as the ability to understand the likely reactions in each of the five emotion components in response to concrete emotion eliciting situations. This theoretical perspective was operationalized in the CEUT-24. It consists of six scenarios that represent six very different goal-relevant episodes which typically elicit a variety of emotional processes. Per scenario participants have to rate the likelihood of four possible reactions. Across the six scenarios there are four appraisals, four action tendency, four bodily reactions, four expressions, four feelings, and four emotion term items participants have to rate on their likelihood. The instrument thus assesses understanding of all emotion components that make up the emotion process according to the componential emotion approach (Huyghe et al., 2022).

## INTERNAL STRUCTURE AND SCORING OF EI TESTS

The internal structure at item level of ability EI (sub)tests has seldom been investigated, and if investigated, no consistent or difficult to interpret results have been reported (e.g., Austin, 2010; Ferguson & Austin, 2011; Gignac, 2005). However, understanding to which extent the responses to individual items are driven by the presumed EI construct is essential for determining the validity of EI instruments (e.g., Maul, 2012). The inconsistent findings with respect to the internal structure could be attributed to a scoring problem with ability EI (sub)tests. A major challenge in the EI domain is identifying what are “correct” responses. The most frequently used solution is to work with Proportion Consensus Scoring (PCS). A person’s raw item response is transformed on the basis of the proportion of participants in a norm group that gave the same response (e.g., Barchard, Hensley & Anderson 2012). According to Legree et al. (2014) PCS is sensitive to irrelevant response characteristics. The scores across items in EI (sub)tests are characterized by a score pattern, score elevation (i.e. profile means), and score scatter (i.e. within-profile variance). According to Legree et al. (2014) only the score pattern contains valid information about a person’s EI, while elevation and scatter are irrelevant interindividual differences in EI. Therefore, they propose to score EI based on the similarity between the observed and the correct response profile across items (e.g., by computing a Pearson correlation), which is not sensitive to individual differences in elevation and scatter. Profile similarities can overcome the identified scoring problems. However, as it is a Gestalt measure, they do not provide any information about the dimensionality of EI tests, nor about the psychometric quality of individual items. A consequence is that the profile similarity approach is not suitable for investigating cross-cultural generalizability. When participants in other cultural groups show a low profile similarity, it can be both due to generalizability problems with the items or because of genuine group differences in the ability to process information about emotion.

To overcome this issue Huyghe et al. (2022) identified theoretical expectations about the constructs that determine the reactions to the CEUT-24 based on work of Fontaine et al. (2022). They identified three different constructs that could account for the observed raw item scores (EU ability, acquiescent responding, and scenario specific covariance). They then tested with confirmatory factor analysis whether the a priori predicted structure could account for the observed item scores. EU ability is the target construct. Because it can be expected that the higher the EU ability, the more a participant will rate correct items as correct and rate incorrect items as incorrect, a bipolar EU ability factor was predicted with correct items loading positively and incorrect items loading negatively. Next, (dis)acquiescent responding, a response tendency to use the (lower or) higher end of the response scale independent of the content of the items (e.g. Hinz, Michalski, Schwarz & Herzberg, 2007) was also expected to play a role. In a CFA model, this can be represented by a unipolar factor with all items sharing the same item loading (as the effect is not dependent on specific items). Finally, because of the Situational Judgement Test (SJT) format of the CEUT-24 with emotion reactions being nested in specific emotion eliciting situations, design-based error covariances between the items sharing the same scenario were expected. This a priori-predicted internal structure at item level was clearly confirmed with confirmatory factor analysis in four West-European samples from the UK, Germany, Belgium, and Spain (Huyghe et al., 2022).

By demonstrating that a theoretically derived structure can be identified at item level for EU ability tests, a key source of validity evidence is added to the existing validity evidence for ability EU. It is now also possible to investigate the generalizability of EI (sub)tests beyond Western populations. It can be empirically investigated whether the same factor structures emerge in non-Western populations with a bipolar EU ability factor, a unipolar (dis)acquiescent responding factor and scenario-specific error covariances. Because the CEUT-24 was developed on the basis of a universal emotion framework which was supported in empirical psycholinguistic research with a large diversity of languages (ranging from English to Chinese), it can be expected that across cultural groups emotion understanding consists of understanding the likelihood of emotional reactions in all emotion

components when people are confronted with goal-relevant situations. The psycholinguistic research, however, does not imply that specific items would function in exactly the same way. The psycholinguistic research also demonstrated that while the overall emotion structure is very stable across cultural and linguistic groups, carefully translated individual emotion features could shift in meaning across the groups (Fontaine, Scherer, Roesch & Ellsworth, 2007; Fontaine, Scherer & Soriano, 2013). Moreover, the precision of the components of emotion may be affected by whether the culture is individualistic or collectivist. For example, in Western cultural groups, children's emotional expression may be seen and supported as a manifestation of individuality. However, in non-Western cultural groups, controlling emotions can be seen as valuable, thus, supported (Southam Gerow, 2013). On the other hand, the rules for displaying emotions may vary according to the culture. For example, in some cultures, people are expected to be sad and openly express their sadness at funerals, while in some cultures this is not expected (Smith, et al., 2003).

In the present study the expectation that an internal structure consisting of a bipolar EU ability factor, a unipolar (dis)acquiescent responding factor, and design-based error covariances between items of the same scenario also applies in non-Western cultural and linguistic groups is tested in Turkey. Moreover, it is investigated to which extent the specific emotional reactions in the CEUT-24 are to the same extent considered as likely or unlikely in a Turkish context compared to a West-European context, and thus function in the same way in a Turkish context.

## METHOD

### PARTICIPANTS

In the literature, a sample size of more than 500 participants is suggested to be large enough for applying the Weighted Least Squares (WLSMV) estimator in structural equation modelling (e.g. Bandalos, 2014; Nussbeck, Eid & Lischetzke, 2006; Huyghe et al., 2022). In this study, the sample consisted of 680 participants selected by simple random sampling method. The sample was robust in terms of representativeness of the Turkish context. In fact, participants were from seven regions of Turkey ( $n_{\text{Mediterranean}}=213$ ,  $n_{\text{Eastern Anatolia}}=64$ ,  $n_{\text{Aegean}}=41$ ,  $n_{\text{South Eastern Anatolia}}=129$ ,  $n_{\text{Central Anatolia}}=63$ ,  $n_{\text{Balck Sea}}=70$ ,  $n_{\text{Marmara}}=100$ ) according to geographic region classification (Karcı, Üstübcı, & De Clerck, 2014). Participants over the age of 15 participated in the study, regardless of continuing their education or not. The sample age ranged from 15 to 32 years with a mean age of 20 years and with a 2.22 standard deviation, 206 (30.3%) were male and 471(69.3%) were female (3 participants are not marked their gender). With respect to educational level, 193 (28.4%) of the participants are in secondary education; 79 (11.6%) of the participants are in upper secondary education; 392 (57.6%) of the participants are in undergraduate education; 16 (2.4%) of the participants did not report their educational level.

### MATERIALS

CEUT-24 is used in this study. CEUT-24 assesses emotional understanding as the ability to understand the likely emotional components in specific goal-relevant situations. These emotional components are appraisals, action tendencies, bodily reactions, expressions and subjective feelings. The CEUT-24 is an SJT based on based on a componential emotional approach in which participants rate for each of the 6 emotion eliciting scenarios (i.e. the item stems) the likelihood of four possible emotional reactions on a 5-point Likert scale ranging from (1) Very unlikely to (5) Very likely (i.e. numbers 1 to 5 being the raw item scores). CEUT consists of 24 items in total. CEUT-24 is a balanced instrument in terms of emotion components and correct/incorrect items (with score 1 and 2 being incorrect when an item is unlikely and scores 4 and 5 being correct when an item is likely). CEUT-24 was validated in West-European countries (e.g. UK, Germany, Spain and Belgium) with a newly developed model. Three nested models were tested with CFA for each country separately: model A with only the emotional understanding factor, model B with the acquiescence factor added to model A, and model C with the scenario specific error covariances added to model B. Only model C had

acceptable to good fit on all criteria in all four countries. According to results, Belgian sample with WLSMV:  $\chi^2= 392.283$ ,  $df= 215$ ,  $\chi^2/df= 1.825$ ; RMSEA= .040; RMSEA 90% CI= .033-.046; CFI= .957; SRMR= .048. UK sample with maximum likelihood estimator (MLMV):  $\chi^2=255.496$ ,  $df= 215$ ,  $\chi^2/df= 1.888$ ; RMSEA= .028; RMSEA 90% CI= .009-.041; CFI= .956; SRMR= .046. Germany sample with MLMV:  $\chi^2= 252.649$ ,  $df= 215$ ,  $\chi^2/df= 1.175$ ; RMSEA= .029; RMSEA 90% CI= .007-.043; CFI= .952; SRMR= .049. Spain sample with MLMV:  $\chi^2= 253.304$ ,  $df= 215$ ,  $\chi^2/df= 1.178$ ; RMSEA= .029; RMSEA 90% CI= .008-.042; CFI= .958; SRMR= .043. For the reliability, Mac Donald's omega, was found to be .83, .94, .89, and .93 in Belgium, UK, Germany and Spain respectively (Huyghe, Hovasapian & Fontaine 2022).

In addition, the Personal Information Form was conducted to get sociodemographic information from participants. West-European participants' CEUT-24 item score means were used as a reference to compare item score averages of the Turkish sample with West-European samples.<sup>1</sup>

## PROCEDURE

This study is conducted as a part of the ECoWeB Horizon 2020 project: Assessing and Enhancing Emotional Competence for Well-Being in the Young: A principled, evidence-based, mobile-health approach to prevent mental disorders and promote mental well-being (Newbold, et al., 2020).

The CEUT-24 English version was translated into Turkish by the Turkish and English native speaking researchers using translations and back-translations and committee discussions. After the necessary translation, first, permissions were obtained by the researchers who developed the scale, and the researcher, as a Turkish native speaker, translated the original CEUT-24 instrument from English into Turkish. Second, the control of the Turkish version of CEUT-24 instrument was done by a Turkish native speaker and an expert from the field of English Language Teaching. Third, back translation process for the Turkish CEUT-24 instrument was conducted by another Turkish native speaker from the field of English Language Teaching. Then, the translated instrument and the original instrument were checked by a native English speaker who is a psychology expert and researcher at the ECoWeB Horizon 2020 project. Next, a pilot study was conducted with a small group of 10 people. Feedback from the participants was discussed with two experts from the field of Psychology and from an expert in the field of Guidance and Psychological Counselling, who have studies on emotions and culture.

We recruited 701 participants living in Turkey in the 2019-2020 academic year. Recruitment was conducted with colleagues in other universities and high schools throughout Turkey in order to have a representative sample. Also, through social media participants were attracted. Each participant participated in an online psychological assessment through Qualtrics Research Services. This software allows one-time access to the survey when connected from the same browser. Participants between the ages of 18-35 who received the research link approved the 'Research Consent Form' before starting the research. For 15-17 year olds to participate in the research, contact information of parents was requested and 'Parent Consent Form' was obtained online. The consent form states general information about the research and that participation in the study is on a voluntary basis. In total 21 participants whose mother tongue was not Turkish and also the participant and whose parents were not born in Turkey were excluded from the dataset.

## STATISTICAL ANALYSIS

The data analysis was carried out with raw item scores using the MPlus Version 8.4 (Muthén & Muthén, 2017). CFA was executed to examine the internal structure of the CEUT-24 Turkish version with WLSMV estimation because of the non-normal distribution (the pronounced skewness and

---

<sup>1</sup> West-European participants mean item scores were obtained by computing the mean item scores across the four European Countries (Belgium, UK, Germany, Spain). These mean item scores were reported in a published research supplementary material. (see <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.812525/full#supplementary-material>).

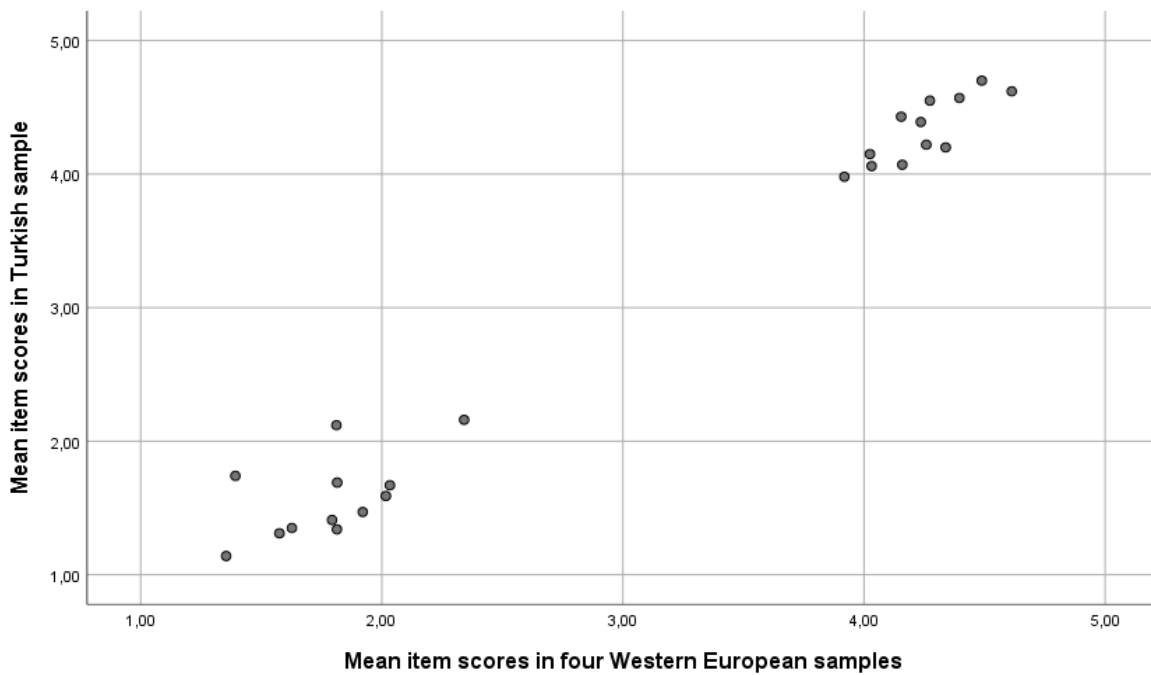
kurtosis in some items). We followed Schweizer’s (2010) criteria to examine the model fit of the proposed priori model. A normed chi-square ( $\chi^2$ ) less than 2, the root mean square error of approximation (RMSEA) less than .05 and a comparative fit index (CFI) range between .95 and 1.00 indicates good model fit. A normed chi-square ( $\chi^2$ ) range between 2 and 3, an RMSEA range between .05 and .08, and a CFI range between .90 and .95 indicates acceptable fit. Standardized root means square residuals (SRMR) should be below .10. In addition, Pearson Correlation, was implemented to compare of the Turkish item means with published research in West-European samples. These analyses were carried out to provide evidence for the validity of the CEUT-24 Turkish version. Cronbach's alpha internal consistency coefficient were utilised for the reliability of the CEUT-24 Turkish version.

**FINDINGS**

**COMPARING AVERAGE ITEM SCORES IN THE TURKISH SAMPLE WITH WEST-EUROPEAN SAMPLES**

First, we have investigated the comparability of the Turkish item means with published research in West-European samples (Huyghe et al., 2022). There was almost perfect correlation between the Turkish and West-European mean item scores ( $r = .99, p < .01$ ). See Figure-1 for the scatter plot of this relationship.

**Figure 1.** Comparing Mean Item Scores of Turkish Sample with Four Western European Samples



**CFA ANALYSES**

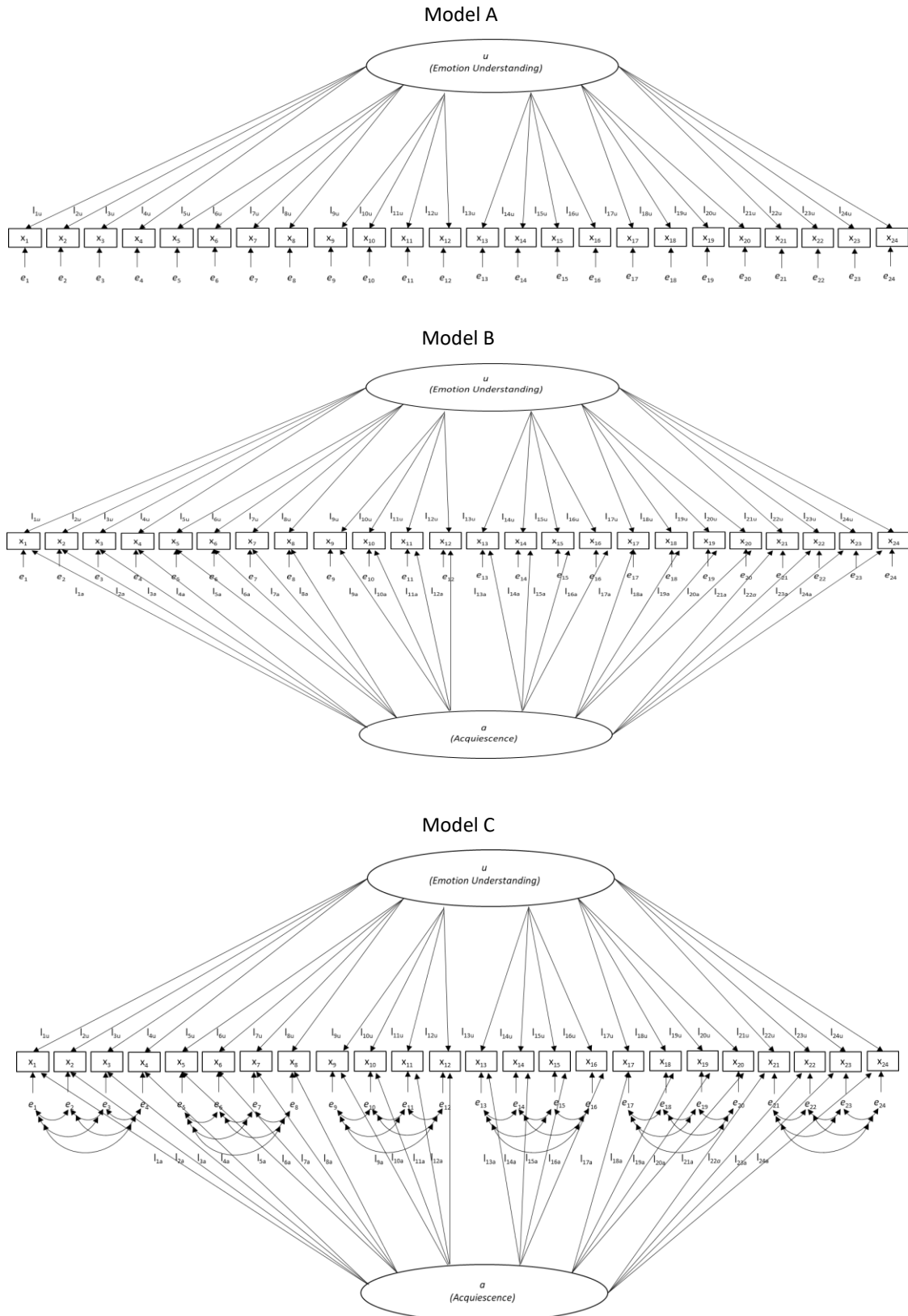
Items mean, variance, skewness and kurtosis values were examined. Most of the skewness and kurtosis values were high. See Table-1 for mean, variance, skewness and kurtosis of the CEUT-24 Turkish version Items.

**Table 1.** Mean, Variance, Skewness and Kurtosis of the CEUT-24 Turkish Version Items

<i>Items</i>	<i>Mean</i>	<i>Variance</i>	<i>Skewness</i>	<i>Kurtosis</i>
A1	1.349	0.606	2.594	6.720
A2	1.591	0.895	1.770	2.701
A3	1.675	1.043	1.519	1.562
A4	1.306	0.653	2.964	8.425
B1	4.197	0.735	-1.342	2.224
B2	4.216	0.772	-1.487	2.694
B3	2.159	0.931	0.769	0.429
B4	4.066	0.703	-1.008	1.605
C1	1.341	0.748	2.895	7.990
C2	1.407	0.750	2.439	5.676
C3	4.547	0.657	-2.300	5.842
C4	3.978	0.642	-0.869	1.582
D1	4.571	0.689	-2.454	6.429
D2	1.693	0.628	1.243	1.897
D3	4.062	0.723	-1.094	1.719
D4	4.388	0.620	-1.527	2.888
E1	1.144	0.303	4.669	23.907
E2	4.696	0.350	-2.646	10.078
E3	4.619	0.415	-1.983	4.909
E4	1.743	1.244	1.371	0.842
F1	4.428	0.562	-1.845	5.079
F2	4.149	0.679	-0.990	1.217
F3	2.116	1.294	0.719	-0.509
F4	1.472	0.564	1.752	3.252

Three nested models have tested with WLSMV estimator because of the pronounced skewness and kurtosis. Model A consists of only the EU factor, model B consists of the (dis)acquiescent responding factor added to model A, and model C consists of the scenario-specific error covariances added to model B. Figure-2 displays model A, model B and model C (Huyghe, Hovasapian & Fontaine, 2022).

**Figure 2.** These Three Nested Models (Model A, Model B, Model C) are Based on Drawings of Huyghe, Hovasapian & Fontaine (2022).





Only model C had good fit ( $\chi^2=422.709$ ,  $df=215$ ,  $\chi^2/df=1.966$ ;  $RMSEA=.038$ ;  $RMSEA\ 90\% CI=.032-.043$ ;  $CFI=.965$ ;  $SRMR=.046$ ). See Table-2 for the Goodness of fit statistics of all models and see Table-3 for standardized factor loadings of the EU factor and (dis)acquiescent responding factor.

**Table 2.** Goodness of Fit Statistics of Model

Model	Fit Indices						
	$\chi^2$	df	$\chi^2/df$	RMSEA	90% CI for the RMSEA	CFI	SRMR
A	2152.515	252	8.541	.105	.101-.109	.682	.099
B	1904.647	251	7.588	.098	.094-.103	.723	.091
C	422.709	215	1.966	.038	.032-.043	.965	.046

**Table 3.** Standardized Factor Loadings of EU Factor and (Dis)Acquiescent Responding Factor

Scenario and items	EU factor	(dis)acquiescent responding	Scenario and items	EU factor	(dis)acquiescent responding
A1	-.46	.185	D1	.50	.185
A2	-.36	.185	D2	-.51	.185
A3	-.31	.185	D3	.41	.185
A4	-.56	.185	D4	.50	.185
B1	.43	.185	E1	-.81	.185
B2	.44	.185	E2	.63	.185
B3	-.36	.185	E3	.59	.185
B4	.37	.185	E4	-.45	.185
C1	-.52	.185	F1	.53	.185
C2	-.52	.185	F2	.50	.185
C3	.52	.185	F3	-.39	.185
C4	.38	.185	F4	-.44	.185

Note: A: Scenario 1; B: Scenario 2; C: Scenario 3; D: Scenario 4; E: Scenario 5; F: Scenario 6.

See Table 4 for the error correlations between the items of the same scenario (\* $p < .05$ ).

**Table 4.** The Error Correlations between the Items of the Same Scenario.

Item	With	Estimate	Item	With	Estimate	Item	With	Estimate
A1	A2	.38 *	B1	B2	.64 *	C1	C2	.65 *
	A3	.20 *	B3		-.23 *	C3		-.60 *
	A4	.26 *	B4		.28 *	C4		-.19 *
A2	A3	.50 *	B2	B3	-.22 *	C2	C3	-.63 *
	A4	.57 *	B4		.31 *	C4		-.19 *
A3	A4	.64 *	B3	B4	-.19 *	C3	C4	.27 *
D1	D2	-.28 *	E1	E2	-.21	F1	F2	.36 *
	D3	.25 *	E3		-.37 *	F3		-.10
	D4	.33 *	E4		-.05	F4		-.35 *
D2	D3	-.25 *	E2	E3	.44 *	F2	F3	-.08
	A4	-.20 *	E4		.09	F4		-.17 *
D3	D4	.30 *	E3	E4	.14 *	F3	F4	-.01

**COMPARING FACTOR SCORES WITH SCALE SCORES**

We also investigated how well simple scale scores represent the EI factor scores. We estimated factor scores with Mplus and examined the correlations of the CEUT-24 scale scores with the EI factor scores and the (dis)acquiescent responding factor scores. A very high positive relationship was observed between the CEUT-24 scale scores and EI factor scores ( $r=.95$ ,  $p < .01$ ). No statistically significant correlation was observed between the CEUT-24 scale scores and (dis)acquiescent

responding factor scores ( $r=-.02$ ,  $p>.01$ ). In this study, CEUT-24 scale score had a Cronbach's alpha of .83

### DEMOGRAPHIC DIFFERENCES

Univariate analysis of variance were conducted to test differences according to gender (male,  $N=202$  / female,  $N=459$ ) and education level<sup>2</sup> (members from secondary education,  $N=191$ , upper secondary education,  $N=79$  and undergraduate,  $N=391$ ) for the CEUT-24 scale scores.<sup>3</sup> The main effect of gender was statistically significant  $F_{(1, 655)}=5.62$ ,  $p=.018$ , partial  $\eta^2=.01$  with women ( $\bar{x}=105.14$ ) outscoring men ( $\bar{x}=102.85$ ). The main effect of education level was statistically significant  $F_{(2, 655)}=6.60$ ,  $p=.001$ , partial  $\eta^2=.02$ : Undergraduates score ( $\bar{x}=105.68$ ) significantly higher than upper secondary pupils ( $\bar{x}=103.60$ ) and secondary pupils ( $\bar{x}=102.71$ ).<sup>4</sup> The interaction effect between gender and educational level was not significant,  $F_{(2, 655)}=1.31$ ,  $p=.272$ ,  $\eta^2=.00$ .

## DISCUSSION, CONCLUSION AND IMPLICATIONS

### MEAN ITEM SCORES

The comparability of the features in the CEUT-24 instrument has been exploratively investigated across Turkish and West-European adolescents and early adults. Participants in all cultural groups agreed on the likelihood of each feature. This implies that the CEUT-24 items have on average the same meaning in Turkish than in Western samples. This implies that not only the same latent factors could be expected in the Turkish sample, but that also the same item loadings should be found.

### INTERNAL STRUCTURE

The predicted internal structure of CEUT-24 was completely confirmed at item level: both the EU ability factor and two design-based method effects – an acquiescence responding and design-based error covariance were needed for a fitting model. From a content perspective, the instrument is basically one-dimensional, but one needs to control for acquiescent responding and consider the situational judgment test nature.

As theoretically predicted, evidence was found that all emotion components were involved also in Turkish context. To well represent the emotion construct, emotional understanding ability needs to include understanding of all emotional components (i.e. understanding appraisals, understanding action tendencies, understanding bodily reactions, understanding expressions and understanding subjective feelings).

The present study further demonstrated that there is no need to transform raw item scores into proportion scores, as Fontaine et al. (2022) Huyghe et al. (2022) already demonstrated in Western samples. Also in a non-Western, Turkish context raw item scores contain the needed information.

### SCALE CONSTRUCTION

CEUT-24 scale scores were extremely highly correlated with the EI factor scores. Thus, simple scale scores very closely match model based factor scores. Moreover, there was no correlation between acquiescent responding factor scores and CEUT-24 scale scores. This can be explained by the balanced design of the CEUT-24 with as many correct as incorrect items. In such a balanced design a

<sup>2</sup> Age was not taken into account due to the confounding between education level and age.

<sup>3</sup> ANOVA analyses were executed on a subsample of participants ( $N=661$ ). 19 participants who marked the 'other' option for gender and education level were not included.

<sup>4</sup> We also checked the effects of gender and education level with the EI factor scores. We came to the same conclusions. The main effect of gender was statistically significant  $F_{(1, 655)}=5.20$ ,  $p=.023$ , partial  $\eta^2=.01$  for the EI factor scores with women ( $\bar{x}=.01$ ) outscoring men ( $\bar{x}=-.08$ ). The main effect of education level was statistically significant  $F_{(2, 655)}=3.35$ ,  $p=.036$ , partial  $\eta^2=.01$  for the EI factor scores. Undergraduate member scores ( $\bar{x}=.01$ ) were significantly higher than upper secondary ( $\bar{x}=-.01$ ) and secondary members ( $\bar{x}=-1.1$ ). The interaction effect between gender and educational level was not significant,  $F_{(2, 655)}=2.10$ ,  $p=.124$ ,  $\eta^2=.01$ .

method factor that affects all items to the same extent is cancelled out when scale scores are computed. Design based error covariances had no (or at best a marginal) impact on the scale scores, because they are limited to each specific scenario. Together with the good internal consistency of the scale scores, these correlations justify to continue working with the easy to compute scale scores in the future.

### **DEMOGRAPHIC VARIABLES**

There were to be expected, but small gender and education effects on EU ability. This information gives extra validity evidence for the CEUT-24 instrument. According to the findings, women were better than men on EU ability. There are similar findings in the CEUT original version validity research examining the differentiation of emotion EU ability in line with gender in different cultural groups (Sekwena & Fontaine, 2018). Also, undergraduates on average outperformed upper secondary and secondary pupils. It can be said that EU ability can be improved with education. In fact, emotional competence can be nurtured and developed as a person grows by context and cultural-related experiences with others (Saarni, 1999).

### **LIMITATIONS AND FUTURE DIRECTIONS**

In this study only EU ability was investigated in Turkey. As a future direction, it is possible to study whether the aforementioned model can be generalized to other facets of the EI like emotion recognition and emotion regulation ability. EI scales with an SJT format using Likert response can be investigated with the same model. The current results are very promising. Moreover, as only one non-Western context, the Turkish context, was investigated, future research should test the CEUT-24 internal structure in other non-Western cultural groups.

### **CONCLUSION**

With the confirmatory factor structure also emerging in the Turkish context using raw item scores, strong evidence is found for the generalizability of the CEUT-24 beyond western contexts. The same theoretical framework and the same instrument can be used in a Turkish context to assess emotional understanding ability and to control for the two method effects of acquiescent responding and design-based error covariances.

### **ACKNOWLEDGEMENT**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. We would like to thank Dr. Esin Dündar for the back-translation of the Turkish CEUT-24 to English and Dr. Arpine Hovasapian to examine this back-translation of CEUT-24.

### **ETHICAL STATEMENT**

The research ethical protocol was approved by the Social and Human Sciences Ethical Board at the Mersin University – Turkey with the data and number of 03/07/2020-35. Informed consent forms were obtained before the research digitally. For minors, informed consent forms are also obtained from their parents. All data were anonymized.

### **AUTHOR CONTRIBUTION**

First author has made contributions to data curation; resources; roles/writing - original draft & editing. The second author has been involved in conceptualization; formal analysis; methodology; resources; writing - review & editing.

## REFERENCES

- Austin, E. J. (2010). Measurement of ability emotional intelligence: Results for two new tests. *British Journal of Psychology*, 101(3), 563-578. <https://doi.org/10.1348/000712609X474370>
- Bandalos, D. L. (2014). Relative performance of categorical diagonally weighted least squares and robust maximum likelihood estimation. *Structural Equation Modelling: A Multidisciplinary Journal*, 21, 102-116. <https://doi.org/10.1080/10705511.2014.859510>
- Barchard, K. A., Hensley, S., & Anderson, E. D. (2012, April). *When proportion consensus scoring fails*. Paper presented at the Western Psychological Association Annual Convention, San Francisco, CA.
- Ferguson, F. J., & Austin, E. J. (2011). The factor structures of the STEM and the STEU. *Personality and Individual Differences*, 51(6), 791-794. <https://doi.org/10.1016/j.paid.2011.07.002>
- Fiori, M. (2015). Emotional intelligence compensates for low IQ and boosts low emotionality individuals in a self-presentation task. *Personality and Individual Differences*, 81(July), 169-173. <https://doi.org/10.1016/j.paid.2014.08.013>
- Fontaine, J. (2016). Comment: Redefining emotional intelligence based on the componential emotion approach. *Emotion Review*, 8 (4). 332-333. <https://doi.org/10.1177/1754073916650503>
- Fontaine, J. R. J., Scherer, K. R., Roesch, E. B., & Ellsworth, P. C. (2007). The world of emotions is not two-dimensional. *Psychological Science*, 18(12), 1050-1057. <https://doi.org/DOI10.1111/j.1467-9280.2007.02024.x>
- Fontaine, J. R. J., Scherer, K. R., & Soriano, C. (2013). *Components of emotional meaning: A sourcebook*. OUP Oxford.
- Fontaine, J. R. J., Sekwena, E., Veirman, E., Schlegel, K., MacCann, C., Roberts, R. D., & Scherer, K. R. (2022). Assessing emotional intelligence abilities, acquiescent and extreme responding in situational judgement tests using Principal Component Metrics. *Frontiers in Psychology*. 13(April), 1-17. <https://doi.org/10.3389/fpsyg.2022.813540>
- Gignac, G. E. (2005). Evaluating the MSCEIT V2.0 via CFA: Comment on Mayer et al. (2003). *Emotion*, 5, 233-235. <https://doi.org/10.1037/1528-3542.5.2.233>
- Hinz, A., Michalski, D. Schwarz, R., & Herzberg, P.Y. (2007). The acquiescence effect in responding to a questionnaire. *GMS Psycho-Social-Medicine*, 4, 1-9.
- Huyghe, V. E. I., Hovasapian, A., & Fontaine, J. (2022). The scoring challenge of Emotional Intelligence ability tests: A Confirmatory Factor Analysis approach to model substantive and method effects using raw item scores. *Frontiers in Psychology*, 13 (March), 1-17. <https://doi.org/10.3389/fpsyg.2022.812525>
- Jardine, B. B., Vannier, S., & Voyer, D. (2022). Emotional intelligence and romantic relationship satisfaction: A systematic review and meta-analysis, *Personality and Individual Differences*, 196, 111713, <https://doi.org/10.1016/j.paid.2022.111713>.
- Karçi, K. D., Üstübcici, A., & De Clerck, H. (2014). *Turkey: country and research areas report. MiReKoç Project Reports 2/2014*. İstanbul, Turkey: Koç University, Migration Research Center.
- Legree, P. J., Pstotka, J., Robbins, J., Roberts, R. D., Putka, D. J., & Mullins, H. M. (2014). *Profile similarity metrics as an alternate framework to score rating-based tests: MSCEIT Reanalyses*. *Intelligence*, 47, 159-174. <https://doi.org/10.1016/j.intell.2014.09.005>
- MacCann, C. (2010). Further examination of emotional intelligence as a standard intelligence: A latent variable analysis of fluid intelligence, crystallized intelligence, and emotional intelligence. *Personality and Individual Differences*, 49, 490-496. <https://doi.org/10.1016/j.paid.2010.05.010>
- Maul, A. (2012). Examining the structure of emotional intelligence at the item level: new perspectives, new conclusions. *Cognition and Emotion*. 26, 503-520. <https://doi.org/10.1080/02699931.2011.588690>
- Mayer, J. D., Salovey, P., Caruso, D. R., & Sitarenios, G. (2003). Measuring emotional intelligence with the MSCEIT V2.0. *Emotion*, 3(1), 97-105. <https://doi.org/10.1037/1528-3542.3.1.97>
- Moeller, S. K., Robinson, M. D., Wilkowski, B. M., & Hanson, D. M. (2012). The big chill: Interpersonal coldness and emotion labeling skills. *Journal of Personality*, 80(3), 703-724. <https://doi.org/10.1111/j.1467-6494.2011.00738.x>
- Muthén, L. K., & Muthén, B.O. (2017). *Mplus user's guide* (Eighth Edition). Muthén & Muthén.

- Newbold, A., Warren, F. C., Taylor, R. S., Hulme, C., Burnett, S., Aas, B., Botella, C., Burkhardt, F., Ehring, T., Fontaine, J. R. J., Frost, M., Garcia-Palacios, A., Greimel, E., Hoessle, C., Hovasapian, A., Huyghe, V., Lochner, J., Molinari, G., Pekrun, R., . . . Watkins, E. R. (2020). Promotion of mental health in young adults via mobile phone app: study protocol of the ECoWeB (emotional competence for well-being in Young adults) cohort multiple randomised trials. *BMC psychiatry*, *20*(1), 458. <https://doi.org/10.1186/s12888-020-02857-w>
- Nussbeck, F. W., Eid, M., & Lischetzke, T. (2006). Analysing multitrait-multimethod data with structural equation models for ordinal variables applying the WLSMV estimator: What sample size is needed for valid results? *Br J Math Stat Psychol*. *59*(1), 195-213. <https://doi.org/10.1348/000711005X67490>
- Rossen, E., Kranzler, J. H., & Algina, J. (2008). Confirmatory factor analysis of the Mayer\_Salovey\_Caruso Emotional Intelligence Test v 2.0 (MSCEIT). *Personality and Individual Differences*, *44*, 1258\_1269. <https://doi.org/10.1016/j.paid.2007.11.020>
- Saarni, C. (1999). *The development of emotional competence*. The Guilford Press.
- Salovey, P., & Mayer, J. D. (1990). "Emotional intelligence," *Imagination, Cognition and Personality*, *9*, 185–211. <https://doi.org/10.2190/DUGG-P24E-52WK-6CDG>
- Scherer, K. R. (2009). The dynamic architecture of emotion: Evidence for the component process model. *Cognition & Emotion*, *23*, 1307–1351. <https://doi.org/10.1080/02699930902928969>
- Schweizer, K. (2010). Some guidelines concerning the modelling of traits and abilities in test construction. *European Journal of Psychological Assessment*, *26*(1), 1–2. <https://doi.org/10.1027/1015-5759/a000001>
- Sekwena, E. K., & Fontaine, J. R. J. (2018). Redefining and assessing emotional understanding based on the componential emotion approach. *South African Journal of Psychology*, *48*(2), 243-254. <https://doi.org/10.1177/0081246317714681>
- Smith, E.E., Nolen-Hoeksema, S., Fredrickson, B., Loftus, G.R., Bem, D., & Maren, S. (2003). *Atkinson & Hilgard's introduction to psychology*. (14<sup>th</sup> edition). Wadsworth/Thomson Learning.
- Southam-Gerow, M. A. (2013). *Emotion regulation in children and adolescents a practitioner's guide*. The Guilford Press.
- Trentacosta, C. J. & Fine, S.E. (2010). Emotion knowledge, social competence, and behavior problems in childhood and adolescence: A meta-analytic review. *Social Development*, *19*(1), 1-29. <https://doi.org/10.1111/j.1467-9507.2009.00543.x>

## APPENDIX

### DATA AVAILABILITY

The data of the sample can be shared for scientific purposes. Please contact to first author.