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Cross-cultural affective neuroscience personality comparisons of Japan, Turkey and Germany

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Abstract

Mothering styles and family models of different cultures- that vary in interdependency and independency combinations—can influence the development of basic affects differently. The present study carried out the cross-cultural comparisons of samples from Japan, Turkey and Germany on self-construals, basic affects and Big Five factors. The countries were selected along a Euro-Asian spectrum, from highly collectivistic Japan to least collectivistic Germany, with Turkey as a bridging culture. The sample consisted of undergraduate and graduate students from Kyoto in Japan ($n = 353$), Istanbul in Turkey ($n = 327$) and Bonn in Germany ($n = 222$). The questionnaire included the self-construal scale (SCS), the affective neuroscience personality scales (ANPS) and the big five scale (B5S). SCS scores showed that the level of interdependent self-construals decreased from East to West, but independent self-construals did not gradually increase. Highest independency score was found in Turkey. Theoretically well-known German individualism was not found to be based on higher independency, but on lower interdependency. On ANPS, female groups seemed very similar on positive affects whereas for negative affects they had differences; like Japanese females had higher FEAR, Turkish females had higher ANGER. Similarly, Japanese males had higher FEAR and SADNESS, Turkish males had higher ANGER. On ANPS, Turkish and Japanese males were more similar and distinct from the German males who had lower scores almost on all affects. However on B5S; Turks and Germans were found to be quite similar and distinct from the Japanese. Turkey seemed to maintain more subcortical affective personality similarities with Japan, while attuning more to B5 factors displayed by Germany. Findings are discussed in light of child-rearing styles in each country.

Keywords Affective neuroscience · Culture · Affective neuroscience personality scales · Big five · Self-construals · Interdependency · Independency · Cross-cultural affective neuroscience

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Introduction

The desire to be socially related to others and the desire to be a unique individual that is independent are the two existential needs of each human being. These universal needs for inter-relatedness and autonomy are the fundamentals of interdependent and independent self-construals (Markus and Kitayama 1991). While interdependent self-construals are related to attending to maintain the social harmony, controlling internal states in order to promote the ideals of the social group and behaving based on social norms; independent self-construals are related to attending to the self, expressing individual needs and autonomy and behaving based on individual internal attributes (Markus and Kitayama 1991; Triandis 1995). These two self construals are reinforced differently in Eastern and Western cultures and cross-cultural theories of self-development discuss this issue generally as the "Collectivistic Self and Individualistic Self" (Triandis et al. 1988), "Interdependent Self and Independent Self" (Markus and Kitayama 1991) or "Relational Self and Separate Self" (Fişek 2010; Kağıtçıbaşı 1996).

Although polarized terminologies have been used for Eastern and Western selves, in all cultures the mother-infant interaction is the primal biopsychosocial context where infants first experience *"symbiotic union and relatedness"* and then *"separation and individuation"* (Mahler et al. 2008). Therefore, the role of mother-infant interaction styles in the biopsychological development of human beings is universally important. However the time-lines of developmental progressions seem to vary across cultures. For instance, the basic characteristics of mothering (duration of breast feeding, onset of toilet training, duration of co-sleeping in the room of parents etc.) are regulated uniquely by each culture. While breast feeding may typically last around 6-12 months in individualistic cultures, it may extend up to 2 years in more collectivistic cultures (www.lansinoh. com/en/globalsurvey). While the infant may be placed in a separate room to sleep independently after about half a year in individualistic cultures, co-sleeping with parents is more common and prolonged in collectivistic cultures (Mindell et al. 2010; Shimizu et al. 2014). Thus, relatedness and separateness, and the reinforcement or suppression of self-object differentiation, are molded by cultural influences (Fişek 2010; Kağıtçıbaşı 1996; Roland 1996).

The collectivistic and individualistic cultural norms are taught to influence mothering styles in different ways (Narvaez et al. 2012; Roland 1988, 1996). While prolonged symbiotic Eastern mothering styles do not reinforce separation-individuation, thereby promote loose self-object boundaries, Western mothering styles reinforce separation individuation in order to promote more distinct and separate selves (Roland 1996). A cross-cultural study carried out by Friedlmeier and Trommsdorff (1998) found that Japanese mothering style- which is based on feeling oneness with the child- amplified the affectionate interpersonal relationship by a stronger emotional bond between the mother and child, more physical contact and higher maternal sensitivity and responsiveness. On the contrary, German mothering style—which is based on perceiving the child as a separate being- amplified a more distant mother–child relationship by less physical contact

(except high eye contact) and lower maternal sensitivity/responsiveness. In a way, Japanese children had more emotional interactions to internalize compared to German children. The authors suggested that the cultural differences in emotional internalizations may influence the emotional development of these children differently.

Consistent to mothering styles, interdependent family models include extended families where emotional interdependencies are highly valued but personal autonomy is de-emphasized while independent family models include nuclear families where personal autonomy is highly valued but emotional interdependencies are de-emphasized (Mayer et al. 2012). For child rearing practices, the independent family models focus mainly on the personal autonomy of the child, and to a relatively smaller degree on interpersonal relationships and interdependence; whereas the interdependent family models focus more on the emotional inter-relatedness of the child and less on autonomy. A recent study comparing Germany, Turkey and India in terms of family models and family change found out that Germany showed the highest prevalence of independent family model, India showed the highest prevalence of interdependent family models, while Turkey displayed the highest prevalence of emotionally interdependent family models- which is the synthesis of the former two models (Mayer et al. 2012). In emotionally interdependent families, personal autonomy is allowed while emotional closeness and inter-relatedness are maintained. It is possible to be independent while keeping interdependency, as these are not opposing poles, but co-existing needs (Kagitçibasi 2005, 2007).

The argument, that the different mothering styles and family models found in different cultures can lead to variations in interdependency and independency, gains support also from personality related neuropsychology studies (Han and Northoff, 2008) and oxytocin related neuroscientific studies (Luo and Han 2014; Scheele et al. 2014; Wade et al. 2014). In line with the notion that the self and the mother are more symbiotic for Easterners, but more separated for Westerners; it was found that Chinese show a substantial increase in the MPFC for both self judgement and mother judgment, while Westerners show no such increased activation in the mother-reference condition (Zhu et al. 2007). Moreover, subjects who endorse individualistic values have higher medial prefrontal cortex (MPFC) activation to general self-descriptions, whereas subjects who endorse collectivistic values have higher MPFC activation to social-contextual self-descriptions (Chiao and Blizinsky 2010). Based on such findings, it has been argued that two kinds of neural representations of self (collectivistic self and individualistic self) are elaborated within MPFC regions of individuals from different cultures.

The influence of culture on basic affects and affective neuroscience personality scale

The different mothering styles/family models found in different cultures lead to cross-cultural variations not only for inter-relatedness and separateness, but also for affective developments. Cross-cultural emotion socialization studies also show that parents promote or inhibit different emotions of the child, depending on their cultural

norms and the gender of their child (Friedlmeier et al. 2011; Song and Trommsdorff 2016). However, emotion socialization studies are carried out by observations of parent–child interactions, not by objective tools. On the other side, neuroscientific studies for affective development supply us the necessary objective means to enlighten the probable neurological mechanisms that may be underlying the emotion socializations. According to the *Affective Neuroscience* of Panksepp (1998), emotions based in the subcortical affective systems are suggested to be the primary processes, which are shaped by the secondary processes of learning and development, which finally result into cortical cognitive systems of tertiary processes (Panksepp and Solms 2012). Mothering styles shape the development of subcortical affective systems and subcortical-cortical networks (especially in the right hemisphere) of the infant, influencing the qualities of affect regulation in later life (Korkmaz and Njiokiktjien 2013; Narvaez et al. 2012; Panksepp 1998; Panksepp and Biven 2012; Schore 1994). The degree to which subcortical basic affective systems are reinforced or inhibited is discussed to be influenced further by culture (Özkarar-Gradwohl et al. 2014). Thus, it is increasingly recognized that universally shared subcortical affective systems are initially regulated uniquely in each mother-infant bond and subsequently by family models and culture.

Affective Neuroscience Personality Scale (ANPS) has been constructed as an objective tool based on this "neurodevelopmental approach" that personality is formed upon the strengths and weaknesses of the basic affective systems, which are initially regulated by the mother-infant interactions and early environmental experiences (Davis et al. 2003; Panksepp 2011). ANPS measures the subcortical affective systems, thus the primary processes that are shaped by secondary processes and that are evolutionary older than the tertiary processes located in cortical regions. Big Five Model- which had been widely used in personality studies in the 20th century- is not based on such a neurodevelopmental theory of personality and it measures mostly the cortical cognitive and behavioral characteristics of personality. The Five Factors are named as Extraversion (e.g. talkative, assertive, sociable, optimistic), Agreeableness (e.g. trusting, compliant, modest, compassionate), Conscientiousness (e.g. cautious, disciplined, planful, neat), Openness to Experience (e.g. curious, experimenting, adventurous, intellectual, open-minded) and Emotional Instability (the only factor related to the cortical control over negative affects, named also as Neuroticism; e.g. anxious, worrying, restless, self-critical). The Big Five dates back to the "lexical approach" of Allport and Odbert who had prepared a list of personality describing words based on the "English dictionary" in 1920's, which was later improved by Cattell and categorized into Five Factors by Tupes and Christal in 1961 (cf. John and Srivastava 1999). Linguistic universality of the lexically derived Big Five is open to discussions, as it is criticized to be based on Western cultural norms embedded in the English language (John and Srivastava 1999). Moreover, Big Five produces findings that lead to East–West polarizations; lower scores in East and higher scores in West (Gurven et al. 2013; Piedmont et al. 2002; Schmitt et al. 2007; Triandis 1997).

Based on the evolutionary theory of Affective Neuroscience, primary processes of subcortical affective systems come prior to cortical linguistic processes. Neurodevelopmentally speaking, the affects of an infant exist before his/her language

develops. Therefore, ANPS stands as a more fundamental tool, which has the privilege of assessing the primary processes embedded in the universally shared subcortical affective systems. ANPS measures six primal basic affective systems namely: SEEK, PLAY, CARE, FEAR, SADNESS and ANGER [capitalizations are used to highlight their primary-process nature; see Panksepp (2011)], with the addition of a ''Spirituality'' subscale, which may qualify as the highest human emotion (Davis et al. 2003). Among the three major positive affect scales, SEEK is defined as ''feeling curious, feeling like exploring, striving for solutions to problems'', PLAY is described as ''having fun, playing games involving physical contact, humor, laughter, being generally happy and joyful'', CARE consists of ''nurturing, feeling softhearted toward animals and people in need, feeling empathy, feeling affection for and liking to care for others''. For the three negative scales, FEAR reflects the tendency for ''feeling anxious and tense, worrying, struggling with decisions, ruminating about past decisions, losing sleep, not typically being courageous'', SADNESS monitors ''feeling lonely, crying frequently, thinking about loved ones and past relationships, feeling distressed when not with loved ones'' and ANGER for ''feeling hotheaded, being easily irritated and frustrated, expressing anger verbally/physically, remaining angry for long''. Spirituality is defined as ''feeling connected to humanity and creation as a whole, striving for inner peace and harmony, searching for meaning in life'' (Davis et al. 2003), in short the intrinsic brotherhood and sisterhood of all human beings, indeed based on ancestral relationships with all other mammals. Spirituality measured by ANPS focuses mostly on transcendent values, therefore its operational definition *is not* equal to religiousness. While some see spirituality and religiousness as overlapping constructs (Miller and Thoresen 2003), there is also evidence that these are two independent dispositions (Saucier and Skrzypinska 2006).

The main findings of the original ANPS study (Davis et al. 2003) have been confirmed by the ANPS standardization studies in Spain, France, Turkey, Japan and Germany (Abella et al. 2011; Pahlavan et al. 2008; Pingault et al. 2012; Özkarar-Gradwohl et al. 2014; Narita et al. 2017; Reuter et al. 2017). For instance, positive inter-correlations among positive subscales and positive inter-correlations among negative subscales were found in all Spanish, French, Turkish, Japanese and German samples; strengthening the proposition that both positive and negative affect might be higher-order cross-cultural personality factors (Davis et al. 2003). Moreover, the gender effect obtained in the original study showing that females have higher scores than males on CARE and SADNESS were also detected in the Spanish, French, Turkish and German studies (Abella et al. 2011; Pahlavan et al. 2008; Pingault et al. 2012; Özkarar-Gradwohl et al. 2014; Montag et al. 2016a, b). On the other hand, different from the findings of the original study (Davis et al. 2003), culture specific gender effects were also obtained; like both Spanish and French females having higher scores than males on FEAR, Spanish females having higher scores than males on SEEKING, French females showing lower scores than males on PLAY (Abella et al. 2011; Pahlavan et al. 2008). Within gender differences were also seen, e.g. American females had higher SADNESS and FEAR than Turkish females, whereas Turkish females had higher ANGER (Özkarar-Gradwohl et al. 2014).

In sum, standardization studies of ANPS demonstrated that the basic affective systems (underlying the development of self) have both universal and culture specific properties, which are open to gender effect. However, the influence of culture on the regulation of basic affective systems is still a new topic and needs to be explored further (Özkarar-Gradwohl et al. 2014).

The aims of the present study

Sufficient amount of literature argue that interdependent/independent norms influence the affective development differently via varying mothering styles/family models, but studies that analyze the influence of culture on basic affective systems are not common. *To our knowledge, the cross-cultural comparison of basic affective systems along a Euro-Asian cultural spectrum has not been yet studied.* Therefore we decided to carry out a cross-cultural comparison of Japan, Turkey and Germany on basic affective systems. Literature defines Japan as a collectivistic Asian culture, Turkey as a bridging culture between East and West, and Germany as a more individualistic European culture. After measuring the levels of interdependent-independent self-construals for our samples and empirically controlling to what extend our samples fit to these theoretical descriptions in the literature; we proceeded with our aims stated below.

The first aim of the present study was to carry out comparisons of Japan, Turkey and Germany on the Affective Neuroscience Personality Scale (ANPS) and to explore how basic affective systems evolve in these three cultures which vary in interdependency-independency levels. *The second aim of this study* was to carry out the comparisons of these three samples on Big Five Scale (B5S). We predicted that the East–West polarizations, reported by cross-cultural Big Five studies, will be confirmed by our B5S comparisons, while no such polarizations will be found for our ANPS comparisons. If our prediction is supported, we suggest the utilization of ANPS as a non-polarized psychometric tool in future cross-cultural personality studies. *The last aim of our study* was to observe how the subcortical affective characteristics measured by ANPS and the cortical cognitive/behavioral characteristics measured by B5S relate to the formation of self-construals in each country. Although Panksepp (1998) stated that the self is rooted in subcortical affective processes, the relation of ANPS to self-construals has not been yet studied. It was found that B5 factors influence self-construals (Levinson et al. 2011), but Asian subjects were excluded from those analyses. Our study is the first to observe how ANPS and B5S relate to self-construals in different cultures. We predicted that different affective and cognitive-behavioral compositions may be related to interdependency-independency in each culture.

Cross-cultural Affective Neuroscience (CAN) is *a new research field* that we propose to analyze the influence of culture on basic affective systems. Therefore, the aims of our study are mostly exploratory rather than hypothetical and the results will be discussed in order to see whether our new research field can be affirmed in line with the relevant literature.

Method

Sample

The research sample was composed of undergraduate and graduate university students from the Kyoto Bunkyo University, Kio University and Kyoto Gakuen University in Japan, from Istanbul Bilgi University in Turkey and from the University of Bonn in Germany. The German sample included 222 participants with 115 females and 107 males ($M = 28.39$, SD $= 12.33$, median $= 23$), the Japanese sample included 353 participants with 144 females and 209 males ($M = 19.47$, SD $= 5.07$, median $= 19$), and the Turkish sample included 327 participants with 209 females and 118 males ($M = 21.33$, SD $= 1.49$, median $= 21$). All three samples were recruited from the students who attended the courses of the psychology departments. However some of the students who were taking these classes came from other social sciences departments. All subjects attended the research voluntarily and did not receive any extra credit for their courses. Data were collected in classroom settings, from the students who filled in the consent forms. In Germany, 72 participants responded online rather than in classroom. All subjects completed the Self Construal Scale, Affective Neuroscience Personality Scale and Big Five Scale. For the collection of data, the Ethical Committee for Conducting Research on Human Beings- in the related universities of Turkey and Japan- approved the distribution of the questionnaires. This ethical approval was considered valid also in Germany.

Materials

Self-construal scale

The Self-Construal Scale was developed by Singelis (1994) to measure the independent self which represents the separate dimension of the self and the interdependent self which represents the inter-related side of the self. These two dimensions of the self are measured with 15 questions assigned to each dimension. The participants are asked to rate their experiences in daily life, related to independent and interdependent self-construals, on a seven-point Likert scale and receive an independence score and an interdependence score. The reliabilities for SCS were; for the Japanese version (Takahashi et al. 2009) .67 and .72 for independent and interdependent self-construal subscales; for the Turkish version (Wasti and Erdil 2007) .68 and .75 for independent and interdependent self-construal subscales; for the German translation (Montag, unpublished data) .64 and .71 for independent and interdependent self-construal subscales. There were slight item differences between the translated versions used in Japan, Turkey and Germany; therefore only the common items among these translated versions were used for the statistical analyses. These common items correspond to those in the 24-item version of the SCS, of which subsequent versions are a superset (Singelis 1994).

Affective neuroscience personality scales

Translated versions of the Affective Neuroscience Personality Scales- ANPS in Japanese (Narita et al. 2017), in Turkish (Özkarar-Gradwohl et al. 2014) and in German (Reuter et al. 2017)—were used to measure the six affective neuroscience subscales (PLAY, SEEK, CARE, FEAR, ANGER, SADNESS) and the Spirituality subscale. The ANPS uses a four-point Likert scale that ranges from strongly agree to strongly disagree. The ANPS assessments used in the different countries were based on two different versions of the original English-language ANPS, which vary slightly in length, item phrasing, and item selection. A 110-item questionnaire based on the first version of the ANPS (Davis et al. 2003) was used in Turkey and Germany, whereas 112-item questionnaire based on the second version of the ANPS (Davis and Panksepp 2011) was used in Japan. In both versions, each subscale contains 14 items, the Spirituality subscale contains 12 items, and positively and negatively phrased items are balanced equally. The remaining items in both versions are filler items. The two different versions of the ANPS used in the present study have 81 out of 96 (84.4%) scored items in common. The statistical analysis was carried out based on the common items in the two versions. Reliabilities for the original full subscales used in each country, as well as the subset of common items (used for the statistical analysis) are presented in Table 1. Using the common items of the two ANPS versions did not lead to a significant change in subscale reliabilities.

Big five scales

Big Five Scales (B5S) were modelled after Goldberg (1990, 1992) by Davis et al. (2003) and consisted of 70 items with five subscales measuring five personality dimensions, namely; Extraversion, Agreeableness, Conscientiousness, Emotional Instability and Openness to Experience. Every subscale has 14 items with a mixture of positive and negative adjectives. The reliabilities measured for B5S were; for the Japanese translation .86 for Extraversion, .80 for Agreeableness, .83 for Conscientiousness, .74 for Emotional Instability and .72 for Openness to Experience; for the Turkish translation .88 for Extraversion, .83 for Agreeableness, .88 for Conscientiousness, .81 for Emotional Instability and .78 for Openness to Experience; for the German translation .88 for Extraversion, .86 for Agreeableness, .86 for Conscientiousness, .81 for Emotional Instability, .84 for Openness to Experience.

Table 1 Observed Cronbach's α levels for the different versions of the ANPS used in each country

Country	SEEK	FEAR	CARE	ANGER	PLAY	SADNESS	Spirituality
DE	.86 (.87)	.84 (.83)	.90 (.88)	.80 (.81)	.91 (.87)	.61 (.67)	.88 (.93)
JP	.80 (.77)	.85 (.83)	.74 (.73)	.87 (.86)	.77 (.77)	.82 (.74)	.72 (.70)
TR	.64 (.60)	.74 (.71)	.70 (.69)	.76 (.76)	.70 (.60)	.60 (.63)	.78 (.80)

Values are calculated from the data used in the present study. The values in parentheses indicate Cronbach's alphas for common item sets shared by all the versions

Results

Cronbach's Alphas for ANPS

The Cronbach's alpha levels measured for the different versions of the ANPS used in each country and the Cronbach's alphas measured for the common item sets of ANPS for each country are summarized in Table 1.

Analysis of covariance for SCS, ANPS and B5S

The means and standard deviations derived from the common items of the SCS, ANPS, B5S versions are presented in Figs. 1, 2 and 3. One-way analysis of covariance (ANCOVA) with age as the covariate and country as the grouping variable ($\alpha = .05$) was performed separately for females and males on each subscale of SCS, ANPS and B5S. In a prior Turkish ANPS study (Özkarar-Gradwohl et al. 2014) age had been found to have negative correlations with all ANPS subscales and a positive correlation with Spirituality, therefore the present study considered age as a covariate that must be controlled for all the analysis. In line with the literature of ANPS where genders are always analyzed separately (e.g. Davis et al. 2003; Abella et al. 2011; Pahlavan et al. 2008; Özkarar-Gradwohl et al. 2014), all our analysis were also made separately for females and males. Tukey's HSD tests were used for post hoc analysis.
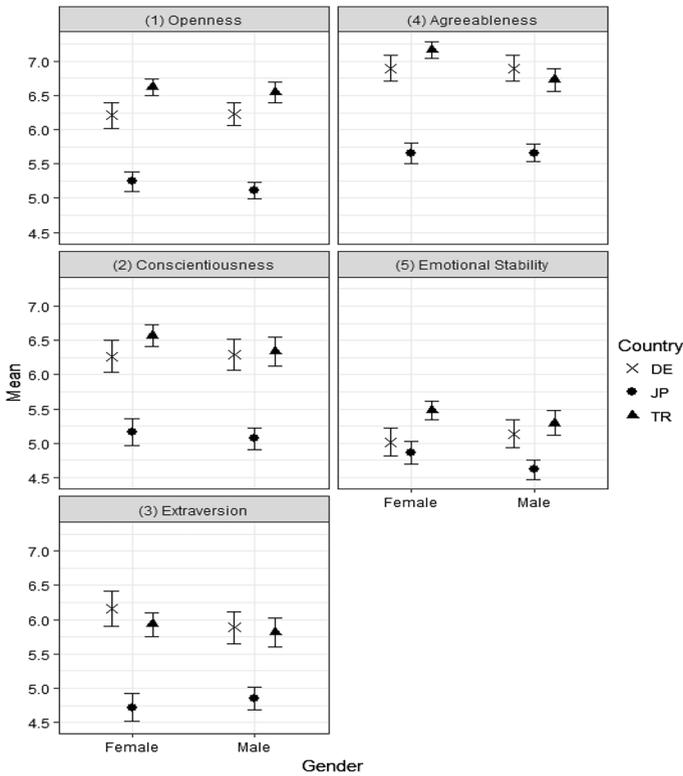
Females

On the SCS subscales presented in Fig. 1, ANCOVA's showed significant differences for Independent self-construals, $F(2, 464) = 45.70$, $p < .001$, $\eta^2 = .26$; and Interdependent self-construals, $F(2, 464) = 3.35$, $p = .036$, $\eta^2 = .26$. Tukey's HSD tests showed that, for independency, Turkish females had significantly higher scores than both the Japanese and the German females, whereas Japanese and
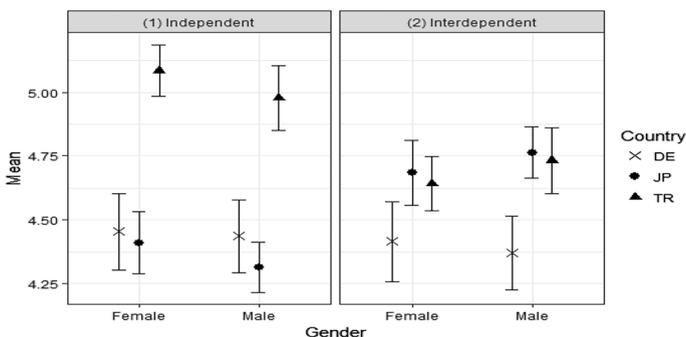
Fig. 1 Means and standard deviations for SCS by gender and country. Age-adjusted means for Self-Construal Scales with 95% confidence intervals. Overlapping confidence intervals indicate no significant differences at the 95% level
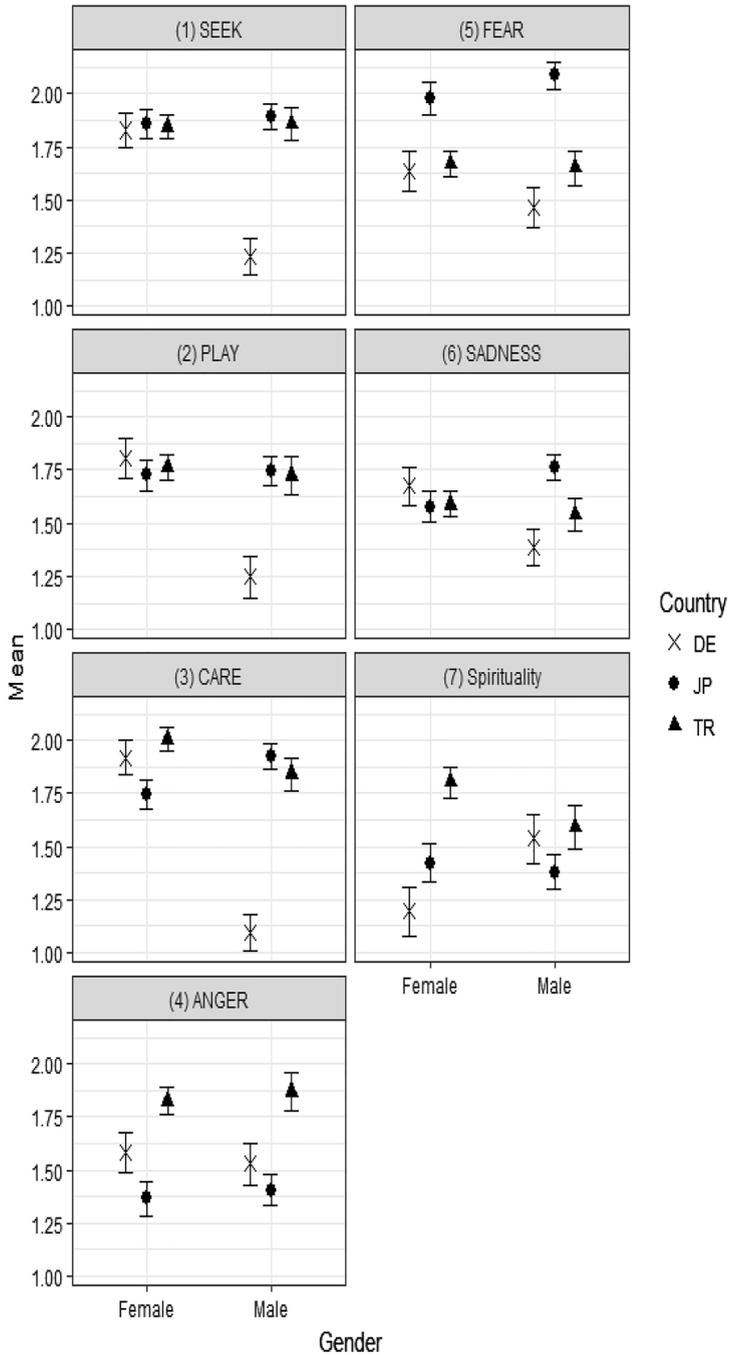
Fig. 2 Means and standard deviations for ANPS by gender and country. Note: Age-adjusted means for ANPS with 95% confidence intervals. Overlapping confidence intervals indicate no significant differences at the 95% level

Fig. 3 Means and standard deviations for B5S by gender and country. Note: Age-adjusted means for Big Five Scales with 95% confidence intervals. Overlapping confidence intervals indicate no significant differences at the 95% level

German females did not show a significant difference. For interdependency, Japanese females scored significantly higher than German females, whereas Turkish females showed no significant difference to Japanese and German females.

For ANPS subscales presented in Fig. 2, ANCOVA showed significant differences among the three groups on ANGER, $F(2, 464) = 43.15$, $p < .001$, $\eta^2 = .26$; CARE, $F(2, 464) = 18.36$, $p < .001$, $\eta^2 = .26$; FEAR, $F(2, 464) = 24.42$, $p < .001$, $\eta^2 = .26$; and Spirituality, $F(2, 464) = 44.69$, $p < .001$, $\eta^2 = .26$. Tukey's HSD tests showed that, for ANGER, Turkish females scored significantly higher than German and Japanese females, whereas German females scored significantly higher than Japanese females. For CARE, Turkish and German females scored significantly higher than Japanese females, whereas no difference was found between Turkish and German females. For FEAR, Japanese females scored significantly higher than Turkish and German females, whereas no significant difference was found between Turkish and German females. For Spirituality, Turkish females had significantly higher scores than both the Japanese and the German females, whereas Japanese females had significantly higher scores than German females.

No significant differences were found among countries for PLAY, SADNESS or SEEK.

On the B5S subscales presented in Fig. 3, ANCOVA's showed significant differences for Openness to Experience, F (2, 464) = 103.69, $p < .001$, $\eta^2 = .26$; Conscientiousness, F (2, 464) = 66.44, $p < .001$, $\eta^2 = .26$; Extraversion, F (2, 464) = 51.14, $p < .001$, $\eta^2 = .26$; Agreeableness, F (2, 464) = 122.69, $p < .001$, $\eta^2 = .26$; and Emotional Instability, F (2, 464) = 17.81, $p < .001$, $\eta^2 = .26$. Tukey's HSD showed that for Openness to Experience, Turkish females scored significantly higher than German and Japanese females, whereas German females scored significantly higher than Japanese females. For Conscientiousness, Extraversion, and Agreeableness Turkish females and German females had significantly higher scores than Japanese females, whereas Turkish and German females did not significantly differ from each other. For Emotional Stability, Turkish females had significantly higher scores than German and Japanese females, whereas German and Japanese females did not significantly differ from each other.

Males

On the SCS subscales presented in Fig. 1, ANCOVA's showed significant differences for Independent self-construals, F (2, 430) = 34.27, $p < .001$, $\eta^2 = .26$; Interdependent self-construals, F (2, 430) = 9.87, $p < .001$, $\eta^2 = .26$. Tukey's HSD tests showed that for independency; Turkish males had significantly higher scores than Japanese and German males, whereas Japanese and German males did not show a significant difference from each other. For interdependency; Japanese and Turkish males were significantly higher than German males, while Japanese and Turkish males did not show a significant difference from each other.

For ANPS subscales presented in Fig. 2, ANCOVA's showed significant differences between groups on ANGER, F (2, 430) = 32.94, $p < .001$, $\eta^2 = .26$; CARE, F (2, 430) = 121.69, $p < .001$, $\eta^2 = .26$; FEAR, F (2, 430) = 67.87, $p < .001$, $\eta^2 = .26$; PLAY, F (2, 430) = 34.22, $p < .001$, $\eta^2 = .26$; SADNESS, F (2, 430) = 24.52, $p < .001$, $\eta^2 = .26$; SEEK, F (2, 430) = 81.51, $p < .001$, $\eta^2 = .26$; Spirituality, F (2, 430) = 5.71, $p = .004$, $\eta^2 = .26$. Tukey's HSD tests showed that for CARE, PLAY and SEEK; Japanese and Turkish males had significantly higher scores than German males, whereas Japanese and Turkish males did not significantly differ from each other. For FEAR and SADNESS; Japanese males scored significantly higher than Turkish and German males, whereas Turkish males scored significantly higher than German males. For ANGER, Turkish males had significantly higher scores than German and Japanese males, but Japanese and German males did not show a significant difference from each other. For Spirituality, Turkish males had significantly higher scores than Japanese males, while no significant difference was found between Turkish and German males, or between Japanese and German males.

On the B5S subscales presented in Fig. 3, ANCOVA's showed significant differences for Openness to Experience, F (2, 430) = 124.51, $p < .001$, $\eta^2 = .26$; Conscientiousness, F (2, 430) = 60.52, $p < .001$, $\eta^2 = .26$; Extraversion, F (2, 430) = 34.70, $p < .001$, $\eta^2 = .26$; Agreeableness, F (2, 430) = 76.43, $p < .001$, $\eta^2 = .26$; and Emotional Instability, F (2, 430) = 19.16, $p < .001$, $\eta^2 = .26$. For Openness to Experience;

Turkish males had significantly higher scores than German and Japanese males, and German males had significantly higher scores than Japanese males. For Conscientiousness, Extraversion, Agreeableness and Emotional Stability, German and Turkish males had significantly higher scores than Japanese males, but they didn't differ from each other.

Regression analysis for loadings of ANPS and B5S on SCS

To observe how the affective personality traits and Big Five factors load on interdependency and independency measured by SCS, multiple linear regression analysis were carried out. The results by country, taking age and gender into consideration are shown on Table 2.

The regression analysis showed that the main factor predicting independent self-construals in all three countries was Extraversion. For Germany, independency was mostly predicted by B5S factors; higher Openness to Experience, higher Extraversion, lower Agreeableness, higher Emotional Stability and only the lower PLAY on

Table 2 Multiple linear regression analysis predicting SCS scores, by country

Fit statistics	Independent			Interdependent		
	DE	TR	JP	DE	TR	JP
R^2	.28	.25	.34	.20	.37	.38
Adjusted R^2	.23	.22	.31	.15	.35	.35
F	5.787	7.601	12.17	3.785	13.34	14.54
df1	14	14	14	14	14	14
df2	207	312	338	207	312	338
p	<. 001	< .001	< .001	< .001	< .001	< .001
β coefficients						
(Intercept)	.00***	.00***	.00***	.00***	.00***	.00***
Age	.00	.04	− .02	− .11	.10*	− .02
Female	.02	.03	.07	− .09	− .20***	.02
ANGER	.03	.18*	− .05	.02	− .14*	− .09
CARE	− .06	.00	.04	.02	.04	.22***
FEAR	− .16	− .12	− .15*	.21*	.02	.06
PLAY	− .22*	.04	.02	− .01	.03	.25***
SADNESS	.02	− .06	− .01	− .07	.15*	.07
SEEK	.16	− .05	.17**	.20	.02	− .02
Spirituality	.00	.08	.15**	.13	.28***	.10*
Openness	.28***	.21**	.06	− .24**	− .25***	− .18***
Conscientiousness	− .11	.04	.10	.10	.09	.04
Extraversion	.35***	.19**	.29***	− .03	.07	− .17**
Agreeableness	− .23**	.14	− .04	.42***	.43***	.31***
Emo. stability	.25***	− .07	.01	− .20**	− .13	− .04

*, ** and *** indicate $p < .05$, $p < .01$ and $p < .001$, respectively

ANPS. For Japan; independent self-construals were determined mostly by ANPS traits like lower FEAR, higher SEEK and Spirituality, and only by higher Extraversion on B5S. Lastly, for the Turkish sample only higher ANGER on ANPS, higher Openness to Experience and Extraversion from B5S were predictors for independency. For interdependent self-construals the B5S predictors were more overlapping for the three countries, with high Agreeableness and low Openness to Experience being significant factors for all three countries. In addition; higher FEAR and lower Emotional Stability were predictors of German interdependency; higher CARE and PLAY, and lower Extraversion were predictors for Japanese interdependency; lower ANGER and higher SADNESS predicted Turkish interdependency. Spirituality was a positive predictor of interdependency for both Japanese and Turkish samples. Age was a positive predictor for interdependency only for the Turkish sample.

Discussion

Cultural descriptions of our samples by self-construals comparisons

In line with the literature, on interdependent Self Construal scores, Japan ranked the highest and Germany the lowest. Japanese and Turkish samples—regardless of gender—did not significantly differ in terms of their level of interdependency. German males had significantly lower interdependency from their Japanese and Turkish counterparts, while German females had significantly lower interdependency only from their Japanese counterparts. In sum, for our Japan, Turkey and German samples, the level of interdependency decreased while moving from East to West. The same gradual pattern did not occur for independent self-construals hence the level of independency did not increase gradually from East to West. The Turks –regardless of gender- showed significantly higher independency than either Germans or Japanese. Although Germans had higher independency scores than Japanese, the difference was not statistically significant. In short, the theoretically well-known Japanese collectivism was confirmed by our SCS findings. However, the theoretically well-known German individualism was found to be based mostly on their lower interdependency rather than on a higher independency. The German child-rearing style, that reinforces autonomy and separateness, does not seem to promote the independency of the self, but it seems to decrease the interdependency. Our finding regarding Turkish sample was in line with the literature review that Turkey -especially Turkish women- display higher independency scores than certain Western cultures like USA and Canada (İmamoglu and Karakitapoglu-Aygun 2004). In Turkey, children are socialized to become autonomous while maintaining high levels of emotional proximity with their families (Kağıtçıbaşı 2007). It is discussed that the Turkish self is neither a typical Western nor a typical Eastern self, but a unique combination which can be conceptualized as "individuated familial self" (Fişek 2018), which can act independently while staying interdependent (Kagitçibasi 2005).

The SCS results for Japan, Turkey and Germany show that no culture is uniformly interdependent or independent, but each displays different combinations of interdependency and independency. Although the present study did not analyze the SCS

item clusters in detail, the overall scores pointed to the need of being cautious about not attributing independency solely to Western cultures. The recent debate over world-wide SCS comparisons emphasizes that theoretical generalizations like "collectivistic East versus individualistic West" must be avoided (Vignoles et al. 2016). Our findings imply that inter-relatedness promoting upbringing styles seem to lead to higher interdependent self-construals, but the relation of autonomy promoting upbringing styles to independent self-construals needs to be explored further. Generally speaking, our samples fit to most of the cultural descriptions in the literature where Japan stands as an Asian culture where interdependency prevails; Turkey as a bridging culture where emotional interdependency (coexistence of interdependency-independency) prevails; and Germany as a European culture where lower interdependency prevails. Therefore the discussions in further sections will be based on this confirmed definitional ground.

Cross-cultural affective neuroscience personality traits comparisons

The females, regardless of country of origin, had similar results on the positive affects SEEK and PLAY and on the negative affect SADNESS. The only small difference on positive subscales was on the CARE subscale, where Turkish and German females had *slightly* higher scores than Japanese females. Based on the finding of Friedlmeier and Trommsdorff (1998), that Japanese mothers display higher maternal sensitivity than German mothers do, one should have expected higher CARE in Japanese females. However, the same authors had discussed that maternal sensitivity has different meanings in different cultural contexts. This brings the question how mothers, who are described as having prolonged symbiotic mothering styles (described by Roland 1988, 1996), express their maternal sensitivity for their off-springs. In Japanese child rearing practices, maternal sensitivity is shown by not expressing negative emotions like anger towards the child and presenting high patience and tolerance for the needs of the child (Friedlmeier and Trommsdorff 1998; Holloway and Nagase 2014). Supporting this argument, our study also found that Japanese females had the lowest ANGER scores.

On the contrary, the Turkish females had the highest ANGER scores. This was consistent with the previous finding that Turkish females had higher ANGER than American females did (Özkarar-Gradwohl et al. 2014). As ANGER is the main affect underlying "separation-individuation" (Mahler et al. 2008), the highest independency scores obtained by Turkish women seemed related to their higher ANGER. As our findings showed larger cross-cultural discrepancies on ANGER, rather than on CARE; this directed our attention to the probable cultural variations in child rearing styles with regard to expressing anger towards the child. It has been found that Turkish mothers respond with more anger to their child's anger, compared to their respond to their child's distress and sadness (Özdemir 2009) and higher anger is observed in Turkish children who receive less emotional support about their anger (Çorapçı et al. 2012). In a way, Turkish mothers seem to display high CARE besides high ANGER, which enables self-object inter-relatedness and separateness simultaneously. On the contrary, not expressing ANGER towards the child is the

core aspect of Japanese child rearing practices (Roland 1996; Holloway and Nagase 2014) in order to protect the inner harmony of the family against conflicts and separations (Friesen 1972). In other words, Japanese mothers may be providing CARE with minimum ANGER, which strengthens interdependency, while suppressing the sense of separateness. Roland (1988) describes the Japanese mothering style to be marked by intense emotional connectedness, where almost all the needs of the child are immediately gratified with minimum frustration. Hence, the child barely needs to separate from this almost fully gratifying "we-ness" and the rumination about or the experience of losing such "we-ness" may cause intense anxiety. In line with this analytical perspective, the Japanese females and males had significantly higher FEAR scores than their Turkish and German counterparts. This high FEAR in overall Japanese sample (and high SADNESS in Japanese males) also explains the high social anxiety and depression prevalence stated for Japan (Lim 2013). "Taijin Kyofusho" is known as Japanese "social phobia", where the person fears to embarrass others and it is found to be positively correlated with interdependent self-construals and negatively correlated with independent self-construals (Vriends et al. 2013). The relation of FEAR to self-construals will be discussed more after reporting the findings for the male groups.

The ANPS comparisons for females showed both similar (on SADNESS, PLAY and SEEK) and culturally different (on ANGER, FEAR, slightly on CARE) results, however finding a common result shared by all the three male groups was not possible. Although, Japanese and Turkish males were quite similar to each other on all positive affects (namely SEEK, PLAY and CARE), German males had significantly lower scores on all ANPS subscales (except ANGER). Moreover, the males of the three countries showed several differences on all negative subscales (namely ANGER, FEAR and SADNESS).

For ANGER, Turkish males had significantly higher scores than Japanese and German males. Turkish mothers show low emotional support to the anger of their children regardless of gender (Çorapçı et al. 2012), which may be related to higher ANGER and higher independency scores found for the overall Turkish sample (both for females and males). The developmental affective outcomes of mirroring anger-seen in Turkish child rearing practices- need to be explored further. Another probable explanation for higher ANGER found in Turkish sample and the low ANGER found in Japanese sample may be related to the fact that Turkey has an honor culture which utilizes ANGER to protect honor, while Japan has a face culture which inhibits ANGER in order to protect the face against shame (Boiger et al. 2014). Moreover, the previous finding that Turkish males did not differ from American males on ANGER (Özkarar-Gradwohl et al. 2014) brings the necessity of examining how ANGER is utilized in the United States.

For FEAR and SADNESS, Japanese males had significantly higher scores than Turkish and German counterparts, while Turkish males had significantly higher scores than German males. Although, this Eastward increasing pattern brings into mind the question whether the level of FEAR and SADNESS increases as the level of interdependent self-construals increases, one must avoid such robust generalizations. Previous ANPS findings showed that American and Turkish males did not differ on FEAR and SADNESS, while a Westward increasing pattern was

found for females, where American females had higher FEAR and SADNESS than Turkish females did (Özkarar-Gradwohl et al. 2014). In the present study, although similar pattern of Eastward increase in FEAR was observed for the female groups, no difference was obtained for the SADNESS of German, Turkish and Japanese females.

Consequently, German males reported the lowest scores for all the basic affects measured by ANPS (except ANGER). Interestingly, this general affect inhibition measured by ANPS is observed only in German males, but not in German females. Emotion inhibition is thought to be related to lack of emotional support in childhood, negative beliefs about emotions that they are signs of weakness, and beliefs that one must cope with emotions with rational strategies (Coggins and Fox 2009). Although Friedlmeier and Trommsdorff (1998) reported that the German mothering style is characterized by a distant mother–child relationship with lower affective inter-relatedness and lower maternal sensitivity, their study was carried only for mothers and daughters, but not for boys. Therefore, future studies on German child rearing practices need to focus more on gender specific emotion socializations and need to explore how German males are raised with a more rationalistic emphasis that inhibits affects. The only cultural cue, that may explain why all the affects-except ANGER- is inhibited in German males, comes from the cross-cultural studies on beliefs about power. Power -which is defined as one of the basic factors in personality- is found to be related to different emotions in different cultures (Mondillon et al. 2005). Germans are found to believe that powerful people inhibit all submissive emotions, but express dominant emotions like ANGER; whereas for Japanese it is not uncommon for a powerful person to also express SADNESS (Mondillon et al. 2005). In short, future cross-cultural studies on gender specific emotion socializations need to specify which beliefs about expressing emotions and which beliefs about power are taught to the children by their parents.

As for the Spirituality subscale, the Turkish females had significantly higher scores than Japanese and German females, while Japanese females had significantly higher scores than German females. On the other hand the Turkish males had significantly higher scores than Japanese males, but did not differ from the German males. Interestingly, although German females did not differ from their Turkish and Japanese counterparts on most of the affects, they scored the lowest on Spirituality subscale. As Spirituality can be considered as a higher form of intersubjectivity, this finding shows that German mothers' lower emotional connectedness observed by Friedlmeier and Trommsdorff (1998) seems to be related to lower emotional intersubjectivity. In contrast, although German males differed sharply from their Turkish and Japanese counterparts on almost all basic affects, Spirituality became the subscale where they did not differ from their Turkish and Japanese counterparts. As Spirituality measured by ANPS is based on transcendent values, these results must not be elaborated as comparisons of different religions found in Japan, Turkey and Germany. Spirituality- as a form of attachment to all existence- must be elaborated as a primary affect that has subcortical roots. For a future article, we carried out further analysis to observe the correlations of ANPS, B5S, SCS to Spirituality and found that the Japanese, Turkish and German Spirituality have both similarities and culture specific differences. Rather than simply comparing the Spirituality

scores, how Spirituality is composed and experienced in different cultures must be understood.

Cross-cultural big five comparisons and the East–West polarizations caused by big five

Although the Turkish subjects shared more similarities with the Japanese subjects on ANPS (which underpin the subcortical affective characteristics of personality), they shared more similarities with the German subjects on Big Five factors (which are more likely related to cortical cognitive/behavioral characteristics of personality). The Turkish sample, as a «bridging culture, seems to maintain certain subcortical affective personality characteristics of Eastern cultures, while attuning more to cortical Big Five personality factors displayed by Western cultures. As a rough metaphor, Turkey- as the eastern part of the Mediterranean melting pot- seems to function like the geographical corpus callosum of our globe.

Our cross-cultural comparisons of B5S showed that the Turkish sample- regardless of gender- had similar results with German sample on Conscientiousness, Extraversion and Agreeableness. Moreover, on Openness to Experience—regardless of gender- the Turks had the highest scores while the Japanese had the lowest scores. In today's science, the distance and duration of immigration is considered as a factor that influences culture-gene interactions, e.g. long allelic versions of DRD4 (dopamine receptor gene 4) provide an advantage in adapting to new environments (and experiences) because they are increasing as a function of the distance and duration by which people immigrated in history (Chen et al. 1999). The distance/duration of migration and the variety of genetic intermixture for the humans that populated Japan, Turkey and Germany seem to be different (for world map of migrations see Oppenheimer 2012; for world map of haplogroups see McDonald 2005). Japan, as an Asian "island culture" that gave importance to protect its cultural uniqueness against intrusions from outsiders for centuries, had to culturally interact with Westerners only in the last two centuries (Clemens 2017). On the contrary, the Turkish population had settled in a "melting pot" geography (Anatolia), where a mosaic of cultures from 3 continents; Europe, Asia, (North) Africa had largely culturally/genetically interacted/intermixed throughout history (Çağatay and Kuban 2006). Not surprisingly, German culture- which is a "continental culture" that had culturally/genetically interacted/intermixed with other European cultures (Hawes 2017)—stands in between Japan and Turkey in terms of their Openness to Experience.

In contrast to the similarities shared by the Turkish and the German samples on B5S, the Japanese sample showed widespread differences from its counterparts. Japanese sample—regardless of gender- had significantly lower scores on all five factors; Openness to Experience, Conscientiousness, Extraversion, Agreeableness and Emotional Stability. Our B5S findings for Japan, Germany, Turkey were similar to the findings of the cross-cultural Big Five Factor research (comparing 56 countries) of Schmitt et al. (2007) that all East Asian countries—including Japan—had lower scores on big Five Factors. In our study, only on Emotional Stability, Japanese females did not significantly differ from German females, while the Turkish females

had the highest scores. As Schmitt et al. (2007) did not analyze the Big Five data separately for males and females; it was not explicit in their study how gender contributes to Neuroticism (low Emotional Stability).

In sum, all our results confirmed the previously reported East–West polarized findings on Big Five. It is well documented that the Five Factor Model receives less consistent support in many non-Western countries (e.g., Piedmont et al. 2002; Schmitt et al. 2007), thus the universalism of its lexically derived content is increasingly questioned (Gurven et al. 2013). The low cultural sensitivity of the B5S is discussed to be caused by its content that is constructed on Western cultural norms. For instance, while filling the items about Conscientiousness, praising yourself as a tidy, punctual, well-organized person may not be appreciated in Japan, where the praise must be taken from the society, but not declared on your own.

As a conclusion, in line with the second aim of our study, our cross-cultural B5S comparisons confirm the East–West polarizations produced by the Big Five, where Japan stands totally apart from Turkey and Germany. On the contrary, our cross-cultural ANPS comparisons do not show any East–West polarizations on subcortical affective personality characteristics, where one country stands totally apart from others. Therefore, our study confirms that lexically derived BFS is not immune to the differences in Eastern-Western cultural norms, whereas neurodevelopmental constructed ANPS seems to supply a more global personality assessment tool, as it measures the universally shared subcortical affective systems described by the evolutionary theory of Affective Neuroscience (Panksepp 1998). More cross-cultural affective neuroscience personality researches need to be carried out to test the universalism of ANPS and to re-discuss the East–West polarizations in the previous literature of personality studies.

The relation of ANPS and B5S to independent and interdependent self-construals

In line with the third aim of our study, we observed if different affective and cognitive formulations relate to independent and interdependent self-construals for our three samples. Literature suggests that collectivism and individualism may have different causes in different parts of the world (Rentfrow 2014). Therefore, we analyzed which Affective Neuroscience Personality traits and Big Five factors contributed to independency and interdependency.

Turkish independent self-construals were determined positively by ANGER, Openness to Experience and Extraversion. Considering that Turks had the highest scores on ANGER and Openness to Experience, the highest level of independency found in Turkish sample seems to be based on this specific formulation. On the other hand for Germany, Openness to Experience, Extraversion, and Emotional Stability were positive predictors and Agreeableness and PLAY were negative predictors of independent self-construals. The American finding that Extraversion, Emotional Stability and Openness to Experience have a significant positive relationship with independent self-construals (Levinson et al. 2011) was in line mostly with our German sample. On the other hand, Japanese independency was influenced positively by SEEK, Spirituality and negatively by FEAR, whereas affected positively only

by Extraversion. Our regression results showed that, for independency the common positive predictor shared by all our samples was Extraversion. The comparisons point out that Extraversion may be a universal predictor for independency. However in our study, the affects underlying the independent self-construals were varying; Turks utilized ANGER, Japanese utilized SEEK and Spirituality in the service of independency, while FEAR suppressed Japanese and PLAY suppressed German independency.

For German interdependency FEAR and Agreeableness were positive predictors and Openness to Experience and Emotional Stability were negative predictors; for Japanese interdependency CARE, PLAY, Spirituality were positive predictors and Openness to Experience, Extraversion were negative predictors; and finally for Turkish interdependency SADNESS, Spirituality, Agreeableness were positive predictors and Openness to Experience and ANGER were negative predictors for Turkish interdependency. The negative influence of Openness to Experience and the positive influence of Agreeableness were the shared B5 predictors of interdependency for all samples. This was partly in line with the American finding that showed Agreeableness to have positive relationship to interdependent self-construals (Levinson et al. 2011). The comparisons point out that Agreeableness may be a more universal predictor for interdependency. However, our study also showed that the subcortical affective processes underlying the interdependent self-construals varied again among cultures; Germans seem to get more interdependent when they experience FEAR, Japanese seem to get more connected when they experience CARE, PLAY and Spirituality, while Turks seem to get more interrelated when they experience SADNESS and Spirituality, and only their ANGER suppresses their interdependency.

To summarize the formulations of self-construals; it might be said that while the German independent-interdependent self-construals were determined mostly by B5 factors rather than subcortical affective systems measured by ANPS, the Turkish independent-interdependent self-construals were influenced by both ANP traits and B5 factors. In contrast to German independent self-construals, the Japanese independent self-construals were influenced by various ANPS subcortical affective systems rather than B5 factors. On the other hand, similar to the Turkish interdependent self-construals, the Japanese interdependent self-construals were determined by both ANP traits and B5 factors. Moreover, in line with the argument that the German self-construals were mostly predicted by cortical personality characteristics and less by affective personality traits, Emotional Stability –thus the cortical control over negative affects- was a significant predictor of independent-interdependent self-construals only for the German sample.

Although common B5 predictors namely Extraversion, Openness to Experience, Agreeableness contribute to self-construals in all the 3 countries; how a Japanese, a Turkish or a German "feel" when acting independently or interdependently vary from each other. This supports the suggestion that collectivism and individualism may have different causes in different parts of the world (Rentfrow 2014). Collectivistic/individualistic attitudes which look alike across cultures are not induced necessarily by similar affects in different cultures. The similarities in the cortical levels do not necessarily imply subcortical affective similarities. Our findings showed that

although independent-interdependent self-construals may be related to some similar tertiary cognitive processes, it is linked to varying primary affective processes in different cultures. Sharing the same cognition or behavior does not necessarily imply sharing the same affect. Therefore, when self-construals are studied among cultures, researchers must be aware that independency-interdependency is formulated by culturally unique neuropsychological compositions. We strongly recommend that rather than simply comparing the scores of independent- interdependent self-construals among cultures, these unique neuropsychological formulations underlying self-construals must be analyzed in each culture. As females and males may experience interdependency and independency differently, within country gender effects on these neuropsychological formulations will be also analyzed and reported in our future article.

Suggestions and limitations

Our samples were selected from certain cities in Japan, Turkey and Germany; namely Kyoto, Istanbul and Bonn. As the influence of urban life and rural life on the shaping of basic affective systems is a newly discussed topic (Sindermann et al. 2017), within country ANPS comparisons among urban and rural areas are also required in the future. Although our study had limitations based on variances in age and gender distribution (female-male ratio), the optimum statistical measures were taken in order to eliminate the variances; taking age as a statistical covariate and avoiding total sample comparisons and separately analyzing female and male samples between countries.

On the other hand, as the present study is the first inter-cultural Affective Neuroscience Personality Scale research in the literature, our findings on the Euro-Asian spectrum have the strength of opening a new research field: "Cross-cultural Affective Neuroscience (CAN)". Up to date, the cross-cultural personality literature undermined the role of affect and mostly focused on South East Asia—North West America comparisons, falsely naming it as East–West comparisons. In the globalized world of twenty-first Century, we suggest the utilization of further CAN researches to analyze the influence of culture on affective personality traits, considering the four directions: North, West, South, East. For future CAN researches, we also recommend the cross-cultural comparisons of Northern and Southern cultures in terms of affect expressions and affect inhibitions. Although, up to date, cultural variations in mother–child interaction styles, parents' child-rearing styles and emotion socializations have not been discussed in order to explain the differences found in cross-cultural personality studies, CAN suggests the consideration of these variables as possible explanation of cultural differences. Moreover, CAN recommends exploring *the unique affective personality profile of each culture* rather than overemphasizing a dichotomy like collectivistic versus individualistic self.

The outcomes of the present and the future CAN researches may be also utilized for the selection and/or modification of psychotherapy techniques according to the cultures in which they are applied. For instance, in a culture where cognitive control over emotions is so high, emotive therapy techniques rather than solely cognitive

techniques may be opted. In a culture where anger expression is so high, analytic techniques that promote anger expression in the service of separation-individuation need to be avoided and instead of that the meaning of anger may be analyzed and resolved. In a culture where the fear of loosing social bonds due to self-assertiveness is so high, self-reflection oriented introspective non-verbal therapies rather than the talking cure may be opted. Moreover; Kirmayer (2007) states that psychotherapy techniques—based on Euro-American values of individualism—need to be modified while working in collectivistic cultures. The Western ideal of separated-individuated individual can not be accepted as a universal therapeutic goal, as it may have contraindications for Easterners (Fişek 2018). Psychotherapists must be careful not to harm their clients with culturally inappropriate techniques (Fisek and Kagitçibasi 1999). Future CAN researchers can be utilized to specify the unique affective personality profiles and the unique interdependency-independency combinations in each culture. According to these cultural specifications, culture-specific needs in order to regain homeostasis can be assessed and therapy techniques can be modified accordingly.

Conclusion

As a conclusion, Japans, Turks, Germans (all humankind) share universal subcortical affective systems, however, which affects are reinforced or inhibited and which affects underlie independent-interdependent attitudes vary across these cultures. This makes "affect" the inevitable starting point for personality researches. The comparisons of "how cultures regulate the universal primary processes in the subcortical affective systems" enable us to have a *neurodevelopmental approach to cross-cultural personality studies.* The findings of the present study support *our initiation of Cross-cultural Affective Neuroscience and our suggestion of the utilization of ANPS as a global tool in cross-cultural personality studies of twenty-first century.*

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