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Serbian Adaptation of the Positive and Negative Affect Schedule (PANAS): Its Facets and Second-Order Structure

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Although the PANAS is widely used in affect research there are some controversies regarding its structure. Two related studies were reported providing evidence that a Serbian adaptation of the PANAS represents a valid and reliable measure of self-reported affect. Study 1 (N = 455), showed that its psychometric properties and correlates obtained in a Serbian sample are highly comparable to those reported in the American validation study. Additionally, a hierarchical structure of specific affects within the PANAS was explored via a second-order confirmatory analysis. Results showed that Joviality, Self-Assurance, and Attentiveness can be regarded as lower-order factors of Positive Affect, whereas Fear, Self-Disgust, and Hostility seem to represent lower-order factors of Negative Affect. Study 2 (N = 87) demonstrated differential momentary activations of the identified lower-order factors in the real-life situation of taking an exam. The construct validity of the specific subscales was supported. Among the subscales, Self-Disgust had inadequate psychometric properties.

Keywords: PANAS; specific affect subscales; hierarchical; Serbian adaptation

The Positive and Negative Affect Schedule (PANAS) is a self-report measure of affect which is based on the circumplex model of affect (Watson, Clark, & Tellegen, 1988; Watson & Tellegen, 1985). According to this model, specific affects represent linear combinations of some higher-order dimensions which can be arranged circularly to form a circumplex. Mood terms that are placed within a particular octant of the circumplex are believed to be highly correlated, those 90° apart are believed to be uncorrelated, whereas mood adjectives that are separated by 180° are believed to be highly negatively correlated (i.e., bipolar

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opposites of the same dimension). Various authors have emphasized different higher-order dimensions (Russell, 1980; Thayer, 1989; Watson & Tellegen, 1985). For example, Watson and Tellegen (1985) have suggested the existence of four second-order dimensions of affective experience: Pleasantness, Positive Affect (PA), Negative Affect (NA), and Engagement. However, PA and NA were subsequently prioritized given the finding that these two dimensions explain most of the variance in self-reports of mood (e.g., Watson & Clark, 1997). More recently, there has been some debate as to whether valence and arousal are the primary dimensions along which affects differ, or there are other important differentiating criteria such as motivational direction (approach vs. avoidance) (Carver & Harmon-Jones, 2009; Watson, 2009). Nonetheless, the PANAS, inspired by the dimensional-valence approach to affect research, is still one the most frequently used affect measures.

The PANAS consists of two scales, one for measuring positive affect/activation and the other tapping negative affect/activation. The scales were derived from the nine Zevon and Tellegen (1982) mood content categories. The PANAS items were intentionally sampled from the higher ends of their respective dimensions representing blends of valence and activation (Larsen & Diener, 1992; Watson, Wiese, Vaidya, & Tellegen, 1999). More precisely, the items from the PA scale were sampled from the octant of the affect circumplex defined by high Engagement (e.g., active, alert, interested) and high PA (e.g., enthusiastic, excited, strong) (Watson et al., 1999). On the other hand, the NA items seem to belong to the octant of the circumplex representing various forms of unpleasant activation (e.g., nervous, irritable, fearful). The PANAS can be used as a trait or state measure depending on instructions.

The PANAS is translated into various languages and is used in different areas of psychology (e.g., Gaudreau, Sanchez, & Blondin, 2006; Gençöz, 2000; Terracciano, McCrae, & Costa, 2003; Watson, Clark, & Tellegen, 1984). However, there are still some controversial issues regarding its structure. One such issue concerns its proposed hierarchical structure (Tellegen, Watson, & Clark, 1999). According to Tellegen et al. (1999), PA and NA subsume lower-order factors corresponding to various discrete affective states. For example, joviality, self-assurance, and attentiveness represent lower-order factors of PA, whereas fear, guilt, hostility, and sadness are believed to be lower-order factors of NA (Watson & Clark, 1994). In order to measure these discrete affects an expanded version of the instrument was developed (PANAS-X; Watson & Clark, 1994). However, to our knowledge, the question of whether a hierarchical structure of affect can be found within the short PANAS has remained untested so far, even though its authors suggested such a possibility (Tellegen et al., 1999).

Although there are a number of confirmatory factor-analytic (CFA) studies of the short PANAS (e.g., Crawford & Henry 2004; Crocker, 1997; Gaudreau et al., 2006; Killgore, 2000; Mehrabian, 1997; Tuccitto, Giacobbi, & Leite, 2010), testing its hierarchical structure via second-order confirmatory factor analysis has been fraught with difficulties. Given that the PANAS scale was derived from the nine Zevon and Tellegen (1982) mood content categories and the small number

of items comprising the scale, fitting a second-order structure to the nine first-order and two second-order factors has not been possible due to identification problems. Instead, the researchers have opted for testing the models with error correlations between items belonging to the same content category as identified by Zevon and Tellegen (Gaudreau et al., 2006; Tuccitto et al., 2010), or nested factor models (e.g., Crawford & Henry 2004). It is noteworthy, however, that Watson and Clark (1994), using the same Zevon and Tellegen's marker items, identified seven specific affects; thus, fewer first-order factors than nine, which, in turn, can resolve the problem of model identification.

Heterogeneity of the PA and NA Scales

Diener, Smith, and Fujita (1995) have noted that the items "strong", "active", and "alert" from the PA scale can be differentiated from other emotional items given their cognitive/ attentional nature. More recently, it has been demonstrated that a German version of the PA scale can be meaningfully divided into three subscales of Joy, Interest, and Activation, which show a differential pattern of activation under various affect-arousing conditions (Egloff, Schmukle, Burns, Kohlamann, & Hock, 2003).

Heterogeneity of the item content has been suggested for the 10-item NA scale as well. In a confirmatory factor analysis, Mehrabian (1997) have found that the NA items can be split into two factors termed Afraid ("scared", "afraid", "nervous", "jittery", "ashamed", and "guilty") and Upset ("distressed", "upset", "hostile", and "irritable"). However, this two-factor model of the NA scale was derived on a posteriori basis and had an inadequate fit. Additionally, each subsequent study testing this model needed to introduce some modifications (e.g., Gaudreau et al., 2006; Killgore, 2000). For example, the NA items defining Afraid and Upset varied from study to study. The items "ashamed" and "guilty" showed significant instability, suggesting that they do not belong either to the Afraid or Upset factor (e.g., Gaudreau et al., 2006; Killgore, 2000; Mehrabian, 1997). On the other hand, "scared", "afraid", "nervous", and "jittery" seem to have consistently defined the Afraid factor. Even though the sample composition in the cited studies varied (undergraduates, young athletes, nonclinical adults, combined student and adult samples), it seems that sample differences can only partly account for the reported variations in dimensionality. For example, in the two studies in which "ashamed" and "guilty" switched from one factor to another, undergraduates were the main source of information (Mehrabian, 1997; Killgore, 2000).

In this article, two studies are reported. The Study 1 had the following goals: a) provide evidence regarding the validity and reliability of a Serbian adaptation of the short PANAS; and b) explore the presence of specific, discrete affects within the PA and NA scales. The reviewed studies are suggestive of the heterogeneous PA and NA content, although it is not clear as to how many specific affects can be found, particularly within the NA scale. Assuming the presence of several discrete affects, a related question concerned their

hierarchical organization. Although a different, bifactor model of the PANAS has been suggested (Ebesutani et al., 2011; Leue & Beauducel, 2011), it is still feasible to test its second-order structure providing the following conditions: a) the first-order factors (i.e., specific affects of the same valence) are highly correlated, and b) the second-order factors (i.e., PA and NA) are hypothesized to be able to account for the observed correlations between the first-order factors (Chen, West, & Sousa, 2006). To support the meaningfulness of separation of different PANAS subscales, Study 2 examined differential courses of the PA and NA subscales in a real-life situation such as taking an important exam.

Study 1

This cross-sectional study provided information about the psychometric characteristics of the Serbian adaptation of the PANAS. It also tested the assumption that within both the PA and NA scales there are three correlated facets of discrete affects. Based on the previous studies (Diener et al., 1995; Egloff et al., 2003; Patrick & Lavoro, 1997), the PA items were conceptualized to load on Joviality ("excited", "enthusiastic", "inspired"), Attentiveness ("active", "alert", "interested", "attentive"), and Self-Assurance ("strong", "proud", "determined"). Placement of the NA scale items on their respective factors was less certain. Item-content analysis and the previous work (Gaudreau et al., 2006; Killgore, 2000; Mehrabian, 1997) suggested splitting of the NA items into Fear ("scared", "afraid", "nervous", "distressed", "jittery") and Anger ("irritable", "hostile"). Additionally, our hypothesis was that items tapping self-disgust ("guilty", "ashamed") should load on a factor different from those defined by items tapping fear and anger. As previously argued (e.g., Power, 2006) and demonstrated (e.g.,Gaudreau et al., 2006; Killgore, 2000; Mehrabian, 1997), self-disgust items do not seem to cluster consistently with either fear or anger items. Also, in the line with the work of Killgore (2000) and Gaudreau et al. (2006), these two items were expected to load on the same factor with "upset." Next, we opted to test the assumption about the hierarchical organization of discrete affects within the PANAS using a second-order CFA. Finally, we sought to establish validity of different subscales within the PA and NA scales by examining their relations with relevant personality constructs.

Method

Participants and Procedure

Four hundred and fifty five participants (among which were 279 women) consented to participate in the study (M_{age} = 28.8, *SD* = 11.84). Most of the sample consisted of students enrolled at the University of Novi Sad, Serbia. The remaining participants, who also volunteered for the study, were older adults recruited via the "snowball" strategy whereby the students were asked to recruit further participants. The percentage of participants within four age bands (18–25, 26–35, 36–49, 50+) was 63%, 13%, 13%, and 11%, respectively.

Measures

Positive and Negative Affect Schedule (PANAS). The PANAS (Watson et al., 1988) consists of 20 items measuring PA and NA with 10 items tapping each. The items were affect descriptors selected based on the previous factor-analytic studies (e.g., Zevon & Tellegen, 1982). The PANAS can be employed with different time instructions (moment, past few days or weeks, past year, or general), depending of whether one is interested in exploring trait or state affect. In this study, respondents were asked to rate the extent to which they had experienced each particular affect during the past few days, tapping into time-limited affect. Responses were indicated on a 5-point scale labelled "not at all", "little", "moderately", "quite a bit", and "extremely".

The first two authors translated the items into Serbian language. Then two bilingual persons, blind to the original items, back-translated the items. Preliminary analyses suggested that the item "excited" (uzbudjeno) in Serbian had an ambivalent valence and was substituted with "elated" (oduševljeno). Also, in Serbian there is no straightforward translation of "distressed". Similar to other cross-cultural adaptations of the PANAS (Gaudreau et al., 2006), it was translated using an adjective (uznemireno) that has more of a tense connotation. Cronbach's alpha reliabilities for PA and NA in this study were .89 and .85, respectively (M = 33.18, SD = 7.29 for PA and M =15.94, SD = 5.41 for NA).

State-Trait Anxiety Inventory (STAI-S). The STAI-S (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1977) is a self-report inventory comprised of two subscales of 20 items assessing state and trait anxiety. In the current study, we were interested in assessment of state anxiety. A subset of participants (N = 141) were asked to report how they felt "right now", on a 4-point scale from "not at all" to "very much so." Cronbach's alpha in the current study was .95 (M = 38.71, SD = 11.65).

Beck Depression Inventory, Version II (BDI – II). The BDI-II (Beck, Steer, & Brown, 1996) is one of the most frequently used instruments developed to assess the intensity of depression. It contains 21 items pertaining to measure the intensity of depressive symptoms. A subset of participants (N = 141) were asked to select one statement that best described the way they had felt during the past two weeks using a 4-point scale with a maximum score of 63. For the current sample, Cronbach's alpha was .84. On average, the participants obtained the depression score of 6.41 (SD = 5.68). This score, according to the cut-off scores proved by Dozois, Dobson, and Ahnberg (1998), fell within a normal range (0–12 normal; 13–19 mildly dysphoric; 20–63 dysphoric and depressed).

Big Five Plus Two (BF+2). F+2 (Smederevac, Mitrović i Čolović, 2010) is a self-report measure of personality resulted from a Serbian psycho-lexical study, which was conducted according to the criteria set by Tellegen and Waller (Waller, 1999). The instrument contains 184 items and measures seven higher-order dimensions: Neuroticism (α = .90), Extraversion (α = .86), Conscientiousness (α = .87), Aggressiveness (α = .88), Openness (α = .79), Positive valence (α = .91), and Negative valence (α = .84). Each higher-order dimension contains a certain number of personality subscales.

Results

Descriptive, Reliability and Validity Data of the PA and NA scales

Table 1 represents descriptive statistics for the PA and NA scales. The means and standard deviations are reported separately for men and women. Men scored significantly higher than women on the PA scale (t (453) = –3.29, p <.001, Cohen's d = 0.31). Although such gender differences were not found in

the normative U.S. sample, similar difference was reported in another European study (Crawford & Henry, 2004). Internal consistency reliabilities, as measured by Chronbach's alphas, for both scales were comparable to those found in the normative U.S. sample (Watson et al., 1988), as well as their test-retest reliabilities.

Table 1
Descriptive Statistics, Reliabilities, Retest Correlations, and Congruence Coefficients of the PANAS

	Total		Women			Men					
	M	SD	*M*	*SD*	α	*M*	*SD*	α	α_{total}	test-retest[a]	r_c
PA state	33.18 (33.3)	7.29 (7.2)	32.29	7.34	.88	34.58	7.03	.88	.89 (.88)	.50 (.48)	.98
NA state	15.94 (17.4)	5.41 (6.2)	15.65	5.21	.85	16.39	5.69	.85	.85 (.85)	.30 (.42)	.97

Note. N= 455; [a] A sub-sample of 69 was retested after six weeks. U.S. norms are given in parentheses.

Using the same extraction and rotation method as in Watson et al.'s study, an exploratory principal component analysis identified two components corresponding to PA and NA. The Tucker's coefficients of congruence (r_c = .98 for PA and r_c = .97 for NA) suggested a high degree of congruence between the Serbian and U.S. sets of factor loadings (Lorenzo-Seva & ten Berge, 2006). The values of r_c greater than .95 suggest practical identity of the solutions (Lorenzo-Seva & ten Berge, 2006; McCallum, Widaman, Zhang, & Hong, 1999).

Validity of the Serbian adaptation of the PANAS can be discerned by considering its relations with other measures of mood, symptomatology, and personality. In a subsample (N = 141), scores on the NA scale correlated .51 (p <.01) with the BDI-II, and .69 (p <.01) with the STAI-S. In the same sample, scores on the PA scale correlated –.43 (p <.01) with the BDI-II and –.54 (p <.01) with the STAI-S. These results parallel those obtained on the U.S. validation sample (Watson et al., 1988). In another subsample (N = 260), and as expected, NA correlated with two BF+2 Neuroticism subscales (r = .52; p <.01 with Depression and r = .47; p <.01 with Anxiety), whereas PA was significantly correlated with the same measures but in the opposite direction (r = –.54; p <.01 and r = –.38; p <.01, respectively). Additionally, PA was more strongly related to Depression than Anxiety (z = 4.52; p <.01).

Competing Confirmatory Factor-Analytic Models of the PA and NA Scales

Data-analytic strategy. Two series of CFA tested the assumptions that within both the PA and NA scales one can differentiate three facets of discrete affects. These three-factor models were compared to the alternative two-factor and one-factor models via chi-square difference tests. The two– and one-factor models were more restricted versions of the three-factor models

that were obtained by fixing the correlations between the factors to equal 1; each of the three possible two-factor models was examined in turn. Under certain parameter specifications, models that differ in the number of latent factors can be regarded as nested models (Brown, 2006). For example, a one-factor solution is considered to be nested within a correlated two-factor model when the correlation between the two factors is fixed to 1.00 (i.e., by setting the correlation to 1.00 the factors are considered to be identical or collapsed into a single factor). Similarly, the one-factor solution can be considered to be nested within a correlated three-factor solution by fixing the correlations between the three pairs of correlations to 1.00. The same principle generalizes to two– and three-factor solutions, whereby a two factor-solution is considered a more constrained version of the three-factor solution when the correlation between any of the three factors is fixed to 1.00. In our analysis, by fixing the appropriate correlations, the one-factor and the two-factor-models were considered nested within the correlated three-factor model, and were compared via a chi-square difference test.

Consistent with previous findings, we estimated within each model the correlated error associated with "afraid" and "scared", to account for item similarity (Kercher, 1992; Mackinnon et al., 1999).

To estimate reliability of the specific affect subscales, composite reliabilities (CR) and average variance extracted (AVE) were reported. CR and AVE estimate the degree to which score variance is accounted for by the underlying latent factor in relation to the variance due to random measurement error (Fornell & Larcker, 1981; Raykov, 2001). CRs are preferred to alpha coefficients when using multidimensional scales (Raykov, 2001).

A second-order CFA was run to test the hypothesis that PA and NA represent two higher-order factors. They were expected to manifest relative independence evident in their low to moderate correlation (e.g., Crawford & Henry, 2004; Tellegen et al., 1999). To evaluate the adequacy of the solution, the explained variance ratios (EVRs) were reported (Marsh, 1987).

Data screening and distribution. The normalized Mardia's coefficient was 93.11 (p <.001) suggesting multivariate non-normality. To account for this, the Bollen-Stine bootstrap (Finney & Distefano, 2006) was used to estimate the probability values associated with the obtained chi-square values as well as the naïve bootstrap to obtain more accurate standard errors of the proposed model parameters available in AMOS 18.0 software (Arbuckle, 1995).

Competing models. The fit statistics for the competing CFA models and chi-square difference tests used to compare them are presented in Table 2. The three-factor models for both the PA and NA scales expressed the research hypotheses that three separate but correlated facets of specific affects can be found within each scale.

Table 2
Goodness-of-Fit Statistics for CFA Models of the PANAS

Model	χ^2	df	$\Delta\chi^2$	Δdf	RMSEA	SRMS	CFI	TLI	GFI
PA scale									
3-factor	91.93**	32	___	___	.05-.08	.04	.97	.97	.96
2-factor[a]	161.89**	33	69.96***	1	.08-.11	.12	.93	.93	.94
2-factor[b]	192.63**	33	100.70***	1	.09-.12	.15	.91	.91	.93
2-factor[c]	198.26**	33	106.33***	1	.09-.12	.16	.91	.91	.93
1-factor	208.89**	35	116.96***	3	.09-.12	.17	.91	.91	.93
NA scale									
3-factor	81.50*	31	___	___	.04-.08	.04	.97	.97	.97
2-factor[d]	187.02**	32	105.52***	1	.09-.12	.13	.91	.91	.93
2-factor[e]	215.15**	32	133.65***	1	.11-.13	.15	.89	.89	.93
2-factor[f]	258.84**	32	177.34***	1	.11-.14	.16	.87	.87	.92
1-factor	263.86**	34	182.36***	3	.11-.13	.18	.87	.87	.92

Note. N = 455; $\Delta\chi^2$ = difference in chi-square values between models; Δ df = difference in the number of degrees of freedom between models; RMSEA = Root mean square error of approximation; CFI = Comparative fit index; TLI = Tucker-Lewis index; GFI = Goodness-of- fit index; [a] Covariance between Self-Assurance and Joviality fixed to 1; [b]Covariance between Self-Assurance and Attentiveness fixed to 1; [c]Covariance between Attentiveness and Joviality fixed to 1; [d]Covariance between Fear and Self-Disgust fixed to 1; [e]Covariance between Fear and Hostility fixed to 1; [f]Covariance between Hostility and Self-Disgust fixed to 1; *Bollen-Stine bootstrap p <.05. ** Bollen-Stine bootstrap p <.01. *** p <.001.

The Bollen-Stine bootstrap p values for all tested models were significant indicating that the specified models were incorrect. Because the Bollen-Stine estimates of p values are sensitive to minor deviations between the estimated and actual covariance matrix, additional fit indices were considered. Inspection of the reported fit indices suggested a good fit for the three-factor model for both scales. The root mean square error of approximation (RMSEA) value for the PA and NA scales ranged from .05-.08 and .04-.08 respectively, suggesting reasonable errors of approximation in population based on the proposed cut-off values (i.e., RMSEA ≤ .05 indicates good fit and RMSEA ≤ .08 indicates mediocre fit) (MacCallum, Browne, & Sugawara, 1996). The standardized root mean square residuals (SRMR) of .04 for both scales also suggested a good fit (SRMR ≤ .07) (Bagozzi, 2010). The comparative fit indices (CFI and TLI) and the goodness-of-fit index (GFI) for the three-factor models exceeded the proposed cut-off values (≥.95 for all three indices), indicating a good fit (Schumacker & Lomax, 2004). Finally, the three-factor solutions were also supported by the chi-square difference tests (p <.001; see Table 2). Correlations among the affect subscales within the three-factor models are presented in Table 3.

Table 3
Correlations among the PA and NA Subscales: The Three-Factor Model

Subscales	1	2	3
PA Subscales			
1. Joviality	__		
2. Self-Assurance	.93	__	
3. Attentiveness	.91	.95	__
NA Subscales			
1. Fear	__		
2. Self-Disgust	.64	__	
3. Hostility	.64	.74	__

Second-Order Structure of the PANAS

To test the proposed hierarchical organization of affect, a second-order CFA was conducted in which two higher-order factors, PA and NA, were expected to subsume lower-order specific affects. PA and NA were allowed to correlate (see Figure 1).

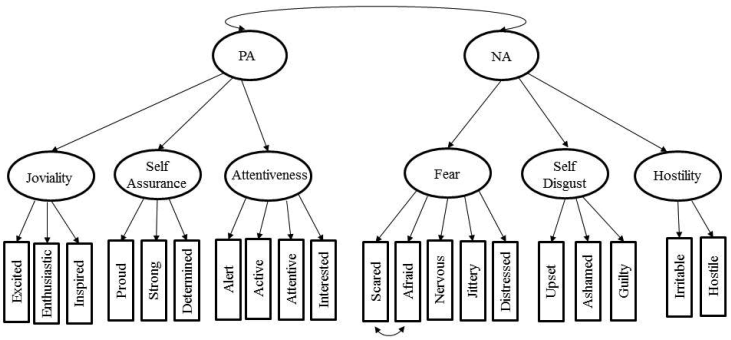

Figure 1. Graphical representation of the proposed second-order structure of the PANAS. Although the error terms for endogenous variables were estimated, they were not included to ease presentation.

The fit statistics associated with this model were $\chi^2_{(162)} = 382.98$, $p < .01$; CFI = .94; TLI = .93; GFI = .92; RMSEA = .05 – .06; and SRMR = .05. The Bollen-Stine bootstrap p value, the goodness-of-fit index and comparative fit indices would suggest the model rejection. However, the index based on the non-central chi-square distribution (RMSEA), its close-fit hypothesis ($p = .129$) and the average residuals between observed and predicted covariances would imply that the model fits the data adequately. Browne (1992) has suggested that two-factor models could be regarded as very restricted forms of circumplex structure, and given their restrictiveness they are not very likely to have good fit. Following Browne's argument, Remington, Fabrigar, and Visser (2000) have recommended reliance on RMSEA in the situations when the circumplex is defined by two orthogonal dimensions. Given our fit results and the arguments provided by Browne and Remingont et al., we concluded that the specified second-order model

was a good fitting model. In this model, the estimated PA and NA correlation was –.41 (95% bootstrap CI = –.52 to –.32). Requiring that PA and NA be orthogonal produced the following changes in the model fit ($\chi^2_{(163)} = 436.14$, $p < .01$; CFI = .93; TLI = .91; GFI = .91; RMSEA = .05 – .07, SRMR=.11). The chi-square difference test was significant ($\Delta\chi^2_{(1)} = 53.16$, $p < .001$), indicating that the correlated solution had a better fit than the orthogonal (see the correlated solution in Table 4). The standardized first-order factor loadings for all items were significant, and excepting "ashamed"[2] were of large magnitude (> .40). Also, the standardized second-order factor loadings were significant and ranged from .75 to .98.

Table 4
Unstandardized and Standardized Bootstrap Parameter Estimates for the Proposed Hierarchical Model of Affect

	Unstandardized Estimates		Standardized Estimates	
Latent Variables Indicator variables	Point Estimate	95% CI	Point Estimate	95% CI
PA (2nd-order latent variable)				
Joviality	1.00	1.00	.95	.90–.99
1. Excited (Oduševljeno)	1.00	1.00	.57	.49–.63
2. Enthusiastic (Pun entuzijazma)	1.45	1.25–1.70	.87	.83–.91
3. Inspired (Nadahnuto)	1.25	1.07–1.48	.74	.68–.78
Self-Assurance	1.10	.94–1.37	.98	.94–1.04[a]
1. Proud (Ponosno)	1.12	.98–1.32	.66	.59–-.74
2. Strong (Jakim)	1.00	1.00	.66	.60–.72
3. Determined (Odlučno)	1.19	1.03–1.34	.78	.72–.83
Attentiveness	.76	.59–.95	.96	.90–1.00
1. Alert (Budno)	1.00	1.00	.45	.37–.54
2. Active (Aktivno)	1.40	1.20–1.84	.69	.61–.75
3. Attentive (Usredsredjeno)	1.50	1.17–1.91	.71	.62–.77
4. Interested (Zainteresovano)	1.24	.96–1.58	.67	.59–.71
NA(2nd-order latent variable)				
Fear	1.00	1.00	.79	.68–.92
1. Scared (U strahu)	.63	.51–.76	.62	.54–.69
2. Afraid (Uplašeno)	.55	.43–.64	.59	.50–.66
3. Nervous (Nervozno)	1.17	1.00–1.30	.81	.76–.86
4. Jittery (Napeto)	1.27	1.15–1.44	.88	.83–.91
5. Distressed (Uznemireno)	1.00	1.00	.76	.69–.82
Self-Disgust	.96	.76–1.29	.98	.84–1.10[b]
1. Upset (Nesrećno)	1.00	1.00	.77	.68–.87
2. Ashamed (Postidjeno)	.29	.19–.44	.36	.25–.51
3. Guilty (Krivim)	.36	.26–.51	.41	.31–.54
Hostility	.35	.22–.49	.75	.60–.91
1. Irritable (Gnevno)	2.05	1.43–3.25	.79	.68–.93
2. Hostile (Neprijateljski)	1.00	1.00	.48	.35–.60

Note. PA = Positive Affect; NA = Negative Affect; Serbian translations are given in parentheses;[a,b] There is nothing to prevent a confidence interval from including impossible values. The question is whether one can distinguish estimated coefficient values from a null hypothesis value. (E. Rigdon, message to SEMNET, April 4, 2011)

2 Although the item "upset" loaded about twice as highly as "ashamed" and "guilty", we decided to term the factor Self-Disgust in order to capture a more specific meaning conveyed by "ashamed" and "guilty." If we labelled the factor Upset or Distress, this specificity would have been lost. For further clarification see discussion.

To assess the adequacy of the second-order model, EVRs were calculated which indicated the proportion of the first-order factor variance explained by the second-order factors (Table 5). 89% of the variance in Joviality, 93% of the variance in Attentiveness, and 97% of the variance in Self-Assurance was explained by the PA factor. The EVRs for the NA items were slightly lower but still substantial. Namely, 61% of the variance in Hostility, 66% of the variance in Fear, and 87% of the variance in Self-Disgust was explained by the NA factor.

Table 5
Explained Variance Ratios (EVRs), Average Variance Extracted (AVE) and Composite Reliabilities (CR) for the First-Order Factors

First-order factors	Variance	EVR	AVE	CR
PA Subscales				
1. Self-Assurance (3)	.45	.97	.50	.74
2. Joviality (3)	.41	.89	.54	.77
3. Attentiveness (4)	.23	.93	.36	.73
NA Subscales				
1. Fear (5)	.62	.66	.51	.86
2. Self-Disgust (3)	.35	.87	.28	.53
3. Hostility (2)	.34	.61	.44	.59

Note. PA = Positive Affect; NA = Negative Affect; EVR = 1– (residual variance/factor variance); AVE = (sum of squared standardized loadings)^2 / (sum of squared standardized loadings)^2 + sum of indicator measurement errors; CR = (sum of standardized loadings)^2 / (sum of standardized loadings)^2 + sum of indicator measurement errors; the number of items per subscales are given in parentheses

Reliability of the Specific Affect Subscales

To estimate reliability, AVEs and CRs for each subscale were calculated (the last two columns in Table 5). As can be seen, Joviality and Self-Assurance explained around 50% of their item variance, whereas Attentiveness accounted for 36% of its item variance. Among the NA subscales, Fear and Hostility accounted for 51% and 44% of their item variance, whereas Self-Disgust had the lowest AVE value of .28. It should be noted that a value of AVE greater than .50 is considered an acceptable threshold value (Hair, Anderson, Tatham, & Black, 1998).

CR of each subscale represents the proportion of the subscale total score variance that is accounted for by true scores rather than random measurement error. The CR greater than .70 is considered an acceptable value (Hair et al., 1998). As can be seen from the last column in Table 5, all subscales had acceptable CR values with the exception of Self-Disgust and Hostility.

Convergent and Divergent Validity of the Specific Affect Subscales

Table 6 presents correlations between the PANAS subscales and Big Seven personality traits. The mean correlation across the two subsets of specific affects (.28) was significantly smaller than the mean correlations among the PA

subscales (r = .69, t = 9.31, p <.001) and among the NA subscales (r = .53, t = 6.04, p <.001) (Fisher's r to z transformation was used in calculation of these average correlations).

Table 6
Convergent and Discriminant Validity of the Specific Affect Subscales

Variables	1	2	3	4	5	6
1. Self-Assurance	—					
2. Joviality	.70**	—				
3. Attentiveness	.67**	.63**	—			
4. Fear	-.33**	-.26**	-.34**	—		
5. Self-Disgust	-.44**	-.32**	-.35**	.58**	—	
6. Hostility	-.11	-.11	-.16**	.49**	.45**	—
7. BF+2 Extraversion	.35**	.37**	.33**	-.19**	-.21**	-.23**
8. BF+2 Openness	.35**	.41**	.26**	-.22**	-.19*	-.13*
9. BF+2 Neuroticism	-.49**	-.38**	-.46**	.61**	.51**	.33**
10. BF+2 Conscientiousness	.29**	.21**	.46**	-.05	-.22**	-.13*
11. BF+2 Aggressiveness	.02	.04	-.01	.29**	.23**	.32**
12. BF+2 Positive Valence	.52**	.49**	.36**	-.22**	-.24**	-.04
13. BF+2 Negative Valence	.01	.00	-.08	.03	.19**	.35**

Note: N = 260; *p <.05. ** p <.001.

As shown in Table 6, Self-Assurance correlated moderately and positively with Positive Valence, modestly and positively with Extraversion, Openness and Conscientiousness. There was also a moderate negative correlation between Self-Assurance and Neuroticism. Joviality correlated moderately and positively with Positive Valence and Openness, modestly and positively with Extraversion and Conscientiousness, and modestly and negatively with Neuroticism. Attentiveness correlated moderately and positively with Conscientiousness, modestly and positively with Positive Valence, Extraversion, and Openness, and had a moderate negative correlation with Neuroticism. Regarding the NA subscales, there was a high positive correlation between Fear and Neuroticism, and a modest positive correlation with Aggressiveness. Also, Fear correlated modestly and negatively with Openness, Positive Valence and Extraversion. Self-Disgust correlated positively and moderately with Neuroticism, positively and modestly with Negative Valence and Aggressiveness, and negatively and modestly with Positive Valence, Conscientiousness, Extraversion, and Openness. Finally, Hostility correlated modestly and positively with Negative Valence, Neuroticism and Aggressiveness, and modestly and negatively with Extraversion, Openness, and Conscientiousness.

Study 2

To support the meaningfulness of separation of different PANAS subscales, in Study 2 we examined differential courses of the PA and NA subscales in a real-life situation such as taking an important exam. Test-taking situations are known to be anxiety provoking (Lench, Flores, & Bench, 2011). Also, real-life situations might be effective in reducing demand effects from participants and likely to evoke strong affect (Harmon-Jones, Amodio, & Zinner, 2007).

Method

Participants and measures

Eighty seven students (71 women) from the University of Novi Sad volunteered in this study (M_{age} = 19.72, *SD* = 1.59). They agreed to participate in a study regarding their test-taking attitudes. Participants completed the Serbian version of the PANAS twice, right before and after the exam, reporting how they had felt at the present moment.

Results

To examine potential differntial patterns of change among the PA and NA subscales in this naturally-occuring affect-laden situation, two repeated measures ANOVAs were conducted with PANAS subscales and time as repeated measures. Regarding the PA subscales, there was a significant PA subscales X Time interaction, F (2,172) = 18.38, p <.001, η^2 = .18. Similarly, there was a significant NA Subscales X Time interaction, F (2,171) = 60.45, p <.001, η^2 = .41.

Table 7
Means and Standard Deviations of the PA and NA Subscales by Time (Study 2)

	Time 1		Time 2			
	M	*SD*	*M*	*SD*	*t*[a]	Cohen's *d*
PA subscales						
Joviality	1.97	.83	2.25	1.03	–2.58*	–0.29
Self-Assurance	2.50	.88	2.66	1.05	–1.49	–0.16
Attentiveness	3.17	.83	2.92	.97	2.75**	0.28
Global PA	2.61	.68	2.64	.92	–0.40	–0.03
NA subscales						
Fear	3.23	1.18	2.18	1.04	9.54***	0.94
Self-Disgust	1.78	.86	1.94	.98	–1.65	–0.17
Hostility	1.76	1.04	1.68	1.05	0.81	0.08
Global NA	2.50	.84	2.01	.87	6.24***	0.57

Note: [a]Bonferroni adjusted
* p <.05. ** p <.01. *** p <.001.

Table 7 presents descriptive statistics, t-tests, and effect sizes for each PA and NA subscale, global PA and global NA, per measurement occasions. Results of paired t-tests suggested that among the PA subscales, Joviality increased, Attentiveness decreased, whereas Self-Assurance remained unchanged after the exam in comparison to before the exam. Such a pattern and amount of change among the PA subscales resulted in the unchanged global

PA score. Among the NA subscales, there was a significant large drop on the Fear subscale after the exam in comparison to before the exam. Although this was the only NA subscale that changed in response to the exam situation, the amount of change was large enough to be reflected in a significant decrease on the total NA scale.

Discussion

Reliability and Validity of the Serbian-Adaptation of the PANAS

Study 1 demonstrated that the Serbian adaptation of the PANAS represents a reliable and valid affect measure. Its psychometric properties are comparable to the English original. Exploratory factor-analytic results and the pattern of factor loadings between the Serbian adaptation and the original are highly comparable, indicating that the Serbian adaptation can be regarded a reliable measure of PA and NA. Additionally, the pattern of correlations with other measures of personality and symptomatology supports its validity. For example, according to the original Tripartite model (Clark & Watson, 1991), NA is a general factor underlying both anxious and depressive symptomatology, whereas PA is uniquely (inversely) related to dysphoria. Our findings that NA is equally related to both depression and anxiety personality traits whereas PA is more strongly related to depression than anxiety personality traits are in accordance with the Tripartite model predictions. Also, both the global PA and NA scores are related in a meaningful way to the state measure of depression and anxiety. However, differential relations of the PA and NA scales to the symptom measures based on the Tripartitite model were not obtained probably due to the fact that the STAI-S scale is not a pure measure of anxious states but rather a measure of negative affect (e.g., Feldman, 1993).

In Serbian sample, men scored higher than women on PA. Similar deferences were reported in United Kingdom (Crawford & Henry, 2004) and Korea (Lim, Yu, Kim, & Kim, 2010), however, there were no gender differences on U.S. samples (Watson & Clark, 1999). Although the issue of gender differences is important, we refrain from making any strong conclusions due to the following reasoning. Watson & Clark (1999) found inconsistent gender differences in general PA in two out of ten large samples, with men scoring higher in one sample and women scoring higher in the other, leading them to conclude that men and women do not differ in their tendency to experience positive affect. Given that our Study 1, British and Korean studies were based on smaller number of participants than U.S studies, the obtained small differences, in addition to gender, might reflect various influences: chance variations, instructional variations, and translational differences.

Competing Models of the Latent Structure of the PANAS: Subscales within the PA and NA Scales

The PANAS has been widely used as a measure of PA and NA in different areas of psychology (e.g., Gaudreau et al., 2006; Gençöz, 2000; Terracciano et al, 2003; Watson et al., 1984). However, there are still some controversial issues

regarding its structure. Previous studies supported a two-factor (e.g., Crawford & Henry, 2004; Kercher, 1992; Terracciano et al., 2003; Watson et al., 1999) or a three-factor structure of the PANAS (PA, Fear and Distress; e.g., Gaudreau et al., 2006; Mehrabian, 1997), or no preferences for either structure (Killgore, 2000). More recently, a bifactor structure has been proposed (Ebesutani et al., 2011; Leue & Beauducel, 2011). Rather than testing a bifactor model of the PANAS, we have suggested that one problem with previous work involving the structure of this scale was an inadequate partitioning of the items and that both the PA and NA scales tap more differentiated specific affects. More specifically, we proposed that PA and NA, as measured by the PANAS, represent higher-order factors subsuming a certain number of specific affects.

CFA indicated that a three-factor model had a significantly better fit than the competing two-factor and one-factor models for both the PA and NA scales. Joviality, Self-Assurance, and Attentiveness can be differentiated within the PA scale, whereas Fear, Self-Disgust, and Hostility seem to be separate facets of the NA scale. In Study 1, the PA subscales yielded a cleaner pattern of results demonstrating acceptable scale reliabilities and AVE values. On the other hand, Hostility and Self-Disgust showed unacceptable CRs. The Hostility subscale seems to be related to both emotional and behavioural aspects of aggression (see the following paragraph). Hence, tapping such a complex phenomenon with two items might not be warranted. Regarding Self-Disgust, others have reported that state self-reports about guilt and shame have low endorsement rates compared to general judgments of one's affect, which might have led to item distributional and statistical problems (Outley & Duncan, 1992; Power, 2006). Additionally, the item "upset" does not seem to capture any specific affect but rather the higher-order NA. For example, in the expanded version of the PANAS, this item does not belong to any specific negative affect scale but rather to the General Negative Affect scale (Watson & Clark, 1999).

The construct validity of the subscales was assessed by relating them to personality traits. Joviality, Self-Assurance, and Attentiveness demonstrated a pattern of relations to Extraversion and Conscientiousness similar to the pattern previously found among their longer PANAS-X counterparts and these personality traits (McCrae & Costa, 1991; Watson & Clark, 1992). A common feature of Extraversion, Joviality, and Self-Assurance seems to be the imminent reward orientation (Shiota, Keltner, & John, 2006), whereas Attentiveness and Conscientiousness might share a sensitivity to distal rewards (Tellegen, 1982). In contrast to some (McCrae & Costa, 1991; Watson & Clark, 1992), but in agreement with others (Shiota et al., 2006; Ellsworth & Smith, 1988; Kahn & Isen, 1993), our results indicated that Self-Assurance and Joviality are associated with Openness, suggesting that positive mood might foster playful creativity, exploration, and receptiveness towards novel experiences. Again, similar to previous research reports (McCrae & Costa, 1991; Watson & Clark, 1992), the three NA subscales and Neuroticism correlated positively. Based on the values of the correlation coefficients, it appears that Hostility was divided between Negative Valence, Neuroticism, and Aggressiveness. Our results

also imply that the Hostility subscale is related to both aspects of aggression: emotional, attributable to Neuroticism, and behavioural, which is usually linked to Aggressiveness/Agreeableness. Also, these findings have some implications for a recent debate regarding placement of anger in the structure of affect. Namely, Carver and Harmon-Jones (2009) reviewed substantial evidence arguing that anger is best conceptualized as an affect closely linked to an appetitive motivational system, whereas Watson (2009) has reasoned that it is linked to both appetitive and avoidance motivational systems. Our result that anger is closely linked not only to Neuroticism but also Aggressiveness is more in line with Watson's claim.

Second-Order Structure of the PANAS

To our knowledge, this is the first study that provided support for the higher-order dimensionality of this scale. PA and NA can be regarded as latent second-order factors with 6 specific, lower-order affects. The correlation between PA and NA was moderate supporting their relative independence (17% of shared variance). In addition to the fit indices, the viability of the higher-order solution is justified by the ability of the second-order factors to account for the substantial amount of the variance in their respective first-order factors.

Our findings that the three PA facets had fairly high loadings on the higher-order PA factor and that their inter-correlations were extremely high, suggest that these PA facets are not particularly distinct when examined at a single administration. In contrast, the facets are clearly distinct in their sensitivity to situational changes. This lack of differentiation when examined at a single, non-provocative occasion complies with the observation that positive emotions in contrast to negative are not easily distinguished from one another both cognitively and physiologically (Fredrikson, 2003). In order to elicit their greater differentiation, one needs to be exposed to a particular amount of stress or strain, as was the case in our Study 2 in which differential activation of the PA subscales was found following an exposure to a naturally occurring stressor. Such a pattern of differential activation of the PA subscales led to null overall PA change. Hence, if one focused solely on an overall PA score, one would miss specific patterns of change on Joviality and Attentiveness. On the other hand, the overall change on the NA subscale obtained during the same real-life stressor was largely due to the specific affect of fear and anxiety (only the Fear subscale demonstrated a significant decrease following a cessation of an anxiety-provoking situation in Study 2). If the PANAS NA scale was a sole measure of a general dimension of NA, one would not expect to find a differential amount of change in the three identified subscales.

Implications

Overall, the results of the studies reported in this article suggest that the hierarchical structure of affect can be captured by the PANAS scale by considering the total PA and NA scores as well as their respective subscales. Differentiation of the PA and NA subscales within the PANAS can be interesting

to those working under both the dimensional and discrete affect models (e.g., Watson & Tellegen, 1985; Ekman, 1992). Namely, it has been speculated that each affect has its nonspecific component (i.e., the variance shared with other affects of the same valence attributable to the existence of a higher-order factor) and a specific component (i.e., its unique variance not shared with the same-valence affects) (Watson, 2009). Thus, the composite PA and NA together with their respective subscale scores can be used in the research areas exploring relative contributions of these nonspecific and specific components under various affect evocation conditions.

Apart from theoretically inspired research, the Serbian adaptation of the PANAS can be a useful measure in applied research. Given its briefness and sensitivity to situational stress, as demonstrated in our study, it can be a very useful tool in the areas of sport and clinical psychology, and psychopathology. For example, it would be interesting to see how Anger and Attentiveness interact while athletes are getting ready to compete. Similarly, the scale can be used to measure changes in emotional experience following exposure to psycho– and pharmacotherapy. Mohr et al. (2005) have shown that NA decreases whereas PA increases in depressed patients over the course of cognitive-behavioural treatment. It would be informative to learn whether specific affects within both NA and PA change at the same rate, particularly in those with comorbid depression and anxiety, and endogenous depression.

The PANAS would likely be improved by replacing "upset" with another item that is more specifically related to self-reproach. Also, the Self-Disgust factor might be more of a non-specific negative affect facet, distinguished from fear and hostility more by the absence of specific content than by its presence.

Our study with exposure to a naturally-occurring stressor, suggests that the Attentiveness scale measures arousal/alertness. Others have also cautioned that the use of the total PA scale, due to this valence-independent component, might be misleading in affect evocation studies (Egloff et al., 2003; Patrick & Lavoro, 1997; Schaefer, Nils, Sanchez, & Phillipot, 2010).

Limitations

Participants in our studies were mainly university students and women. This may limit the generalizability of our findings particularly in the light of recent evidence that older adults (above the age of 70) might discriminate less among the facets of PA (Ready et al., 2011). In our study the eldest participant fell below this age category suggesting that our findings might not be influenced by age-related changes; however, it is still not clear how the scale would function in the Serbian elderly. All instruments were self-reports. The use of self-ratings of personality and affectivity raises the concern that we only detected semantic similarities but not behavioural or emotion-expressive similarities.

In our study, the partitioning of the PA items was slightly different from the results reported in Egloff et al.'s study (2003). We partitioned the items into their respective subscales based on the previous confirmatory factor-analytic

studies and in accordance with the item placements within the PANAS-X, whereas Egloff et al. used the latent state-trait theory (Steyer, Schmitt, & Eid, 1999) as a guiding analytical framework. In addition to the type of analyses, one explanation for the obtained differences might lie in different cross-cultural adaptations of the PANAS (Serbian versus German version of the scale).

The conclusions of our study are limited to the structure of state affect (last few days and right now). Future studies need to explore existence of the hierarchical structure of affect using the trait version of the PANAS.

Conclusions

Our research supports adequate psychometric characteristics of the Serbian adaptation of the PANAS. It also provide evidence for the hierarchical structure of self-rated affect measured by the PANAS suggesting two higher-order factors each subsuming three facets of discrete affects. Two studies reported in this article provide converging evidence that the subscales within the PA scale tapping self-assurance, joviality, and attentiveness possess adequate psychometric characteristics. Although the three facets of NA can be differentiated, only the Fear and, to an extent, Hostility subscales have demonstrated adequate reliability and validity. These reliable subscales can be recommended for further use, particularly when research situation calls for brevity and/or there are time constraints. The Self-Disgust subscale might show better psychometric properties when used in the trait form.

References

Arbuckle, J. L. (1995). *Amos 6.0 user's guide*. Chicago: SPSS, Inc.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation. Copyright: Beck Depression Inventory-II. Copyright (c) 1996 by Aaron T. Beck. Serbian translation Copyright (c) 2008. Translated and reporduced with the permission fo publisher NCS Pearson, Inc. All rights reserved.

Bagozzi, R. P. (2010). Structural equation models are modelling tools with many ambiguities: Comments acknowledging the need for caution and humility in their use. *Journal of Consumer Psychology, 20*(2), 208–214.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press.

Browne, M. W. (1992). Circumplex models for correlation matrices. *Psychometrika, 57*(4), 469–497.

Carver, C. S., & Harmon-Jones, E. (2009). Anger is an approach-related affect: Evidence and implications. *Psychological Bulletin, 135*(2), 183–204. doi: 10.1037/a0013965

Chen, F. F., West, S. G., & Sousa, K., H. (2006). A comparison of bifactor and second-order models of quality of life. *Multivariate Behavioral Research, 41*(2), 189–225. doi.org/10.1207%2Fs15327906mbr4102_5

Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology, 100*(3), 316–336. doi: 10.1037/0021–843X.100.3.316

Crawford, J. R., & Henry, J. D. (2004). The positive and negative affect schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 43*(3), 245–265. doi:10.1348/0144665031752934

Crocker, P. R. (1997). A confirmatory factor analysis of the Positive and Negative Affect Schedule (PANAS) with a youth sport sample. *Journal of Sport and Exercise Psychology, 19,* 91–97.

Diener, E., Smith, H., & Fujita, F. (1995). The personality structure of affect. *Journal of Personality and Social Psychology, 69*(1), 130–141. doi: 10.1037/0022–3514.69.1.130

Dozois, D. J. A., Dobson, K. S., & Ahnberg, J. L. (1998). A psychometric evaluation of the

Beck Depression Inventory-II. *Psychological Assessment, 10*(2), 83–89. doi:10.1037/1040–3590.10.2.83

Ebesutani, C., Smith, A., Bernstein, A., Chorpita, B., Higa-McMillan, C., & Nakamura, B. (2011). A bifactor model of negative affectivity: Fear and distress components among younger and older youth. *Psychological Assessment, 23*(3), 679–691. doi:10.1037/a0023234

Egloff, B., Schmukle, S. C., Burns, L. R., Kohlmann, C. W., & Hock, M. (2003). Facets of dynamic positive affect: Differentiating Joy, Interest, and Activation in the and Negative Affect Schedule (PANAS). *Journal of Personality and Social Psychology, 85*(3)*,* 528–540. doi: 10.1037/0022–3514.85.3.528

Ekman, P. (1992). Are there basic emotions? *Psychological Review, 99*(1)*,* 550–553. doi:10.1037/0033–295X.99.3.550

Ellsworth, P. C., & Smith, C. A. (1988). Shades of joy: Patterns of appraisal differentiating pleasant emotions. *Cognition and Emotion, 2*(4)*,* 301–331. doi: 10.1080/02699938808412702

Feldman, L. (1993). Distinguishing depression and anxiety in self-reports: Evidence from confirmatory factor analysis on nonclinical and clinical samples. *Journal of Consulting and Clinical Psychology, 61*(4), 631–638. doi: 10.1037/0022–006X.61.4.631

Finney, S. J., & Distefano, C. (2006). Nonnormal and categorical data in structural equation modeling, In G. R. Hancock and R. O. Mueller (Eds.), *Structrual equation modeling: A second course* (pp. 269–314). Greenwich, Connecticut: Information Age Publishing.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. doi: 10.2307/3151312

Fredrickson, B. L. (2003). The value of positive emotions: The emerging science of positive psychology is coming to understand why it's good to feel good. *American Scientist, 91,* 2003.

Gaudreau, P., Sanchez, X., & Blondin, J. P. (2006). Testing the factorial structure of the PANAS across two samples of French-Canadian participants. *European Journal of Psychological Assessment, 22*(4)*,* 240–249. doi: 10.1027/1015–5759.22.4.240

Gençöz, T. (2000). Pozitifve negatif duygu ölçeği: Geçerlik ve güvenirlik çalışması çalışması [Positive and Negative Affect Schedule: Validity and reliability study]. *Türk Psikoloji Dergisi,15*, 19–26.

Hair, J. R., Jr., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Englewood Cliffs, NJ: Prentice-Hall.

Harmon-Jones, E., Amodio, D. M., & Zinner, L. R. (2007). Social psychological methods of emotion elicitation. In J. A. Coan & J. J. B. Allen (Eds.), *Handbook of emotion elicitation and assessment* (pp. 91–105). New York, NY: Oxford University Press.

Kahn, B. E., & Isen, A. M. (1993). The influence of positive affect on variety seeking among safe, enjoyable products. *Journal of Consumer Research, 20*(2), 257–270. doi:10.1086/209347

Kercher, K. (1992). Assessing subjective well-being in the old-old. The PANAS as a measure of orthogonal dimensions of positive and negative affect. *Research on Aging, 14*(2), 131–168. doi:10.1177/0164027592142001

Killgore, W. D. S. (2000). Evidence for a third factor on the Positive and Negative Affect Schedule in a college student sample. *Perceptual and Motor Skills, 90*(1)*,* 147–152. doi:10.2466/PMS.90.1.147–152

Larsen, R. J., & Diener, E. (1992). Promises and problems with the circumplex model of emotion. In M. S. Clark (Ed.), *Review of personality and social psychology: Emotion* (pp. 25–29). Newbury Park, CA: Sage.

Lench, H. C., Flores, S. A., & Bench, S. W. (2011). Discrete emotions predict changes in cognition, judgment, experience, behavior, and physiology: A meta-analysis of experimental emotion elicitations. *Psychological Bulletin, 137*(5), 834–855. doi:10.1037/a0024244

Leue, A., & Beauducel, A. (2011). The PANAS structure revisited: On the validity of a bifactor model in community and forensic samples. *Psychological Assessment, 23*(1), 215–225. doi: 10.1037/a0021400

Lim, Y-J., Yu, B-H., Kim, D-K., & Kim, J-H. (2010). The Positive and Negative Affect
Schedule: Psychometric properties of the Korean version. *Psychiatry Investigation, 7*(3), 163–169. doi:10.4306/pi.2010.7.3.163

Lorenzo-Seva, U., & ten Berge, J. M. F., (2006). Tucker's congruence coefficient as a
meaningful index of factor similarity. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences, 2*(2), 57–64. doi: 10.1027/1614–2241.2.2.57

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, *1*(2), 130–149. doi: 10.1037/1082–989X.1.2.130

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong S. (1999). Sample size in factor analysis. *Psychological Methods, 4*(1), 84–99. doi: 10.1037/1082–989X.4.1.84

Mackinnon, A., Jorm, A. F., Christensen, H., Korten, A. E., Jacomb, P. A., & Rodgers, B. (1999). A short form of the positive and negative affect schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. *Personality and Individual Differences, 27*(3), 405–416. doi: 10.1016/S0191–8869(98)00251–7

Marsh, H. W. (1987). The hierarchical structure of self-concept and the application of hierarchical confirmatory factor analysis. *Journal of Educational Measurement, 24*(1)*,* 17–39. doi: 10.1111/j.1745–3984.1987.tb00259.x

McCrae, R. R., & Costa, P. T. J. (1991). Adding liebe und arbeit: The full Five-factor model and well-being. *Personality and Social Psychology Bulletin, 17*(2), 227–232. doi: 10.1177/014616729101700217

Mehrabian, A. (1997). Comparison of the PAD and PANAS as models for describing emotions and for differentiating anxiety from depression. *Journal of Psychopathology and Behavioral Assessment, 19*(4)*,* 331–357. doi: 10.1007/BF02229025

Mohr, D. C., Hart, S. L., Julian, L., Catledge, C., Honos-Webb, L., Vella, L., & Tasch, E. T. (2005). Telephone-administered psychotherapy for depression. *Archives of General Psychiatry,62*(9),1007–1014. doi:10.1001/archpsyc.62.9.1007

Oatley, K., & Duncan, E. (1992). Incidents of emotion in daily life. In K. T. Strongman (Ed.), *International review of studies of emotion* (pp. 250–293). Chicester, UK: Wiley.

Patrick, C. J., & Lavoro, S. A. (1997). Ratings of emotional response to pictorial stimuli: Positive and Negative affect dimensions. *Motivation and Emotion, 21*(4), 297–321. doi:10.1023/A:1024432322584

Power, M. J. (2006). The structure of emotion: An empirical comparison of six models. *Cognition and Emotion, 20*(5)*,* 694–713. doi:10.1080%2F02699930500367925

Raykov, T. (2001). Bias of Coefficient α for Fixed Congeneric Measure with Correlated Errors. *Applied Psychological Measurement, 25*, 69–76. doi: 10.1177/01466216010251005

Ready, R. E., Vaidya, J. G., Watson, D., Latzman, R. D., Koffel, E. A., & Clark, L. A. (2011). Age-group differences in facets of positive and negative affect. *Aging and Mental Health, 15*(6)*,* 784–795. Doi:10.1080/2F13607863.2011.562184

Remington, N. A., Fabrigar, L. R., & Visser, P. S. (2000). Reexamining cirmumplex model of affect. *Journal of Personality and Social Psychology, 79*(2), 286–300. doi:10.1037//0022–3514.79.2.286

Russell, J. A. (1980). A circumplex model of affect. J*ournal of Personality and Social Psychology, 39*(6), 1191–1178. doi: 10.1037/h0077714

Schaefer, A., Nils, F., Sanchez, X., & Philippot, P. (2010). Assessing the effectiveness of a large database of emotion-eliciting films: A new tool for emotion researchers. *Cognition and Emotion, 24*(7)*,* 1153–1172. doi: 10.1080/02699930903274322

Schumacker*,* R. E., & Lomax, R. G. (2004). *A Beginner's Guide to Structural Equation Modeling* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Shiota, M., Keltner, D., & John, O. (2006). Positive emotion dispositions differentially associated with Big Five personality and attachment style. *The Journal of Positive Psychology, 1*(2)*,* 61–71. doi: 10.1080/17439760500510833

Smederevac, S., Mitrović, D. i Čolović, P. (2010). *Velikih pet plus dva: primena i interpretacija.* Beograd: Centar za primenjenu psihologiju.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1977). *State-Trait Anxiety Inventory Form Y*. California: Mind Garden, Incorporated.

Steyer, R., Schmitt, M., & Eid, M. (1999). Latent state-trait theory and research in personality and individual differences. *European Journal of Personality, 13*(5)*,* 389–408. doi:10.1002/(SICI)1099–0984(199909/10)13:5<389:AID-PER361>3.0.CO;2-A

Tellegen, A. (1982). *Brief manual for the Multidimensional Personality Questionnaire.* Unpublished manuscript. Univeristy of Minnesota, Minneapolis.

Tellegen, A., Watson, D., & Clark, L. A. (1999). On the dimensional and hierarchical structure of affect. *Psychological Science, 10*(4), 297–303. doi: 10.1111/1467–9280.00157

Terracciano, A., McCrae, R. R., & Costa, P.T. (2003). Factorial and construct validity of the Italian Positive and Negative Affect Schedule (PANAS). *European Journal of Psychological Assessment, 19*(2), 131–141. doi:10.1027//1015–5759.19.2.131

Thayer, R. E. (1989). *The biopsychology of mood and affect.* New York: Oxford University Press.

Tuccitto, D. E., Giacobbi, P. R. Jr., & Leite, W. L. (2010). The internal structure of positive and negative affect: A confirmatory factor analysis of the PANAS. *Educational and Psychological Measurement, 70*(2)*,* 125–141. doi: 10.1177/0013164409344522

Waller, N. G. (1999). Evaluating the structure of personality. In C. R. Cloninger (Ed.), *Personality and Psychopathology* (pp. 155–197). Washington, DC: American Psychiatric Press.

Watson, D. (2009). Locating anger in the hierarchical structure of affect: Comment on Carver and Harmon-Jones. *Psychological Bulletin, 135*(2)*,* 205–208. doi: 10.1037/a0014413

Watson, D., & Clark, L.A. (1997). Measurement and mismeasurement of mood: Recurrent and emergent issues. *Journal of Personality Assessment, 68*(2)*,* 267–296. doi: 10.1207/s15327752jpa6802_4

Watson, D., & Clark, L. A. (1992). On traits and temperament. General and specific factors of emotional experience and their relation to the 5-factor model. *Journal of Personality, 60*(2)*,* 441–476. doi: 10.1111/j.1467–6494.1992.tb00980.x

Watson, D., & Clark, L. A. (1999). *The PANAS-X: Manual for the Positive and Negative Affect Schedule-Expanded Form.* Iowa City, IA: University of Iowa.

Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin, 98*(2), 219–235. doi:10.1037/0033–2909.98.2.219

Watson, D., Clark, L. A., & Tellegen, A. (1984). Cross-cultural convergence in the structure of mood: A Japanese replication and a comparison with U.S. findings. *Journal of Personality and Social Psychology, 47*(1), 127–144. doi:10.1037/0022–3514.47.1.127

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measure of Positive and Negative Affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. doi: 10.1037/0022–3514.54.6.1063

Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations and psychobiological evidence. *Journal of Personality and Social Psychology, 76*(5), 820–838. doi:10.1037/0022–3514.76.5.820

Zevon, M. A., & Tellegen, A. (1982). The structure of mood change: An idiographic/nomothetic analysis. *Journal of Personality and Social Psychology*, *43*(1), 111–122. doi:10.1037/0022–3514.43.1.111