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Article

Scale of Positive and Negative Affects (EAPN-10): Evidence of its Psychometric Adequacy

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Abstract

This study aimed to gather psychometric evidence of the *Scale of Positive and Negative Affects* (EAPN-10) within the Brazilian context. Three studies were performed (N = 911). Study 1 considered 296 undergraduate students (M_{Age} = 23.8; 59.1% females), who answered the EAPN-10 and a demographic questionnaire. Exploratory factor analysis revealed a two-factor structure [positive affects (α = .82) and negative affects (α = .81)], explaining 59.7% of the total variance. Study 2 took into account the participation of 313 undergraduate students (M_{Age} = 23.3; 57.2% females), who answered the same instruments. Confirmatory factor analysis corroborated the two-factor structure (e.g., CFI = .92), which was invariant across males and females (e.g., ΔCFI < .01), with alphas greater than .70. Finally, Study 3's participants were 302 university students (M_{Age} = 23.1; 54.3% females), who answered the aforementioned instruments as well as measures of vitality, positivity, optimism, anxiety, depression and stress. Supporting their criterion validity, positive affects (α = .83) were positively correlated

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with well-being indicators, and negative affects (α = .80) were positively correlated with indicators of psychological discomfort. In conclusion, the EAPN-10 is a psychometrically adequate measure that can be employed to assess people's affects and their correlates within the Brazilian context.

Keywords: Affects, scale, positivity, vitality, anxiety, depression.

Escala de Afetos Positivos e Negativos (EAPN-10): Evidências de sua Adequação Psicométrica

Resumo

Este estudo objetivou reunir evidências psicométricas da *Escala de Afetos Positivos e Negativos* (EAPN-10) no contexto brasileiro. Realizaram-se três estudos. O *Estudo 1* considerou 296 estudantes universitários (M_{Idade} = 23,8; 59,1% mulheres), os quais responderam a EAPN-10 e perguntas demográficas. A análise fatorial exploratória revelou uma estrutura bifatorial [*afetos positivos* (α = 0,82) e *afetos negativos* (α = 0,81)], explicando 59,7% da variância total. No *Estudo 2* participaram 313 estudantes universitários (M_{Idade} = 23,3; 57,2% mulheres), que responderam os instrumentos do estudo anterior. A análise fatorial confirmatória corroborou a estrutura bifatorial (e.g., CFI = 0,92), que se mostrou invariante entre homens e mulheres (e.g., ΔCFI < 0,01), tendo alfas superiores a 0,80. Por fim, o *Estudo 3* reuniu 302 estudantes universitários (M_{Idade} = 23,1; 54,3% mulheres), que responderam os instrumentos prévios e medidas de vitalidade, positividade, otimismo, ansiedade, depressão e estresse. Atestando evidências de sua validade de critério, os afetos positivos (α = 0,83) se correlacionaram positivamente com os indicadores de bem-estar, enquanto os negativos (α = 0,80) o fizeram com aqueles de mal-estar psicológico. Conclui-se que a EAPN-10 é psicometricamente adequada, podendo ser empregada para conhecer os afetos e seus correlatos no contexto brasileiro.

Palavras-chave: Afetos, escala, positividade, vitalidade, ansiedade, depressão.

Escala de Afectos Positivos y Negativos (EAPN-10): Evidencias de su Adecuación Psicométrica

Resumen

Este estudio ha tenido como objetivo reunir evidencias psicométricas de la *Escala de Afectos Positivos y Negativos* (EAPN-10) en el contexto brasileño. Se realizaron tres estudios. El *Estudio 1* consideró 296 estudiantes universitarios (M_{Edad} = 23.8, 59.1% mujeres), que contestaron a la EAPN-10 y preguntas demográficas. El análisis factorial exploratorio ha indicado una estructura bifactorial [afectos positivos (α = .82) y afectos negativos (α = .81)], explicando el 59.7% de la varianza total. En *Estudio 2* reunió 313 estudiantes universitarios (M_{Edad} = 23.3, 57.2% mujeres), que contestaron los instrumentos del estudio anterior. El análisis factorial confirmatorio ha corroborado la estructura bifatorial (CFI = .92), que se mostró invariante entre varones y mujeres (ΔCFI < .01), con alfas superiores a .70. Por último, el *Estudio 3* contó con 302 estudiantes universitarios (M_{Edad} = 23.1, 54.3% mujeres), que contestaron a los instrumentos previos y medidas de vitalidad, positividad, optimismo, ansiedad, depresión y estrés. Confirmando evidencias de validez de criterio, los afectos positivos (α = .83) se han correlacionado positivamente con los indicadores de bienestar, mientras que los negativos (α = .80) lo hicieron con aquellos de malestar psicológico. Concluyendo, la EAPN-10 se ha mostrado psicometricamente adecuada, pudiendo ser empleada para conocer los afectos y sus correlatos en el contexto brasileño.

Palabras clave: Afectos, escala, positividad, vitalidad, ansiedad, depresión.

Affects refer to an internal emotional state, which can be intense and related to a specific stimulus (i.e., emotion) or less intense and lacking identification of the source (i.e., mood; Cohen, Pham, & Andrade, 2008; Russell & Carroll, 1999). Along these lines, affects are of two main types, *positive* and *negative*, and are characterized according to their frequency, intensity and stability in the perception of those who experience them (Diener & Emmons, 1984; Lyubomirsky, King, & Diener, 2005).

Positive affects encompass the diverse feelings people experience when situations are favorable; in contrast, *negative affects* refer to the experience of feelings resulting from unfavorable events. In this sense, positive affects involve momentary states, such as amusement; and long-term feelings, such as satisfaction with life (Diener, Presman, Hunter, & Delgadillo-Chase, 2017). Optimism, which includes positive expectations as to the future, can also be included among positive affects (Alarcon, Bowling, & Khazon, 2013). In contrast, negative affects involve states that are more momentary, such as anger and preoccupation, yet they also involve feelings that can be longer lasting and more persistent, such as depression (Diener et al., 2017).

This model of affects is based on two-dimensional/circumplex theories of emotion that are founded upon positive and negative valences/affects (Larsen & Diener, 1992; Russell, 2003). From this perspective, the component of the feeling is conceived in terms of two directions: the emotion is positive when the feeling is pleasant; or negative, when the experience of a certain event is unpleasant (Sander, 2013). Nonetheless, the valence dimension is not limited to the component of the feeling, given that it depends on the manner in which the situation is assessed and can thus produce an ambiguous evaluation, for the relationship between the occasioned situations does not always exist (Scherer, 2001; Silvia, 2006). Hence, despite the fact that feelings are frequently considered positive or negative, it is acknowledged that the assessments of events and feelings can be ambivalent (Larsen, 2007).

One of the possible explanations for the ambivalence of affects could be associated with personality traits (Gaderman & Zumbo, 2007). Studies reveal that individuals who exhibit high scores in relation to positive affects also experience moments of preoccupation, frustration and sadness, that is, experiences of negative affects; nonetheless, shortly thereafter, there is a return to the previous levels of those affects (Zanon, Bastianello, Pacico, & Hutz, 2013). Along these lines, DeNeve and Cooper (1998) contended that the trait of extroversion is strongly associated with positive affects, while that of neuroticism is negatively associated, and such traits can contribute to understanding these variations.

Another point in relation to affects refers to the perspective recently proposed by Diener, Kanazawa, Suh, and Oishi (2015), who suggested that positive affects are an evolutionary adaptation, since happier individuals are more prone to engage in behaviors that promote survival and reproductive success. The above authors began with the hypothesis that positive affects were selected based on the experience of a positive mood and the absence of adverse stimuli; hence, happier people tend to engage in behaviors involving not only reinforcement-based learning but also stimulation of the current behavior. This mechanism is known as compensatory positive affect.

The perspective proposal by Diener et al. (2015) associates positive and negative affects with a psychological phenomenon that is vital to the individual: subjective well-being (Diener, 1984). It is made up of two sets of elements – emotional (positive and negative affects) and cognitive (satisfaction with life; Strack, Argyle, & Schwarz, 1991) – that are involved in healthy human psychological functioning, which is associated with other facets, such as optimism and vitality. For example, He, Cao, Feng, Guan, and Peng (2013) assessed the impact of dispositional optimism on the well-being of patients who had suffered burns, concluding that such optimism was an important predictor of reduced mental suffering and greater propensity for recovery. In another context, a longitudinal study correlated vitality and self-esteem with

increased levels of well-being (Wood, Linley, Maltby, Kashdan, & Hurling, 2011).

It seems evident that affects play an important role in increasing or decreasing subjective well-being; it is thus necessary to take them into consideration. Accordingly, one must quantify them, assessing the extent to which people exhibit them. To this end, the most well-known and most cited measure is the Positive and Negative Affect Schedule (PANAS), which was proposed by Watson, Clark, and Tellegen (1988). It is made up of 20 items that are equally distributed between the two types of affects, and has been adapted to the Brazilian context (Carvalho et al., 2013; Zanon & Hutz, 2014). In addition to the above measure, Zanon et al. (2013) developed and assessed the psychometric parameters of the Positive and Negative Affects Scale, which differs from the PANAS due to being composed of 20 items in the form of sentences, aiming at ensuring better comprehension of the affects. Nonetheless, despite the advances occasioned by these scales in studies within the Brazilian context, one requires a measure that is brief while also ensuring evidence of validity and internal consistency comparable with that of those measures.

Along the lines of the aforementioned, we propose a brief measure (i.e., the Scale of Positive and Negative Affects – EAPN-10; abbreviation in Portuguese), gathering evidence of its presumably two-factor structure and of the internal consistency of those factors. This measure features ten items that are equally distributed between positive (happy, satisfied, fun, optimistic and joyful) and negative affects (depressed, frustrated, angry, worried and unhappy). The scale is based on the study by Diener and Emmons (1984), which identified its structure based on the participants' daily responses concerning their assessment of the moods they experienced on a day-to-day basis; furthermore, in selecting the affects, we adopted the theoretical viewpoint that they are not totally independent, as has been suggested (Watson et al., 1988), although they do amount to legitimate dimensions.

The Present Study

This article presents a brief measure for assessing positive and negative affects, demonstrating its psychometric adequacy for research in Brazil. Specifically, the study sought to: (a) come to know the factor structure of the EAPN-10, also gathering evidence of its internal consistency (*Study 1*); (b) test the adequacy of the two-factor structure, assessing its factorial invariance (*Study 2*); and, lastly, (c) discover the correlation between the affects and subjective well/ill-being variables (*Study 3*).

Study 1: Evidence of the Factorial Validity and Reliability of the EAPN-10

This study was the first to assess the factor structure of the EAPN-10 and check the internal consistency (Cronbach's alpha and homogeneity) of its factors. Nonetheless, at the time, we decided to focus on exploratory analyses, checking whether the two factors could emerge without any imposition.

Method

Participants. The present study took into account the participation of 296 undergraduate students of three academic areas (natural sciences, human sciences and health sciences) at a public university in João Pessoa (Pernambuco, Brazil). Most of the participants were female (59.1%), single (84.1%), and Catholic (24.1%) or Protestant (22%), perceiving themselves as belonging to the middle class (26.6%) or lower middle class (18.1%); they had a mean age of 23.8 years (SD = 7.25; ranging from 18 to 55 years old), describing themselves as moderately religious (M = 2.72; SD = 0.95; 0 = *Not religious* and 5 = *Extremely religious*). It was a convenience sample made up of people who were present in the classroom and voluntarily consented to participate.

Instruments

Scale of Positive and Negative Affects (EAPN-10). This measure was developed by the authors of the present article, based on a study by Diener and Emmons (1984) in which they sought to discover the correlation between positive and negative affects. On the occasion, following the Daily Day procedure, they aimed to know the frequency of the feelings experienced by the participants daily, weekly and/or monthly, arriving at a list of nine adjectives/affects. Reis, Sheldon, Gable, Roscoe, and Ryan (2000) employed the same list of adjectives to assess the valence of the positive (happy, joyful, satisfied and fun) and negative (depressed, worried, frustrated, angry and unhappy) affects. Accordingly, the above list of affects was adopted here, adding the adjective *optimistic* to the group of positive affects so as to ensure a balanced number of positive and negative affects. Subsequent to reading each affect, the participants indicated the extent to which they had experienced it recently, on a seven-point Likert scale ranging from 1 (*Never*) to 7 (*Very frequently*).

Demographic Questionnaire. In this section, the participants responded to a list of questions related to their demographic characteristics (age, sex, socioeconomic class, religion and religiosity).

Procedure. We contacted the professors of the academic disciplines, requesting authorization to administer the questionnaires to the students that were present. Three trained test administrators were responsible for this activity, informing those present of the study's objective, letting them know that participation would be voluntary and assuring them that their responses would be anonymous. Data collection was conducted in a collective, classroom environment, although the responses were given individually. After reading the instructions as to how to answer the questionnaire, the administrators stayed in the classroom in order to monitor the process and clear up eventual doubts. We followed the ethical procedures compliant with Resolution 510/16, receiving the approval of the corresponding Ethics Committee (CAAE: 70957517.0.0000.5188). On average, the participants took around ten minutes to complete their participation in the study.

Data Analysis. We employed SPSS (version 22) software to calculate the descriptive statistics (measures of central tendency, dispersion and frequency); multivariate analysis of variance (MANOVA) to know the discriminative power of the items; exploratory factor analysis (EFA) to check the dimensionality of the measure under study; and Cronbach's alpha and the average inter-item correlation ($r_{i.i}$) to assess the internal consistency of the resulting factors.

Results

Initially, we checked the discriminative power of the EAPN-10's items, which were summed (inverting the scores of the negative affects), and, adopting the empirical median (*Md* = 43) as the criterion, we defined the upper and lower criterion groups. By way of MANOVA, the group means for each item were compared, checking whether they would discriminate the participants with close magnitudes in the latent trait, which was confirmed [Wilks' Lambda (10.258) = 0.31; $p < .001$, $\eta^2 = 0.69$]. The items discriminated individually, with the *satisfied* affect exhibiting the lowest power [F (1.267) = 5.07; $p = .02$; $\eta^2p = 0.02$]; and the *angry* affect, the highest [F (1.267) = 85.86; $p < .001$; $\eta^2p = 0.24$].

Having tested the discriminative power of the items, we sought to identify the EAPN-10's factor structure. First of all, we confirmed the adequacy of this type of analysis [KMO = 0.89 and Bartlett's Test of Sphericity χ^2 (45) = 1,191.00; $p < .001$], deciding to perform an analysis of the principal axes and adopting oblique rotation (*Oblimin*), without fixing the number of factors to be extracted. In this case, three criteria were adopted in order to make this decision: Kaiser, Cattell and Horn. According to the first criterion, two factors could be extracted, individually exhibiting values greater than 1 (4.63 and 1.34) and collectively explaining 59.7% of the total variance; considering the

Cattell criterion, two factors that stood out could also be extracted (Figure 1); and, lastly, employing the Horn criterion, accepting the parameters of the database (296 participants and 10 items) and conducting 1000 simulations, the two-factor structure was corroborated, since the third empirical value (0.79) was less than the simulated value (1.13).

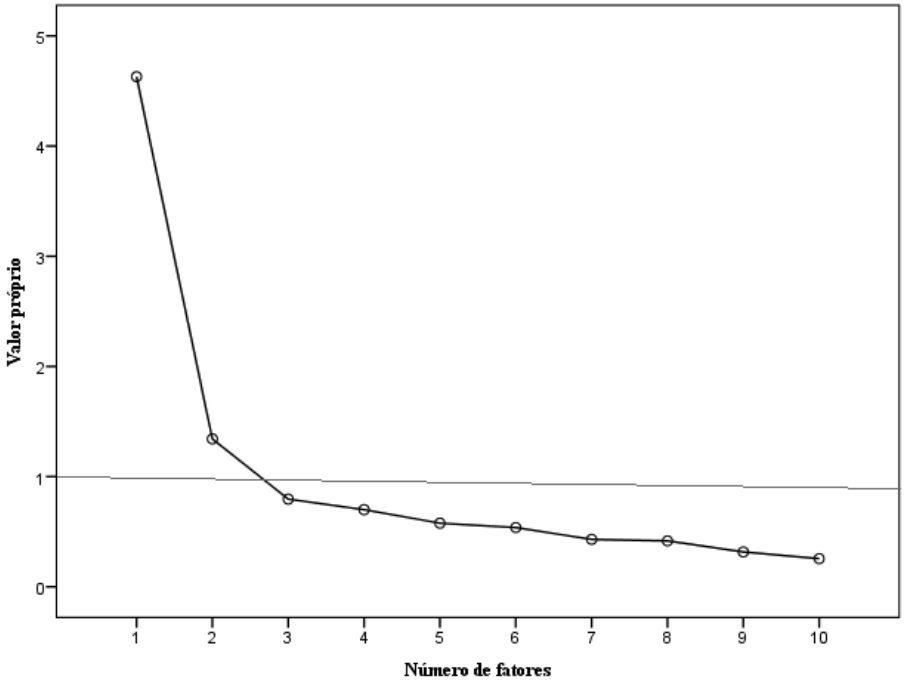

Figure 1. Graphic representation of individual eigenvalues (scree plot).

In light of the preliminary evidence, we decided to extract two factors, consistent with the nature of the affects. The factor structure is shown in Table 1. It is worth emphasizing that all of the items exhibit saturations equal to or greater than 0.40. As one observes in the table, the first factor encompasses the *positive affects*, its items presenting saturations between 0.64 (*optimistic*) and 0.83 (*joyful*), while the second factor contains the *negative affects*, whose items display saturations ranging from 0.47 (*worried*) to 0.75 (*unhappy*).

With respect to the internal consistency of the affects factors, we calculated the Cronbach's alphas and the coefficients of homogeneity (average inter-item correlation [$r_{i.i}$]). The *positive affects* factor exhibited a Cronbach's alpha (α) of 0.82 and homogeneity of 0.49, ranging between 0.34 (*fun* and *satisfied*) and 0.62 (*fun* and *joyful*); and the *negative affects* factor, α = 0.81 and $r_{i.i}$ = 0.45, ranging between 0.34 (*worried* and *angry*) and 0.62 (*unhappy* and *depressed*).

Partial Discussion

This was the first study in which evidence was obtained concerning the factorial validity and internal consistency of the Scale of Positive and Negative Affects within the Brazilian context. Although Reis et al. (2000) did not check the factor structure of this measure, they did accept the two factors. Nonetheless, more recently Gouveia et al. (2003) suggested its two-factor structure, whose factors presented internal consistency coefficients close to those reported here [*positive affects* (α = 0.81) and *negative affects* (α = 0.71)]. Even so, such findings must be replicated, assessing whether this is the most suitable two-factor structure.

Study 2: Confirmatory Factor Analysis and Factorial Invariance of the EAPN-10

This second study sought to confirm the adequacy of the two-factor structure of affects,

Table 1
Factor structure of the Scale of Positive and Negative Affects

Item	Item Content	Factor	
		I	II
10	Joyful	**0.83**	-0.50
01	Happy	**0.80**	-0.50
03	Satisfied	**0.66**	-0.57
06	Fun	**0.65**	-0.11
08	Optimistic	**0.64**	-0.50
09	Unhappy	-0.63	**0.75**
04	Frustrated	-0.42	**0.70**
02	Depressed	-0.43	**0.59**
05	Angry	-0.11	**0.57**
07	Worried	-0.24	**0.47**
Number of Items		5	5
Individual Value		4.63	1.34
% Explained Variance		46.3	13.4
Cronbach's Alpha		0.82	0.81

Note. Factor loadings in bold were considered to define the corresponding factor.

as assessed by the EAPN-10. The two-factor structure (Study 1) was thus compared with a one-factor structure (all of the items saturated in a single general affects factor). Furthermore, considering the differences between men and women in relation to affects, whereby women exhibit greater anxiety and depression than men do and tend to harbor negative thoughts and ruminate more frequently (Brody, Hall, & Stokes, 2016; Nolen-Hoeksema, 2012), we checked the factorial invariance of this measure in relation to the sex of the participants.

Method

Participants, Instruments and Procedure. This study involved a convenience sample of 313 university students from João Pessoa (Paraíba, Brazil). Their ages ranged from 18 to 62 years (M = 23.3; SD = 6.50); and most of them were female (57.2%), single (85.6%) and Catholic (63.9%) and declared themselves to be of middle-class status (44.1%). The participants answered a questionnaire containing demographic questions (age, sex, marital status, religion and social class) and the EAPN-10. The same procedure described in the previous study was followed and was approved by the Ethics Committee.

Data Analysis. R software (version 3.3.2; R Development Core Team, 2015) was employed to analyze the data. In the case of confirmatory factor analysis (CFA), we used the Lavaan package (Rosseel, 2012), employing the covariance matrix as an entry and adopting the Robust Maximum-Likelihood estimator. The following goodness-of-fit indicators were considered

(Brown, 2015; Tabachnick & Fidell, 2013): (a) chi-squared per degree of freedom (χ^2/df), acknowledging values between 2 and 3 as recommendable, yet accepting values up to 5; (b) Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), accepting values equal to or greater than 0.90; (c) Standardized Root Mean Square Residual (SRMR), recognizing a model with a value less than 0.08 as a good fit; and Root Mean Square Error of Approximation (RMSEA), whose recommended values are between 0.05 and 0.08, yet values up to 0.10 were considered acceptable.

With the aim of proving the EAPN-10's factorial invariance, we performed a multigroup confirmatory factor analysis (MGCFA) (semTools Contributors, 2016). Hierarchical models were tested, taking into consideration the following types of invariance: 1. *Configural*: the (two-dimensional) factor model being equal for the groups; 2. *Metric*: equivalent structure and factor loadings (λ); 3. *Scalar*: in addition to the other equivalent parameters, one presumes equality of intercepts (thresholds); and 4. *Residual*: adds the requirement of equal measurement errors (item residuals) across the groups. In order to assess the invariance, we considered the difference of the indicators ΔCFI (if less than 0.01, invariant model; Cheung & Rensvold, 2002) and ΔRMSEA (if less than or equal to 0.015, invariant model; Chen, 2007).

Results

First of all, we sought to test the two-factor structure's suitability to the EAPN-10, as was observed in Study 1. CFA revealed the following goodness-of-fit indicators: $\chi^2(34) = 130.13$, $\chi^2/df = 3.82$, $p < .001$, CFI = 0.92, TLI = 0.90, SRMR = 0.05 and RMSEA = 0.07 (CI90% = 0.06-0.09). This model proved to be more promising than the one-factor model: $\chi^2(35) = 243.31$, $\chi^2/df = 6.95$, $p < .001$, CFI = 0.83, TLI = 0.78, SRMR = 0.07 and RMSEA = 0.13 (CI90% = 0.12-0.15). In fact, when the two models were compared, the two-factor model proved to be statistically more suitable [$\Delta\chi^2(1) = 28.57$, $p < .001$]. We thus adopted the two-factor model, whose item saturations were as follows: *positive affects* (*Joyful* = 0.85, *Happy* = 0.70, *Fun* = 0.67, *Optimistic* = 0.66 and *Satisfied* = 0.61) and *negative affects* (*Depressed* = 0.80, *Unhappy* = 0.77, *Frustrated* = 0.74, *Worried* = 0.53 and *Angry* = 0.46). None of the factor weights (*lambdas*) were equal to zero ($\lambda \neq 0$; $z > 1.96$, $p < .05$), since the factors were not completely independent ($r = -0.58$, $p < .001$).

Having demonstrated that the two-factor model was more suitable than the one-factor model, we decided to test its invariance in relation to the participants' sex. The results are shown below, in Table 2.

Table 2
Evidence of the EAPN-10's Factorial Invariance

		Goodness-of-Fit Indicators			Invariance Test	
		χ^2 (*df*)	CFI	RMSEA	ΔCFI	ΔRMSEA
Sex	Configural Invariance	175.90 (68)	0.91	0.08	—	—
	Metric Invariance	179.67 (76)	0.92	0.07	0.005	0.007
	Scalar Invariance	186.69 (84)	0.92	0.07	0.001	0.003
	Residual Invariance	202.21 (94)	0.92	0.06	0.004	0.001

According to the above table, adopting the aforementioned criteria (ΔCFI < 0.01 and ΔRMSEA ≤ 0.015), the *configural*, *metric*, *scalar* and *residual* invariance parameters of this measure were corroborated. Accordingly, bearing in mind that the EAPN-10 exhibits

complete factorial invariance, it can be employed to compare men and women. Lastly, we calculated the indicators of internal consistency of the affects, which presented the following Cronbach's alphas (*negative affects* = 0.80 and *positive affects* = 0.82) and coefficients of homogeneity (*negative affects* = 0.45 and *positive affects* = 0.50).

Partial Discussion

The appropriateness of treating the Scale of Positive and Negative Affects as a two-factor measure has thus been confirmed, avoiding mentioning affects without differentiating their type. Nonetheless, such findings slightly differ from the literature, which suggests that the affects are independent (Watson et al., 1988). Although men and women can experience affects differently, the results corroborate the EAPN-10's invariance in relation to the participants' sex, taking into account the criteria that are commonly adopted (Chen, 2007; Cheung & Rensvold, 2002). Furthermore, this measure exhibited satisfactory coefficients of internal consistency, higher than the generally accepted thresholds (Clark & Watson, 1995; Pasquali, 2003). Hence, having assessed the measure's structure and factorial invariance, what remained to be done was to discover whether it exhibits evidence of criterion validity, correlating itself with variables with which it should correlate hypothetically.

Study 3: Criterion Validity of the Scale of Positive and Negative Affects

This study sought to gather evidence of the EAPN-10's psychometric adequacy, assessing the extent to which its scores on positive affects are positively correlated with indicators of subjective well-being (i.e., vitality, positivity, and optimism), meanwhile its scores on negative affects are positively correlated with psychological ill-being / discomfort (i.e., anxiety, depression, and stress).

Participants. Study 3 considered the participation of students from a public university in João Pessoa (Paraíba, Brazil). Their mean age was 23.1 years (ranging from 18 to 52 years; *SD* = 5.65), and most of them were female (54.6%), single (85.8%) and Catholic (51.7%) and perceived themselves as belonging to the middle class (55%). This was a convenience sample, featuring participants who, present in the classroom, consented to participating voluntarily.

Instruments and Procedure. This study adhered to the same procedure described in Studies 1 and 2, with the participants responding, as in the previous two studies, to a booklet containing the Scale of Positive and Negative Affects and a demographic questionnaire, as well as the following measures:

Subjective Vitality Scale. Designed by Ryan and Frederick (1997), this scale was adapted to the Brazilian context by Gouveia et al. (2012), measuring a single factor made up of six items (e.g., *I want to live each new day*; *I feel vitalized*). These items are rated according to a seven-point Likert scale ranging from 1 (*Not at all true*) to 7 (*Completely true*). Its internal consistency (Cronbach's alpha, α) was 0.73.

Positivity Scale. Proposed by Caprara et al. (2012), this scale was adapted to the Brazilian context by Souza, Araújo, Gouveia, Coelho, and Gouveia (2014). It measures a general factor of tendencies to assess people's lives and experiences from a positive standpoint, and is made up of eight items (e.g., *I have great faith in the future*; *I generally feel self-confident*), which are rated on a five-point scale ranging from 1 (*Completely disagree*) to 5 (*Completely agree*). Its Cronbach's alpha was 0.85.

Life Orientation Test – Revised (LOT-R). This measure was developed by Scheier, Carver, and Bridges (1994) for the purpose of assessing dispositional optimism and was adapted to the Brazilian context by Bastianello, Pacico, and Hutz (2014). It consists of ten items that measure a continuum that ranges from optimism (e.g., *In times of uncertainty, I usually expect the best*) to pessimism (e.g., *I rarely expect good things for myself*). The participants rated the items according to a five-point scale ranging from 1 (*Completely disagree*) to 5 (*Completely agree*). Its internal consistency (α) was 0.80.

Depression, Anxiety and Stress Scale – Short Form (DAAS-21). This instrument was developed by Lovibond and Lovibond (1995) and was adapted to the Brazilian context by Vignola and Tucci (2014). It seeks to assess symptoms of psychological discomfort in clinical and nonclinical adult populations and consists of 21 items divided into three subscales: ***anxiety*** (e.g., *I perceived that my mouth was dry*; *I experienced trembling [for example, in my hands]*), ***depression*** (e.g., *I was unable to experience positive feelings*; *I was unable to feel enthusiastic about anything*) and ***stress*** (e.g., *I found it difficult to relax*; *I experienced difficulty in calming myself down*). These items are rated on a four-point scale ranging from 0 (*This week I did not experience this at all*) to 3 (*I experienced this most of the time during the week*). The Cronbach's alphas for these factors were above 0.90.

Data Analysis. We employed R software (version 3.3.2; R Development Core Team, 2015) to analyze the data. In addition to the descriptive statistics (frequency, mean, standard deviation), we also calculated the Cronbach's alphas, the average inter-item correlation and the Pearson coefficient of correlation (*r*) between the affects scale and the other criterion-variables.

Results

As mentioned above, we calculated the correlations between the positive/negative affects and the indicators of psychological well/ill-being, obtaining criterion validity evidence, as shown in Table 3 below. We emphasize that the correlation coefficients we observed cannot be attributed to the variation in the internal consistency of the affects measure, whose factors exhibited acceptable indicators: *negative affects* (α = 0.80; $r_{i.i}$ = 0.43) and *positive affects* (α = 0.83; $r_{i.i}$ = 0.50).

Table 3
Correlations between EAPN-10 Factors and Psychological Well/Ill-Being Variables

	1	2	3	4	5	6	7	8
1. Positive Affects								
2. Negative Affects	-0.62							
3. Positivity	0.70	-0.59						
4. Vitality	0.71	-0.53	0.73					
5. Optimism	0.51	-0.40	0.55	0.49				
6. DASS-Total	-0.52	0.64	-0.50	-0.53	-0.40			
7. Depression	-0.59	0.66	-0.60	-0.62	-0.46	0.87		
8. Anxiety	-0.41	0.52	-0.38	-0.43	-0.34	0.91	0.70	
9. Stress	-0.40	0.52	-0.49	-0.40	-0.29	0.91	0.67	0.80

Note. All correlations are statistically significant ($p < .001$).

The positive affects scores were directly correlated ($p < .001$) with *optimism* (r = 0.50), *positivity* (r = 0.70) and *vitality* (r = 0.71); and inversely correlated with indicators of psychological discomfort or ill-being ($p < .001$): *DASS* general score (r = -0.52), *stress* (r = -0.40), *anxiety* (r = -0.41) and *depression* (r = -0.59). In contrast, the negative affects were positively correlated ($p < .001$) with the total score of the *DASS* (r = 0.64) and its specific factors [*anxiety* (r = 0.52), *stress* (r = 0.52) and *depression* (r = 0.66)]; and negatively correlated with *optimism*

(r = -0.40), *vitality* (r = -0.53) and *positivity* (r = -0.59).

Partial Discussion

As confirmed above, the EAPN-10 exhibited criterion validity evidence. Specifically, as expected (Wood et al., 2011), its *positive affects* factor was positively correlated with well-being indicators and negatively correlated with indicators of psychological discomfort. In contrast, its *negative affects* factor exhibited a contrary pattern of correlations with these criterion variables.

General Discussion

This article's general objective was to furnish psychometric evidence of the Scale of Positive and Negative Affects (EAPN-10) within the Brazilian context. Specifically, we sought to assess the scale's factor structure and internal consistency, also gathering evidence of its criterion validity. We hope that this objective has been achieved, discussing the principal findings.

In the first study (Study 1), basing ourselves on the Classical Test Theory approach, we checked the discriminative power of the EAPN-10's items. To do so, we adopted a stricter criterion, corresponding to the median (Pasquali, 2003), proving that all of the items discriminated satisfactorily. Next, in Study 1 and in the following two tests, we assessed evidence of the scale's factorial validity, internal consistency and criterion validity, which are dealt with separately below.

Evidence of Factorial Validity

As a starting point, we employed an exploratory approach to assess the EAPN-10's factor structure, performing an analysis of the principal axes (Study 1). Considering various criteria (Kaiser, Cattel, and Horn), we identified a two-factor solution for this measure, corresponding to positive and negative affects. The next step was to check the adequacy of this structure by way of an independent sample (Study 2), an occasion on which we observed goodness-of-fit indicators that were acceptable and more promising for the two-factor model than for the one-factor model (Brown, 2015; Tabachnick & Fidell, 2013). Hence, the two-dimensional perspective of affects was corroborated, conceiving the affects as possessing positive and negative valences (Larsen & Diener, 1992; Russell, 2003), as was previously suggested by Diener and Emmons (1984) and adopted in the study by Reis et al. (2000), which served as the basis for the development of this scale.

In addition to gathering evidence of the measure's factorial validity, clearly identifying the two dimensions of affects, in Study 2 its absolute factorial invariance (i.e., *configural*, *metric*, *scalar* and *residual*) was confirmed (Chen, 2007; Cheung & Rensvold, 2002). Such factorial invariance took into account the participants' sex, since the studies show that this variable is important for explaining differences in the degree to which the affects are experienced, especially in relation to the negative affects, which are more descriptive of women (Nolen-Hoeksema, 2012; Zanon et al., 2013). Therefore, these findings suggest that eventual differences between the sexes can be attributed to the levels they exhibit in the corresponding latent trait (e.g., negative affects) and not to the lack of equivalence of the scale's parameters (Nimon & Reio, 2011; Sass, 2011).

Evidence of Internal Consistency

We assessed two indicators of internal consistency: Cronbach's alpha (α) and the homogeneity coefficient ($r_{i.i}$). The literature recommends a Cronbach's alpha of 0.70 or higher (Pasquali, 2003; Tabachnick & Fidell, 2013) and an inter-item correlation of at least 0.20 (Clark & Watson, 1995). In all three studies, we checked these parameters, observing alpha and homogeneity values equal to or greater than 0.80 and 0.40, respectively, and thus evidencing the EAPN-10's internal consistency. Furthermore, comparing the alphas of the positive and negative affects factors in the three studies, we found them to be invariant ($M_{H\text{-}W} < 1$; Hakstian & Whalen, 1976). Hence, there is evidence of this affects measure's internal consistency, with indicators that are even more promising than

those recommended in the literature (e.g., Clark & Watson, 1995; Cohen, Swerdlik, & Sturman, 2014).

Evidence of Criterion Validity

In Study 3, we sought to gather evidence that the EAPN-10 could associate or explain indicators of psychological well/ill-being (criterion validity). In line with the literature, the positive affects proved to be directly and more strongly correlated with indicators of well-being (positivity, optimism and vitality; Alarcon et al., 2013; Caprara, Eisenberg, & Alessandri, 2017; Carver & Scheier, 2014; Ryan & Frederick, 1997; Zhang et al., 2014), while the negative affects were directly and more strongly correlated with indicators of psychological ill-being or discomfort, such as anxiety, depression and stress (Reis et al., 2000). Nonetheless, contrary to what is suggested in the literature (Watson et al., 1988), the positive and negative affects did not prove to be completely independent, negatively correlating themselves with ill-being and well-being, respectively, and thus capable of being treated as elements of the general dimension of well-being (Fonseca, Chaves, & Gouveia, 2006).

Despite the findings mentioned above, the studies presently under discussion are not free of limitations. The samples we considered – which were convenience samples made up of people present in the classroom who voluntarily consented to participating in the study – certainly impose restrictions. Although university students, most of whom are middle-class youths, are not the majority in Brazil, including them in studies not only is a problem in this country, but also is capable of producing uncertainties in relation to generalizing and replicating the findings (Peterson & Merunka, 2014). This implies that one must consider people of different age groups that represent the general population, minority groups (e.g., homosexuals, blacks) and those who seek psychological help, assessing the adequacy and applicability of this measure.

Notwithstanding the aforementioned, there also are potential limitations with respect to the EAPN-10's psychometric parameters, thus requiring further studies. For example, the present study focused on internal consistency as an indicator of reliability, but it could be promising to examine evidence of the measure's temporal stability (test-retest); it could be equally useful to gather evidence of its convergent validity with respect to other affects measures, such as the PANAS (Watson et al., 1988; Zanon & Hutz, 2014) or the EA (Zanon et al., 2013).

Regarding future studies, due to the above-mentioned inconsistency in relation to positive and negative affects being independent (orthogonal) or interdependent (oblique; Barrett & Russell, 1999; Galinha, Pereira, & Esteves, 2013; Watson et al., 1988), we recommend performing confirmatory factor analyses in which the correlation between the factors is specified, testing at least three models: absolute independence (constrain $\Phi = 0$), partial interdependence (constrain $\Phi = 0.50$) and absolute interdependence (constrain $\Phi = 1$). It might also be interesting to check the variation of the affects during the life cycle (infancy/childhood, adolescence, adult phase and the Third Age), assessing whether linear and/or curvilinear changes occur, or even administering this scale to the same group at different moments in order to ascertain whether the affects can be more adequately classified as states or traits, along the lines of the study by Merz and Roesch (2011).

In conclusion, the EAPN-10 is an instrument that exhibits favorable evidence of factorial validity, criterion validity and internal consistency, being appropriate and useful for mapping positive and negative affects within the Brazilian context. The measure can thus be employed to assess people's affects, also favoring the identification of their antecedent potentials (e.g., sex, age, personality traits) and consequent potentials (e.g., self-esteem, academic performance, suicidal ideation).

Authors' Contributions

Substantial contribution in the concept and design of the study: Valdiney Veloso Gouveia.

Contribution to data collection: Olindina Fernandes da Silva Neta e Maria Gabriela Costa Ribeiro.

Contribution to data analysis and interpretation: Gleidson Diego Lopes Loureto e Roosevelt Vilar.

Contribution to manuscript preparation: Rildésia S. V. Gouveia.

Contribution to critical revision, adding intelectual content: Valdiney Veloso Gouveia e Sandra Elisa de Assis Freire.

Conflicts of interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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