

## Methodological Issues about Affect: A Systematic Review about Assessment Tests of Affect

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### Abstract

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*This article aimed to present the psychometric tests used in the assessment of affect in the world by a systematic review. The specific objectives of this paper are: a) to identify the assessment tests of affect internationally; b) to identify the theoretical basis used for the construction of the affect tests; c) to discuss theoretically the measurement of affect. The assessed databases were: periódicos CAPES, Science Direct and Scielo. The data analysis from all the results showed a continuous growing on the affect research field in the last 10 years. Three theoretical basis were identified in the results: the circumplex theory, the positive and negative affect theory and the discrete affects theory. The affect has been measured, in general, with PANAS and single-item scales based on the circumplex, which reflects a tendency in the psychological assessment field of affect.*

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**Keywords:** affect, affect scales, Psychometrics tests, Systematic review.

### 1. Introduction

The researches of affect began with studies about emotion and mood. The transversalities seen today in affect, emotion and mood are most likely due to their deep roots in history. However, these similarities must be overcome and the three concepts should be differentiated, which will turn possible to perform psychological assessments with reliability and efficiency (Gray & Watson, 2007).

The studies about affect date back over one hundred years. In 1848, when a metal bar crossed the medial prefrontal lobes of Phineas Gage, there were emotional and personality changes. At the time, Phineas staying alive after the accident was the surprise, but, subsequently, his emotional and personality changes were the highlight (Pinel, 2005). Shortly thereafter, in 1872, Darwin wrote the book "The expression of emotions in man and animals", in which he described how some emotions could be observed both in men and in animals (Darwin, 1872/2012).

Affect is a stimulus that, when interpreted, becomes meaningful. By that, the affective experience is the interpretation of an event and not the event itself (Russell, 1980). On the other hand, emotions are a complex program of actions triggered by an identifiable object or phenomenon, such as fear, anger, sadness, joy, disgust and surprise (Damasio, 2011). Mood is more diffuse and global, with low intensity and also, can happen without a specific reason (Frijda, 2009; Damasio, 2011; Ekkekakis, 2012) lasting from hours, or even days (Gray & Watson, 2007).

The duration and presence of mood are more extensive than emotion, which makes it similar to affect. Emotions demonstrated greater intensity when compared to affect and mood, but its duration and presence are quicker than these two. (Ekkekakis, 2013).

For example, if you happen to be in a car accident, the emotion of fear would be present to activate the defense reflex. Therefore, the emotion refers to something immediate and specific as the affect and the mood refer to general conditions and not so immediate.

The distinction between these constructs directly implies on the psychological assessment. First, the researchers have to decide which phenomenon will be measured, and for that, the theoretical concept must be clear. Secondly, the theoretical basis must reflect this phenomenon and the researcher must be aware of any limitations on the theory. For example, the Positive and Negative Affect Schedule (PANAS) initial's purpose was to measure mood, even with the word affect in its name (Watson et al., 1988). Subsequently, the PANAS directed its use for the assessment of affect and even got validity evidences all over the world.

For this purpose, this article presents the psychometric tests used in the assessment of affect in the world with a systematic review. The specific objectives of this paper are: a) to identify the assessment tests of affect internationally; b) to identify the theoretical basis used for the development of the tests; c) to discuss theoretically the measurement of affect.

## 2. Method

This article was featured as a systematic review of the literature about affect tests used internationally. Firstly, the descriptors were defined: affect and affect scale. Secondly, it was established the databases and virtual libraries: *periódicosCAPES* (N=964), SciELO (N = 12,019) and ScienceDirect (N=95,466).

In total, there was 108,449 results between 1943 and 2014. The results were divided by the database and then by year. The aim of this stage was to identify the amount of research about affect over the years. The screening process of articles and their relevance to the study was conducted by the reading of abstracts to identify which pertained to the construction, adaptation and/or validation of affect tests. At the end, 234 articles were analyzed. For data analysis, the theoretical bases of the articles were identified through the concept utilized and the research method, which included the psychometric results.

## 3. Results and Discussion

By the systematic search, a total of 108,449 articles about affect were found. When the articles were classified by period, based on the year of publication, it was identified a growth in the researches through the years. In SciELO online library, 9823 results were found after 2005 and 2196 results before 2005. In *periódicosCAPES* database, 20 results were found after 2005 and 46 results before 2005. In the ScienceDirect database, 55338 results were found before 2005 and 40128 results after 2005. Based on these data, it was found evidence that researches about affect are growing extensively in the last 10 years, as seen also by Ekkekakis, Hargreaves and Parfitt (2013), which confirms the scientific relevance of the topic. This pattern was also found after the screening process in the 234 articles used for the review (Figure 1).

Despite the use of descriptors as affect and affect scales, 75 titles of articles referred to emotion and 14 titles referred to mood. This data reflects the history of the affect knowledge and more recently, the common use of the concept as similar. Examples of the lack of discrimination between the three constructs can be seen with tests that aim to measure mood or emotion but have an affect theoretical basis, like PANAS (Watson & Tellegen, 1985; Watson, Clark and Tellegen, 1988) or The Semantic Differential Measures of Emotional State (SDMES) (Mehrabian & Russell, 1974). This pattern can be seen in recent researches too, when researchers aim to assess one phenomenon and use a test to assess other, like Peluso et al (2010), that proposed to measure mood in college students with the PANAS, an affect test.

In total, were found 17 affect tests after the screening process. The tests were divided into: circumplex based tests (n = 7), discrete affects based tests (n = 3) and positive and negative affect based tests (n = 7). This division was performed according to the theoretical basis of each article and the test utilized (Table 1).

### 3.1 Circumplex based tests

The tests of this category reflects the partially or completely utilization of Russell (1980) circumplex theory about affect. The dimensions of this model are arranged as bipolar and orthogonal, being called valence (pleasure or displeasure) and perceived activation (high or low).

The development of the circumplex involved a study with college students and two tasks. The first task contained 28 stimulus words, described as words or phrases about participants' moods, feelings, emotions or affects.

After the description of affects, the participants were asked to add each word in one of eight categories (excitement, misery, pleasure, depression, activation, contentment, suffering and sleep). In the second task, the participants were asked to allocate the 8 categories around a circle. The participant was instructed that words in opposite directions meant opposite feelings and words next to each other meant similar feelings. The results showed a circumplex with 8 categories: pleasure (0 °), arousal (45), activation (90), suffering (135), discontent (180), depression (225), sleep (270) and relaxation (315) (Russell, 1980). These dimensions of the circumplex remained the same over the years (Barret & Russell, 1999, Russell, 2003), with some changes only on the combinations (categories) (Carroll, Yik, Russell & Barrett, 1999; Yik Steiger & Russell, 2011).

Similar to the theoretical framework of Russell's circumplex (1980), the first test of table 1, the SDMES (Mehrabian & Russell, 1974), aims to assess emotions through three dimensions: pleasure, activation and dominance. The dimensions are evaluated with six 9-point scales: happy-unhappy, pleased-annoyed, stimulated-relaxed, excited-calm, controlling-controlled, influential-influenced. The adjectives pair's use reflect the semantic differential scale, which was a new approach for affect researches at the time, even though initially this instrument was used to measure emotions. This approach has brought a boost to dimensional models were used in research on affect, unlike models that used every emotion as a dimension.

As the second test of the table 1, SAM (Lang, 1980) was developed with the same dimensional structure of SDMES (Mehrabian & Russell, 1974): valence, activation and dominance. To test these dimensions a stimulus is given during the application of the test (Lang, 1980). The difference between the SAM and SDMES is the representation of the scales by figures, in order to make it applicable worldwide without the need of translation to other cultures. Each scale has a drawing of a doll, which can be a happy face to an unhappy face (happiness-unhappiness), a face with closed eyes to a puppet shaking (arousal-drowsiness) and a small doll up to a large doll (dominance-submission). The scale is also based on the semantic differential (Bradley & Lang, 1994).

The investigation of SDMES and SAM involved the correlation between their dimensions (Bradley & Lang, 1994). The two instruments were administered with stimuli taken from the International Affective Picture System (IAPS) (Lang, Bradley, & Cuthbert, 2005) The items SDMES were correlated by a component matrix and three factors emerged, as predicted by its theoretical basis. The second step was to correlate the mean scores of each factor by the stimuli applied. The dimensions of valence and activation showed good correlations between the two tests ( $r=0,94$  to  $0,97$ ). However, the dominance dimension obtained weak correlation ( $r=0,18$  to  $0,23$ ).

The Affect Grid (Russell, Weiss, & Mendelsohn, 1989) was created also in the Russell (1980) proposal. It follows the dimensional model and is a 1-item test. Its dimensions are pleasure-displeasure and activation-sleepiness. The item is characterized by a 9x9 grid, which has components allocated exactly like the circumplex. The horizontal dimension represents the valence and the vertical dimension represents the activation. The test was applied to 60 students, divided into three groups. The first group responded to scale with the 9x9 grid, the second group responded the scale on a circular shape and the third group responded the test in a 1-item scale. There was significant correlations between the applications, with  $r = 0.89$  to  $0.95$ , which showed that validity evidences based on convergence were found.

The FAS (Svebak & Murgatroyd, 1985) were not developed based on the circumplex but its proposal was very similar to the activation dimension. This scale is part of a test called Telic State Measure (TSM), but in the affect researches is used separately. The FAS aims to measure the perceived activation and, therefore, utilizes a single item with a 6-point scale, so, 1 means low and 6 means high activation. The validity evidence based on convergence were sought by Van Landuyt, Ekkekakis, Hall, and Petruzzello (2000), who identified that correlations of  $r=0,45$  to  $0,70$  with SAM) and  $r=0,47$  to  $0,65$  with the activation dimension of Affect Grid.

The FS is a single item scale like FAS but uses a 11-point scale that ranges from -5 to +5. The verbal anchors are the number 0 (neutral), +5 (very good), +3 (good), +1 (relatively good) -5 (very bad), -3 (bad) and -1 (relatively bad) (Hardy & Rejeski, 1989). The FS was tested with SAM valence dimension and obtained correlations of  $r=0,51$  to  $0,88$  (Van Landuyt, Ekkekakis, Hall & Petruzzello, 2000). As much as FAS and FS are not scales developed with the aim of measuring the affect *a priori*, recent discoveries (Ekkekakis, Parfitt, & Petruzzello, 2011) indicate that the scales used together can dimensionally assess affect as proposed by Russell (1980).

The Empirical Valence Scale (EVS) was built with a similar proposal of FS and FAS. This scale is a single item scale, that ranges from "The most unpleasant imaginable" to "The most pleasant imaginable".

Its construction was carried out since the FS and FAS have only numbers anchors on their items and, therefore, could generate bias as the meaning of numbers can vary for each individual. In the EVS, the descriptors of the scale were allocated according to studies conducted between the values placed on the scale and categories by the participants (Lishner, Cooter, & Zald, 2008).

The Activation and Deactivation Adjective Check List (ADACL) is a multidimensional instrument that aims to access states of momentary activation. It has 20 items with a 4-point scale and two dimensions labeled: a) activation energy, which includes fatigue; b) tensioned activation, which includes calm. In its description, the authors report that the test dimensions are associated with features of activation, physiological changes and mood (Thayer, 1986). Its structure resembles the structure of the PANAS, but the ADACL capture states of low activation. Ekkekakis (2013) recommends that the ADACL is used with precaution, once the test has problems related to the type of scale used and not the measurement of affect globally.

The use circumplex's theory is recommended (Ekkekakis, 2013) since it has a dimensional approach of affect and because allows the integration of all models of affect within the circumplex (Yik, Russell & Barrett, 1999). Ekkekakis (2013) also recommended the use of tests like FS and EVS, since they explore the combinations of the dimensions of affect, enabling global assessment of affect.

### 3.2 Discrete affects based tests

The MAACL brought a different perspective to the assessment field of affect since the test assess each affective state as a separated factor. Initially, the dimensions were anxiety, depression and hostility (Zuckerman, Lubin, Vogel & Valerius, 1964). The scale of the depression factor was constructed based on the application of the scale in neuropsychiatric patients and in the opinion of the judges who classified the responses into "severe", "moderate", "light" and "not observed". The scale of the anxiety had previous studies (Zuckerman, 1960) and had 21 items. The hostility scale was constructed with 132 items, using 21 items of anxiety, depression, and 40 items of 71 items related to hostility. Of the 71 items, 28 were anchored as the hostility factor.

The studies with MAACL continued (Zuckerman, Lubin & Rinck, 1983) and two new factors have emerged of the 132 items, labeled positive affect and sensation seeking. These factors were seen after the use of factor analysis with varimax rotation, and the rotated factors explained 47-51% of the common variance. As the factors anxiety, depression and hostility obtained strong correlations ( $r = 0.32$  to  $r = 0.62$ ), they were reassembled into a dysphoria scale. The high correlation of positive affect scale and sensation seeking scale ( $r = 0.44$  to  $r = 0.56$ ) generated the scales of positive affect with sensation seeking (PASS). Reliability coefficients of test-retest procedure were considered good ( $r = 0.8$ ), except for the sensation seeking scale. Dysphoria scale and PASS showed  $r = 0.9$  or higher for the reliability coefficients.

The EFI scale aims to access feelings that occur together with peaks of activity. Its dimensions are revitalization, tranquility, positive engagement and physical exhaustion. EFI has 12 items, characterized by descriptors such as calm, tired, excited, energetic and happy. Participants must respond to the instrument thinking of how they feel at that moment and mark, on a 4-point scale, how much the descriptor makes sense to them at that moment. . The subscales demonstrated good internal consistency and the share expected variance with their constructs (Gauvin & Rejeski, 1993). Although promising, the EFI is not a widely used instrument. In methodological and conceptual critique to EFI, it was realized that substantial shortcomings in its theoretical basis, so when is used, guidelines must be established because this lead to important implications for data validation (Ekkekakis & Petruzzello, 2001).

The PAAS arose from the combination of EFI with the Subjective Exercise Experiences Scale (SEES) due to both instruments present factors in common. The PAAS was formed, initially with the psychological distress subscale of SEES, and all subscales of the EFI. Exploratory and confirmatory factor analyzes demonstrated support for four factors, labeled positive affect, negative affect, fatigue and tranquility. At the end of development process, 12 items remained (Lox et al. 2000). When evaluated the invariance of the test with samples of physically active and not active participants, the PAAS demonstrated invariance results (Carpenter, Tompkins, Schmiege, & Nilsson, 2010). Despite referring only to affect in the exercise, contradictions are found in its items once they have been taken from PANAS, POMS and the State-Trait Anxiety Inventory (STAI), which are not specific tests for the exercise field (Ekkekakis, 2013).

These tests based on discrete affects do not have similar theories between each other, the dimensions of each test are different.

The lack of consistency in their theories tends to generate different results with each other and tends to contribute in a negative manner for research, since each test generates information only about its own dimensions. What is common in these tests is the way to treat affects as discrete dimensions. This perspective turns out to be very close to some discussions about emotions. When discussing dimensional models and discrete models in the understanding of emotions, Levenson (1988) explains that the vision of discrete models approaches to the "primary" emotions perspective, also similar to the studies of Ekman, Friesen and Ellsworth (1972).

The PAAS and the MAACL also have in common the positive affect dimension, which is a dimension of Watson and Tellegen (1985) model. However, classifying it as part of that theory can become somewhat skewed once only the items proposed by the PAAS were taken from the PANAS, not the whole theory, and in the study of the MAACL (Zuckerman, Lubin & Rinck, 1983) this dimension arose from a factor analysis. Thus, the weak consistency among the reasons for developing and the partial use of some theories, are relevant information to be thought before the use of one of these tests as proposed by Ekkekakis (2013).

### 3.3 Positive and negative affect based tests

The theory used for these tests comes from studies of the 60s (Bradburn, 1969). In this study, the author conducted his research around the well-being phenomenon, but, to support this construct, two dimensions were created - positive affect and negative affect. These two dimensions are interconnected to the well-being, and so, they determine the level of well-being by the level of positive and negative affect in the life's person. Thus, if the individual scores higher in positive affect than negative affect, that indicates a higher level of well-being. These two dimensions appeared later in other studies, as seen in Kammann and Flett (1983), Diener and Larsen (1984) and Watson and Tellegen (1985).

The Affectometer 2 (Kammann & Flett, 1983) was built during the 80's, in order to measure welfare. This instrument has 40 items and is based on the dimensions of positive affect and negative affect. Thus, the level of well-being is measured as the positive feelings outweigh the negative feelings. The items of the test were constructed based on a pool of items created empirically, being characterized by items-phrases and adjectives. In the assessment, participants were asked how often they felt certain feelings: not at all, occasionally, some of the time, often, all the time. The two dimensions showed a correlation of  $r = -0.66$  and the instrument as a whole showed  $\alpha = 0.95$ . When the Affectometer's dimensions were correlated with the Beck Depression Inventory (BDI), positive affect was negatively correlated ( $r = -0.74$ ) and negative affect was positively correlated ( $r = 0.83$ ), strengthening the validity evidence of convergence of the test.

The PANAS was based on Watson and Tellegen's theory (1985), with the structure of positive and negative affect. Its level of internal consistency was satisfactory, with  $\alpha=0,90$  for positive affect and  $\alpha=0,84$  for negative affect. To check the evidence of construct validity, a factor analysis was performed. Two factors emerged from the procedure, accounting for 87.4% of the common variance. The positive affect reflected how the individual feels enthusiastic, active and alert. The negative affect reflected mood suffering and aversive states such as anger and contempt (Watson et al., 1988). However, it is noticed that the two dimensions of this test covers only pleasant and unpleasant affective states with high activation (Barrett & Russell, 1999).

The PANAS also features an expanded version of its original test, which is the Positive and Negative Affect Schedules-Expanded Form (PANAS-X). The dimensions are equal to the PANAS, but is a 60-item scale. The PANAS-X aims to measure the mood with eleven new subscales: fear, sadness, guilt, hostility, shyness, fatigue, surprise, playfulness, confidence, attention and serenity (Watson & Clark, 1994). Also based on the PANAS, was built to International Positive and Negative Affect Schedule Short Form (I-PANAS-SF). This instrument has 10 items and keeps the two dimensions related to positive affect and negative affect (Thompson, 2007).

In Brazil, Giacomoni and Hutz (1997) started the process to search validity evidences for PANAS. The authors have kept the dimensions of positive and negative affect, because factor analyzes indicated that the best solution was to scale the two orthogonal factors: positive affect ( $\alpha=0,88$ ) and negative affect ( $\alpha =0,86$ ). It comprises 40 items, 20 items per factor about adjectives representing moods and emotions like, kindness, careful, anxious, impatient. Each adjective is rated by participants on a 5-point likert scale. The PANAS was also developed for children (Giacomoni & Hutz, 2006) and adolescents (Segabinazi, Zortea, Zanon Flag Giacomoni & Hutz, 2012) in Brazil. The latest version of the PANAS in Brazil (Zanon & Hutz, 2014) was published with the same theoretical framework but with only 20 items.

In Europe, the version with 20 items of the PANAS also obtained validity evidences in Portugal by Galinha, Esteves and Pereira (2014). A study in France (Nicolas, Martinent & Field, 2014) provided validity evidences for the PANAS-D, a modified version of PANAS. In this version, the affects are still divided by positive affect and negative affect, however, the dimensions have two equal divisions called direction and intensity. The authors of the PANAS-D suggested that the number of residues left in factor analyzes of the PANAS can be a worrying factor and therefore a solution of four factors is the most reliable option for assess affect. Thus, the PANAS, and their derivations, are tests used worldwide, with validity evidences in several countries, which contributes greatly to the study of affect in various cultures.

### **3.4 Theoretical implications about affect tests**

By using a test, the researcher must understand that he or she is agreeing with its theoretical basis, directly or indirectly. The use of tests by tradition, sometimes, cause bias in studies, which consequently generates knowledge also biased (Ekkekakis, 2013). Thus, the careful research about affect brings theoretical implications that should be considered fundamental to the continued development of knowledge in the field.

Studies about affect had gone through several periods, but especially the 80's brought advances in theoretical and methodological issues (Russell, 1980; Diener & Larsen, 1984; Watson & Tellegen, 1985; Thayer, 1989), which are studies considered pillars for future researches. The use of dimensional models such as Russell (1980) and Watson, and Tellegen (1985) brought the great benefits for the coverage of the construct, the organization of a synthesis of the phenomenon and the acceleration on the development of the knowledge in the area.

By understanding affect on Watson and Tellegen (1985) sight, affect becomes two dimensions of well-being, as proposed by Bradburn (1969). By understanding affect from Russell (1980) perspective, affect is a stimulus that is interpreted and becomes meaningful to the person, and by that, the affective experience is the interpretation of an event. While these two theories and its tests are assessing the same phenomenon, the conception of affect is different for each one, which should be taken into consideration when using tests and their results. So, based on the results presented, it was found that these two concepts hold two strong features of the study of affect and, according Yik, Russell and Barrett (1999), they can be integrated to deepen the knowledge about the construct.

When a test is used, its limitations must also be understood. The PANAS has flaws in the globally access the affect construct, and the FS has failures with the numerical anchors, once each number can mean a different thing to each participant (Ekkekakis, 2013). Thus, any limitations must be identified for further studies about affect to understand the way to use the test with reliability.

## **4. Conclusion**

The growing amount of researches observed through the systematic review, points to the fact that affect is becoming a recurring theme in the scientific field. The breadth of social and scientific research results generated through the development of knowledge, meets the purposes of science for society, which is disclose what is produced, generate benefits and mitigate sufferings of the subjects.

Through this research was also possible to find how the phenomena affect, emotion and mood are still used interchangeably, and how this stills an important debate for the academic environment. It is necessary for researchers to produce more studies on these three constructs, and by that, their distinction can be realized with increasing clarity. When a test is used, researchers must have clarity of conceptual, epistemological and methodological issues that constitute the phenomenon of interest.

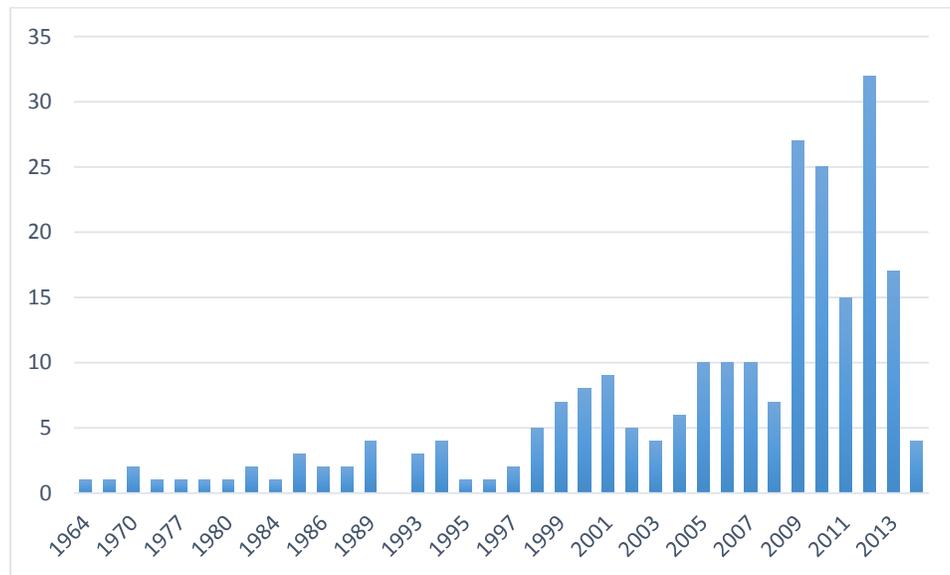
This study had two international databases and also with a virtual library. It is suggested that future studies use other articles databases and databases of dissertations and thesis to make this data more complete. Therefore, a deeper analysis can be performed with more affect assessment tests.

As noted, the affect domain is permeated by various measuring tests and theoretical concepts. Thus, performing a systematic review about the tests used in the affect measurement, their validity evidences and their theoretical grounds, contributed to an overview about the direction that researches are taking and enabled a reflection about what need to be done.

## 5. References

- Barrett, L. F. & Russell, J. A. (1999). The structure of current affect: controversies and emerging consensus. *Current Directions in Psychological Science*, 8(1), 10-14.
- Bradley, M. M. & Lang, P.J. (1994). Measuring emotion: The self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatric*, 25, 49-59.
- Bradburn, N. M. (1969). The structure of psychological well-being. Chicago: Aldine.
- Carpenter, L. C., Tompkins, S. A., Schmiede, S. J., Nilsson, R., & Bryan, A. (2010). Affective response to physical activity: testing for measurement invariance of the physical activity affect scale across active and non-active individuals. *Measurement in Physical Education and Exercise Science*, 14(1), 1-14.
- Carroll, J.M., Yik, S. M., Russell, J. A., & Barrett, L. F. (1999). On the psychometric principles of affect. *Review of General Psychology*, 3(1), 14-22
- Damáso, A. R. (2011) *E o cérebro criou o homem*. São Paulo, SP: Companhia das letras.
- Darwin, C. (2012) *A expressão das emoções nos homens e nos animais*. São Paulo, SP: Companhia de Bolso.
- Diener, E. & Larsen, R. (1984). Temporal stability and cross-situational consistency of affective, behavioral, and cognitive responses. *Journal of Personality and Social Psychology*, 47(4), 871-883.
- Ekkekakis, P. (2012) Affect, mood and emotion. In: G. Tenenbaum, R. Eklund & A. Kamata (eds.). *Measurement in sport and exercise psychology*. Champaign, IL: Human Kinetics.
- Ekkekakis, P. (2013) *The measurement of affect, mood and emotion: A guide for health-behavioral research*. New York, NY: Cambridge University Press.
- Ekkekakis, P. & Petruzzello, S. J. (2001). Analysis of the affect measurement conundrum in exercise psychology. III. A conceptual and methodological critique of the Exercise-Induced Feeling Inventory. *Psychology of Sport and Exercise*, 2, 205-232.
- Ekkekakis, P., Parfitt, G., & Petruzzello, S. J. (2011). The pleasure and displeasure people feel when they exercise at different intensities. *Sports Med.*, 41(8), 641-671.
- Ekkekakis, P., Hargreaves, E. A., & Parfitt, G. (2013). Editorial: Introduction to the special section of affective responses to exercise. *Psychology of Sport and Exercise*, 14, 749-750.
- Ekman, P., Friesen, W.V., & Ellsworth, P. (1972). *Emotion in the human face: Guidelines for research and an integration of findings*. New York: Pergamon Press.
- Fridja, N. H. (2009). Mood. In: D. Sander & K. R. Scherer (Eds.), *The Oxford companion to emotion and the affective sciences* (pp.258-259). New York: Oxford University Press.
- Galinha, I. C., Pereira, C. R., & Esteves, F. G.(2014). Confirmatory factor analysis and temporal invariance of the Positive and Negative Affect Schedule (PANAS). *Psicologia: Reflexão e Crítica*, 26(4), 671-679.
- Gauvin, L. & Rejeski, W. J. (1993). The Exercise-Induced Feeling Inventory: development and initial validation. *Journal of Sport & Exercise Psychology*, 15, 403-423.
- Giacomoni, C. H., & Hutz, C. S. (1997). A mensuração do bem-estar subjetivo: Escala de afeto positivo e negativo e escala de satisfação de vida [Resumos]. In Interamerican Society of Psychology (ED.), *Proceedings of the XXVI Interamerican Congress of Psychology* (p. 313). São Paulo: IPS.
- Giacomoni, C. H., & Hutz, C. S. (2006). Escala de afeto positivo e negativo para crianças: Estudos de construção e validação. *Revista Semestral da Associação Brasileira de Psicologia Escolar e Educacional (ABRPEE)*, 10(2), 234-247.
- Gray, E. K., & Watson, D. (2007). Assessing Positive and Negative Affect via self-report. In: J. A. Coan & J. J. B. Allen (Eds.). *Handbook of emotion elicitation and assessment*. New York: Oxford University Press.
- Hardy, C. J. & Rejeski, W. J. (1989). Not what, but how one feels: the measurement of affect during exercise. *Journal of Sport & Exercise Psychology*, 11, 304-317.
- Kammann, R. & Flett, R. (1983). Affectometer 2: A scale to measure current level of general happiness. *Australian Journal of Psychology*, 35(2), 259-265.
- Lang, P. J. (1980). Behavioral treatment and bio-behavioral assessment: Computer applications. In J.B. Sadowski, J.H. Johnson, & T.A. Williams (eds.), *Technology in mental health care delivery systems*.
- Lang, P. J., Bradley, M.M., & Cuthbert, B. N. (2005) International Affective Picture System (IAPS): Affective ratings of pictures and instruction manual. University of Florida: Gainesville.
- Levenson, R. W. (1988). Emotion and the autonomic nervous system: a prospectus for research on autonomic specificity. In H. L. Wagner (ed.), *Social psychophysiology and emotions: Theory and clinical applications*. London: John Wiley & Sons ltda.

- Lishner, D. A., Cooter, A. B., & Zald, D. H. (2008). Addressing measurement limitations in affective ratings scales: Development of an empirical valence scale. *Cognition and Emotion*, 22(1), 180-192.
- Lox, C. L., Jackson, S., Tuholski, S. W., Wasley, D., & Treasure, D. C. (2000). Revisiting the measurement of Exercise-Induced Feeling States: the Physical Activity Affect Scales (PAAS). *Measurement in Physical Education and Exercise Science*, 4(2), 79-95.
- Mehrabian, A., Russel, J.A. (1974) An approach to environmental psychology. Cambridge: MIT Press.
- Nicolas, M., Martinet, G., & Campo, M. (2014). Evaluation of the psychometric properties of a modified Positive and Negative Affect Schedule including a direction scale (PANAS-D) among French athletes. *Psychology of Sport and Exercise*, 15, 227-237.
- Peluso, M. A. M., Savalli, C., Cúri, M., Gorenstein, C., & Andrade, L. H. (2010) Mood changes in the course of preparation for the Brazilian university admission exam\_ a longitudinal study. *Rev. Bras. de Psiq.*, 32(1), 30-36.
- Pinel, J. P. J. (2005) *Biopsicologia*. 5ª ed. Porto Alegre: Artmed.
- Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, 39, 1161-1178.
- Russell, J. A., Weiss, A., & Mendelsohn, G. A. (1989). Affect Grid: A single-item scale of pleasure and arousal. *Journal of Personality and Social Psychology*, 57(3), 493-502
- Segabinazi, J. D., Zortea, M., Zanon, C., Bandeira, D. R., Giacomoni, C. H., & Hutz, C. S. (2012). Escala de afetos positivos e negativos para adolescentes: adaptação, normatização e evidências de validade. *Avaliação Psicológica*, 11(1), 1-12
- Svebak, S. & Murgatroyd, S. (1985).Metamotivacional dominance: a multimethod validation of reversal theory constructs. *Journal of Personality and Social Psychology*, 48, 107-116.
- Thayer, R. E. (1986). Activation-Deactivation Adjective Checklist: current overview and structural analysis. *Psychological Reports*, 58, 607-614.
- Thayer, R. E. (1989). *The biopsychology of mood and arousal*. New York: Oxford University Press.
- Thompson, E. R. (2007). Development and Validation of an Internationally Reliable Short-Form of the Positive and Negative Affect Schedule (PANAS). *Journal of Cross-Cultural Psychology*, 38(2), 227-242
- Van Landuyt, L. M., Ekkekakis, P., Hall, E. E., & Petruzzello, S. (2000) Throwing the mountains into the lakes: On the perils of nomothetic conceptions of the exercise-affect relationship. *Journal of Sport and Exercise Psychology*, 22, 208-234.
- Watson, D. & Clark, L. A. (1994). *The PANAS-X: Manual for the positive and negative affect schedule (Expanded form)*. Unpublished manuscript, University of Iowa, Iowa City.
- Watson & Tellegen, (1985). Toward a consensual structure of mood. *Psychological Bulletin*, Vol 98(2), Sep 1985, 219-235.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070
- Yik, M. S. M., Russell, J. A., & Barrett, L. F. (1999). Structure of self-reported current affect: Integration and beyond. *Journal of Personality and Social Psychology*, 77(3), 600-619.
- Yik, M., Steiger, J. H., & Russell, J. A. (2011) A 12-Point circumplex structure of core affect. *Emotion*, 11(4), 705-731.
- Zanon, C. & Hutz, C. S. (2014). Escala de afetos positivos e negativos (Panas). In Hutz, C. S. *Avaliação em Psicologia Positiva*. Porto Alegre: Artmed.
- Zuckerman, M. (1960). The development of an affect adjective check list for the measurement of anxiety. *Journal of Consulting Psychology*, 24, 457-462.
- Zuckerman, M., Lubin, B., & Rinck, C. M. (1983). Construction of new scales for the Multiple Affect Adjective Check List. *Journal of Behavioral Assessment*, 5(2), 119-129
- Zuckerman, M., Lubin, B., & Vogel, L., & Valerius, E. (1964). Measurement of experimentally induced affects. *Journal of Consulting Psychology*, 28, 418-425.



**Figure 1: Frequency distribution of articles per year (N=234).**

Test	Authors	Year
Circumplex based tests		
The Semantic Differential Measures of Emotional State (SDMES)	Mehrabian & Russell	1974
Self Assessment Manikin (SAM)	Lang	1980
Felt Arousal Scale (FAS)	Svebak & Murgatroyd	1985
Activation and Deactivation Adjective Check List (AD ACL)	Thayer	1986
Affect Grid	Russell, Weiss, & Mendelsohn	1989
Feeling Scale (FS)	Hardy & Rejeski,	1989
Empirical Valence Scale (EVS)	Lishner	2008
Discrete affects based tests		
Multiple Affect Adjective Check List (MAACL)	Zuckermann, Lubin, & Rinck	1964/1983
Exercise-Induced Feeling Inventory (EFI)	Gauvin & Rejeski	1993
Physical Activity Affect Scale (PAAS)	Lox, Jackson, Tuholski, Wesley, & Treasure	2000
Positive and negative affect based tests		
Affectometer 2	Kammann & Flett	1983
Positive and Negative Affect Schedule	Watson, Clark & Tellegen	1988
Positive and Negative Affect Schedules-Expanded Form (PANAS-X)	Watson & Clark	1994
PANAS ( brazilian version )	Giacomoni & Hutz	1997
PANAS para crianças (brazilian version)	Giacomoni & Hutz,	2006
International Positive and Negative Affect Schedule Short Form (I-PANAS-SF	Thompson	2007
PANAS para adolescentes (brazilian version)	Segabinazi, Zortea, Zanon, Bandeira, Giacomoni, & Hutz	2012

**Table 1: Compilation of affect tests classified by theoretical basis.**