

## MEASURING PERCEIVED EMOTIONAL INTELLIGENCE IN THE ADOLESCENT POPULATION: PSYCHOMETRIC PROPERTIES OF THE TRAIT META-MOOD SCALE

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The Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) is a well-established measure of perceived emotional intelligence, an aspect of emotional intelligence that includes people's beliefs and attitudes about their own emotional experience. Although the TMMS has been widely used in adult populations, until now no data have been reported on its validity in the adolescent population. In the present work we analyzed the psychometric properties of the TMMS in a sample of 1,497 adolescents aged 12 to 17. The results of the confirmatory factor analysis corroborated the 3-factor structure of the original scale (attention to feelings, clarity of feelings, and mood repair); moreover, these dimensions showed adequate reliability and correlated among themselves in the expected fashion. We also found evidence of discriminant validity with the Big Five personality factors and analyzed differences in the TMMS dimensions according to participants' age and sex. We discuss both the implications of these results and the utility of this scale in research on the emotional intelligence construct.

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In recent years the scientific literature has reflected particular interest in the study of individual differences in the ability to process and utilize emotional information (Mayer, Roberts, & Barsade, 2008). This perspective is based on the hypothesis that people who are capable of expressing and understanding emotions, of assigning meaning to emotional experience, and of regulating their feelings will be better adjusted psychologically and socially (Ciarrochi, Chan, Caputi, & Roberts, 2001).

Such abilities have been conceptualized in general under the term *emotional intelligence* (EI; Mayer & Salovey, 1997). Although there are different theoretical approaches to EI (for a review see Mayer, Salovey, & Caruso, 2000), its most widely accepted definition forms part of Mayer and Salovey's (1997) ability model, according to which it is understood as "*the ability to perceive accurately, appraise, and express emotion; the ability to access and/or generate feelings when they facilitate thought; the ability to understand emotion and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth*" (Mayer & Salovey, 1997, p. 10).

A large part of the work in the field of EI has been focused on the creation of valid instruments for assessing aspects associated with EI (Extremera, Salguero, Fernández-Berrocal, & Ruíz, 2009). Following the model of Mayer and Salovey (1997), different measures have been developed that permit the assessment of EI as an ability (such as the Mayer-Salovey-Caruso Emotional Intelligence Test, MSCEIT; Mayer, Salovey, & Caruso, 2001), or that are used to assess perceived emotional intelligence (PEI). Within this group, one of the most widely used instruments has been the Trait Meta-Mood Scale, or TMMS (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The TMMS was the first instrument developed by the authors who originally identified the construct, and was designed to assess individual differences in the process of emotional regulation, involving what is called emotional meta-knowledge, which combines the monitoring, appraisal, and regulation of one's own feelings and emotions (Salovey et al., 1995).

It is, then, a measure of people's beliefs and attitudes, stable over time, about the importance of paying attention to their emotions and feelings ("I do not pay much attention to my feelings"), about their capacity for understanding their own emotions ("I am often aware of my feelings on a matter"), and about their ability to regulate negative emotional states and prolong positive ones ("When I become upset I remind myself of all the pleasures in life"). It is an index of perceived emotional intelligence dealing with basic aspects of EI from an intrapersonal perspective (Salovey, Stroud, Woolery, & Epel, 2002).

The TMMS has been shown to have adequate psychometric properties and evidence of a three-factor structure both in its original version (Salovey et al., 1995) and in adaptations to other populations (Lee & Lee, 1997; Li, Yan, Yin, & Wu, 2002; Otto, Döring-Seipel, Grebe, & Lantermann, 2001; Palmer, Gignac, Bates, & Stough, 2003; Queirós, Fernández-Berrocal, Extremera, Cancela, & Queirós, 2005). In Spain, a shortened version of the TMMS (Fernández-Berrocal, Extremera, & Ramos, 2004) showed high reliability for each component (Cronbach's  $\alpha = 0.90, 0.90,$  and  $0.86$  for attention to feelings, clarity of feelings, and mood repair, respectively) and evidence of temporal stability for a 4-week interval (test-retest correlations =  $0.60, 0.70,$  and  $0.83,$  respectively). Moreover, as has emerged in other studies, the magnitude of the correlations was greater between attention and clarity, and between clarity and emotional repair, which suggests the existence of a functional sequence between the three dimensions that would characterize the emotional regulation process (Palmer et al., 2003).

In the field of EI, different authors have stressed the need for assessment measures to show distinctiveness with respect to personality variables that are well consolidated and associated with emotional characteristics (Zeidner, Roberts, & Matthews, 2008). In this regard, although some self-report instruments (based principally on mixed models of EI) have shown a degree of overlap with personality measures (see MacCann, Matthews, Zeidner, & Roberts, 2003), evidence has been found of discriminant validity within the TMMS dimensions (Otto et al., 2001; Palomera & Brackett, 2006).

As far as predictive validity is concerned, this instrument has made possible research on the involvement of emotional meta-knowledge in the explanation of important criterion variables in adults, such as physical and psychological health, adaptation to stressful situations, interpersonal functioning, or life satisfaction (for a review see Fernández-Berrocal & Extremera, 2008). In spite of this, to date no researchers have analyzed the psychometric properties of the TMMS in an adolescent population. The availability of a valid and reliable tool for measuring perceived emotional intelligence in this population could be useful for various reasons.

First of all, it would increase the number of available instruments for measuring aspects associated with EI in this age group, considered as a priority goal by several authors (Ciarrochi, Chan, & Bajgar, 2003), and could serve to complement other measures of EI, such as ability or external-observer measures.

Secondly, it would permit analysis of how the characteristics of the emotional regulation process evolve over the course of development. Some researchers have found differences in the TMMS dimensions between adult men and women, with men scoring higher on clarity of feelings and mood repair and women on attention to feelings (Fernández-Berrocal & Extremera, 2008; Thayer, Rossy, Ruiz-Padial, & Johnsen, 2003). In this regard, it would be interesting to explore

whether such differences exist in adolescents, and if so, to determine at which point or in which phase of development they begin to emerge.

Thirdly, as has been shown in research with adults, the TMMS dimensions can help us to explain differences in adolescents' psychosocial adaptation and to determine the importance of perceived emotional competence in this age group.

Bearing in mind the above factors, the chief objective in the present work was to analyze the psychometric properties of the Spanish shortened version of the TMMS in a sample of Spanish adolescents. To this end we examined the dimensionality of the instrument by means of confirmatory factor analysis, analyzed its reliability with regard to internal consistency and the correlation between its different dimensions, and finally, obtained evidence on the discriminant validity and on the relationship between the TMMS dimensions and the variables of age and sex.

## METHOD

### PARTICIPANTS AND PROCEDURE

Participants in the study were 1,497 adolescents (840 females and 657 males) aged between 12 and 17 ( $M = 14.42$ ;  $SD = 1.56$ ), all from secondary schools in the province of Málaga, Spain. The assessment was carried out in classrooms during the normal school day, with guarantees of anonymity for participants and with the approval of both the school authorities and the pupils' parents.

### INSTRUMENTS

**Trait Meta-Mood Scale** The Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) was designed to assess how people reflect upon their moods, and determine the extent to which people attend to and value their feelings (Attention), feel clear rather than confused about their feelings (Clarity), and use positive thinking to repair negative moods (Repair). It is answered using a 5-point Likert scale, with options ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Salovey et al. (1995) reported adequate internal consistency, as well as convergent and discriminant validity for this scale. In this study we used the well-validated Spanish shorter version of the TMMS (Fernández-Berrocal et al., 2004). The original 48 items were subjected to a principal components analysis with varimax rotation. Items with loadings  $\leq .40$  were removed. The shortened Spanish version includes 24 items from the original version (eight for each subscale), and shows high internal consistency (Cronbach's alpha for Attention = .90, Clarity = .90, Repair = .86) and satisfactory test-retest reliability ( $r$  values from .60 to .83).

**Big Five Inventory-44** The BFI-44 (BFI-44; Benet-Martínez & John, 1998) is a 44-item self-report inventory designed to assess the Big Five personality factors: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness

to Experience. The BFI-44 scales have shown substantial internal consistency, test-retest reliability, a clear factor structure, as well as considerable convergent and discriminant validity with longer Big Five measures. We used the Spanish version of the BFI-44, which has similar psychometric properties to the English version (Benet-Martínez & John, 1998).

## RESULTS

### CONFIRMATORY FACTOR ANALYSIS

Confirmatory factor analysis was carried out using LISREL version 8.80 (Jöreskog & Sörbom, 1993) with the maximum likelihood (ML) method with the aim of testing whether the data for the adolescent sample corroborated the 3-factor model found in the original version of the TMMS. The results of a KMO (= 0.90) and a statistically significant ( $p = 0.0001$ ) Bartlett's test of sphericity provided the basis for the analysis. The loadings obtained were greater than .45 for all the items except for item 23, making it clear that the items are important to the definition of their corresponding construct (Table 1 shows all items with their factor loadings).

**TABLE 1**  
**TMMS-24 ITEMS AND THEIR LOADINGS**

	Loadings
<b>Atención (Attention)</b>	
1. Presto mucha atención a los sentimientos	.64
2. Normalmente me preocupo mucho por lo que siento	.74
3. Normalmente dedico tiempo a pensar en mis emociones	.72
4. Pienso que merece la pena prestar atención a mis emociones y estado de ánimo	.69
5. Dejo que mis sentimientos afecten a mis pensamientos	.46
6. Pienso en mi estado de ánimo constantemente	.61
7. A menudo pienso en mis sentimientos	.74
8. Presto mucha atención a cómo me siento	.72
<b>Claridad (Clarity)</b>	
9. Tengo claros mis sentimientos	.65
10. Frecuentemente puedo definir mis sentimientos	.74
11. Casi siempre sé cómo me siento	.72
12. Normalmente conozco mis sentimientos sobre las personas	.60
13. A menudo me doy cuenta de mis sentimientos en diferentes situaciones	.54
14. Siempre puedo decir cómo me siento	.68
15. A veces puedo decir cuáles son mis emociones	.58
16. Puedo llegar a comprender mis sentimientos	.58
<b>Reparación (Repair)</b>	
17. Aunque a veces me siento triste, suelo tener una visión optimista	.64
18. Aunque me sienta mal, procuro pensar en cosas agradables	.80
19. Cuando estoy triste, pienso en todos los placeres de la vida	.74
20. Intento tener pensamientos positivos aunque me sienta mal	.81

Table 1 continued

21. Si doy demasiadas vueltas a las cosas, complicándolas, trato de calmarme	.51
22. Me preocupo por tener un buen estado de ánimo	.50
23. Tengo mucha energía cuando me siento feliz	.29
24. Cuando estoy enfadado intento cambiar mi estado de ánimo	.61

The fit of the model was assessed by means of the following indices: a)  $\chi^2$  likelihood ratio statistic, b) Jöreskog and Sörbom's (1989) goodness-of-fit (GFI) and adjusted goodness-of-fit (AGFI) indices, c) Tucker and Lewis' (1973) non-normed-fit index (NNFI), d) Bentler's (1990) comparative-fit index (CFI), and e) Steiger's (1990) root mean square error of approximation (RMSEA). Values of the GFI, AGFI, NNFI, and CFI range from zero to 1.00, and the closer the value to 1.00, the better the fit (e.g., Mulaik et al., 1989). For the RMSEA, values of less than .05 are considered a close fit, and of less than .08, an adequate fit; values over .10 suggest room for improvement in the model (Finch & West, 1997). The value of the chi-square statistic,  $\chi^2(249, N = 1497) = 1667.09, p = 0.01$ , indicated a statistically significant lack of fit of the model; however, the sensitivity of the chi-square statistic to the violation of the assumptions on which it is based (Bollen, 1989) and, specifically, its dependence on sample size (Floyd & Widaman, 1995), mean that the fit assessment should be based mainly on alternative indices. In fact, when measures of fit less sensitive to sample size and to deviations from normality were used, the results showed a good fit, with values of GFI (.90), AGFI (.89), NNFI (.94), and CFI (.95) close to 1.00 and RMSEA value (.065) between the cut-off points of .05 (good fit) and .08 (acceptable fit).

## RELIABILITY

The internal consistency of each dimension of the scale was estimated by means of Cronbach's  $\alpha$  coefficient. Values on this index in the total sample were 0.84, 0.82, and 0.81 for the subscales of Attention, Clarity, and Repair, respectively. With the aim of analyzing if the instrument was reliable for all the stages of adolescence, and not only in later years (in which meta-knowledge may be greater), we estimated the internal consistency in all age groups (12 to 17 years). The Cronbach's alphas ranged between .77 and .87 for the subscale of Attention, between .79 and .85 for Clarity, and between .79 and .84 for Repair. These values permit us to conclude that internal consistency is high in all the dimensions and in all age groups, exceeding the cut-off point of 0.75 generally accepted for instruments in the area of health sciences (Streiner & Norman, 1989).

Table 2 shows, together with the descriptive statistics, the correlations between the three TMMS dimensions. As can be seen in this table, there are correlations of considerable magnitude between Attention and Clarity and between Clarity and Repair, with a smaller correlation observed between Attention and Repair.

**TABLE 2**  
**MEANS, STANDARD DEVIATIONS, AND CORRELATIONS BETWEEN TMMS AND BFI-44 DIMENSIONS**

	1	2	3	4	5	6	7	8
Attention	--							
Clarity	.38**	--						
Repair	.15**	.38**	--					
Extraversion	.14**	.15**	.12**	--				
Agreeableness	.15**	.17**	.20**	.25**	--			
Conscientiousness	.07*	.14**	.12**	.04	.30**	--		
Neuroticism	.24**	-.09**	-.20**	-.05	-.17**	-.14**	--	
Openness to experience	.18**	.17**	.18**	.21**	.21**	.19**	-.04	--
<i>M</i>	3.04	3.05	3.12	3.37	3.67	3.14	2.93	3.35
<i>SD</i>	.81	.80	.90	.67	.55	.60	.60	.60

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$

#### ASSOCIATION BETWEEN THE DIMENSIONS OF THE TMMS AND THE BFI-44

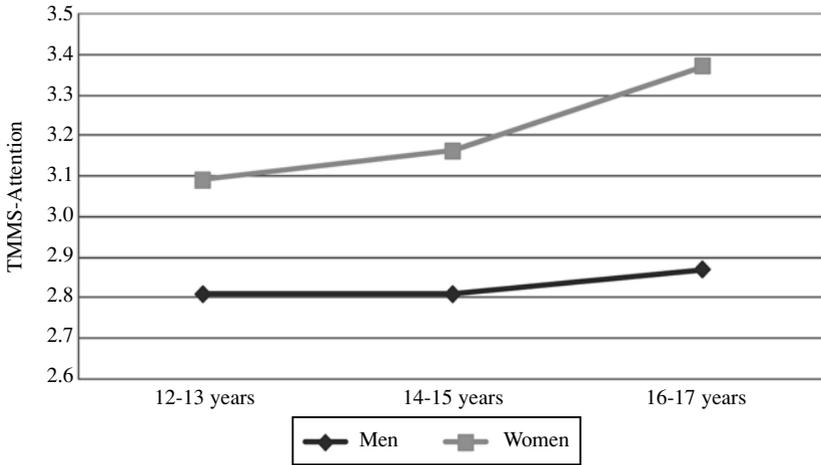
With the aim of obtaining discriminant evidence for the instrument we calculated the Pearson correlation coefficients between scores on the dimensions of the TMMS and the BFI-44. These coefficients are shown in Table 2. As expected, participants' scores in the Attention, Clarity, and Repair dimensions of the TMMS did not show substantial correlations with any of the Big Five personality factors (between .07 and .24), indicating an absence of overlap between them. Furthermore, while Attention was positively related to all the personality dimensions, Clarity and Repair showed positive correlations with Extraversion, Agreeableness, Conscientiousness, and Openness to Experience, and negative correlations with Neuroticism; likewise, the highest correlations, though they were also moderate, were found between Attention and Repair and Neuroticism.

#### DIFFERENCES IN THE TMMS DIMENSIONS BY SEX AND AGE

With a view to obtaining additional evidence on the validity of the TMMS in the adolescent population, we checked for differences between its dimensions according to the variables of sex and age of participants.

The analysis of variance carried out taking sex and age as predictor variables and Attention as the criterion variable revealed a statistically significant effect in the cases of both sex,  $F(1, 1491) = 81.42$ ;  $p = 0.0001$ , and age,  $F(2, 1491) = 5.49$ ;  $p = 0.004$ . However, in both cases the effect size was small ( $\text{Eta}^2_{\text{sex}} = 0.05$ ;  $\text{Eta}^2_{\text{age}} = 0.007$ ). The same can be said of the effect size associated with the interaction ( $\text{Eta}^2_{\text{interaction}} = 0.002$ ), which did not reach statistical significance. In order to determine whether in any of the age ranges there were differences in Attention according to gender, we calculated the simple effects – comparing, in an independent fashion, the effects of the sex factor in each age group. The results

showed that in the age ranges 12-13 years,  $F(1, 1491) = 15.67$ ;  $p = 0.0001$ , 14-15 years,  $F(1, 1491) = 32.57$ ;  $p = 0.0001$ , and 16-17 years,  $F(1, 1491) = 36.04$ ;  $p = 0.0001$ , there were statistically significant differences between males and females. According to these results (see Figure 1), the effect size corresponding to the difference of means between males and females in the 16-17 age range was quite high (Hedges'  $g_{16-17 \text{ years}} = 0.64$ ). In the age range 14-15 years, the effect size was of average magnitude (Hedges'  $g_{14-15 \text{ years}} = 0.45$ ), whilst in the 12-13 years age range the effect size was small to moderate (Hedges'  $g_{12-13 \text{ years}} = 0.37$ ).



**Figure 1.** Differences in attention to feelings by age and sex.

As regards the analysis of variance carried out with sex and age as predictor variables and Clarity as the criterion variable, we obtained a statistically significant effect of the age variable,  $F(2, 1491) = 3.18$ ;  $p = 0.042$ , though the effect size associated with that variable was small ( $\text{Eta}^2_{\text{age}} = 0.004$ ). The same can be said for the effect sizes associated with the variable of sex ( $\text{Eta}^2_{\text{sex}} = 0.0001$ ) and the interaction ( $\text{Eta}^2_{\text{interaction}} = 0.002$ ), which fell short of statistical significance in either case. Analysis of the simple effects revealed that there were no statistically significant differences between males and females in any of the age ranges. This result was corroborated by the small effect sizes associated with the differences between sexes found in the different age ranges (Hedges'  $g_{12-13 \text{ years}} = 0.10$ ; Hedges'  $g_{14-15 \text{ years}} = 0.08$ ; Hedges'  $g_{16-17 \text{ years}} = 0.16$ ).

Finally, the analysis of variance carried out with sex and age as predictor variables and Repair as the criterion variable showed a statistically significant effect of the variable age,  $F(2, 1491) = 18.76$ ;  $p = 0.0001$ , even though the effect size associated with that variable was small ( $\text{Eta}^2_{\text{age}} = 0.025$ ). The effect

sizes associated with the variable of sex ( $\text{Eta}^2_{\text{sex}} = 0.001$ ) and the interaction ( $\text{Eta}^2_{\text{interaction}} = 0.004$ ) were also small, though in this case they were statistically significant. Analysis of the simple effects revealed that in the 16-17 age range there were statistically significant differences between males and females,  $F(1, 1491) = 5.95$ ;  $p = 0.015$ . However, the effect size associated with this difference of means was small (Hedges'  $g_{16-17 \text{ years}} = 0.23$ ). In the remaining age ranges statistical significance was not reached, and, in accordance with this result, the effect sizes associated with the differences between males and females in the age ranges 12-13 years (Hedges'  $g_{12-13 \text{ years}} = 0.09$ ) and 14-15 years (Hedges'  $g_{14-15 \text{ years}} = 0.06$ ) were also small.

## DISCUSSION

Evidence has been provided of the TMMS's validity and reliability as an instrument for assessing individual differences in the process of emotional regulation, or perceived emotional intelligence, in adults. In the present work we have attempted to add to this body of evidence by analyzing the psychometric properties of the Spanish shortened version of the TMMS in a sample of adolescents.

As far as factor validity is concerned, the results obtained corroborate a 3-factor structure, the factors corresponding to the dimensions of Attention, Clarity, and Repair, in accordance with the original structure of the scale (Salovey et al., 1995) and its Spanish adaptation (Fernández-Berrocal et al., 2004). Of the 24 items in the Spanish version of the TMMS, only item 23 failed to obtain a clear saturation with its corresponding dimension, the Repair subscale, so it was therefore eliminated. It may be that this statement ("I have a lot of energy when I feel happy") is related to the use of emotional motivation or to the recognition of the signs that accompany positive emotions, which could be associated with other EI skills (such as emotional facilitating or emotional perception), but not with emotional repair, in adolescents.

Analysis of the internal consistency of the 23-item version of the TMMS revealed satisfactory values in the three dimensions, similar to what was found in other adaptations (Fernández-Berrocal & Extremera, 2008). Moreover, the three subscales correlated as expected, with correlations of greatest magnitude between Attention and Clarity and between Clarity and Repair. This suggests – as has been shown in adults (Palmer et al., 2003) – the existence of a functional sequence in the emotional regulation process, whereby a certain level of attention to feelings is necessary in order to understand emotional states and a certain level of clarity of feelings is required in order to moderate or regulate them.

Regarding the relationship between the TMMS and the Big Five personality factors, we found evidence of discriminant validity of the TMMS, with low

to moderate correlations between its three dimensions and the Big Five. As in previous works (Otto et al., 2001; Palomera & Brackett, 2006), the highest correlations are observed for the subscales Attention (in a positive direction) and Repair (in a negative direction) with Neuroticism. Neuroticism is a personality trait characterized by proneness to experience negative emotions such as anxiety, depression or anger, or feelings of vulnerability (Diener & Lucas, 1999; Watson, 2000). Thus, it may be that a high tendency to attend to and be concerned about emotional states combined with low confidence in being able to regulate them are aspects of the emotional regulation process characteristic of people with a strong Neuroticism trait; indeed, this PEI profile has been associated with greater negative emotionality in various studies (Extremera, Fernández-Berrocal, Ruíz-Aranda, & Cabello, 2006; Salguero & Iruarrizaga, 2006; Salguero, Ruíz, Fernández-Berrocal, & González-Ordi, 2008). Increasing our knowledge about the characteristics of emotional processing that underlie Neuroticism should be a priority objective in future research, and such increased knowledge could contribute to the development of specific strategies of emotional regulation that permit people with this personality trait to achieve greater emotional stability.

As for the differences in the TMMS dimensions according to age and sex, the analyses carried out have revealed some interesting findings. Some researchers have shown how, in adult populations, women present a greater tendency to attend to their emotions and lower clarity and repair in comparison with men (Fernández-Berrocal & Extremera, 2008; Thayer et al., 2003). Our data indicate that some of these differences begin to emerge in adolescence, so that girls score higher in Attention than boys; moreover, this difference becomes more pronounced as the adolescents get older.

Some authors have suggested that differences in the emotional regulation process between men and women form the basis of the higher prevalence in women of emotional problems and the use of ineffective coping strategies, such as rumination (Nolen-Hoeksema, 2003; Thayer et al., 2003). The results obtained show how such differences begin establishing themselves over the course of adolescence, mainly in its final stages. Should such findings be confirmed in longitudinal studies, they could be extremely useful in the development of programs for the prevention of emotional problems or for the improvement of socioemotional skills, by indicating the specific needs of males and females with a view to strengthening their emotional regulation abilities.

Although we have found evidence of the validity of the TMMS as a measure of PEI in an adolescent population, future researchers can contribute new data, primarily on the instrument's convergent and predictive validity. In this regard, it will be useful to reveal the extent to which the dimensions of this scale are related to theoretically associated variables, such as empathy, emotional knowledge, or other self-report PEI measures. Furthermore, it is to be hoped that the TMMS

dimensions can help us to better explain individual differences in adolescents' psychosocial adjustment, by exploring their relationship to important criterion variables such as emotional adjustment, the appearance of risk behaviors, behavioral problems, interpersonal functioning, or academic performance, as shown in the adult population. Studies demonstrating the effects of emotional intelligence education programs have grown in number in recent years (Brackett, Alster, Wolfe, Katulak, & Fale, 2007; Ulutas & Omeroglu, 2007; Yilmaz, 2009); identifying the variables that characterize the emotional regulation processes of people with better or poorer psychosocial adjustment will permit us to increase the efficacy of such programs in the adolescent population.

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