

Does optimism mediate the relationship between Big Five and perceived stress? A study with Spanish adolescents

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Título: ¿El optimismo media la relación entre los Cinco Grandes y el estrés percibido? Un estudio con adolescentes españoles

Resumen: Los resultados de investigación han mostrado la existencia de relaciones entre los Cinco Grandes factores de personalidad, optimismo y estrés percibido. El objetivo del estudio es explorar, mediante modelos de ecuaciones estructurales, el posible papel mediador que se ha sugerido podría desempeñar optimismo en esta relación. También, se explora a través de un análisis multi-grupo la invarianza por sexo de los resultados. Un total de 611 adolescentes españoles completaron de forma anónima los cuestionarios BFQ, LOT-R y PSS. Optimismo se asoció positivamente con los rasgos de personalidad y negativamente con estrés percibido. El estrés se relacionó negativamente con Estabilidad Emocional, Extraversión y Responsabilidad y no mostró asociación alguna con Afabilidad ni con Apertura. Los análisis de mediación revelaron el papel mediador de optimismo en la relación entre Estabilidad Emocional (mediación parcial), Extraversión y Responsabilidad y estrés. Estos resultados no variaron por sexo. En conclusión, un perfil básico de personalidad caracterizado por Extraversión, Estabilidad Emocional y Responsabilidad favorecería el desarrollo de expectativas positivas de futuro que representan un predictor proximal de estrés percibido. El papel mediador del optimismo puede resultar relevante para el desarrollo de intervenciones focalizadas en reducir los niveles de estrés y, consecuentemente, mejorar el ajuste del adolescente.

Palabras clave: Optimismo. Cinco Grandes. Estrés percibido. Adolescentes. Análisis de mediación.

Abstract: Research results have shown the existence of relationships between the Big Five personality factors, optimism, and perceived stress. The aim of this study is to explore the possible mediating role that it has been suggested might play optimism in this relationship. Structural equation models were conducted to examine the mediating role of optimism. A multi-group analysis was performed to verify whether the results varied by sex. 611 Spanish adolescents completed anonymously the measures of BFQ, LOT-R, and PSS. The findings showed that optimism was positively associated with the personality traits and negatively with perceived stress. Perceived stress was in turn negatively related to Emotional Stability, Extraversion, and Conscientiousness, while it was not correlated with Agreeableness and Openness. Mediation analysis revealed the mediating role of optimism on the relationship between Emotional Stability (partial mediation), Extraversion, and Conscientiousness and the perception of stress. These findings did not vary by sex. In conclusion, a basic personality profile characterized by Extraversion, Emotional Stability, and Conscientiousness would favor the development of positive future expectations that represent a proximal predictor for perceived stress. Optimism mediation may be relevant for the development of interventions focused on reducing stress levels and, consequently, to improve the adolescent's adjustment.

Keywords: Optimism. Big Five. Perceived stress. Adolescents. Mediation analysis.

Introduction

Personality seemingly impacts what stressful events are encountered, the extent to which stressors are considered stressful, and coping responses (Carver & Connor-Smith, 2010). A substantial volume of work has focused on which of Big Five factors (BF), predominant model of general personality structure (Widiger, 2017), may mediate the appraisal of stress. Previous studies have found that Perceived Stress (PS) has a positive relationship with Neuroticism (N) (Ebstrup, Eplov, Pisinger, & Jorgensen, 2011; Vallejo-Sánchez & Pérez-García, 2016), a negative association with Extraversion (E) and Conscientiousness (C), and a weak and inconsistent relationship with Agreeableness (A) and Openness to Experience (O) dimensions (Baldasaro, Shanahan, & Bauer, 2013; Ebstrup et al., 2011; Kim et al., 2016; Luo, Derringer, Briley, & Roberts, 2017; Roohafza et al., 2016). Attending to frequency, type, and appraisal of the stressors experienced, C

predicts low stress exposure (Vollrath, 2000). N predicts high overall and interpersonal stress exposure, and prone to appraise events as more harmful or threatening and coping resources as low (Grant & Langan-Fox, 2006; Suls & Martin, 2005). E, C, and O relate to the perception of events as challenges rather than threats and to positive appraisals of coping resources (Penley & Tomaka, 2002).

Optimism -Op- is a personality trait-like characteristic that implies a disposition to believe that good things are more likely to happen than bad things in the future (Scheier, Carver, & Bridges, 1994). This generalized positive outcome expectancy may impact how people appraise and approach stressors. In fact, research supports the protective role of Op regarding PS by potentially buffering the adverse impact that stressful events have on individuals (Carver, Scheier, & Segerstrom, 2010; Liu, Pu, & Hou, 2016). People who dispositionally hold positive expectations for the future are more confident that their efforts will be successful, show a higher persistence in the pursuit of their objectives, are more flexible regarding to demands from the stressor, develop more effective coping strategies (e.g., attending to the type and controllability of the stressor), have better social connections than pessimists, and they may consequently be less reactive to the stresses of life (Alarcon, Bowling, & Khazon, 2013; Carver & Scheier, 2014).

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The position of Op in the larger network of human personality constructs is still not well understood (Peterson, 2000). For the most part, the research has focused on exploring the predictive power of Op, considering sometimes if that power remains above and beyond the BF personality traits (Carver & Scheier, 2014). However, it is critical to gain insight into potential antecedents of Op because of the number of its positive physical, psychological, and behavioral outcomes. Thus, getting a deeper understanding of its relationship to basic personality dimensions can be a relevant step.

The scarce available research initially focused on N and E, suggesting that Op represents a combination of these two basic personality dimensions (Marshall, Wortman, Kusulas, & Hervig, 1992). However, subsequent studies tend to support the view that Op differs from those traits (Alarcon et al., 2013) and focus on examining the relationships between this variable and the remaining BF. The results indicated that while Op's greatest relationships were established with N (negative) and E (positive), weaker positive associations with the rest of the BF were also presented (Busseri & Choma, 2016; Rey & Extremera, 2014). O was the factor with which Op showed the weakest and most inconsistent relationship (Miciuk, Jankowski, Laskowska, & Olés, 2016; Sharpe, Martin, & Roth, 2011).

From the previous results, Op cannot be identified simply as a low N or a facet of E, but emerges as a more complex personality variable that, according to Sharpe et al. (2011), results from a basic personality profile. From a trait perspective, these authors propose a model that assumes that basic personality traits operate as Op antecedents by means three conceptual relationship pathways: affective, social, and persistence. The affective pathway involves the negative affectivity inherent in N and the positive of E. The social pathway implicates the surgency features of E and A traits. Finally, the persistence pathway concerns C. The personality profile marked by low N (Emotional Stability, ES) and high E, A, and C leads to the development of optimistic beliefs. These positive outcome expectancies that result in turn in a tendency toward more adaptive behaviors and better mental/physical health would represent proximal predictors for adjustment that mediate the influences of personality dispositions (Sharpe et al., 2011).

Finally, the studies that have explored the relationships between BF, Op, and PS have not examined the possible mediating role of Op highlighted by Sharpe et al. (2011). In fact, to our knowledge, just one study carried out on adult population has examined the relationship between BF, Op, and PS and has shown an increase in incremental validity over the BF to predict stress (Chan, 2004). In this sense, it is important to explore whether the influence of personality traits on the stress perception could be explained, at least in part, by the degree of Op associated with a specific personality profile.

Certainly, the perception of stress is somewhat likely throughout the life cycle. However, adolescence is consid-

ered as a developmental period associated with heightened stress (Romeo, 2013) due to the many changes experienced: e.g., physical maturation, drive for independence, intensification of emotional experiences... (Blakemore, 2008). Consequently, it is important to address the mediating role of Op in the association between BF and PS in a critical period, such as adolescence; especially when it seems that the perception of stress is associated with positive and negative mental health (Tian, Jiang, & Huebner, 2019). Moreover, because the timing of changes experienced tends to diverge for boys and girls (Blakemore, Burnett, & Dahl, 2010), adolescence is a key period for the emergence of differences in personality by sex (De Bolle et al., 2015). These personality differences may in turn be responsible for the results obtained with respect to lower PS in males as opposed to adult (Kim et al., 2016) and adolescent females (Serrano & Andreu, 2016).

Considering the mentioned research, the aim of this study was to explore, using structural equation models, the possible mediating role of Op in the relationship between BF model and PS in adolescent population. Additionally, a multi-group analysis was carried out in order to check if the variables were related in a different way depending on the sex.

Method

Participants and Procedure

Adolescents in the study come from four secondary schools belonging to the autonomous community of Valencia (Spain). The study was approved by the school boards that provided the informed consent. All adolescents, who agreed to participate, anonymously completed a paper-and-pencil survey of approximately 45 minutes.

The participants were 611 (303 females and 308 males) high school students aged 14 to 18 (mean = 15.49 years, standard deviation = 1.00). The 40.9 % of the students attended to 3rd year of secondary school, 32.9 % to 4th year of secondary school, and 26.2 % to 1st year of A-levels.

Instruments

Life Orientation Test-Revised (LOT-R) (Scheier et al., 1994; Spanish version of Ferrando, Chico, & Tous, 2002). The LOT-R comprises 10 items rated on 5-point Likert response scale (1 = never, 5 = always), in which the adolescents assess their expectancies regarding future outcomes. Of the 10 items, six evaluate Op (three are worded positively, three are worded negatively), and four are fillers. The internal consistency of the instrument in this study was adequate ($\alpha = .62$).

Perceived Stress Scale (PSS) (Cohen, Kamarck, & Mermelstein, 1983; Spanish version of Remor & Carrobes, 2001). The PSS is a self-reported measure of 14 items rated on a 5-point Likert scale (0 = never, 4 = very often) that evaluates

the degree of PS in the last month. The internal consistency for this study was satisfactory ($\alpha = .79$).

Big Five Questionnaire (BFQ) (Caprara, Barbaranelli, Borgogni, & Perugini, 1993; Spanish version of Bermúdez, 1995). The BFQ is a self-reported instrument that consists of 132 items organized into five scales that evaluate the BF personality dimensions: E, ES, O, C, and A. Responses are collected using a 5-point Likert scale (1 = totally disagree, 5 = totally agree). The BFQ showed satisfactory internal consistency in this study ($\alpha_{ES} = .88$; $\alpha_A = .85$; $\alpha_C = .84$; $\alpha_O = .82$; $\alpha_E = .81$).

Statistical Analysis

The descriptive statistics were used to summarize the socio-demographic and psychological characteristics of the participants. A correlation analysis explored the bivariate relationships between the studied variables. The SPSS statistical package (v. 23.0) was used to calculate these analyses.

Structural equation models (SEM) were conducted to explore the mediating role of Op between BF and PS. The strategy for analyses was based on MacKinnon (2008). To evaluate the goodness of fit of the models to the data, different fit indices were computed and assessed with the following criteria levels (in parenthesis) (Hair, Anderson, Tatham, & Black, 1999; Jackson, Gillaspay, & Purc-Stephenson, 2009): Root Mean Square Error of Approximation (RMSEA) [$< .08$; 90 % confidence interval (CI)], Non-Normed Fit Index

(NNFI) ($> .90$), Bollen Incremental Fit Index (IFI) ($> .90$), and Comparative Fit Index (CFI) ($> .90$). The Satorra-Bentler chi-square (S-B χ^2) test was also considered, a p value over .05 indicate a good fit between the observed and estimated matrices by the proposed model. This index was divided by degree of freedom (S-B χ^2/df) -to correct the influence of the number of subjects- was also considered. S-B $\chi^2/df < 2$ indicates a good fit, although a value lower than 5 is acceptable (Pedhazur & Schmelkin, 1991). Finally, a multi-group analysis was performed to explore whether there were differences in the mediating role of Op according to sex.

Results

Correlation Analysis

Table 1 shows the descriptive statistics and correlations between the studied variables. Op is highly and negatively related to PS ($r = -.59$; $p \leq .001$) and positively to BF personality dimensions ($r_{Op-E} = .30$, $p \leq .001$; $r_{Op-ES} = .28$, $p \leq .001$; $r_{Op-C} = .26$, $p \leq .001$), even though its correlation with A and O is small ($r_{Op-A} = .12$, $p \leq .01$; $r_{Op-O} = .11$, $p \leq .01$).

PS is negatively correlated with ES ($r = -.46$, $p \leq .001$), E ($r = -.17$, $p \leq .001$), and C ($r = -.16$, $p \leq .001$). However, it is worth noting that the two last associations are weaker.

Table 1. Descriptive statistics and correlations between the studied variables.

	1	2	3	4	5	6	7	
1. Extraversion								
2. Agreeableness	.21***							
3. Conscientiousness	.30***	.42***						
4. Emotional Stability	-.11**	.08	.18***					
5. Openness	.34***	.38***	.41***	.03				
6. Perceived Stress	-.17***	.04	-.16***	-.46***	-.04			
7. Optimism	.30***	.12**	.26***	.28***	.11**	-.59***	1.00	
	<i>M</i>	77.04	88.97	80.49	67.00	77.03	27.24	19.89
	<i>SD</i>	10.83	10.21	11.09	12.84	12.12	7.18	4.17

*** $p \leq .001$; ** $p \leq .01$.

Mediation Analysis

Structural equations were calculated to explore the mediating role of Op between BF and PS. Considering the amount of deviation from normality, a robust version of the maximum likelihood estimator was used (Mardia's normalized coefficient = 3.59).

To calculate the mediating effect, a previous model (general mediation model) was computed with direct and indirect effects, a restricted model, and finally compared both models (MacKinnon, 2008). First, a general mediation model (Model 1) in which E, C, and ES had direct and indirect effects on

PS was computed. Model 1 (and successive models) included correlations between these three personality traits. Although Model 1 showed very good fit values, only the direct path from ES to PS was significant (see Figure 1). Consequently, Model 1 without the non-significant paths was recalculated; this restricted model (Model 2) showed very good values in all indices, including normed chi-square (see Table 2). Moreover, Model 2 was not statistically different from Model 1 ($\Delta S-B \chi^2_5 = .66$; $p > .05$). All three indirect effects of personality traits were significant: C had a marginal and negative indirect effect on PS ($\beta = -.11$; $p < .01$). Additionally, the indirect effect of ES and E was greater: e.g., the indirect ef-

fect of ES was $-.23$ ($p < .01$) and the value for E was $\beta = -.26$ ($p < .01$).

The results showed that the effects of E and C were completely mediated by Op, while ES had an indirect effect but also a direct effect on PS. Therefore, Op has a partially mediating role between ES and PS.

Table 2. Fit indices of mediating models (Model 1 and Model 2) and their unrestricted (Model 1U and Model 2U) and restricted versions (Model 1R and Model 2R) for multi-group analysis by sex.

Model	S-B χ^2	df	S-B χ^2/df	CFI	IFI	NNFI	RMSEA (90% CI)	SRMR
Model 1	14.96	7	2.14	.99	.99	.98	.041 [.000–.071]	.017
Model 2	15.62	9	1.76	.99	.99	.98	.035 [.000–.063]	.019
Model 1U	18.31	14	1.31	.99	.99	.99	.022 [.000–.048]	.019
Model 1R	19.94	21	.95	1.00	1.00	1.00	.000 [.000–.032]	.025
Model 2U	20.81	18	1.16	.99	.99	.99	.016 [.000–.041]	.022
Model 2R	21.79	23	.95	1.00	1.00	1.00	.000 [.000–.031]	.026

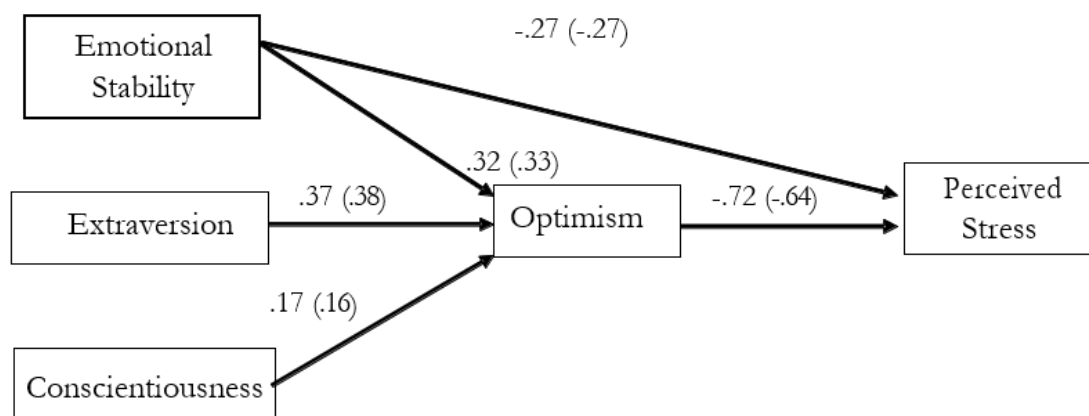


Figure 1. The standardized solution for Model 1 and (Model 2).

Note. All paths showed are $p \leq .01$. Correlation between personality factors, and direct paths of Model 1 between Extraversion and Perceived Stress ($\beta = -.01$; $p > .05$) and Conscientiousness and Perceived Stress ($\beta = -.06$; $p > .05$) are omitted for the sake of simplicity.

Multi-group analysis

A multi-group analysis was performed to evaluate the mediating role of Op by sex. The Model 1 without constraints (Model 1U or unrestricted model) showed a good multi-sample adjustment, which suggests a similar structure of relationships across sex (see Table 2). The model with all the paths between factors fixed between groups (Model 1R or restricted model) showed a good fit. Since the restricted model did not imply a significant increase in the value adjustment of χ^2 compared with the unrestricted model, it concluded that the model of relationships was appropriate for both male and female adolescents (Δ S-B $\chi^2_7 = 1.63$; $p > .05$).

For Model 2, the same strategy was followed. Thus, the unrestricted model was calculated (Model 2U) followed by the restricted model (Model 2R). The increase in the χ^2 value was also non-significant, which indicated once again that the model of relationships was appropriate for both sexes (Δ S-B

$\chi^2_5 = 0.98$; $p > .05$). Taken together, the results indicate that Op plays a similar mediating role for both male and female adolescents between BF and PS.

Discussion

The goal of this study was to examine in adolescent population the possible mediating role of the generalized positive outcome expectancy (Op) in the relationship between basic personality dispositions (BF) and the degree to which a person's life situations are assessed as stressful (PS). Previously, the relationships between the analyzed variables were explored.

The results replicated overall the associations obtained in the literature between BF, Op, and PS. The link between PS and Op was strong and negative, supporting the protective role of Op in stressful situations (Liu et al., 2016; Milam, Slaughter, Verma, & McConnell, 2014; Zandara, Villada, Hidalgo, & Salvador, 2018). Consistent also with previous find-

ings (Busseri & Choma, 2016; Di Fabio et al., 2018; Rey & Extremera, 2014), Op was associated with each of BF dimensions, although the intensity of the relations was not always the same: Op showed a positive and moderate association with E, ES, and C and positive and low with A and O. Finally, as stated literature (Evans et al., 2016; Kiekens et al., 2015; Tian et al., 2019), PS revealed a negative and strong linkage with ES and was also negatively, although weakly, related to E and C. A and O were not significant related to PS. It is worth noting that the association of PS with these traits of personality described in the literature is small or non-significant (Baldasaro et al., 2013; Ebstrup et al., 2011).

Attending to the identified associations, the mediating role of Op was tested using a model that explored the direct and indirect effects of E, ES, and C on PS. The results showed that the effect of E and C on PS was fully mediated by Op; however, only a partial mediation for ES was observed. These findings may contribute to understand how these variables are related to each other. Specifically, personality may be related to the likelihood of experiencing stressful events -differential exposure- (Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012) and to the interpretation of an event as stressful -appraisal process- (Guntherth, Cohen, & Armeli, 1999). The personality is related to the likelihood of experiencing stressful events to the extent that it is crucial to the shaping of them (Kandler et al., 2012). The differential exposure is considered a function of the negative affectivity and the consequent increase in the processing of negative information, characteristic of people with low ES (Suls & Martin, 2005). Accordingly, the greater probability of experiencing stressful events could account for the direct effect of ES on PS. On the other hand, the expectancy of positive results could be the key element in the association of E, ES, and C with more benign primary and secondary appraisals in the stress process shown by the literature (Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Suls & Martin, 2005). The expectation that the future can be expected to bring us better than bad things would make it easier both to perceive events as challenges (rather than threats) and to value positively the resources available to deal with them.

In addition, these findings did not indicate differences across sex in the mediating role that Op plays in the relationship between personality and perception of stress. Thus, sex differences in personality and PS shown by the literature (De Bolle et al., 2015; Kim et al., 2016; Serrano & Andreu, 2016) do not turn into differences in the relationships observed between these variables.

Overall, the obtained data support the three-way model (i.e., affective, social, and persistent) proposed by Sharpe et al. (2011). A basic personality profile characterized by E, ES, and C would lead to the development of generally positive expectations for life events that represent proximal predictors for PS. Sharpe et al.'s proposal (2011) that there is a basic personality profile that favours the development of a positive expectation about the future is useful because it al-

lows Op to be placed into the nomological network of the basic personality dimensions.

It is true that the absence of relationship between PS and the dimensions of A and O ruled out the role of these dimensions in the explored mediation model. Although O does not play a clear role in the model proposed by Sharpe et al. (2011), a specific function is contemplated for A. The specific adjustment index assessed -perception of stress- may be the underlying cause of the lack of A's role in the proposed mediation model. Supporting this argument, some meta-analyses have shown the significant role played by A as a subjective wellbeing predictor (Heller, Watson, & Hies, 2004; Steel, Schmidt, & Shultz, 2008). On the contrary, Ebstrup et al. (2011) explored the mediating role of general self-efficacy between BF personality dimensions and PS. The results obtained by these authors also discounted A and O as relevant dimensions in the model, mediation effects were only linked to N, E, and C.

As a personality trait and individual difference construct, Op is mainly considered stable. However, several reasons support the view of Seligman (1991) that optimism can be learned by experience: long-term stability in Op is not always high (Carver et al., 2010); non-shared environmental influences accounts for about two-third of its variance (Mavioglu, Boomsma, & Bartels, 2015), and despite emotional and motivational implications, Op is an essentially cognitive construct (Carver & Scheier, 2014). As a result, the mediating role of Op is useful for the development of interventions focused on reducing the levels of stress perceived by the adolescent. Results from previous studies have not supported a relevant mediating role in the relationship between N and PS either for dysfunctional attitudes (Conard & Matthews, 2008) or for general self-efficacy (Ebstrup et al., 2011). However, these findings do support the protective effect that improving the optimism would have on people who score high in N. In addition, Op mediation can be relevant to enhance the adjustment of subjects that go through life periods, such as adolescence, that involve vital changes (Blakemore, 2008) and a high level of stress (Romeo, 2013). Even more so if, as suggested by Carver et al. (2010), Op may be more changeable during times of life transition when there is a break from prior experiences and outcomes become more uncertain.

Decreasing PS levels may also improve the adolescent's adjustment, given its association with positive and negative mental health found in the bibliography (Tian et al., 2019). Consequently, working to increase expectations of positive outcomes can be a step in the direction of promoting the adolescent's health claimed by the World Health Organization (WHO, 2017).

Experimental research has shown that Op can be improved through positive thinking exercises about the future (Peters, Flink, Boersma, & Linton, 2010). Indeed, it might be argued that the broad range of cognitive-behavioral therapies used in clinical practice typically involve efforts to induce

people to approach their lives in more optimistic ways (Carver, Scheier, Miller, & Fulford, 2009).

To our knowledge, this is the first study that sheds some light on the mediating role of Op in the relationship between BF and PS. This aspect and the exploration of the possible modulation of the results by sex were important strengths of this research.

However, certain limitations are also presented such as the transversal nature of the study design, the assessment only by self-reports, or the exclusive focus on Op as a psychological construct of positive valence susceptible to play a mediating role between basic personality dimensions and PS. Future longitudinal studies that use a sequential temporal evaluation of the variables should be performed in order to demonstrate a causal relation from personality to perception of stress through Op. Next research might also incorporate targets' reports of significant others (e.g., peers, parents...) to validate the self-report data. In addition, it would be relevant to verify the weight of Op as a mediator in comparison with other positive cognitive constructs, such as those collected in the so-called "positive orientation" conceptualized as the proximal sufficient cause of an 'optimal functioning syndrome' (Caprara et al., 2009).

On the other hand, the sample size was large, but it was limited to a specific population of adolescents. Future re-

search should explore whether these results can be replicated in different contexts and ages, which would allow us to obtain an overview about the stability or the variability of the mediating role of Op among BF and PS at different stages of life. The greater malleability of Op during the periods of vital transition suggested by Carver and Scheier (2014) could go hand in hand with a weakening of Op with personality relationships, while increasing their dependence on context during such periods.

Finally, further studies should also identify the unique contributions of personality facets to advance in the understanding about the mediating role of Op between personality traits and perception of stress. It is possible that the effects of the BF are focused on some, but not all facets that comprise these traits. Thus, according to the Costa and McCrae model (2008) and taking into account the Sharpe et al. (2011), it is possible that among the facets from E, that of 'positive emotions' plays a more relevant role than, for example, that of 'assertiveness' in the shaping of positive outcome expectations and, consequently, in PS. On the other hand, the basic 'vulnerability to stress' inherent to N can highlight the role of this facet in the direct relationship found between this trait and perception of stress.

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