

Empirical Articles

Relationships of the Big Five facets and dysfunctional attitudes with depression

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There are two parallel lines of research on the relationship between personality and depression, one based on the Big Five personality model and one on Beck's cognitive theory of depression. However, no study has jointly examined the dimensions and facets of the Big Five and the dysfunctional attitudes of Beck's theory. This was the objective of the present study. The Revised NEO Personality Inventory (NEO PI-R), the Dysfunctional Attitude Scale (DAS-A), and the Beck Depression Inventory (BDI-IA) were applied to 221 adults from the Spanish general population (53.7% females; mean age: 38.3 years). Various multiple linear regression analyses revealed that only the facet of depression was significantly related to depressive symptomatology. The different associations of the broad and specific personality traits and the need to control as many third variables as possible to prevent the finding of spurious relationships are discussed.

Key words: Depression, personality, Big Five, dysfunctional attitudes.

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INTRODUCTION

There is a long tradition of personality-depression relationships, dating back at least to Hippocrates and Galen, as well as extensive scientific literature on such relationships, especially the hypothesis that certain personality characteristics are a vulnerability factor for depression, but also on the role of personality in the way depression presents, the course of depression, or the response to treatments for depression (Bucher, Suzuki & Samuel, 2019; Klein, Finsaas, Goldstein, Kessel, Kopala-Sibley & Kotov, 2018; Kotov, Gamez, Schmidt & Watson, 2010).

Much of this scientific literature has been developed around two lines of research. The first line has examined the relationships of depression with the personality dimensions proposed by the personality trait models such as those of Eysenck, Gray, Cloninger, or the *Big Five* (Klein *et al.*, 2018). Of these models, the Big Five is currently the most consensual and validated taxonomy of personality traits (McCrae & Costa, 2013). According to this model, which has been replicated in different countries and languages and with different instruments and populations, five global dimensions of personality called neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness summarize and integrate most personality traits.

Based on this model, a considerable number of studies have found, for example, that depressive disorders and symptoms are related to high levels of neuroticism and low levels of extraversion and conscientiousness (Hakulinen, Elovainio, Pulkki-Råback, Virtanen, Kivimäki & Jokela, 2015; Klein *et al.*, 2018; Kotov *et al.*, 2010). However, most of this research has focused on the basic five dimensions of the Big Five, not the specific

traits or facets that are part of each of those five dimensions. This is an important limitation when unravelling the relationships between personality and depression, as research has also shown that not all facets of a dimension have the same pattern of relationships with other variables or criteria of interest, so single analyses of dimensions could mask the relationship of some specific personality traits with those variables or criteria (Paunonen, 2003).

The few studies that have examined the relationships of the Big Five facets with depression have preferably used the facets measured by the Revised NEO Personality Inventory (NEO PI-R) of Costa and McCrae (1992), the inventory that is considered the standard instrument for the evaluation of the Big Five. These few studies have found some consistent results, for instance, that depressive symptomatology correlates positively with the facets of depression, angry hostility, self-consciousness, and vulnerability of the neuroticism dimension (Avia, Sanz, Sánchez-Bernardos, Martínez-Arias & Graña, 1995; Jourdy & Petot, 2017). However, when multiple linear regression analyses are used to control for the effect of the relationships between the neuroticism facets, only the depression facet shows significant relationships with depressive symptoms (Lyon, Juhasz, Brown & Elliott, 2020). Concerning the facets of the other dimensions of the Big Five, the few studies carried out have only found, consistently, that depressive symptomatology correlates negatively with the facet of assertiveness, from the extraversion dimension (Avia *et al.*, 1995; Lyon *et al.*, 2020), and with the facet of competence, from conscientiousness (Jourdy & Petot, 2017; Lyon *et al.*, 2020). Other facets also have significant correlations with depression in only one of these studies.

The second line of research on the relationships between personality and depression has focused on the two personality

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traits, sociotropy and autonomy, which, according to Beck's (1987) cognitive theory, constitute factors of vulnerability to depression. In this theory, personality traits are considered as cognitive schemas that present a higher hierarchical order than other cognitive schemas. Sociotropic schemas include attitudes and beliefs that involve a very high consideration of interpersonal relationships and high social dependence when judging one's worth. Such attitudes are measured by the subscale or factor of Dependency/Need for Approval of the Dysfunctional Attitude Scale or DAS of Weissman and Beck (1978), the most widely used and validated instrument to evaluate the dysfunctional attitudes of Beck's cognitive theory of depression (De Graaf, Roelofs & Huibers, 2009; Dunkley, Sanislow, Grilo & McGlashan, 2004; Sanz & Vázquez, 1993). Autonomous schemas include attitudes that give priority to independence, self-determination, goal achievement, and fear of failure, and correspond to the attitudes measured by the DAS's Achievement/Perfectionism subscale or factor (De Graaf *et al.*, 2009; Dunkley *et al.*, 2004; Sanz & Vázquez, 1993).

Based on Beck's cognitive theory, a good number of studies have found that dysfunctional attitudes of achievement/perfectionism and dependency/need for approval, both measured with the DAS or with some of its versions, show positive and significant relationships with depressive symptomatology in very diverse populations (Batmaz & Ozdel, 2016; De Graaf *et al.*, 2009; Ruiz, Suárez-Falcón, Odriozola-González *et al.*, 2015; Sanz & Vázquez, 1993). On the other hand, there are not many studies that have examined if dysfunctional attitudes mediate between personality and depressive symptomatology. One of the few studies is that of Lakdawalla and Hankin (2008). This study used a sample of university students and a longitudinal design and it demonstrated that the interaction between dysfunctional attitudes and stress partially mediate the relationship between negative emotionality, which is largely similar to neuroticism, and future elevations of depressive symptoms.

However, no study has been found that has jointly examined the relationships of the Big Five and dysfunctional attitudes with depression, except for the study of Peñate, Perestelo, Bethencourt and Ramírez (2009) with a sample of university students. In three multiple linear regression analyses of two depressive symptomatology measures taken at a 6-month interval, this study found that neuroticism and dysfunctional attitudes of achievement/perfectionism were significantly and consistently associated with depression, whereas the remaining dimensions of the Big Five and the dysfunctional attitudes of dependence/need for approval were not significantly related to depression or, in the case of openness and conscientiousness, they were only related in one of the three analyses.

Unfortunately, in the study of Peñate *et al.* (2009), an abbreviated version of the NEO PI-R, the NEO-FFI, was used to evaluate the Big Five, so it was not possible to examine the role of the facets of that model, but only that of its five dimensions. The objective of this study was precisely to examine concurrently the relationships of the Big Five and dysfunctional attitudes with depression, taking into account not only the dimensions of the Big Five, but also their facets, and not in a sample of university students, but a sample of the general population. Therefore, the main potential contribution of the study would be to determine if

any of those two models – the dimensions and facets of the Big Five and the dysfunctional attitudes of Beck's theory – better explain depressive symptomatology, as well as establishing which one of the two does it more accurately or if both are equally important. Also, this study could help identify which specific dimensions and facets of the Big Five and the dysfunctional attitudes of Beck's theory are more important when explaining depressive symptomatology.

METHOD

Participants

This study involved 221 adults (53.7% females) from the general population of the Community of Madrid, Spain, between the ages of 18 and 82 (mean age 38.3, *SD* = 16.3). These people were recruited by university psychology students who voluntarily participated in a seminar on personality and depression and invited their families and friends to participate in a study on personality and depression, following criteria that would ensure some heterogeneity of the sample in terms of age and sex. Four percent of that sample of participants responded "totally disagree" or "disagree" or did not respond to the validity item A of the NEO PI-R ("I have tried to answer all of these questions honestly and accurately"); 8.1% answered no or did not answer the validity item B of the NEO PI-R ("Have you responded to all of the statements?"), and 5.5% answered no or did not respond to the validity item C of the NEO PI-R ("Have you entered your responses in the correct areas?"). The data of all these participants were eliminated from the statistical analyses, leaving a sample of 198 participants, with a mean age of 38.6 years (range 18–82 years, *SD* = 16.5), of whom 54.6% were women. More information about the sociodemographic characteristics of the final sample of participants is displayed in Table 1.

A priori, the size of this sample allowed one to have enough statistical power to find statistically significant results. In the study by Peñate *et al.* (2009), a statistically significant squared multiple correlation coefficient (R^2) of 0.31 was obtained for a model that, out of 14

Table 1. Sociodemographic characteristics of the adult sample of the general population of this study

Characteristics	Frequency	Percentage
Civil status		
Single	93	47.5
Married or living with a stable partner	94	48.0
Separated	1	0.5
Divorced	3	1.5
Widowed	5	2.5
Level of education		
No studies	1	0.5
Primary studies, general basic education or equivalent	59	30.0
Secondary studies	46	23.3
Three-year university degree or equivalent	27	13.7
Bachelor/Licentiate degree or equivalent (4-year, 5-year or 6-year university degrees)	55	27.9
Doctoral degree or postgraduate studies	9	4.6
Employment status		
Employed	87	44.2
Retired/pensioner	17	8.6
Unemployed and has worked before	8	4.1
Unemployed and looking for a job	2	1.0
Student	51	25.9
Household tasks	30	15.2
Other	2	1.0

predictors, finally included three significant predictors, two of which were neuroticism and need for achievement. Taking into account this R^2 coefficient and using the GPower 3.1.9.6 program (Faul, Erdfelder, Buchner & Lang, 2009), in the present study it was estimated that, for an alpha level of 0.05 and a statistical power of 0.95, a total sample of 60 participants was needed to obtain a statistically significant R^2 of 0.31 for a first regression model that included the five dimensions of the Big Five and the two factors of dysfunctional depressive attitudes in addition to the five sociodemographic variables (12 predictors in total). On the other hand, it was estimated that for an alpha level of 0.05 and a statistical power of 0.95, a total sample of 103 participants was needed to obtain a statistically significant R^2 of 0.31 for a second regression model that included the 30 facets of the Big Five and the two factors of dysfunctional depressive attitudes in addition to the five sociodemographic variables (37 predictors in total).

Instruments

Revised NEO Personality Inventory (NEO PI-R; Costa Jr. & McCrae, 1992). The NEO PI-R is a 240-item self-reporting instrument rated on five-point Likert-type scales, ranging from 0 to 4, designed to evaluate personality based on the Big Five model. The NEO PI-R has five basic scales, each composed of 48 items whose scores can range from 0 to 192, which correspond to the dimensions of the Big Five, and 30 specific scales of eight items each whose scores can range from 0 to 32, which aim to measure the facets that, according to Costa and McCrae (1992), make up the Big Five. The scores of the different NEO PI-R scales have shown adequate reliability and validity in samples of the general population from different countries (McCrae & Allik, 2002). This study used the Spanish adaptation of NEO PI-R of Avia, Sanz & Sánchez-Bernardos (1997), whose scores in samples from the Spanish population have also shown adequate reliability and validity indices (Pelechano, González-Leandro, García & Morán, 2013). In the sample of this study, internal consistency indices were obtained that, according to the criteria of Hernández, Ponsoda, Muñoz, Prieto and Elosua (2016), can be considered good or excellent for the scores of the five dimensions (with Cronbach alphas in a range of 0.83–0.92) and of one of the facets (alpha of 0.82 for depression); adequate for the scores of 10 other facets (alphas in a range of 0.71–0.79); adequate, but with some deficiencies, for the scores of 11 other facets (alphas in a range of 0.60–0.69), and inadequate for the remaining 8 facets (alphas in a range of 0.48–0.59) (Table 2).

Dysfunctional Attitude Scale, Form A (DAS-A; Weissman & Beck, 1978). The DAS-A is a 40-item self-reporting instrument designed to assess the presence and intensity of the dysfunctional attitudes that are characteristic of depressed patients. For each of the DAS-A items, the respondent must indicate, on a seven-point Likert-type scale, the degree to which they agree with the attitude reflected in the item. Each item is scored between 1 and 7, such that the DAS-A provides a total score between 40 and 280, with higher scores indicating a higher level of dysfunctional attitudes. The DAS-A has a fairly stable bifactorial structure, which has been replicated in various studies with different samples of participants, and which points to a first factor related to issues of achievement and perfectionism and a second factor related to issues of dependence and need for approval (De Graaf *et al.*, 2009; Sanz & Vázquez, 1993). Based on these factorial results, the DAS-A also provides scores on a subscale of dysfunctional attitudes of achievement/perfectionism and a subscale of dysfunctional attitudes of dependence/need for approval. The scores of the total scale and the subscales of the DAS-A have shown adequate reliability and validity indices in very different populations (De Graaf *et al.*, 2009; Sanz & Vázquez, 1993). This study used the Spanish adaptation of the DAS-A of Sanz and Vázquez (1993, 1994), and we calculated the scores on its subscales of dysfunctional attitudes of achievement and dependence, which also have adequate reliability and validity in samples of Spanish participants (Sanz & Vázquez, 1993, 1994). The sample in this study obtained an adequate internal consistency index for the scores of the Achievement subscale ($\alpha = 0.77$) and adequate, but with some deficiencies, for the scores of the Dependency subscale ($\alpha = 0.61$).

Table 2. Correlations of the depressive symptomatology measure (BDI-IA) with the control variables, dysfunctional attitude measures (DAS-A), and measurements of the dimensions and facets of the Big Five (NEO PI-R), and mean, standard deviation (SD), and internal consistency coefficient (Cronbach alpha) of the measures

Predictors	BDI-IA	Mean	SD	Alpha
Control variable				
Gender (0 = female; 1 = male)	−0.259**	—	—	—
Status civil: married or living with a stable partner (0 = no; 1 = yes)	0.066	—	—	—
Employment status: employed (0 = no; 1 = yes)	−0.195**	—	—	—
Age	0.229**	37.76	15.99	—
Education level (0–5)	−0.216**	2.47	1.28	—
DAS-A measures				
Achievement	0.234**	34.85	11.52	0.77
Dependence	0.215**	28.57	7.89	0.61
NEO PI-R dimensions				
Neuroticism	0.457**	91.15	23.99	0.92
Extraversion	−0.188**	104.83	21.10	0.87
Openness to experience	−0.113	111.22	20.16	0.88
Agreeableness	−0.022	120.47	16.70	0.83
Conscientiousness	−0.109	117.88	21.92	0.90
NEO PI-R facets				
Anxiety	0.393**	18.88	5.52	0.76
Angry hostility	0.369**	12.40	4.79	0.68
Depression	0.486**	15.21	6.39	0.82
Self-consciousness	0.307**	15.55	5.36	0.71
Impulsiveness	0.071	16.78	4.06	0.49
Vulnerability	0.333**	12.29	5.21	0.78
Warmth	−0.093	20.53	4.48	0.64
Gregariousness	−0.062	16.71	5.66	0.70
Assertiveness	−0.225**	13.67	4.82	0.69
Activity	−0.013	17.74	4.95	0.67
Excitement-seeking	−0.060	15.61	5.02	0.57
Positive emotions	−0.280**	20.53	5.82	0.79
Fantasy	0.034	18.42	5.43	0.72
Aesthetics	0.006	19.83	5.53	0.76
Feelings	−0.082	19.25	3.95	0.53
Actions	−0.149*	14.68	4.12	0.54
Ideas	−0.159*	18.13	5.81	0.76
Values	−0.123	20.88	4.14	0.58
Trust	−0.082	19.97	4.60	0.66
Straightforwardness	0.014	18.48	4.68	0.58
Altruism	−0.012	22.01	3.88	0.63
Compliance	−0.071	16.97	4.71	0.60
Modesty	0.023	20.20	4.71	0.67
Tender-mindedness	0.053	22.82	3.52	0.48
Competence	−0.094	20.10	4.52	0.66
Order	−0.088	18.20	4.91	0.63
Dutifulness	−0.030	22.13	4.18	0.59
Achievement striving	−0.038	19.93	4.58	0.66
Self-discipline	−0.148*	19.29	5.30	0.74
Deliberation	−0.039	18.22	5.60	0.75
Criterion variable: BDI-IA	—	5.69	6.04	0.85

*Correlation is significant at $p < 0.05$ (bilateral).

**Correlation is significant at $p < 0.01$ (bilateral).

Beck Depression Inventory, 1978 version (BDI-IA; Beck, Rush, Shaw & Emery, 1979). The BDI is a 21-item self-report designed to assess the severity of depressive symptomatology. In each item, the person has to choose, from a set of four alternatives sorted by the severity they reflect,

the phrase that is best describes their mood during the last week. Each item is rated from 0 to 3 points depending on the chosen alternative and, after adding the score of each item, a total score is obtained in depressive symptomatology that can range from 0 to 63. There is abundant scientific literature showing that BDI-IA scores have adequate reliability and validity in samples from very different populations (Beck, Steer & Garbin, 1988). This study used the Spanish adaptation of the BDI-IA, whose scores in samples of the general population also have adequate reliability and validity indices Vázquez and Sanz (1997). In the sample in this study, an excellent internal consistency index was obtained ($\alpha = 0.85$).

Procedure

The instruments were applied individually by the psychology student who, as part of a voluntary seminar, had invited the participant to voluntarily collaborate in the research. Previously, the participants read and signed an informed consent form. During that seminar, the last author of this study carried out the training and supervision of the students in the administration of the NEO PI-R, the DAS-A, and the BDI-IA.

Data analysis

The following statistical analyses were performed in this study using the IBM SPSS statistical package, version 22.0: (1) Pearson's correlations of the depression measure with the measures of dysfunctional attitudes and the Big Five dimensions and facets; and (2) standard multiple linear regression analyses on the depressive symptomatology using as predictors the measures of the dysfunctional attitudes and the measures of the Big Five dimensions or facets that showed a statistically significant correlation ($p < 0.05$) with the measure of the depressive symptomatology. These regression analyses were performed controlling for the effect of the sociodemographic variables that are often related to individual differences in depression (sex, age, marital status, level of studies, and employment status) and that showed significant correlations with depression in this study.

As a step prior to the regression analysis, the possible existence of collinearity problems among the predictors was tested by calculating tolerance rates and variance inflation factors (VIF), and considering that tolerance rates below 0.20 are indicative of potential collinearity problems and indices below 0.10 indicate serious problems, whereas VIFs above 12 also suggest a problem of collinearity (Martínez Arias, Castellanos López & Chacón Gómez, 2015).

RESULTS

Relationships of the big five dimensions and dysfunctional attitudes with depressive symptomatology

Table 2 presents the correlations of the depressive symptomatology measure (BDI-IA) with the control variables (sex, age, marital status, employment status, level of studies), the dysfunctional attitude measures (DAS-A), and the measures of the dimensions and facets of the Big Five (NEO PI-R). As can be seen in this table, both the dysfunctional attitudes of achievement and dependence as well as sex, age, employment status, and level of studies showed significant correlations with depressive symptoms (range, in absolute value, between 0.19 and 0.26). Of the Big Five dimensions, only neuroticism and extraversion showed significant correlations with depressive symptoms, positive in the case of neuroticism ($r = 0.46$) and negative for extraversion ($r = -0.19$).

However, when those eight variables that correlated significantly with depressive symptomatology were included in a multiple linear regression analysis, the results (Table 3) indicated

that, in a model that explained 32.7% of the variance of depressive symptoms [$R^2 = 0.327$, $F(8, 194) = 11.77$, $p < 0.001$], only neuroticism, age, and employment status were significantly associated with depressive symptoms ($p < 0.001$, 0.002, and 0.014, respectively). In contrast, neither the dysfunctional attitudes of achievement nor dependence were associated with depressive symptoms, or the Big Five extraversion dimension or sex. The size of the partial correlations shown in Table 3 indicated that neuroticism was the most important variable to explain the variance of depression ($\text{partial } r = 0.40$), followed by age ($\text{partial } r = 0.21$) and employment status ($\text{partial } r = -0.17$), such that a higher level of neuroticism, higher age, or unemployment, in that order of importance, were associated with a higher level of depressive symptomatology. These regression analysis results were not affected by collinearity issues, as all tolerance rates were greater than 0.60 and all VIFs were less than 1.66.

Relationships of the big five facets and dysfunctional attitudes with depressive symptomatology

Although the analyses discussed above indicated that neuroticism was the variable that explained the highest percentage of the variance of depressive symptomatology (16% according to its $\text{partial } r = 0.40$), the correlations in Table 2 indicated that not all the facets of neuroticism were significantly associated with depressive symptoms. Specifically, the facets of anxiety, angry hostility, depression, self-consciousness, and vulnerability, but not impulsiveness, were positively and significantly related to depressive symptoms, with correlations between moderate and large (range between 0.31 and 0.49). The correlations in Table 2 also indicated that two facets of extraversion – assertiveness and positive emotions – two facets of openness – actions and ideas – and one facet of conscientiousness – self-discipline – were also significantly, albeit negatively, related to depressive symptomatology, with correlations between small and moderate (range between -0.15 and -0.28).

However, when all the facets that correlated significantly with depressive symptoms were included, together with the control

Table 3. Regression of depression-related measures of dysfunctional attitudes (DAS-A) and depression-related measures of the personality dimensions of the Big Five (NEO PI-R) on the measure of depressive symptomatology (BDI-IA)

Predictors	Beta	<i>t</i>	<i>p</i>	Partial <i>r</i>
Control variables				
Gender	−0.119	−1.85	0.065	−0.13
Age	0.235	3.09	0.002*	0.21
Employment status: employed	−0.152	−2.46	0.014*	−0.17
Education level	−0.069	−0.957	0.340	−0.06
DAS-A measures				
Achievement	0.032	0.44	0.657	0.03
Dependence	0.004	0.06	0.952	0.00
NEO PI-R dimensions				
Neuroticism	0.436	6.08	0.001*	0.40
Extraversion	0.061	0.87	0.385	0.06

*Statistically significant predictors at $p < 0.05$.

variables and the dysfunctional attitude measures, in a multiple linear regression analysis, their results (Table 4) indicated that, in a model explaining 37.8% of the variance of depressive symptoms [$R^2 = 0.378$, $F(16, 186) = 7.05$, $p < 0.001$], only the facets of depression, age, sex, and employment status were significantly associated with depressive symptomatology ($p < 0.001$, 0.028, 0.046, and 0.016, respectively), but neither dysfunctional attitudes of achievement nor dependence were associated, nor were the other facets of neuroticism nor the facets of extraversion, openness, or conscientiousness. The size of the partial correlations presented in Table 4 indicates that the depression facet was the most important variable to explain the variance of depressive symptomatology (6% according to its *partial r* = 0.25), followed by employment status (*partial r* = -0.17), age (*partial r* = 0.16), and sex (*partial r* = -0.14), such that a higher level of trait depression, being unemployed, being female, and being older, in that order of importance, were associated with a higher level of depressive symptoms. These regression analysis results were not affected by collinearity issues, as all tolerance rates were greater than 0.28 and all VIFs were less than 3.47.

DISCUSSION

The objective of this study was to examine the relationship between personality and depressive symptomatology by jointly analyzing both the constructs proposed by the model of the Big Five – its dimensions and facets – and Beck's cognitive theory of depression – the dysfunctional attitudes of achievement/perfectionism and dependence/need for approval. In this sense, the results obtained expand and nuance those obtained in the only prior study with a similar objective, that of Peñate *et al.* (2009),

since, in our study, contrary to that of Peñate *et al.*, it was possible to examine the role of the personality facets of the Big Five and not only the role of its five basic dimensions.

Thus, the results of this study, on the one hand, confirm Peñate *et al.*'s results that, out of the five dimensions of the Big Five, neuroticism is the dimension that is specifically related to depressive symptomatology after controlling for the effect of dysfunctional attitudes, the rest of the Big Five dimensions and, in the case of this study, also the basic sociodemographic characteristics.

Although previous studies have found that other dimensions of the Big Five, especially extraversion and conscientiousness (Chioqueta & Stiles, 2005; Hakulinen *et al.*, 2015; Wolfenstein & Trull, 1997), are also related to depressive symptoms, these studies have not controlled for the effect of dysfunctional attitudes. In addition, other studies, which also have not controlled for this effect, have found that the only dimension of the Big Five significantly associated with depressive symptomatology is neuroticism (Lamers, Westerhof, Kovács & Bohlmeijer, 2012).

On another hand, the results of this study broaden the results of Peñate *et al.* (2009) and the previous scientific literature, finding that the previously observed relationships between neuroticism and depressive symptoms are limited to the facet of depression. It is true that, in a very recent study (Lyon *et al.*, 2020), when including all the facets of NEO PI-R as predictors in a multiple linear regression analysis, it was also found that the depression facet was the only facet of neuroticism that had significant relationships with depressive symptomatology. However, this study of Lyon *et al.* did not examine the effect of the dysfunctional attitudes of achievement/perfectionism or dependence/need for approval on depressive symptomatology in conjunction with the effect of the Big Five facets. Therefore, the findings of this study on the important role of depression facet to explain individual differences in depressive symptoms even after controlling for the effect of dysfunctional attitudes are novel and relevant.

Given the strong association between the dysfunctional attitudes themselves and neuroticism (Dunkley *et al.*, 2004; Samar, Walton & Mcdermut, 2013), it could be hypothesized that dysfunctional attitudes could be the psychological mechanism that partially or completely mediates the effect of neuroticism or the effect of the facet of depression. In fact, this study found positive and significant relationships of neuroticism and the facet of depression with the dysfunctional attitudes of achievement/perfectionism ($r = 0.28$ and 0.30 , respectively, both with $p < 0.001$) and with the dysfunctional attitudes of dependence/need for approval ($r = 0.39$ and 0.37 respectively, both with $p < 0.001$). However, the results do not support that mediating role of dysfunctional attitudes because neither the dysfunctional attitudes of achievement/perfectionism nor the dysfunctional attitudes of dependence/need for approval showed significant relationships with depressive symptomatology after controlling for the effects of the sociodemographic characteristics and the Big Five dimensions or facets. In this regard, readers are reminded that among the conditions that a variable must meet to be considered a mediator in the relationship between an independent variable and a dependent variable (Hayes, 2018) is a statistically

Table 4. Regression of depression-related measures of dysfunctional attitudes (DAS-A) and depression-related measures of the personality facets of the Big Five (NEO PI-R) on the measure of depressive symptomatology (BDI-IA)

Predictors	Beta	<i>t</i>	<i>p</i>	Partial <i>r</i>
Control variable				
Gender	-0.131	-2.01	0.046*	-0.15
Age	0.178	2.21	0.028*	0.16
Employment status: employed	-0.154	-2.42	0.016*	-0.17
Education level	-0.060	-0.791	0.430	-0.06
DAS-A measures				
Achievement	0.009	0.12	0.899	0.01
Dependence	0.041	0.59	0.550	0.04
NEO PI-R facets				
Anxiety	0.084	0.89	0.370	0.06
Angry hostility	0.115	1.52	0.128	0.11
Depression	0.388	3.59	0.001*	0.25
Self-consciousness	-0.125	-1.39	0.164	-0.10
Vulnerability	-0.008	-0.08	0.937	-0.01
Assertiveness	0.044	0.55	0.578	0.04
Positive emotions	-0.115	-1.53	0.126	-0.11
Actions	0.005	0.06	0.947	0.00
Ideas	0.015	0.21	0.828	0.01
Self-discipline	0.012	0.17	0.862	0.01

*Statistically significant predictors at $p < 0.05$.

significant relationship between the alleged mediator variable – dysfunctional attitudes – and the dependent variable – depressive symptomatology – after controlling for the effect of the independent variable – neuroticism or the depression facet – which was not the case in this study.

This latter finding is not consistent with the results of Peñate *et al.* (2009), which showed that the dysfunctional attitudes of achievement/perfectionism, but not those of dependence/need for approval, did have a statistically significant relationship with depressive symptoms after controlling for the effect of neuroticism. The explanation of this discrepancy between the results of Peñate *et al.* and those of this study could lie, in part, in the differences between the two studies concerning the sociodemographic characteristics of their samples of participants, in particular in the sociodemographic characteristics that the scientific literature has related to depression, and in the differences between the two studies in terms of controlling for the effect of these characteristics when estimating the role of dysfunctional attitudes. The sample of participants in the study of Peñate *et al.* was composed of university students, so it is presumably much more homogeneous in certain sociodemographic characteristics such as age, level of studies, employment status, or marital status. More importantly, in the study of Peñate *et al.*, the effect of such sociodemographic characteristics was not controlled. In contrast, the sample of participants in our study, being composed of people from the general population, was much more heterogeneous in these sociodemographic characteristics. Moreover, several of them – age, level of studies, and employment status – showed significant correlations with depressive symptomatology, as they did in other previous studies with samples of the general population (Lamers *et al.*, 2012). Moreover, when including them in the regression analyses, two of them – age and employment status – continued to show significant relationships with depression even after controlling for the effects of the Big Five dimensions or facets. Therefore, the relationship between dysfunctional attitudes of achievement/perfectionism and depressive symptomatology may depend in part on the relationships of certain sociodemographic characteristics both with depressive symptoms and with the dysfunctional attitudes of achievement/perfectionism themselves. Thus, when controlling for the effect of these characteristics on depressive symptoms, the relationship between the dysfunctional attitudes of achievement/perfectionism and depressive symptomatology would not be significant. In fact, in our study, when we conducted a multiple linear regression analysis of the sociodemographic characteristics on the dysfunctional attitudes of achievement/perfectionism, these characteristics explained 17.6% of the variance of dysfunctional attitudes of achievement/perfectionism [$R^2 = 0.176$, $F(5, 203) = 8.66$, $p < 0.001$], and all of them – sex, age, marital status, level of education, and employment status – had statistically significant regression coefficients on the dysfunctional attitudes of achievement/perfectionism ($p < 0.05$).

On another hand, in our study, once the effect of sociodemographic characteristics and the facet of depression had been controlled, no facet of extraversion, openness to experience, agreeableness, or conscientiousness showed a significant relationship with depressive symptomatology. This finding is not

consistent with the results obtained by Lyon *et al.* (2020) when including all the facets of the NEO PI-R in a multiple linear regression analysis on depressive symptomatology because, in addition to the facet of depression, that study found that the facets of assertiveness and positive emotions (from the extraversion dimension) and the competence facet (from the conscientiousness dimension) also showed significant relationships with depressive symptoms. However, we underline that the study of Lyons *et al.* not only did not jointly examine the effect of dysfunctional attitudes on depressive symptomatology, but neither did it control for the effect of the sociodemographic characteristics of its sample of participants on depressive symptomatology, even though this sample was also recruited from the general population and was very heterogeneous in terms of age, level of studies, marital status, and employment status. Therefore, when controlling for the effects of these sociodemographic characteristics on depressive symptomatology, the relationships of other facets of the Big Five other than the depression facet may not have been significant, as was found in our study.

Other previous studies have also found that some facets of the dimensions of extraversion, openness to experience, agreeableness, or conscientiousness seem to be related to depressive symptomatology. However, the results of these studies are based on simple correlations (Jourdy & Petot, 2017), they have not taken into account the effect of all the facets of the Big Five in their multiple linear regression analyses, and they have even left out the facets of neuroticism (Wolfenstein & Trull, 1997), or they perform a different regression analysis for the facets of each of the Big Five dimensions (Quilty, Pelletier, DeYoung & Michael Bagby, 2013). Moreover, none of them took into account the effects of dysfunctional attitudes. The data from this study suggest that all of these previous results are best explained by the effects of neuroticism and, in particular, the facet of depression and, therefore, these previous results are probably artefacts resulting from not having controlled for such effects.

In this study, the regression model that included neuroticism, age, and employment status explained 32.7% of the variance of depressive symptoms, while the regression model that included depression, age, sex, and employment status explained 37.8% of the differences. These results indicate that a great part of the depressive symptomatology variance is yet to be explained, and for that reason, there are still many psychological, social, or biological variables to identify that could potentially be related to depressive symptomatology. That being said, considering a medium size correlation ($0.30 \leq r < 0.50$) as a moderate practical significance, it is important to highlight that neuroticism and depression facet showed partial correlations of 0.40 and 0.25, respectively, with depressive symptomatology. This suggests that prevention and treatment interventions aimed at modifying those two personality constructs can generate changes in depressive symptomatology of practical significance, especially those aimed at the neuroticism dimension.

In sum, the results of this study confirm the relationship between neuroticism and depressive symptomatology, previously established in the scientific literature. Second and more importantly, the results of the present study reveal that previously observed relationships between neuroticism and depressive symptoms are limited to the facet of depression (or trait

depression), given that it is the only facet out of the Big Five that showed a significant relationship with depressive symptomatology in the general population after controlling the effects of the sociodemographic characteristics. A third contribution of this study shows that, when controlling the effect of trait depression and sociodemographic characteristics, neither the dysfunctional attitudes of achievement/perfectionism nor dependency/need for approval show a significant relationship with depressive symptomatology in the general population.

This study also has some limitations. First, the measures of eight of the 30 facets of the Big Five had inadequate internal consistency indices. Therefore, the results for these eight facets – impulsiveness, excitement-seeking, feelings, actions, values, straightforwardness, tender-mindedness, and dutifulness – should be taken with some caution, as the lack of reliability could explain the absence of meaningful relationships with depressive symptomatology. Future research should use measures of these facets that may show better reliability indices (e.g., the IPIP-NEO of Goldberg, 1999, measures the same facets as the NEO PI-R, but with more items and with better internal consistency indices). Second, the study used a cross-sectional, non-longitudinal design, so it is not possible to test more causal hypotheses about the relationships found. Furthermore, longitudinal studies would allow one to examine the complex and dynamic relationships between personality, stress, and depressive symptomatology, and the role that personality changes over the course of development may have in those relationships. Third, the study used a sample from the general population and, in this type of population, compared to clinical populations, psychopathological measures such as those of depressive symptomatology or dysfunctional attitudes have a lower variance, which could affect the possibility of detecting significant relationships of these measurements with those of other variables. In this sense, in a sample of people with depressive disorders, for example, dysfunctional attitudes of achievement/perfectionism or dependence/need for approval might be found to relate to depressive symptomatology when controlling for the effect of neuroticism or the facet of depression. Such dysfunctional attitudes might even be found to act as mediators in the relationship between neuroticism or the facet of depression and depressive symptomatology. Furthermore, in a sample that presents greater variability in the presence and severity of depressive symptoms such as a sample of people with depressive disorders, it is possible that other facets of personality predict depressive symptoms beyond the facet of depression (Jourdy, Petot & Aguerre, 2018). It would therefore be important for future studies to try to replicate the results of this study in clinical samples. Fourth, the study did not examine the mechanisms that mediate the relationship between trait depression and depressive symptomatology. In this sense, it is important to point out that there are very few previous studies that have specifically examined these mechanisms. Two exceptions are, for example, the studies by Gordon (2008) and Huprich *et al.* (2012). Both examined the factors that mediated the relationship between the NEO PI-R facet of depression and depressive symptomatology measured by the BDI-II. Gordon (2008) found that perceived stress, but not glucocorticoid level, was a mediating variable of this relationship, while Huprich *et al.* (2012) found that rejection sensitivity and difficulties with establishing and maintaining

intimate relationships, as captured by the alienation and insecure attachment constructs, were also mediating variables. Despite the scarce research in this regard, other possible candidates to reflect the mechanisms that relate trait depression with depressive symptomatology could be found in the broader scientific literature that has examined the mediating variables between depressive symptomatology and neuroticism, the personality dimension which encompasses trait depression. Therefore, it would be important for future research to transfer to the field of trait depression the studies that have shown in the field of neuroticism the mediating role of, for example, the following variables: rumination, including several of its components such as, for example, reflection, brooding, and rumination on the causes of sadness (Roelofs, Huibers, Peeters & Arntz, 2008; Roelofs, Huibers, Peeters, Arntz & van Os, 2008); negative automatic thoughts (Du, Luo, Shen *et al.*, 2015; Kercher, Rapee & Schniering, 2009); differential exposure to daily stressors or negative events (Hutchinson & Williams, 2007; Kercher *et al.*, 2009); negative inferential style (Lakdawalla & Hankin, 2008), and maladaptive emotional regulation strategies (Yoon, Maltby & Joormann, 2013).

Despite these limitations, the results of this study: (1) suggest that neuroticism, and, in particular, its facet of depression, is the most important personality trait of the Big Five to explain individual differences in depressive symptomatology; (2) confirm the usefulness of the Big Five model to understand mental health; and (3) underline the need for correlational studies to take into account the effect of as many third variables as possible, both of interest (predictors) and control variables, to prevent the finding of spurious or confounding effects between some predictors and the criteria.

Finally, the findings of this study have several practical implications. The main implication is that prevention and treatment programs aimed at depressive symptomatology should assess and address the personality traits that may constitute factors of vulnerability to depression. In particular, the results of present study suggest that both neuroticism and trait depression, especially this last one, are two main targets to identify people with risk factors for depression symptomatology and to whom depression prevention programs can be aimed. Also, the findings of this study suggest that both prevention and treatment programs for depressive symptomatology should focus on modifying the neuroticism dimension and in particular the facet of depression. This could be achieved by modifying the mechanisms that mediate the relationship between depressive symptomatology and neuroticism or trait depression. Several potential mechanisms known to be associated with depression include perceived stress, fear of rejection, difficulties with establishing and maintaining intimate relationships, rumination, automatic negative thoughts, differential exposure to daily stressors or negative events, negative inferential style, and maladaptive emotional regulation strategies. In summary, future investigations focused on the relationships between personality and depressive symptomatology and on the mechanisms that mediate these relationships can help the development of prevention and treatment interventions.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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