RESEARCH ARTICLE

WILEY

Coping with stress and personality: A study in pregnancies complicated by hypertension

Sabrina Chapuis-de-Andrade[1,2] | Carmen Moret-Tatay[3] |
Tatiana Quarti Irigaray[4] | Dalton Breno Costa[5] | Ivan Carlos Ferreira Antonello[1] |
Bartira Ercília Pinheiro da Costa[1]

[1]Postgraduate Program in Medicine and Health Sciences, Pontifical Catholic University of Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

[2]Department of Public Health, Federal Institute of Education, Science and Technology of Rio Grande do Sul (IFRS), Alvorada, Brazil

[3]MEB laboratory, Faculty of Psychology, Universidad Católica de Valencia San Vicente Mártir (UCV), Valencia, Spain

[4]Postgraduate Program in Psychology, Pontifical Catholic University of Rio Grande do Sul (PUCRS), Porto Alegre, Brazil

[5]Department of Psychology, Federal University of Health Sciences of Porto Alegre (UFCSPA), Porto Alegre, Brazil

Correspondence
Sabrina Chapuis-de-Andrade, Avenida Ipiranga, 6690, 90619-900, Porto Alegre, Brazil.
E-mail: sabrinachapuis@gmail.com

Funding information
IFRS; Coordenação de Aperfeiçoamento de Pessoal de Nível Superior

Abstract

Objective: The objective of this work is to investigate the role of personality in pregnancies complicated by hypertension, thru analysis of structure and associations between negative affect and coping strategies, and their role towards psychological distress.

Method: A cross-sectional study with 343 women, where 192 pregnancies complicated by hypertension, was carried out by employing the following tools: the five-factor model (Big Five), Depression, Anxiety and Stress Scale (DASS-21), and Jalowiec's Coping Inventory. Two complementary strategies were carried out: an exploratory approach on the interactions between latent variables and a confirmatory technique.

Results: Coping strategies seem to be dissociated in the hypertensive group, and these participants tend to use strategies according to their personality, mostly emotion focused, extraversion, and neuroticism. The extraversion model exclusively shows an acceptable goodness-of-fit after a structural equation modelling. A multigroup analysis reached a full metric invariance level for extraversion.

Conclusions: These results are of interest for both clinical and research settings. Prenatal screening and associated interventions may reduce perinatal negative affective states and related pregnancy complications.

KEYWORDS
coping, pregnancy-induced hypertension, network analysis, personality, structural equation modelling

1 | INTRODUCTION

Having a baby is an important event in women's life. For many, it is a time to celebrate. However, for some of them, it can quickly become overshadowed by adversities or even loss due to hypertension.

Hypertension is one of the most common health problems in pregnancy, reaching epidemic proportions (Chen et al., 2017). Worldwide, 5% to 10% of all pregnancies are complicated by hypertension

(Coutinho et al., 2018). It is associated with adverse pregnancy outcomes as well as maternal and fetal morbidity and mortality (Guo et al., 2020; Moussa et al., 2018).

There are different types of hypertensive disorders in pregnancy. Usually, they can be classified as follows: chronic hypertension, gestational hypertension, and preeclampsia syndrome (Chen et al., 2017). Differences between these groups are related to clinical characteristics (Steegers et al., 2010). From the physical perspective, hypertension leads to metabolic and organ changes. Consequently, it is related

to higher risk of arrhythmia, stroke, and mortality (Coutinho et al., 2018; Verdecchia et al., 2019).

There are several theories that try to characterize hypertensive disorders in pregnancy pathophysiology. It is defined as a multifactorial disease, where both genetic and environmental factors can put pregnant women at greater risk for hypertension. The lack of placental perfusion, for example, is a condition that worsens the hypertensive picture (Rana et al., 2020). Its consequences trigger problems in both mother and foetus. Depending on the severity of the hypertensive disease, the solution is pregnancy termination, despite eventual implications to the foetus' survival (Steegers et al., 2010).

Therefore, hypertension is a factor of high interference in pregnant woman's quality of life (Patrícia Medeiros Falcão et al., 2016). Moreover, hypertension in pregnancy might amplify vulnerabilities and other physical and mental health problems. For that reason, personality should be evaluated, since authors have found that it plays an important role in predicting physical and mental health (Aluja et al., 2009; Balada et al., 2019; Hengartner et al., 2016).

Personality refers to relatively stable emotional, behavioural, cognitive, and motivational differences among subjects (Baumert et al., 2017; McCrae & Costa, 2008). The five-factor model (Big Five) is the most common personality model used to describe human personality. This model suggests five broad domains (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience) and classifies personality in traits (Costa et al., 2019). Interestingly, previous studies have found association between the Big Five traits and the health outcome. Ibrahim et al. (2015) showed that higher levels of extraversion and lower levels of neuroticism were associated with higher physical health-related quality of life in patients with hypertension. Also, the authors highlighted the importance of biological pathways that linked personality to future mortality risk. A recent study found that higher conscientiousness was associated with lower risk of mortality (O'Súilleabháin et al., 2021).

Conversely, pregnancy is a period of intense changes in the body and in life. Furthermore, pregnant women have increased biologic vulnerability due to the physical, physiological, and psychological changes (van Heyningen et al., 2017). Thus, some symptoms of stress, anxiety, and even depression are relatively common in women during the prenatal period (Gilles et al., 2018). However, studies highlighted that the altered emotional state of the pregnant women, such as stress, anxiety, and depression can lead to negative outcomes in pregnancy (Black, 2007; Guardino & Dunkel Schetter, 2014; Roos et al., 2011), especially in high-risk pregnancy (Yali & Lobel, 1999).

Although most studies focused on postnatal mental problems, especially postnatal depression (Howard et al., 2014), it is known that prevalence of mental disorders can be higher in the prenatal period than in the postnatal period (Soto-Balbuena et al., 2018). According to a meta-analysis, the prevalence rate for self-report anxiety symptoms was 24.6% in the third trimester of pregnancy (Dennis et al., 2017). The authors show that prevalence rates of clinical anxiety disorders steadily increase in a sample of perinatal women (Goldfinger et al., 2020). Moreover, studies revealed that mental problems may increase as the pregnancy progresses

Key Practitioner Message

- Hypertensive women have important differences in coping strategies and personality factors when compared to a control group. These differences are remarkable in women with preeclampsia syndrome.
- Depression, anxiety, and stress were higher in the total hypertension group than the control group.
- Hypertensive women tend to use coping strategies according to their personality, mostly emotion focused.
- In the hypertensive group, women who use more emotion-focused coping strategies achieved higher scores of depression, anxiety, and stress.

(Effati-Daryani et al., 2018). In other words, the third trimester is the most complex to pregnant women, especially for those who have their pregnancy complicated by hypertension. In this context, women may experience demands that can put them in higher risk for other diseases. However, these demands can be better faced depending of coping strategies.

Coping is characterized as cognitive and behavioural efforts that subjects use to manage demands and conflicts among them (Constant et al., 2018; Folkman & Lazarus, 1988). These efforts can be classified into two main groups: problem focused—when the purpose is to manage or alter the source of stress; or emotion focused—a passive coping in which strategies are used to regulate the negative emotions associated with a situation rather than directly dealing with the threatening situation itself (Hamilton & Lobel, 2008; Moret-Tatay et al., 2016a). Therefore, it is important to investigate coping strategies in pregnancy, once it shows us women's coping patterns, which can be appropriate or inadequate and can impact on both women and foetus' health.

Given that the literature seems to indicate that personality traits might bias the initial states of mental and physical disorders and their persistence (Corr & Matthews, 2020), we consider of interest to examine these effects in a critical stressful state such as pregnancies complicated by hypertension. To the best of our knowledge, this is the first study to examine the relationship between personality, psychological factors, negative affect, and coping strategies, in pregnancies complicated by hypertension. Given the role of both extraversion and neuroticism, that have been previously highlighted in the field (Uliaszek et al., 2010), it is hypothesized that these personality traits are related to the coping strategies and negative affect relationships during pregnancy. Moreover, it is hypothesized that differences in these models appear between hypertensive and healthy pregnancies. To do so, an exploratory and emerging methodology in the field was employed, aiming to achieve a better understanding on both the structure and the relationship between those processes. Therefore, a network analysis approach was chosen. This is a graph theory-based methodology which can be used to examine the relationship between observable and latent variables (Bernabé-Valero et al., 2019; Díaz-

Batanero et al., 2020; Puga et al., 2015; Ruiz-Ruano et al., 2019; Solares-Hernández et al., 2020). Even if the literature argues the role of networks analysis as an emergent approach rather that the classical analysis on latent variables, the previous strategy has also been considered an ideal complement for a confirmatory approach (Guyon et al., 2017). For this reason, both analyses are considered, where the data structure is explored under a network analysis, and a confirmatory approach was carried out through structural equation modelling (including an analysis of invariance).

2 | METHODS

2.1 | Study population and data collection procedures

This cross-sectional study was conducted on an incidental sample encompassing 343 participants, in a hospital in Southern Brazil. The research recruited pregnant women in the third trimester attending prenatal care in the obstetric department in the hospital. Participants were eligible if they were 18 years of age or older. Women were excluded if they had a previous diagnosis of kidney disease, a history of diabetes, fetal malformation, and/or lack of information in the database. Participants' identity confidentiality was guaranteed, and their participation was voluntary. Women completed at enrolment an interviewer-administered survey to collect information regarding sociodemographics, pre-pregnancy general health, and reproductive and medical history.

Participants were classified according to their diagnosis regarding previous hypertension at pregnancy: 151 (44%) women were healthy with uncomplicated pregnancies and 192 (56%) women complicated by hypertension. Among hypertensive women, 61 (32%) women presented gestational hypertension, 100 (52%) women developed pre-eclampsia syndrome, and 31 (16%) women remain with chronic hypertension. The mean age of the control group was 26.1 ± 5.7 years and in the hypertensive group was $28.5 + 6.9$ years old. The proportion of Caucasian women in the control group was 24% ($n = 36$) and in the hypertensive group 24% ($n = 47$). The mean gestational age in the control group was 271.8 ± 12.8 days and in the hypertensive group 264.7 ± 19.5 days.

Volunteers were asked to complete four brief self-administered survey instruments to screen psychological factors. Participants answered to the Mini-Mental State Examination (Folstein et al., 1975), Depression Anxiety Stress Scales 21-items Short Form (DASS-21) (Lovibond & Lovibond, 1995), Jalowiec's Coping Inventory (Jalowiec et al., 1984), and The five-factor model (Big Five) (John et al., 1991)—adapted and validated for the Brazilian Portuguese language. The procedures used in the study were in agreement with the National Research Council of Brazil (Resolution 466/2012) and the Code of Ethics of the World Association. Ethics Committee clearance was taken at the institution (Protocol No. 1.777.443-CEP). All participants provided written informed consent.

2.2 | Instruments

2.2.1 | Mini-Mental State Examination

It enables practical clinical assessment of cognitive status. It consists of 11 items, divided into two sections. First, it requires verbal responses to questions of orientation, memory, and attention, with a maximum score of 21 points. Afterwards, it evaluates specific skills such as naming and understanding commands, which comprise 9 points. Each of the proposed commands is scored. Therefore, the total score of the Mini-Mental State Examination ranges between 0 and 30 points, which indicates a high cognitive impairment and better cognitive capacity, respectively. In this study, we evaluated answers in terms of the total score obtained by the subject. Scores equal to or greater than 27 were considered normal. Accordingly, for the purpose of the present study, we just included women who achieved scores equal or superior to 27.

2.2.2 | Depression, Anxiety and Stress Scale—DASS-21

It consists of 21 statements about negative emotional symptoms (Lovibond, 1998). Women were asked to consider how much each statement applied to them in the past week. The participants used a 4-point Likert scale ranging from *not at all* to *very high* (score 0 to 3). Each of the variables (depression, anxiety, and stress) was measured by seven items. Therefore, the maximum score for each of these three variables would be 21, rather than a maximum of 21 for the entire DASS-21. In the end, the total answer points for each subscale were multiplied by two to produce a possible score of 0 to 42 in each of the three domains. The DASS-21 showed optimal values in terms of internal consistency. The Cronbach alpha values for each symptom were as follows: .91 for depression, .84 for anxiety, .90 for the stress, and .95 for the total of the three subscales (20). For this study, the internal consistencies for each symptom were computed: .87 for depression, .81 for anxiety, and .89 for the stress. In the validation article, a convergent validity was performed. Moreover, DASS-21 has a strong correlation with others scales, such as the Beck Depression Inventory (BDI), the Beck Anxiety Inventory (BAI), and the Inventory of Stress Symptoms Lipp (ISSL). The correlation between the depression subscale and the BDI was .86. The correlation between the anxiety subscale and the BAI was .80. The correlation between the stress subscale and the ISSL was .74 (Vignola & Tucci, 2014).

2.2.3 | Jalowiec's Coping Inventory

This instrument identifies individual characteristics in the search for strategies for coping with stressors. It consists of 60 items, presenting eight styles of coping: confrontive (10 items), evasive (13 items), optimistic (nine items), fatalistic (four items), emotive (five items), palliative (seven items), supportant (five items), self-reliant (seven items), and

two subclassifications—focused on problem and focused on emotion. Women were asked to rate how much they used each coping strategy to deal with or handle the stressor. The questionnaire is rated using a 3-point Likert scale ranging from 0 (*never used*) to 3 (*frequently used*). According to the authors' recommendation, the interpretation of this instrument was as follows: first, we accessed the middle score by summing up items marked in each question dividing by the number of items contained in the subscale. Afterwards, the relative score results from the sum of the number of items marked with "x" divided by the number of items contained in the subscale, called the middle score. Subsequently, the relative score is calculated by dividing the mean score of each subscale by the sum of the total half scores.

Higher score indicates higher coping style for coping with stressors. In this sample, the coefficients of internal reliability for each subscale were computed: confrontive (.79), supportant (.63), evasive (.81), fatalistic (.74), optimistic (.62), emotive (.79), palliative (.58), and self-reliant (.47) and the global Cronbach alpha was .90. In the validation article, a convergent validity of the subscales showed that 69% or more were correlated with hypothesized dimensions. Discriminant validity showed stronger relationships to their hypothesized dimension than to other dimensions, and all the subscales had a success rate near 100% (Saffari et al., 2017).

2.2.4 | The five-factor model (Big Five), IGFP-5

This model classifies personality in traits, which are hierarchically divided into five broad domains: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. It has 44 self-report items in a 5-point Likert scale: *strongly disagree*, *somewhat disagree*, *neither agree nor disagree*, *somewhat agree*, and *strongly agree*. Mean scores for each domain were computed across the items of every scale separately. Internal consistencies for this study were computed: extraversion $\alpha = .88$, agreeableness $\alpha = .75$, conscientiousness $\alpha = .88$, neuroticism $\alpha = .82$, and openness to experience $\alpha = .70$. The general Cronbach $\alpha = .84$. In the validation article, a convergent validity was performed. The correlation between the scale factors of IGFP-5, the Big Five Inventory (BFI), and the Revised NEO Personality Inventory (NEO PI-R) were as follows: extroversion ($r = .43$), agreeableness ($r = .22$), conscientiousness ($r = .45$), neuroticism ($r = .45$), and openness ($r = .27$) (Schmitt et al., 2007).

The obstetric information and current medical history such as hypertension or any other disease, or some type of complication, either physical or psychological, were extracted from the medical records.

2.3 | Statistical analysis

The study allocated participants into a control group (pregnant women with normal blood pressure levels) and hypertensive group (with changes in blood pressure). The hypertensive group was further divided into three subgroups: gestational hypertension, chronic hypertension, and preeclampsia syndrome.

Data analysis was performed in the R 3.5.1 environment for the network analysis and AMOS version 18 for the confirmatory approach. The study performed descriptive analyses using absolute (*n*) and relative (%) values for qualitative variables and average and standard deviation for quantitative variables. The differences between the control and hypertensive groups were studied through Student's *t* test analyses for independent samples, while variance analyses (ANOVA) were used to compare the differences between subgroups of the hypertensive sample. Descriptive analyses were performed with the psych package (Revelle & Revelle, 2015).

Two network analyses were conducted. One with the control group and one with the hypertensive group, in order to examine the magnitude of associations between variables. Network analysis is an exploratory method based on graph theory. Using the qgraph package (Epskamp et al., 2012), a bivariate correlation matrix was generated, and for each pair of variables, the association with the indicated algorithm is calculated considering the level of measurement of these variables. In a following step, a partial correlation matrix is generated by inverse variance/covariance matrix. This matrix is subjected to a smoothing method, setting small values to zero based on a series of different adjustment parameters. Considering that coefficients are standardized, partial correlations are analogous to standardized multiple regression coefficients, or betas, thus allowing to be interpreted using the same rules: 0.1 small effects, 0.3 moderate effects, and ≥0.5 high effects. The last step of network analysis consists of graphing the partial associations between the variables. Variables are represented as nodes (or circles), while relationships between variables are represented as edges (or lines) in the graphic model. The intensity of the edges of the graph represents the magnitude of these associations, while their colour (red or blue) represents the direction (negative or positive, respectively) of the associations (Epskamp & Fried, 2018).

Additionally, the association between the variables, the centrality indices of each network was examined. The centrality indices indicate the relevance of the vertices in the system under study, that is, which nodes have the greatest influence on the network. The measure of centrality used was the expected influence (Robinaugh et al., 2016), calculated from the sum of the edges of first (direct associations) and second (indirect associations) degree of each node.

Due to the high correlation between anxiety, depression, and stress dimensions, a general index of negative affect was created through a principal component analysis. This technique allows combining variables by a weighted sum of elements into a standardized score with average zero and standard deviation one. Moreover, for the same reason, DASS-21 was considered as a second-order variable in the structural equation modelling, named psychological distress. This logic was also followed for coping strategies subfactors.

A structural equation model (SEM) analysis was conducted and examined through the χ^2 to degrees of freedom ratio as well as the Comparative Fit Index (CFI) and Normed Fit Index (NFI), Incremental Fit Index (IFI), and Relative Fit Index (RFI). Ideally, these should be greater than 0.90. The Hoelter Index was also included to determine adequacy of sample size. Finally, an analysis of invariance was carried out across the control and hypertensive groups. This is a hierarchical

procedure which begins with an unconstrained level and continues by adding constraints successively. The logic of this procedure is to test the factorial homogeneity structure across groups, from a stage where all parameters do not need to be equal to a stage where they must be.

3 | RESULTS

Table 1 shows the performance and comparison between the groups relative to the values obtained in the IGFP-5, DASS-21, and Jalowiec's Coping Inventory. The control group showed statistically significant differences when compared to the hypertensive group. The personality traits openness, extroversion, and agreeableness were higher in women from the control group. This difference was more relevant in the subgroup of women with preeclampsia syndrome which, in general, had the worst results in the hypertensive group. However, there was no significant difference between the control and hypertensive groups regarding the conscientiousness and neuroticism factors.

The hypertensive group had higher rates of depression, anxiety, and stress when compared to the control group, this difference being more pronounced in the subgroup of women with preeclampsia syndrome, again. Regarding the coping style, the control group showed to be more optimistic compared to the hypertensive group. Additionally, women in the control group achieved lower scores of evasive, fatalistic, emotive, and palliative coping styles. On the other hand, the other coping styles showed no significant differences between the groups.

The analysis generated partial correlation networks for both the control and hypertensive groups using the variables negative affect (anxiety, depression, and stress), extraversion, openness to experience, coping focused on problem, coping focused on emotion, conscientiousness, agreeableness, and neuroticism. Later, the study extracted the measures of centrality (expected influence) of the two networks, in both cases indicating that the coping focused on problem variable is more likely to activate its adjacent nodes (Figure 1).

Based on the centrality measure, two flow charts were generated (Figure 2) to represent the predictors of coping focused on problem,

TABLE 1 Comparison between control and hypertensive groups in psychological variables

Instruments	Control (n = 151) M (SD)	Hypertension (n = 192) M (SD)	Gestational hypertension (n = 61) M (SD)	Chronic hypertension (n = 31) M (SD)	Preeclampsia syndrome (n = 100) M (SD)
IGFP-5					
Openness	35.89 (5.85)[a]	33.24 (6.53)[b]	33.51 (6.44)[ab]	35.23 (5.51)[ab]	32.23 (6.86)[b]
Conscientiousness	32.21 (7.33)[a]	31.09 (8.60)[a]	30.57 (8.88)[a]	31.13 (8.03)[a]	31.17 (8.67)[a]
Extroversion	28.47 (5.91)[a]	25.97 (7.72)[b]	26.46 (7.46)[ab]	26.65 (6.84)[ab]	25.22 (8.19)[a]
Agreeableness	37.16 (5.65)[a]	34.87 (6.07)[b]	35.82 (5.83)[ab]	35.10 (6.26)[ab]	34.18 (6.08)[b]
Neuroticism	18.26 (5.89)[a]	19.33 (5.59)[a]	17.87 (4.99)[a]	19.26 (5.75)[ab]	20.30 (5.75)[b]
DASS-21					
Depression	4.91 (6.90)[a]	8.30 (7.57)[b]	6.85 (6.86)[a]	6.65 (6.97)[ab]	9.94 (8.08)[b]
Anxiety	8.98 (6.95)[a]	12.66 (7.39)[b]	11.25 (7.12)[a]	10.84 (7.98)[ab]	14.36 (7.29)[b]
Stress	15.93 (8.36)[a]	21.14 (8.99)[b]	19.90 (8.48)[b]	19.55 (9.56)[ab]	22.68 (8.98)[b]
Jalowiec's Coping Inventory					
Confrontive	22.63 (4.35)[a]	23.33 (2.92)[a]	23.34 (3.05)[a]	23.29 (3.40)[a]	22.25 (2.74)[a]
Evasive	21.94 (5.34)[a]	25.44 (4.62)[b]	25.51 (3.85)[b]	24.48 (4.57)[b]	25.77 (5.03)[b]
Optimistic	21.60 (3.82)[a]	20.52 (2.82)[b]	21.28 (2.58)[a]	21.42 (2.79)[a]	19.67 (2.78)[b]
Fatalistic	5.27 (2.24)[a]	6.71 (2.16)[b]	6.61 (1.97)[b]	6.29 (2.10)[ab]	6.97 (2.26)[b]
Emotive	6.97 (2.73)[a]	9.04 (2.46)[b]	8.69 (2.27)[b]	8.84 (2.55)[b]	9.38 (2.45)[b]
Palliative	9.60 (3.06)[a]	11.24 (2.29)[b]	11.36 (2.59)[b]	11.23 (2.34)[b]	11.15 (2.15)[b]
Supportant	9.60 (2.97)[a]	9.32 (2.01)[a]	9.64 (2.21)[a]	9.29 (1.86)[a]	9.09 (1.93)[a]
Self-reliant	15.63 (2.60)[a]	16.04 (1.86)[a]	16.26 (1.84)[a]	15.84 (2.29)[a]	15.98 (1.72)[a]
Confrontive	22.63 (4.35)[a]	23.33 (2.92)[a]	23.34 (3.05)[a]	23.29 (3.40)[a]	22.25 (2.74)[a]
Coping focused on problem	16.11 (3.22)[a]	16.32 (2.16)[a]	16.49 (2.37)[a]	16.29 (2.33)[a]	16.17 (2.03)[a]
Coping focused on emotion	13.49 (2.36)[a]	14.83 (1.62)[b]	14.95 (1.50)[b]	14.68 (1.75)[b]	14.82 (1.65)[b]

Note: Statistical differences between groups in each column were indicated by different alphabetic superscripts: (b) differs from (a), and (ab) does not differ from (a) and (b). M = mean; SD = standard deviation. IGFP-5: The five-factor model—Big Five; DASS-21: Depression, Anxiety and Stress Scale; Problem: Coping focused on the problem Emotion: Coping focused on emotion. Significance level $p < .05$.
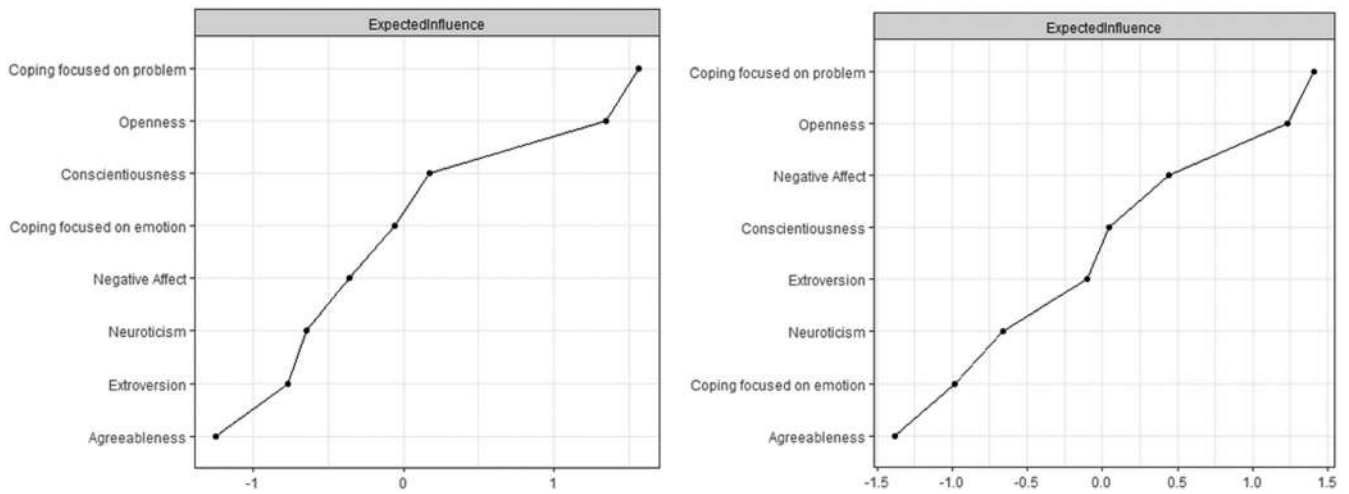
FIGURE 1 Centrality measures. The first table refers to the measures of centrality of the network of partial correlations in the control group, and the second refers to the network of the hypertension group
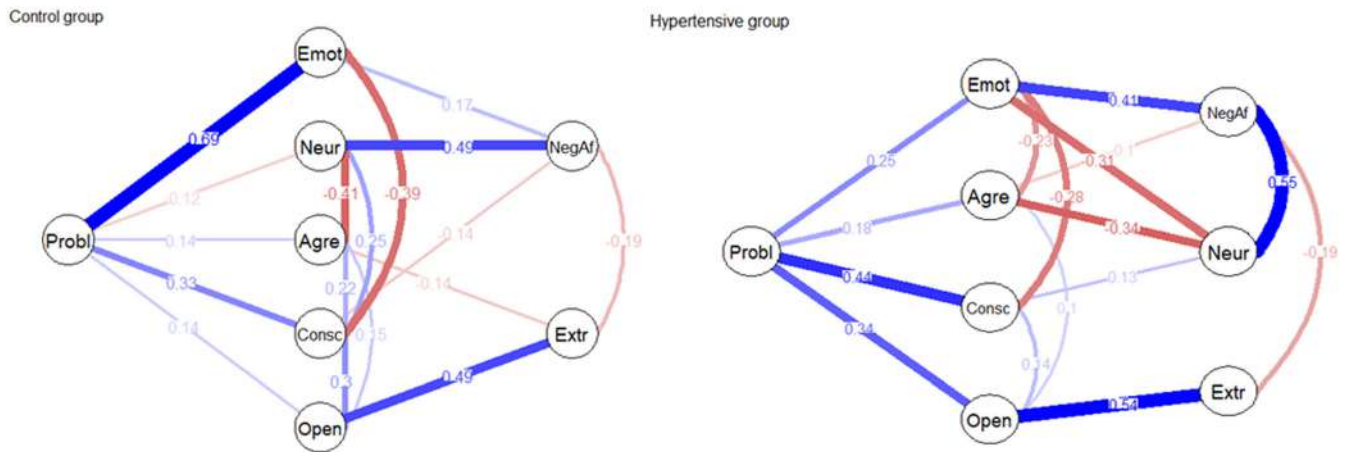
FIGURE 2 Flow chart according to group. Left side: hypertension group. Right side: control group. NegAf = negative affect; Extr = extraversion; Open = openness to experience; Probl = coping focused on problem; Emot = coping focused on emotion; Consc = conscientiousness; Agre = agreeableness; Neur = neuroticism [Colour figure can be viewed at wileyonlinelibrary.com]

which revealed consistent differences between the two groups. In the control group, coping focused on problem had five first-order predictors. In the hypertensive group, four predictors had a direct association with coping focused on problem, with the neuroticism node changing status to an indirect predictor of coping.

In the control group the strongest predictors of coping focused on problem were the coping focused on emotion and conscientiousness nodes, while in the hypertensive group, the strongest predictors were conscientiousness and openness to experience. Comparing the predictors of coping focused on problem in the control group and in the hypertensive group, there was a reduction about 63% in the ratio of coping focused on problem and coping focused on emotion. On the other hand, in the coping focused on emotion and negative affective relationship, there was a 58% increase from the control group to the hypertensive group. It was also observed that in the relationship

coping focused on problem and openness to experience, there was a 58% increase in the hypertensive group regarding the control group. These and other relationships can be seen in Figure 2.

Second, an SEM was carried out on the previous variables. Table 2 depicts the goodness-of-fit for each model underlying each personality trait. Extraversion shows acceptable indexes.

Finally, an analysis of invariance was carried out to determine any significant differences in structural parameters between groups to a metric level. As depicted in Table 3, there are no significant changes comparing Model 2 with the less constrained model in the extraversion trait. Even if neuroticism did not show optimal values for indexes such as CFI, the invariance analysis was also conducted due to its role in the literature. In this case, a higher level of constraints was reached. The comparison between groups is also provided in Figures 3 and 4.

TABLE 2 Summary of the goodness-of-fit indexes under assessment

Model	p value	NFI	IFI	TLI	CFI	RMSEA	Hoelter
Extraversion	<.001	.86	.90	.87	.89	.08	128–138
Neuroticism	<.001	.80	.83	.78	.83	.10	90–98
Agreeableness	<.001	.75	.76	.70	.75	.13	53–57
Openness	<.001	.75	.79	.75	.79	.10	90–96
Conscientiousness	<.001	.81	.77	.85	.85	.10	95–102

Note: Degree of freedom: extraversion 3.25; neuroticism 4.60; agreeableness 4.32; openness 4.53; conscientiousness 4.32.

TABLE 3 Goodness-of-fit statistics for tests of invariance across the control and the hypertension group on extraversion: A summary

Trait	Model	χ^2	df	χ^2/df	CFI	RMSEA	$\Delta\chi^2$	Δdf	Decision
Extraversion	Model 1: Configural invariance	831.18	276	3.01	.83	.07	-	-	-
	Model 2: Full metric invariance	857.30	291	2.94	.83	.07	26.12	15	Accept
	Model 3: Full metric and scalar	958.80	310	3.09	.80	.07	101.50*	19	Reject
Neuroticism	Model 1: Configural invariance	1101.46	266	4.14	.73	.09	-	-	-
	Model 2: Full metric invariance	1062.96	281	3.78	.75	.08	38.5	15	Accept
	Model 3: Full metric and scalar	1067.01	300	3.55	.75	.08	.95	19	Accept
	Model 4: Structural weights	1068.87	304	3.51	.75	.08	1.86	4	Accept
	Model 5: Structural residuals	1076.54	308	3.49	.75	.08	7.67	4	Accept
	Model 6: Measurement residuals	1986.44	342	5.80	.47	.11	909.9*	34	Reject

*Invariance level not satisfactory.

4 | DISCUSSION

This research analyses the role and structure of personality in stressful states, as characterized by prior literature (Corr & Matthews, 2020). To do so, a comparison between women with pregnancies complicated by hypertension and a control group was established. According to data, women in the control group achieved higher scores in openness, extroversion, and agreeableness, compared to the hypertensive group, particularly in women with preeclampsia syndrome. Additionally, conscientiousness and neuroticism traits have not shown a significant difference between control and hypertensive women. Results show evidence to support that women in the control group face adversities strongly related with coping strategies than with the other factors. Moreover, these women use both coping problem focused and emotion focused to manage demands, suggesting that coping strategies work jointly in them. Furthermore, depression, anxiety, and stress are much related to hypertension in pregnancy, especially in women with preeclampsia syndrome.

On the other hand, in the hypertensive group, coping strategies seem to be dissociated. Results showed that personality traits influence in the decision to use coping strategies focused in emotion. Hypertensive women with traits of openness and extraversion used more problem-focused coping strategies. Furthermore, both control and hypertensive group showed negative correlation between conscientiousness and emotion-focused coping.

The results also suggest that the hypertensive group have more negative affect states compared to the control group. Furthermore, anxiety, stress, and depression are more intense in women with pre-eclampsia syndrome, which is in line with previous researches. Some authors found a 31.2% prevalence of moderate to severe depression in women with preeclampsia (Kharaghani et al., 2012), a number that might be supporting the current results. Moreover, another study found that pregnant women with anxiety had a 2.90 times higher risk to preeclampsia than control group (van Esch et al., 2018). Of interest, other authors show that the risk for preeclampsia increases 2.5 and 3.2 times in women with depression and anxiety, respectively, compared to control women (Kurki, 2000). Regarding prenatal stress in pregnancies complicated by hypertension, prevalence is rarely reported in international studies. However, there were some researchers who explored the trend of stress during pregnancy and found that this prevalence in hypertensive women is high. A Mexican study found positive association between stress and hypertensive disorders in pregnancy. These authors found that women with more stress symptoms had an increased risk, ranging from 5 to 26 times, to the development of hypertensive disorders in pregnancy (Garza-Veloz et al., 2017). These results are in line with previous studies which highlighted that prenatal stress is associated with pregnancy-induced hypertension (Cardwell, 2013). Our study has a cross-sectional design; thus, it is important to consider that we cannot establish if hypertensive disorders lead to more negative affect states, or if they predispose to higher risk of hypertension in pregnancy. It is known that negative affect states are risk factors for hypertensive disorders (Steegers et al., 2010). Moreover, pregnancy presents a physiological stress (van Heyningen et al., 2017) which may be the onset of a
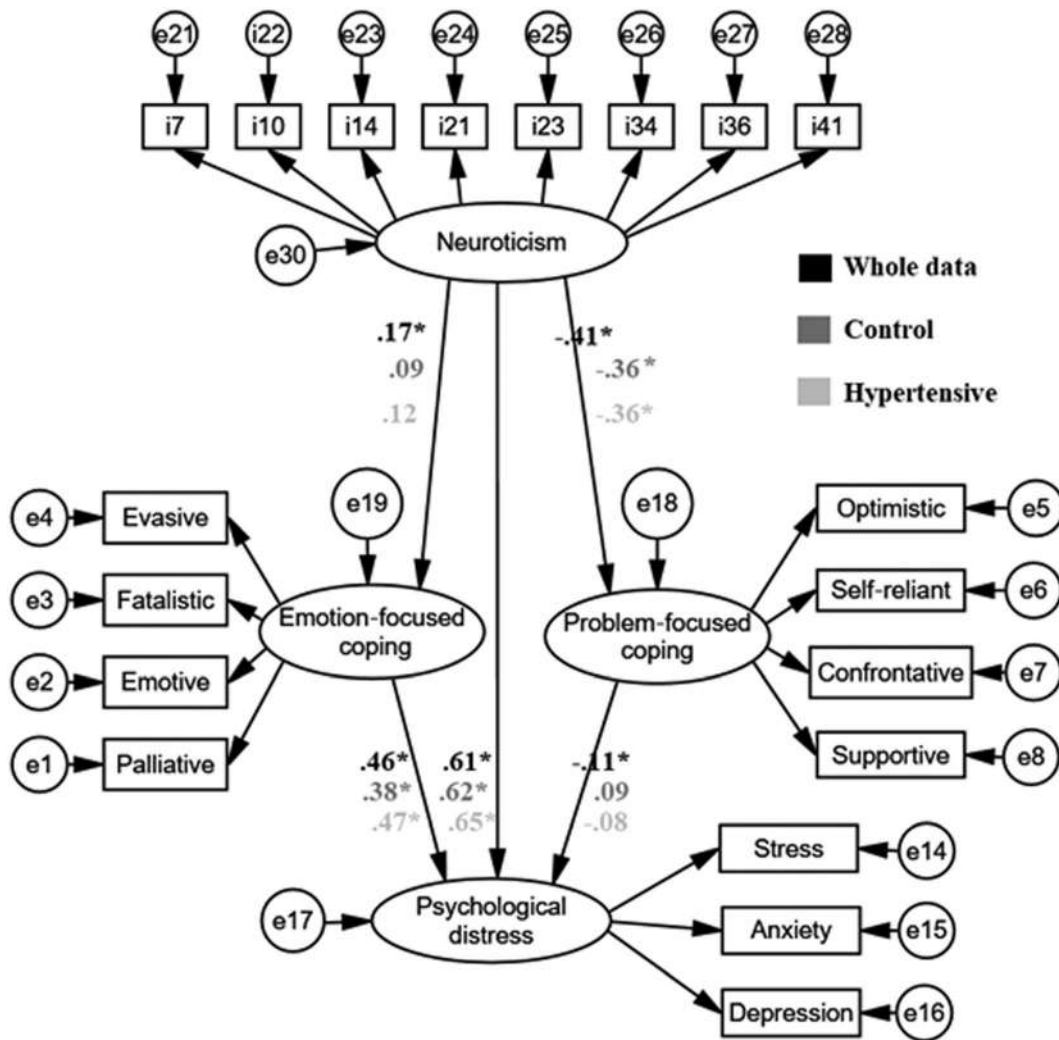
FIGURE 3 Confirmatory analysis for neuroticism for the whole data set and each group

woman's predisposition to disorders. Consequently, women with pregnancy complicated by hypertension tend to have more anxiety, stress, and depression. This may be justified by the demands that the hypertensive pregnant women must face. Since it is a high-risk pregnancy, it is necessary, for example, that women attend the obstetric clinics more often. Besides that, health evaluations are usually done in specialized centres, which may be far from their home. Furthermore, there is the fear of having a serious illness during pregnancy. So, it is understood that if women do not have effective coping strategies, they will find it more difficult to face such situations. Therefore, they may present more negative affect states and they may become more susceptible to other physical and mental health problems (DiPietro et al., 2004).

Regarding coping strategies, women in the control group tend to use more problem-focused coping compared to women with hypertension. In general terms, control women presented both problem-focused coping and emotion-focused coping to face pregnancy's adversities. Importantly, strategies used to dealing with adverse situations can put people in lower or higher risk to vulnerability (Biaggi

et al., 2016; van Heyningen et al., 2017). For example, a pregnant woman who cope by taking action to overcome the problems such as seeking emotional support tends to have healthier outcomes. On the other hand, women who avoid dealing with the problems may have higher deleterious effects of stress. It is known that the emotion-focused coping strategy requires regulation of stressful emotions (Moret-Tatay et al., 2016b). Consequently, it tends to hamper the capacity to solve the problems, in turn increasing negative affective states. This could explain our data, where we found hypertensive women with both high levels of depression, anxiety, and stress and coping strategies focused on emotion. Accordingly, investing in better coping strategies could be a way to lower negative affective states. Although hypertension may be caused by several other nonmodifiable factors such as genetics, hypertensive women with better coping strategies tend to have a better quality of life (Casagrande et al., 2019). This is even more important during pregnancy as it reflects not only in mother's health but also foetus' life.

With regards to personality, openness, extroversion, and agreeableness were remarkable in the control group. According to McCrae
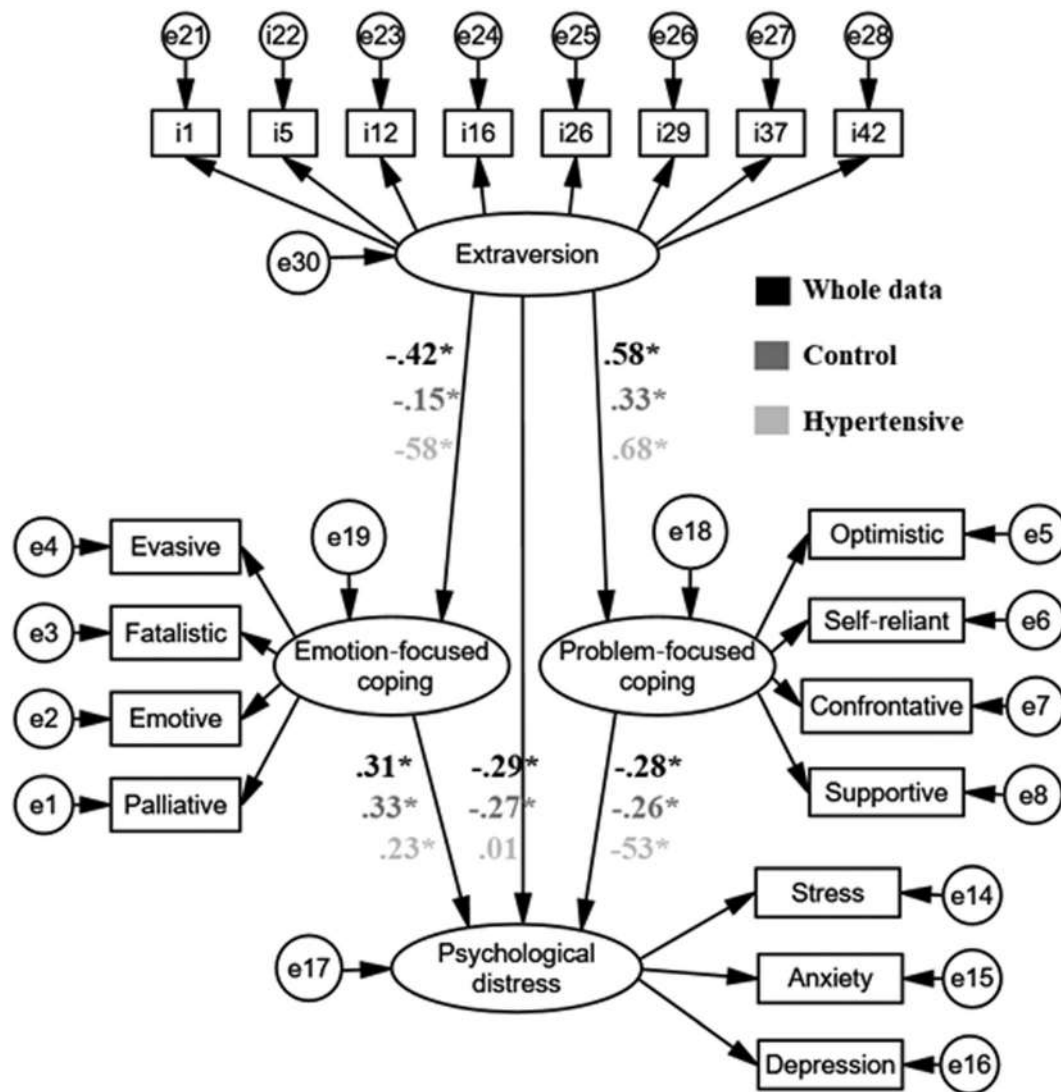
FIGURE 4 Confirmatory analysis for extraversion for the whole data set and each group

and Costa (2008), openness to experience is associated with cognitive ability and adaptive behaviours; extraversion is linked to expansiveness characteristics and social support, and agreeableness is related to selflessness and kindness (Aluja et al., 2003). In other words, these traits are related to positive affect. Consequently, these people tend to have healthier living habits and better quality of life. It can explain why we found a negative association with openness, extroversion, agreeableness, and hypertension in pregnancy, mostly in women with a severe disorder such as preeclampsia syndrome. Importantly, analysing just the hypertensive group, women with traits of openness and extroversion presented more problem-focused coping strategies compared to other personalities. These results are also in line with previous researches that found better coping strategies in people with personality traits of openness and extroversion (Afshar et al., 2015). Furthermore, the conscientiousness trait was important for both hypertensive and control group. Women who achieve higher scores of conscientiousness tend to have more problem-focused coping. This may be explained by subjects' health behaviours. By definition, those

who score higher on the conscientiousness trait also displays higher levels of self-discipline, persistence and impulse-control (Jensen-Campbell et al., 2002). Consequently, people who achieve high scores in conscientiousness might have healthier lifestyles, which are associated with problem-focused coping. On the other hand, hypertensive women who scored higher in neuroticism tend to have more emotion-focused coping strategies.

Lastly, neuroticism traits are associated with anxiety, guilt, sadness, anger, and nervousness (McCrae & Costa, 2008). Therefore, it is expected that people who achieve high scores of neuroticism tend to face more difficulties in dealing with adversities, as they have a tendency to experience more negative emotions. Contrary to expectations, neuroticism traits have no statistical significance in our sample when comparing control and hypertensive groups. However, scientific data remain unclear about it. A study found that higher levels of neuroticism can be associated to the risk of coronary heart disease (Jokela et al., 2014). On the other hand, the authors have not found an association between neuroticism traits and mortality risks in a large

study that included data from 76,150 participants (Jokela et al., 2013). Of note, both extraversion and neuroticism are described as the most relevant traits in the stress–anxiety and stress–depression relationships in the literature (Uliaszek et al., 2010). Even if the network analysis showed strong relationships, the confirmatory approach was clearer for extraversion.

After the confirmatory approach, this study also supports the role of extraversion to a certain extent across groups. Particularly, its invariance across on a both configural and a metric level seems to be of interest. This result suggests that the factor loadings are invariant across groups, offering a questionnaire that psychometrically adapts to both samples in terms of factor loading. However, one of the limitations of work is that the invariance did not reach the scalar level, also known as strong invariance, which might be indicative of potential measurement bias among item intercepts. Therefore, this suggests differences in the way of responding and rating the items which can be higher or lower among the type of administrations. On the other hand, the goodness-of-fit for the neuroticism model was not optimal, but it was examined anyway, because of its theoretical value. In the invariance analysis it reached a level of constraint.

The main limitation of the current study is self-reported data and its incidental sampling. Self-administered survey instruments might be biased by whether or not individuals were seeking treatment for their health problems (Chapuis-de-Andrade et al., 2019). Nonetheless, self-administered forms of assessment as well as incidental samplings are very common in this field of study. Moreover, they can be easily replicated, increasing the study's reliability. Additionally, the picture found in this Brazilian sample may not be found in other cultures. Further studies should explore our results in different population and investigate if is it possible to have better blood pressure levels with changing coping strategies.

Nevertheless, we considered the inclusion of both analysis approaches in the current work, an exploratory and confirmatory one, is an extra value for the field. Rather than being exclusive one to another, by combining them, a promising new way to infer psychological attributes might be reached.

To conclude, the current research provided an integrative picture of the relationship of personality, psychological factors, such as negative affect or psychological distress and coping strategies in pregnancies complicated by hypertension. Our study showed that hypertensive women have important differences when compared to a control group. These differences are remarkable in women with preeclampsia syndrome, a severe hypertension disorder. Women in the control group achieved higher scores in openness, extroversion, and agreeableness and use different coping strategies jointly. In other words, these women usually are more active in life, and they are more organized. If we think about how these people can be described in general terms, they prefer novelties, they may be always active in life, and they are more organized.

On the other hand, in the hypertensive group, coping is dissociated and participants tend to use more strategies according to their personality. Moreover, depression, anxiety, and stress were higher in the total hypertension group than the control group. However, hypertensive women who use more emotion-focused coping strategies achieved higher scores of negative affective states.

Finally, extraversion seems to be the most relevant trait of personality from both exploratory and confirmatory approaches across both groups, and its invariance, to reach a full metric invariance. Given the differences of personality, psychological factors, such as depression, stress, anxiety symptoms, and coping strategies in women with pregnancy complicated by hypertension compared to normal pregnancies, prenatal screening and appropriate interventions may reduce perinatal negative affective states and associated pregnancy complications. For example, to stimulate activities aimed at developing and learning new skills and experiences, activities to reduce anxiety, stress, and depression during pregnancy, strengthening the support network (family, friends, health teams) may also be helpful. Health professionals must understand that women may present different psychological factors during pregnancy. However, it's important to consider that gestational changes, such as hypertension, can exacerbate these negative affective states. Therefore, early identification as well as instituting adequate treatment provides better quality of life and, consequently, a positive impact for the health for both mother and baby. In other words, more attention should be paid to detect and treat psychological factors, such as mental problems during pregnancy. It will benefit the pregnant women themselves, as well as benefitting the next generation.

CONFLICT OF INTEREST

All authors have no conflict of interest related to this paper.

DATA AVAILABILITY STATEMENT

Data regarding this study will not be shared, because clinical data were investigated and the data protection the participants signed included a statement that the data will not be shared.

ORCID

Sabrina Chapuis-de-Andrade 🔟 https://orcid.org/0000-0001-6014-8232

Carmen Moret-Tatay 🔟 https://orcid.org/0000-0002-2867-9399

Tatiana Quarti Irigaray 🔟 https://orcid.org/0000-0002-3078-4219

Dalton Breno Costa 🔟 https://orcid.org/0000-0002-8167-1513

Bartira Ercília Pinheiro da Costa 🔟 https://orcid.org/0000-0001-8015-3952

REFERENCES

Afshar, H., Roohafza, H. R., Keshteli, A. H., Mazaheri, M., Feizi, A., & Adibi, P. (2015). The association of personality traits and coping styles according to stress level. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences*, 20(4), 353–358.

Aluja, A., Garcia, L. F., Blanch, A., De Lorenzo, D., & Fibla, J. (2009). Impulsive-disinhibited personality and serotonin transporter gene polymorphisms: Association study in an inmate's sample. *Journal of Psychiatric Research*, 43(10), 906–914. https://doi.org/10.1016/j.jpsychires.2008.11.008

Aluja, A., García, Ó., & García, L. F. (2003). Relationships among extraversion, openness to experience, and sensation seeking. *Personality and Individual Differences*, 35(3), 671–680. https://doi.org/10.1016/S0191-8869(02)00244-1

Balada, F., Lucas, I., Blanch, Á., Blanco, E., & Aluja, A. (2019). Neuroticism is associated with reduced oxygenation levels in the lateral prefrontal cortex following exposure to unpleasant images. *Physiology & Behavior*, 199, 66–72. https://doi.org/10.1016/j.physbeh.2018.11.002

Baumert, A., Schmitt, M., Perugini, M., Johnson, W., Blum, G., Borkenau, P., Costantini, G., Denissen, J. J. A., Fleeson, W., Grafton, B., Jayawickreme, E., Kurzius, E., MacLeod, C., Miller, L. C., Read, S. J., Roberts, B., Robinson, M. D., Wood, D., & Wrzus, C. (2017). Integrating personality structure, personality process, and personality development: Integrating personality. *European Journal of Personality*, 31(5), 503–528. https://doi.org/10.1002/per.2115

Bernabé-Valero, G., Blasco-Magraner, J. S., & Moret-Tatay, C. (2019). Testing motivational theories in music education: The role of effort and gratitude. *Frontiers in Behavioral Neuroscience*, 13, 172. https://doi.org/10.3389/fnbeh.2019.00172

Biaggi, A., Conroy, S., Pawlby, S., & Pariante, C. M. (2016). Identifying the women at risk of antenatal anxiety and depression: A systematic review. *Journal of Affective Disorders*, 191, 62–77. https://doi.org/10.1016/j.jad.2015.11.014

Black, K. D. (2007). Stress, symptoms, self-monitoring confidence, well-being, and social support in the progression of preeclampsia/gestational hypertension. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 36(5), 419–429. https://doi.org/10.1111/j.1552-6909.2007.00173.x

Cardwell, M. S. (2013). Stress: Pregnancy considerations. *Obstetrical & Gynecological Survey*, 68(2), 119–129. https://doi.org/10.1097/OGX.0b013e31827f2481

Casagrande, M., Boncompagni, I., Mingarelli, A., Favieri, F., Forte, G., Germanò, R., Germanò, G., & Guarino, A. (2019). Coping styles in individuals with hypertension of varying severity. *Stress and Health*, 35(4), 560–568. https://doi.org/10.1002/smi.2889

Chapuis-de-Andrade, S., Moret-Tatay, C., Costa, D. B., Abreu da Silva, F., Irigaray, T. Q., & Lara, D. R. (2019). The association between eating-compensatory behaviors and affective temperament in a Brazilian population. *Frontiers in Psychology*, 10, 1924. https://doi.org/10.3389/fpsyg.2019.01924

Chen, K.-H., Seow, K.-M., & Chen, L.-R. (2017). Progression of gestational hypertension to pre-eclampsia: A cohort study of 20,103 pregnancies.

Pregnancy Hypertension, 10, 230–237. https://doi.org/10.1016/j.preghy.2017.10.001

Constant, H. M., Moret-Tatay, C., Benchaya, M. C., Oliveira, M. D. S., Barros, H. M., & Ferigolo, M. (2018). CBI-20: Psychometric properties for the coping behaviors inventory for alcohol abuse in Brazil. *Frontiers in Psychiatry*, 9, 585. https://doi.org/10.3389/fpsyt.2018.00585

Corr, P. J., & Matthews, G. (Eds.) (2020). *The Cambridge handbook of personality psychology* (Second ed.). Cambridge University Press. https://doi.org/10.1017/9781108264822

Costa, P. T., McCrae, R. R., & Löckenhoff, C. E. (2019). Personality across the life span. *Annual Review of Psychology*, 70(1), 423–448. https://doi.org/10.1146/annurev-psych-010418-103244

Coutinho, T., Lamai, O., & Nerenberg, K. (2018). Hypertensive disorders of pregnancy and cardiovascular diseases: Current knowledge and future directions. *Current Treatment Options in Cardiovascular Medicine*, 20(7), 56. https://doi.org/10.1007/s11936-018-0653-8

Dennis, C.-L., Falah-Hassani, K., & Shiri, R. (2017). Prevalence of antenatal and postnatal anxiety: Systematic review and meta-analysis. *British Journal of Psychiatry*, 210(5), 315–323. https://doi.org/10.1192/bjp.bp.116.187179

Díaz-Batanero, C., Aluja, A., Sayans-Jiménez, P., Baillés, E., Fernández-Calderón, F., Peri, J. M., Vall, G., Lozano, Ó. M., & Gutiérrez, F. (2020). Alternative DSM-5 model for personality disorders through the lens of an empirical network model. *Assessment*, 28, 773–787. https://doi.org/10.1177/1073191119897118

DiPietro, J., Ghera, M., Costigan, K., & Hawkins, M. (2004). Measuring the ups and downs of pregnancy stress. *Journal of Psychosomatic Obstetrics and Gynecology*, 25(3–4), 189–201. https://doi.org/10.1080/01674820400017830

Effati-Daryani, F., Mohammad-Alizadeh-Charandabi, S., Zarei, S., Mohammadi, A., & Mirghafourvand, M. (2018). Depression, anxiety and stress in the various trimesters of pregnancy in women referring to Tabriz health centres, 2016. *International Journal of Culture and Mental Health*, 11(4), 513–521. https://doi.org/10.1080/17542863.2018.1438484

Epskamp, S., Cramer, A. O. J., Waldorp, L. J., Schmittmann, V. D., & Borsboom, D. (2012). qgraph: Network visualizations of relationships in psychometric data. *Journal of Statistical Software*, 48(4), 1–18. https://doi.org/10.18637/jss.v048.i04

Epskamp, S., & Fried, E. I. (2018). A tutorial on regularized partial correlation networks. *Psychological Methods*, 23(4), 617–634. https://doi.org/10.1037/met0000167

Folkman, S., & Lazarus, R. S. (1988). Coping as a mediator of emotion. *Journal of Personality and Social Psychology*, 54(3), 466–475. https://doi.org/10.1037/0022-3514.54.3.466

Folstein, M., Folstein, S., & McHugh, P. (1975). "Mini-mental state." A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research*, 12(3), 189–198. https://doi.org/10.1016/0022-3956(75)90026-6

Garza-Veloz, I., Castruita-De la Rosa, C., Ortiz-Castro, Y., Flores-Morales, V., Castañeda-Lopez, M. E., Cardenas-Vargas, E., Hernandez-Delgadillo, G. P., Ortega-Cisneros, V., Luevano, M., Rodriguez-Sanchez, I. P., Trejo-Vazquez, F., Delgado-Enciso, I., Cid-Baez, M. A., Trejo-Ortiz, P. M., Ramos-Del Hoyo, M. G., & Martinez-Fierro, M. L. (2017). Maternal distress and the development of hypertensive disorders of pregnancy. *Journal of Obstetrics and Gynaecology*, 37(8), 1004–1008. https://doi.org/10.1080/01443615.2017.1313823

Gilles, M., Otto, H., Wolf, I. A. C., Scharnholz, B., Peus, V., Schredl, M., Sütterlin, M. W., Witt, S. H., Rietschel, M., Laucht, M., & Deuschle, M. (2018). Maternal hypothalamus-pituitary-adrenal (HPA) system activity and stress during pregnancy: Effects on gestational age and infant's anthropometric measures at birth. *Psychoneuroendocrinology*, 94, 152–161. https://doi.org/10.1016/j.psyneuen.2018.04.022

Goldfinger, C., Green, S. M., Furtado, M., & McCabe, R. E. (2020). Characterizing the nature of worry in a sample of perinatal women with

generalized anxiety disorder. *Clinical Psychology & Psychotherapy*, *27*, 136–145. https://doi.org/10.1002/cpp.2413

Guardino, C. M., & Dunkel Schetter, C. (2014). Coping during pregnancy: A systematic review and recommendations. *Health Psychology Review*, *8*(1), 70–94. https://doi.org/10.1080/17437199.2012.752659

Guo, Q., Feng, P., Yu, Q., Zhu, W., Hu, H., Chen, X., & Li, H. (2020). Associations of systolic blood pressure trajectories during pregnancy and risk of adverse perinatal outcomes. *Hypertension Research*, *43*(3), 227–234. https://doi.org/10.1038/s41440-019-0350-3

Guyon, H., Falissard, B., & Kop, J.-L. (2017). Modeling psychological attributes in psychology—An epistemological discussion: Network analysis vs. latent variables. *Frontiers in Psychology*, *8*, 798. https://doi.org/10.3389/fpsyg.2017.00798

Hamilton, J. G., & Lobel, M. (2008). Types, patterns, and predictors of coping with stress during pregnancy: Examination of the Revised Prenatal Coping Inventory in a diverse sample. *Journal of Psychosomatic Obstetrics and Gynecology*, *29*(2), 97–104. https://doi.org/10.1080/01674820701690624

Hengartner, M. P., Kawohl, W., Haker, H., Rössler, W., & Ajdacic-Gross, V. (2016). Big Five personality traits may inform public health policy and preventive medicine: Evidence from a cross-sectional and a prospective longitudinal epidemiologic study in a Swiss community. *Journal of Psychosomatic Research*, *84*, 44–51. https://doi.org/10.1016/j.jpsychores.2016.03.012

Howard, L. M., Molyneaux, E., Dennis, C.-L., Rochat, T., Stein, A., & Milgrom, J. (2014). Non-psychotic mental disorders in the perinatal period. *The Lancet*, *384*(9956), 1775–1788. https://doi.org/10.1016/S0140-6736(14)61276-9

Ibrahim, N., Teo, S. S. L., Che Din, N., Abdul Gafor, A. H., & Ismail, R. (2015). The role of personality and social support in health-related quality of life in chronic kidney disease patients. *PLoS One*, *10*(7), e0129015. https://doi.org/10.1371/journal.pone.0129015

Jalowiec, A., Murphy, S., & Powers, M. (1984). Psychometric assessment of the Jalowiec Coping Scale. *Nursing Research*, *33*(3), 157–161.

Jensen-Campbell, L. A., Rosselli, M., Workman, K. A., Santisi, M., Rios, J. D., & Bojan, D. (2002). Agreeableness, conscientiousness, and effortful control processes. *Journal of Research in Personality*, *36*(5), 476–489. https://doi.org/10.1016/S0092-6566(02)00004-1

John, O., Donahue, E., & Kentle, R. (1991). The Big Five Inventory: Versions 4a and 54 [Technical Report] (University of California, Institute of Personality and Social Research.). Berkeley (CA).

Jokela, M., Batty, G. D., Nyberg, S. T., Virtanen, M., Nabi, H., Singh-Manoux, A., & Kivimäki, M. (2013). Personality and all-cause mortality: Individual-participant meta-analysis of 3,947 deaths in 76,150 adults. *American Journal of Epidemiology*, *178*(5), 667–675. https://doi.org/10.1093/aje/kwt170

Jokela, M., Pulkki-Råback, L., Elovainio, M., & Kivimäki, M. (2014). Personality traits as risk factors for stroke and coronary heart disease mortality: Pooled analysis of three cohort studies. *Journal of Behavioral Medicine*, *37*(5), 881–889. https://doi.org/10.1007/s10865-013-9548-z

Kharaghani, R., Geranmaye, M., Janani, L., Hantooshzade, S., Arbabi, M., Rahmani Bilandi, R., & Bagheri, F. (2012). Preeclampsia and depression: A case–control study in Tehran. *Archives of Gynecology and Obstetrics*, *286*(1), 249–253. https://doi.org/10.1007/s00404-012-2260-3

Kurki, T. (2000). Depression and anxiety in early pregnancy and risk for preeclampsia. *Obstetrics & Gynecology*, *95*(4), 487–490. https://doi.org/10.1016/S0029-7844(99)00602-X

Lovibond, P. F. (1998). Long-term stability of depression, anxiety, and stress syndromes. *Journal of Abnormal Psychology*, *107*(3), 520–526. https://doi.org/10.1037/0021-843X.107.3.520

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and anxiety inventories. *Behaviour Research and Therapy*, *33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

McCrae, R. R., & Costa, P. Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality theory and research*. Guilford Press.

Moret-Tatay, C., Beneyto-Arrojo, M. J., Laborde-Bois, S. C., Martínez-Rubio, D., & Senent-Capuz, N. (2016a). Gender, coping, and mental health: A Bayesian network model analysis. *Social Behavior and Personality: An International Journal*, *44*(5), 827–835. https://doi.org/10.2224/sbp.2016.44.5.827

Moussa, H. N., Hosseini Nasab, S., Amro, F. H., Hoayek, J., Haidar, Z. A., Blackwell, S. C., & Sibai, B. M. (2018). Adverse pregnancy outcomes in deliveries prior to, at and beyond 39 weeks; low- and high-risk women. *The Journal of Maternal-Fetal & Neonatal Medicine*, *31*(19), 2545–2549. https://doi.org/10.1080/14767058.2017.1347624

O'Súilleabháin, P. S., Turiano, N. A., Gerstorf, D., Luchetti, M., Gallagher, S., Sesker, A. A., Terracciano, A., & Sutin, A. R. (2021). Personality pathways to mortality: Interleukin-6 links conscientiousness to mortality risk. *Brain, Behavior, and Immunity*, *93*, 238–244. https://doi.org/10.1016/j.bbi.2021.01.032

Patrícia Medeiros Falcão, K., Pedrozo Campos Antunes, T., do Nascimento Andrade Feitosa, A., Victor, E. G., Nunes Alves de Sousa, M., de Abreu, L. C., Vilar de Asis, E., Barros de Quental, O., Pinheiro Bezerra, I. M., & Azevedo de Freitas Junior, H. (2016). Association between hypertension and quality of life in pregnancy. *Hypertension in Pregnancy*, *35*(3), 306–314. https://doi.org/10.3109/10641955.2016.1143485

Puga, J. L., Krzywinski, M., & Altman, N. (2015). Bayesian networks. *Nature Methods*, *12*(9), 799–800. https://doi.org/10.1038/nmeth.3550

Rana, S., Burke, S. D., & Karumanchi, S. A. (2020). Imbalances in circulating angiogenic factors in the pathophysiology of preeclampsia and related disorders. *American Journal of Obstetrics & Gynecology*. https://doi.org/10.1016/j.ajog.2020.10.022

Revelle, W., & Revelle, M. (2015). Package 'psych'. The Comprehensive R Archive Network.

Robinaugh, D. J., Millner, A. J., & McNally, R. J. (2016). Identifying highly influential nodes in the complicated grief network. *Journal of Abnormal Psychology*, *125*(6), 747–757. https://doi.org/10.1037/abn0000181

Roos, A., Robertson, F., Lochner, C., Vythilingum, B., & Stein, D. J. (2011). Altered prefrontal cortical function during processing of fear-relevant stimuli in pregnancy. *Behavioural Brain Research*, *222*(1), 200–205. https://doi.org/10.1016/j.bbr.2011.03.055

Ruiz-Ruano, A.-M., López-Puga, J., & Delgado-Morán, J.-J. (2019). El componente social de la amenaza híbrida y su detección con modelos bayesianos/the social component of the hybrid threat and its detection with Bayesian models. *URVIO. Revista Latinoamericana de Estudios de Seguridad*, *25*, 57–69. https://doi.org/10.17141/urvio.25.2019.3997

Saffari, M., Sanaeinasab, H., Hashempour, M., Pakpour, A. H., Lovera, J. F., & Al Shohaib, S. (2017). Cultural adaptation, validity, and factor structure of the Jalowiec Coping Scale in Iranian women with multiple sclerosis: Which coping strategies are most common and effective? *International Journal of MS Care*, *19*(4), 209–216. https://doi.org/10.7224/1537-2073.2016-042

Schmitt, D. P., Allik, J., McCrae, R. R., & Benet-Martínez, V. (2007). The geographic distribution of Big Five personality traits: Patterns and profiles of human self-description across 56 nations. *Journal of Cross-Cultural Psychology*, *38*(2), 173–212. https://doi.org/10.1177/0022022106297299

Solares-Hernández, P. A., Manzano, F. A., Pérez-Benito, F. J., & Conejero, J. A. (2020). Divisibility patterns within Pascal divisibility networks. *Mathematics*, *8*(2), 254. https://doi.org/10.3390/math8020254

Soto-Balbuena, C., Rodríguez, M. F., & Escudero, A. I. (2018). Incidence, prevalence and risk factors related to anxiety symptoms during

pregnancy. *Psicothema*, *30*(3), 257–263. https://doi.org/10.7334/psicothema2017.379

Steegers, E. A., von Dadelszen, P., Duvekot, J. J., & Pijnenborg, R. (2010). Pre-eclampsia. *The Lancet*, *376*(9741), 631–644. https://doi.org/10.1016/S0140-6736(10)60279-6

Uliaszek, A. A., Zinbarg, R. E., Mineka, S., Craske, M. G., Sutton, J. M., Griffith, J. W., Rose, R., Waters, A., & Hammen, C. (2010). The role of neuroticism and extraversion in the stress–anxiety and stress–depression relationships. *Anxiety, Stress & Coping*, *23*(4), 363–381. https://doi.org/10.1080/10615800903377264

van Esch, J., Bolte, A., Vandenbussche, F., Schippers, D., de Weerth, C., & Beijers, R. (2018). 229. Hair cortisol concentration and reported anxiety are elevated in preeclampsia. *Pregnancy Hypertension*, *13*, S105. https://doi.org/10.1016/j.preghy.2018.08.311

van Heyningen, T., Honikman, S., Myer, L., Onah, M. N., Field, S., & Tomlinson, M. (2017). Prevalence and predictors of anxiety disorders amongst low-income pregnant women in urban South Africa: A cross-sectional study. *Archives of Women's Mental Health*, *20*(6), 765–775. https://doi.org/10.1007/s00737-017-0768-z

Verdecchia, P., Angeli, F., Cavallini, C., Aita, A., Turturiello, D., De Fano, M., & Reboldi, G. (2019). Sudden cardiac death in hypertensive patients. *Hypertension*, *73*(5), 1071–1078. https://doi.org/10.1161/HYPERTENSIONAHA.119.12684

Vignola, R. C. B., & Tucci, A. M. (2014). Adaptation and validation of the depression, anxiety and stress scale (DASS) to Brazilian Portuguese. *Journal of Affective Disorders*, *155*, 104–109. https://doi.org/10.1016/j.jad.2013.10.031

Yali, A. M., & Lobel, M. (1999). Coping and distress in pregnancy: An investigation of medically high risk women. *Journal of Psychosomatic Obstetrics and Gynecology*, *20*(1), 39–52. https://doi.org/10.3109/01674829909075575

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.