# Impact of personality traits, coping styles, and anger on psychological symptoms of patients with arterial hypertension
*Psychological factors in arterial hypertension*

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## ABSTRACT

The observational study aimed to investigate the interplay between psychological factors in clinical and non-clinical groups of patients with arterial hypertension. Specifically, the main objectives were: i) to examine associations between personality traits, anger, and psychological symptoms; ii) to explore how coping styles interact with anger in modulating distress; and iii) to compare patients with and without significant psychological distress. One hundred hypertensive patients (mean age 56.04±12.04) were consecutively recruited. Psychological symptoms, anger dimensions, personality traits, and coping strategies were assessed through the Symptom Checklist-90-Revised (SCL-90-R), the State-Trait Anger Expression Inventory-2 (STAXI-2), the 16 Personality Factors Questionnaire (16PF), and the Coping Orientation to Problems Experienced (COPE), respectively. The Global Severity Index (GSI) of the SCL-90-R was used to differentiate a clinical group (T-score≥63) from a non-clinical one. In the overall sample, specific personality traits predicted anxiety, somatization, and paranoid ideation. Symptoms such as psychoticism and hostility were linked to poor anger regulation, and the expression of anger was associated with avoidance-based coping. Patients with higher levels of psychological distress (49% of the patients) were more introverted and emotionally unstable, with symptoms predicted by low liveliness and high rule-consciousness. In contrast, anger expression and control emerged as key modulators of subclinical symptoms even in the non-clinical group (51% of the sample). The integrative and comparative nature of the study described different relationships between personality, anger management, and psychological symptoms between groups of hypertensive patients, divided according to the severity of psychological distress. Additionally, even subthreshold symptoms proved to be shaped by patterns of emotional regulation, underscoring the need to integrate psychological assessments in the treatment of hypertension.

**Key words:** hypertension, clinical psychology, coping styles, anger, personality.

## Introduction

Hypertension is a major public health concern and one of the leading contributors to global morbidity and mortality (Sarafidis *et al.*, 2008). Characterized by persistently elevated blood pressure, this chronic condition significantly increases the risk of cardiovascular complications such as heart failure, coronary artery disease, and stroke (GBD 2017 Risk Factor Collaborators, 2018; Lee *et al.*, 2019; Rosendorff, 2007). While traditional biomedical and behavioral risk factors – including hyperglycemia, hyperlipidemia, obesity, physical inactivity, tobacco use, and poor dietary habits – have been widely studied (Kim *et al.*, 2020), there is growing recognition of the role psychological factors play in the development and progression of hypertension.

Recent evidence highlights a strong association between psychological symptoms, such as anxiety, depression, stress, and maladaptive anger expression, and elevated blood pressure (Riaz *et al.*, 2021). Psychological comorbidities are not only frequent among hypertensive patients but have also been linked to worse cardiovascular outcomes (Nicholson *et al.*, 2006; Özpelit *et al.*, 2015; Roest *et al.*, 2010). For example, Player *et al.* (2008) found that more than 30% of patients presenting with anxiety were also affected by undiagnosed hypertension. From a physiological perspective, chronic psychological stress may lead to dysregulation of autonomic function and hyperarousal of both the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis, thereby contributing to sustained elevations in blood pressure (Lambert *et al.*, 2010). At the same time, living with hypertension can itself be a source of psychological burden, leading to increased emotional distress, impaired treatment adherence, and worse disease outcomes (Colivicchi *et al.*, 2010).

Anger and hostility, in particular, have been increasingly recognized as relevant psychosocial risk factors for hypertension. Individuals who chronically express or suppress anger, especially in hostile or unregulated ways, show a higher incidence of elevated blood pressure and cardiovascular complications (Suls & Bunde, 2005). Poor anger control has been identified as a predictor of adverse cardiac outcomes, possibly through sympathetic hyperarousal and reduced parasympathetic tone (Davidson & Mostofsky, 2010). These effects may be amplified under stress, leading to both acute and long-term blood pressure elevations.

In parallel, personality traits such as high neuroticism and social inhibition – core components of the Type D (distressed) personality – have been consistently linked to increased emotional vulnerability and unfavorable cardiovascular profiles (Chida & Steptoe, 2009; Kupper & Denollet, 2018). Recent neuroimaging studies further suggest that elevated neuroticism is associated with structural and functional cardiac changes indicative of early biological aging (Mahmood *et al.*, 2023). Although traits such as hostility and competitiveness were historically associated with the Type A profile, it is now understood that it is these specific dimensions, rather than the Type A pattern itself, that are most relevant for blood pressure dysregulation (Williams *et al.*, 1980).

Another important dimension concerns coping strategies. Emotion-focused and avoidant coping styles have been associated with poorer adjustment, greater emotional distress, and worse health outcomes in patients with chronic conditions, including hypertension (Penley *et al.*, 2002). The inability to regulate stress adaptively may exacerbate psychological symptomatology and contribute to elevated cardiovascular risk. Furthermore, maladaptive emotion regulation strategies, such as rumination and suppression, often accompany traits like neuroticism and may mediate the link between personality and health (Aldao *et al.*, 2010).

In addition to general psychological symptoms, personality traits have emerged as potential moderators of disease progression in hypertensive populations. Traits such as high negative affectivity and social inhibition, commonly found in Type D personality profiles, have been associated with higher rates of psychological distress and poorer cardiovascular outcomes (Kretchy *et al.*, 2014). Despite these findings, previous research has often examined psychological factors in isolation, without integrating multiple dimensions such as personality traits, anger expression and control, and coping strategies.

Given the established role of psychological symptoms as both a consequence and a contributing factor in hypertension (Hamam *et al.*, 2020; Riaz *et al.*, 2021), the present study aimed to investigate how personality traits and anger-related dimensions predict psychological symptoms in patients with hypertension, both at the general level and within subgroups stratified by symptom severity.

By simultaneously considering personality traits, anger regulation, and coping styles, the study aims to capture a broader and more ecologically valid picture of psychological functioning in this population. To our knowledge, this study is the first to compare hypertensive patients grouped by psychological distress severity, providing new insights into which psychological characteristics may serve as markers of vulnerability and which may protect against emotional complications in the context of hypertension.

The study was guided by three specific hypotheses: i) certain personality traits significantly predict psychological symptoms in the overall hypertensive sample; ii) there are meaningful differences in personality profiles, anger expression, coping strategies, and psychological symptomatology between two subgroups of patients stratified by level of psychological distress; and iii) personality traits and anger dimensions predict psychological symptoms differently within these two distinct subgroups.

## Methods

### Participants and study design

In this observational and case-control study, one hundred hypertensive patients (51 females and 49 males), aged between 23 and 84 years (mean 56.04±12.04), were consecutively recruited from the Cardiological Rehabilitation Service of San Cesario Hospital in Lecce (Southern Italy). Patients who received a medical diagnosis of arterial hypertension were enrolled. They were referred by their general practitioner, other departments of the Vito Fazzi Hospital, or by self-booking.

Inclusion criteria were: age over 18 years, a medical diagnosis of arterial hypertension, and no current psychological, psychiatric, or psychopharmacological treatment at the time of assessment.

The project took place at the San Cesario Hospital in Lecce, which provided a room for administering the psychological questionnaires during a 60-minute in-person appointment. A PhD student in Clinical Psychology was responsible for administering the questionnaires and collecting medical data from the patient's medical records.

The experimental procedures conducted complied with the 1964 Helsinki Declaration of the World Medical Association, as

well as the 2005 Universal Declaration on Bioethics and Human Rights of UNESCO. This study complies with the Italian privacy law (Legislative Decree No. 196/2003).

## Measures

After a structured clinical interview, participants were administered the following psychological questionnaires in a fixed order.

The Cattell's 16 Personality Factors Questionnaire (16PF; Sirigatti & Stefanile, 2001) consists of 105 items, each with three possible responses (True, False, or Uncertain), that identify 16 primary, bipolar, and relatively independent personality factors. The 16 dimensions identified are A = Warmth (6 items); B = Reasoning (8 items); C = Emotional Stability (6 items); E = Dominance (6 items); F = Liveliness (6 items); G = Rule-Consciousness (6 items); H = Social Boldness (6 items); I = Sensitivity (6 items); L = Vigilance (6 items); M = Abstractedness (6 items); N = Privateness (6 items); O = Apprehension (6 items); Q1 = Openness to Change (6 items); Q2 = Self-Reliance (6 items); Q3 = Perfectionism (6 items); Q4 = Tension (6 items). A key feature of the 16PF questionnaire is that it asks respondents about specific situations, rather than requiring self-assessment of their personality traits. For instance, the items are formulated as follows: "I enjoy being part of a group" and "I enjoy discussing movies and books with others". Raw scores are converted into a nine-point scale, ranging from 1 to 9. Scores between 4 and 7 are considered average. The mean value of Cronbach's α for the various scales is equal to 0.71 (ranging from 0.66 to 0.93 across the 16 personality factors).

The Coping Orientation to Problems Experiences - new Italian version (COPE-NVI; Sica *et al.*, 2008) identifies the coping style adopted in the face of a stressful event. The primary scales are: Social Support (the search for understanding, information, and emotional release); Avoidance Strategies (the use of denial, substance use, and behavioral and mental detachment); Positive Attitude (attitude of acceptance, containment, positive reinterpretation of events); Orientation to the Problem (use of active and planning strategies); and Transcendent Orientation (use of religion, absence of humor). The instrument is made up of 60 items whose response ranges from 1 to 4: "I usually don't do it" (1), "I do it sometimes" (2), "I do it with a certain frequency" (3), to "I almost always do it" (4). The Cronbach's α of factors ranged from 0.78 to 0.86.

The State-Trait Anger Inventory-2 (STAXI-2; Spielberger, 2004) provides concise measures of anger experience, expression, and control. The concept of experience of anger includes the State Anger (S-Ang) (the emotional state characterized by subjective feelings of different intensity) and the Trait Anger (T-Ang) (willingness to perceive various situations as annoying or frustrating and to respond to them with an increase in state anger). Feeling Angry (S-Ang/F), Feel Like Expressing Anger Verbally (S-Ang/V), and Feel Like Expressing Anger Physically (S-Ang/F) are the components of S-Ang, while Angry Temperament (T-Ang/T) and Angry Reaction (T-Ang/R) are the sub-scales of T-Ang. Furthermore, the concept of expression of anger includes anger towards other people or objects of the environment (Anger Expression-Out, AX-O); anger directed inward, where one holds it back or suppresses it (Anger Expression-In, AX-I); attempts to control one's expression of anger towards people or objects (Anger Control-AC-O); or to suppress it by keeping calm (Anger Control-In, AC-I). Finally, the Anger Expression Index (AX Index) provides a summary measure of anger expression and

control. The STAXI-2 demonstrated good internal consistency (Cronbach's α>0.73 for all scales) in both the original and the Italian versions.

The Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994) is a standardized questionnaire for measuring psychological symptoms and their severity. The SCL-90-R is composed of 90 items with Likert responses from 1 to 5. The participant is asked to respond by referring to the internalizing and externalizing manifestations experienced in the last seven days. The clinical scales are the following: Somatization (SOM; 12 items), Obsessive-Compulsive (O-C; 10 items), Interpersonal Sensitivity (I-S; 9 items), Depression (DEP; 13 items), Anxiety (ANX; 10 items), Hostility (HOS; 6 items), Phobic Anxiety (PHOB; 7 items), Paranoid Ideation (PAR; 6 items), and Psychoticism (PSY; 10 items). The Global Severity Index (GSI) (α=0.87) is an indicator of the depth of mental distress experienced by the individual, relating the number of reported symptoms to the intensity of perceived distress. The raw score of each scale is converted into a T-point scale, where T-scores equal to or greater than 63 in two or more scales or the GSI scale indicate the presence of a clinically significant psychological problem. The symptom dimensions have acceptable to excellent Cronbach's α, ranging from 0.67 (PHOB) to 0.87 (DEP).

## Statistical analysis

Data analysis was conducted using IBM SPSS Statistics (Version 28.0.1.0) and Microsoft Excel.

Descriptive statistics (means and standard deviations) were calculated for all psychological variables.

Tests for skewness, kurtosis, and Kolmogorov-Smirnov were used to confirm normality of distribution. Since the data were normally distributed, multiple linear regressions were used to assess: i) which stable personality traits predicted psychological symptoms in the total sample; ii) which components of anger predicted psychological symptoms; iii) whether state and trait anger dimensions were associated with dysfunctional coping strategies.

Subsequently, the sample was stratified using the GSI score of the SCL-90-R (patients with a T-score≥63 were included in the clinical group). Independent samples' t-tests were used to compare personality traits, coping styles, anger dimensions, and psychological symptoms between clinical and non-clinical groups. Furthermore, simple linear regressions were performed within each group, using psychological symptoms as dependent variables and personality traits, coping styles, and anger dimensions as predictors.

## Results

### Analysis of the total sample

A standardized Cohen's effect size of 0.15 was utilized in this study, along with a type I error rate of 5% (α=0.05) and a type II error rate of 5% (β=0.05; power=95%). An *a priori* power analysis conducted using GPower 3.1 determined that a sample size of 90 participants was necessary. Taking into account a dropout rate of 10%, a sample of 100 people was formed. Since no dropouts were verified, the *post hoc* power analysis indicated that the achieved power of the actual sample was 0.97.

A description of the socio-demographic characteristics is shown in Table 1.

Regression analyses on the total sample revealed that specific personality traits significantly predicted psychological symptoms assessed with the SCL-90-R. In particular, i) the Liveliness factor predicted Paranoid Ideation ($\beta$=0.23, t=2.49, p<0.05); ii) Liveliness and Openness to Change predicted Somatization ($\beta$=0.28, t=2.55, p<0.05 and $\beta$=-0.25, t=2.47, p<0.05, respectively); and iii) Vigilance predicted Anxiety ($\beta$=0.20, t=2.06, p<0.05).

Regarding the hostility scale, several components of the STAXI-2 emerged as significant predictors: i) Trait Anger-Temperament ($\beta$=0.30, t=2.31, p<0.05) and Trait Anger-Reaction ($\beta$=0.43, t=2.66, p<0.01); ii) Anger Expression-Out ($\beta$=−0.78, t=−3.95, p<0.001) and Anger Expression-In ($\beta$=−0.52, t=−2.49, p<0.05); iii) Anger Control-In ($\beta$=0.86, t=3.44, p<0.001), and Anger Expression Index ($\beta$=1.54, t=3.24, p<0.001).

**Table 1.** Socio-demographic characteristics of the sample (n=100).

| Marital status, n (%) | |
|---|---|
| Married/cohabitant | 86 (86%) |
| Unmarried | 5 (5%) |
| Separated/divorced | 6 (6%) |
| Widowed | 3 (3%) |
| **Education level, n (%)** | |
| Middle school graduation | 60 (60%) |
| High school graduation | 30 (30%) |
| University degree | 8 (8%) |
| Post-university degree | 2 (2%) |
| **Current occupation, n (%)** | |
| Employed | 57 (57%) |
| Retired/not employed | 42 (42%) |
| Student | 1 (1%) |

The only STAXI-2 scale that did not predict Hostility, Anger Control-Out, was associated with Obsessive-Compulsive symptoms ($\beta$=−0.55, t=−2.62, p<0.01).

Furthermore, the Feeling Angry sub-scale (S-Ang/F) predicted both Phobic Anxiety ($\beta$=−0.53, t=−2.49, p<0.01) and Psychoticism ($\beta$=−0.52, t=−2.62, p<0.01).

Lastly, avoidance coping strategies from the COPE-NVI significantly predicted Anger Expression-In ($\beta$=0.22, t=2.11, p<0.05).

## Comparison between clinical and non-clinical groups

According to the GSI T-score, a clinical group (GSI T-score$\geq$63) composed of 49 people was separated from a non-clinical one (GSI score<63), comprising 51 people.

Independent samples' t-tests showed that the clinical group had higher scores on Apprehension and Tension and lower scores on Emotional Stability, Liveliness, Sensitivity, Openness to Change, and Self-Reliance.

Additionally, average scores in the clinical group for Emotional Stability (C=3.41±2.27), Openness to Change (Q1=3.24±1.52), and Self-Reliance (Q1=2.61±1.56) were below the normative range (4-7), while Apprehension (O=7.10±1.80) and Tension (Q4=7.37±2.04) were above it (Table 2).

The clinical group reported a greater use of avoidance strategies compared to the non-clinical one (Table 3).

Significant group differences were found for the following anger dimensions: Feeling Angry, Feel Like Expressing Anger Physically, State Anger-Total, Angry Reaction, Trait Anger-Total, Anger Expression-In, and Anger Expression Index (Table 4).

All SCL-90-R sub-scales differed significantly between groups. Furthermore, the clinical group exceeded the cut-off of 63 T-scores in Somatization, Obsessive-Compulsive, Depression, and Anxiety (Table 5).

**Table 2.** Mean ± standard deviation for each dimension of the 16PF in the two groups and Student's t-test.

| | Non-clinical group (n=51) | Clinical group (n=49) | t-test | p-value |
|---|---|---|---|---|
| Warmth (A) | 4.80 (1.64) | 4.61 (1.76) | 0.56 | n.s. |
| Reasoning (B) | 3.88 (1.97) | 3.28 (1.78) | 1.59 | n.s. |
| Emotional Stability (C) | 4.21 (2.48) | 3.41 (2.27) | 1.70 | <0.05 |
| Dominance (E) | 3.80 (2.11) | 4.18 (1.94) | -0.94 | n.s. |
| Liveliness (F) | 5.78 (2.29) | 4.71 (2.41) | 2.28 | <0.01 |
| Rule-Consciousness (G) | 5.27 (1.81) | 5.12 (1.94) | 0.40 | n.s. |
| Social Boldness (H) | 3.14 (2.52) | 3.43 (2.20) | -0.61 | n.s. |
| Sensitivity (I) | 5.55 (1.88) | 6.55 (2.01) | -2.57 | <0.01 |
| Vigilance (L) | 5.23 (2.04) | 5.39 (2.21) | -0.36 | n.s. |
| Abstractedness (M) | 4.98 (2.28) | 4.84 (1.72) | 0.35 | n.s. |
| Privateness (N) | 5.23 (2.40) | 5.71 (2.53) | -0.97 | n.s. |
| Apprehension (O) | 5.65 (2.04) | 7.10 (1.80) | -3.78 | <0.001 |
| Openness to Change (Q1) | 4.10 (2.22) | 3.24 (1.52) | 1.92 | <0.05 |
| Self-Reliance (Q2) | 3.60 (2.20) | 2.61 (1.56) | 2.55 | <0.01 |
| Perfectionism (Q3) | 4.23 (2.44) | 3.77 (2.30) | 0.97 | n.s. |
| Tension (Q4) | 6.40 (2.14) | 7.37 (2.04) | -2.33 | <0.01 |

n.s., not significant.

**Table 3.** Mean ± standard deviation for each sub-scale of the COPE-NVI in the two groups and Student's t-test.

| | Non-clinical group (n=51) | Clinical group (n=49) | t-test | p-value |
|---|---|---|---|---|
| Social Support | 30.18 (6.98) | 31.60 (6.42) | -1.05 | n.s. |
| Avoidance Strategies | 23.43 (7.55) | 25.79 (5.72) | -1.76 | <0.05 |
| Positive Attitude | 33.21 (6.25) | 33.26 (3.87) | -0.05 | n.s. |
| Orientation to the Problem | 33.27 (5.74) | 33.65 (4.57) | -0.36 | n.s. |
| Transcendent Orientation | 15.70 (4.80) | 17.06 (5.31) | -1.34 | n.s. |

COPE-NVI, Coping Orientation to Problems Experiences - new Italian version; n.s., not significant.

**Table 4.** Mean ± standard deviation for each sub-scale of the STAXI-2 in the two groups and relative Student's t-test.

| | Non-clinical group (n=51) | Clinical group (n=49) | t-test | p-value |
|---|---|---|---|---|
| **State Anger (S-Ang)** | | | | |
| Feeling Angry (S-Ang/F) | 44.63 (2.38) | 46.94 (5.28) | -2.84 | <0.001 |
| Feel Like Expressing Anger Verbally (S-Ang/V) | 44.04 (1.23) | 45.47 (6.84) | -1.47 | n.s. |
| Feel Like Expressing Anger Physically (S-Ang/P) | 44.90 (1.40) | 46.98 (7.21) | -2.02 | <0.05 |
| State Anger-Total | 44.23 (1.30) | 46.49 (7.04) | -2.25 | <0.01 |
| **Trait Anger (T-Ang)** | | | | |
| Angry Temperament (T-Ang/T) | 44.20 (5.52) | 46.08 (7.26) | -1.47 | n.s. |
| Angry Reaction (T-Ang/R) | 43.88 (8.42) | 47.06 (9.06) | -1.81 | <0.05 |
| Trait Anger-Total | 38.33 (6.64) | 41.55 (6.87) | -2.38 | <0.01 |
| **Anger Expression** | | | | |
| Out (AX-O) | 47.33 (8.39) | 49.18 (8.71) | -1.08 | n.s. |
| In (AX-I) | 48.51 (8.11) | 52.53 (8.73) | -2.38 | <0.01 |
| **Anger Control** | | | | |
| Out (AC-O) | 50.86 (7.44) | 48.98 (7.65) | 1.25 | n.s. |
| In (AC-I) | 55.92 (8.51) | 55.51 (8.19) | 0.25 | n.s. |
| Anger Expression Index (AX Index) | 45.57 (7.22) | 48.04 (7.54) | -1.67 | <0.05 |

STAXI-2, State-Trait Anger Inventory-2; 16PF, 16 Personality Factors; n.s., not significant.

**Table 5.** Mean ± standard deviation for each sub-scale of the SCL-90-R in the two groups and relative Student's t-test.

| | Non-clinical group (n=51) | Clinical group (n=49) | t-test | p-value |
|---|---|---|---|---|
| Somatization (SOM) | 52.44 (8.70) | 70.23 (18.09) | -6.42 | <0.001 |
| Obsessive-Compulsive (O-C) | 48.44 (7.13) | 64.19 (13.62) | -7.46 | <0.001 |
| Interpersonal Sensibility (IS) | 46.32 (4.91) | 55.26 (12.39) | -4.77 | <0.001 |
| Depression (DEP) | 49.57 (8.17) | 63.87 (16.37) | -5.56 | <0.001 |
| Anxiety (ANX) | 50.21 (7.96) | 66.44 (16.99) | -6.15 | <0.001 |
| Hostility (HOS) | 47.33 (6.37) | 54.50 (9.56) | -4.43 | <0.001 |
| Phobic Anxiety (PHOB) | 47.93 (3.87) | 58.39 (19.32) | -3.79 | <0.001 |
| Paranoid Ideation (PAR) | 47.63 (5.95) | 60.13 (16.14) | -5.18 | <0.001 |
| Psychoticism (PSY) | 47.85 (5.00) | 62.20 (17.40) | -5.59 | <0.001 |
| Global Severity Index (GSI) | 48.65 (6.89) | 65.72 (15.77) | -7.06 | <0.001 |

SCL-90-R, Symptom Checklist-90-Revised.

## Group-specific predictive models

In the clinical group, regression analysis showed that: i) Liveliness ($\beta$=0.41, t=2.10, p<0.05) and Rule-Consciousness ($\beta$=0.50, t=2.90, p<0.01) predicted Hostility; while ii) no coping styles or anger components predicted symptoms in this group.

In the non-clinical group, higher Anger Control-In and Anger Control-Out scores predicted higher Somatization, Depression, and Anxiety. Conversely, higher Anger Expression-In and Anger Expression-Out were associated with lower levels of these symptoms. The Anger Expression Index also predicted these outcomes. Furthermore, Feel Like Expressing Anger Physically was a significant predictor of Somatization. Nonetheless, Anger Expression-In, Anger Control-In, and the Anger Expression Index predicted Paranoid Ideation (Table 6).

## Discussion

The analyses conducted on the total group of patients revealed that some stable personality traits could significantly amplify psychological symptoms. In particular, reduced scores on the Liveliness scale may favor an increase in externalizing symptoms (*i.e.*, paranoid ideation), and, along with openness to change, internalizing symptoms (*i.e.*, somatizations). On the other hand, anxiety symptoms are influenced by high levels of vigilance, a typical trait of suspicious and touchy subjects with a tendency to maintain high levels of alertness in social contexts. Additionally, specific components of anger, including trait anger and the ability to express it both internally and externally, as well as control it within, appeared to influence the manifestations of distress, particularly the levels of hostility. Furthermore, a reduced ability to manifest and express anger externally was a significant predictor of obsessive-compulsive symptoms, while the component of state anger, which refers to the ability to feel and recognize it, predicted other psychological symptoms such as anxiety and psychoticism.

Importantly, this study's novelty lies in the comprehensive assessment of multiple psychological dimensions – personality traits, coping styles, and anger components – within a hypertensive population, and the subdivision of participants based

**Table 6.** Regression analysis on the sub-scales Somatization, Depression, Anxiety, and Paranoid Ideation of the SCL-90-R, with the components of anger investigated with the STAXI-2 in the non-clinical group.

| | Somatization | | |
|---|---|---|---|
| | **Beta** | **t-test** | **p-value** |
| State Anger (S-Ang) | | | |
| Feel Like Expressing Anger Physically (S-Ang/P) | 0.45 | 2.06 | <0.05 |
| Anger Expression | | | |
| Out (AX-O) | -0.82 | -2.93 | <0.01 |
| In (AX-I) | -0.98 | -3.39 | <0.001 |
| Anger Control | | | |
| In (AC-I) | 1.31 | 3.70 | <0.001 |
| Anger Expression Index (AX Index) | 2.17 | 3.37 | <0.001 |
| | **Depression** | | |
| | **Beta** | **t-test** | **p-value** |
| Anger Expression | | | |
| Out (AX-O) | -1.25 | -5.31 | <0.001 |
| In (AX-I) | -1.37 | -5.65 | <0.001 |
| Anger Control | | | |
| Out (AC-O) | 1.08 | 4.75 | <0.001 |
| In (AC-I) | 1.85 | 6.22 | <0.001 |
| Anger Expression Index (AX Index) | 3.40 | 6.29 | <0.001 |
| | **Anxiety** | | |
| | **Beta** | **t-test** | **p-value** |
| Anger Expression | | | |
| Out (AX-O) | -1.10 | -4.39 | <0.001 |
| In (AX-I) | -1.25 | -4.86 | <0.001 |
| Anger Control | | | |
| Out (AC-O) | 1.16 | 4.82 | <0.001 |
| In (AC-I) | 1.71 | 5.43 | <0.001 |
| Anger Expression Index (AX Index) | 3.14 | 5.45 | <0.001 |
| | **Paranoid Ideation** | | |
| | **Beta** | **t-test** | **p-value** |
| Anger Expression | | | |
| In (AX-I) | -0.57 | -2.02 | <0.05 |
| Anger Control | | | |
| In (AC-I) | 0.93 | 2.69 | <0.01 |

SCL-90-R, Symptom Checklist-90-Revised; STAXI-2, State-Trait Anger Inventory-2; only significant associations were reported.

on symptom severity, providing a nuanced understanding of psychological distress in hypertension.

Other interesting aspects were observed when looking at the dispositional traits investigated. To illustrate, the tendency to adopt an avoidant coping style favored the repression of the emotion of anger and the tendency to orient it inward. Generally, avoidant coping is linked to the perception of body sensations assessed as unpleasant (Spira *et al.*, 2004) and the rigid attempts to avoid states of psychophysiological arousal that produce further anxiety (Meuret *et al.*, 2017; Tremblay *et al.*, 2022). Even in our sample, the avoidant coping style seemed to be present in subjects who complained of significant distress, which was probably indicative of an ongoing psychopathological process.

Dividing the participants by using the symptom severity parameter of the SCL-90-R allowed us to highlight specific aspects related to the manifestation of psychological distress and its characteristics. The patients of the clinical group described themselves as tense, impatient, and emotionally unstable and reported higher levels of apprehension and a lack of self-reliance. Furthermore, they outlined a sensitive trait but were scarcely open to new experiences and changes. Hence, individual characteristics known to be part of the Type D personality emerged in our sample. Specifically, the clinical group exhibited negative affect and social introversion, confirming previous studies on the prevalence of Type D personality in hypertensive patients (Oliva *et al.*, 2016), which is represented in about half of our patient group as well. Nonetheless, the distress seemed to be precisely predicted by both negative affect and rule-consciousness in the clinical group. In other words, a tendency to have a depressed, worried, and melancholy mood, along with strict respect for cultural rules and standards, seemed to influence the course of the psychological symptoms investigated. Previous studies documented a relationship between specific personality traits and the consequent incidence of ischemic and similar events (Khayyam-Nekouei *et al.*, 2013; Nabi *et al.*, 2008), including the personality traits of Warmth (factor A), Privateness (factor N), Tension (factor Q4), and Apprehension (factor O) as well as Consciousness (factor G) and Emotional Stability (factor C) assessed through the 16PF (Bonaguidi *et al.*, 1996).

Our results are also in line with several studies that documented a high frequency of comorbidities in heart diseases (Celano *et al.*, 2018). On the other hand, even looking at the non-clinical group, interesting relationships were observed. Particularly, anger appeared to be a predictor of somatizations, anxiety, depression, and paranoid ideation, while depression, anxiety, and somatization seemed to be modulated by anger expression and control. Instead, a tendency to specifically orient the expression and control of anger inward seemed to favor the increase of paranoia. Lastly, somatization seemed to be accentuated also by the expression and control of emotions, as well as the ability to physically express anger. These analyses might represent the complex relationships between the psychological variables investigated. Although personality traits were not associated with symptoms, a causal role was played by anger management. A greater tendency to control and repress emotions corresponded to a significant increase in anxiety, depression, and somatization symptoms. Nevertheless, an inverse trend was documented by looking at the scale of the expression of emotions. The results showed that the increase in the manifestations of anger corresponded to a decrease in the same psychological symptoms mentioned above.

It is necessary to underline that the two components of anger (expression and control) modulated the manifestations of

psychological distress, as already reported by previous studies on the difficulties in recognizing and mentalizing emotions, especially negative ones, in stress-related psychosomatic and physical disorders (Apgáua & Jaeger, 2019). Our findings are also consistent with the study by Kline and colleagues (2008), who observed significant correlations between anger expression and anxious arousal, suggesting that individuals who repress anger experience more emotional distress and are at higher risk of having higher systolic/diastolic blood pressure and developing coronary artery disease (Denollet *et al.*, 2008; Hernandez *et al.*, 2009).

Clinically, our study emphasizes the importance of anger as a psychological mechanism influencing symptom severity and psychological distress in hypertensive patients. These findings support the inclusion of anger assessment and management in routine psychological screenings to help identify at-risk individuals and tailor interventions.

Although the results of the present study offer interesting insights, the limitations inherent in its research design cannot be overlooked. First, the cross-sectional design of the research prevents causal conclusions between the investigated variables. In addition, the use of self-report measures is a survey methodology vulnerable to social desirability bias. However, the absence of a healthy control group does not allow for drawing conclusive information on the populations of patients with hypertension. To overcome these limitations, future studies should consider longitudinal designs, include physiological measures of stress and cardiac and autonomic reactivity, and incorporate measures derived from control groups.

Notwithstanding, further investigation is needed to comprehend the role of personality traits and anger in modulating psychological symptoms, including their predisposing, precipitating, and chronicizing effects. Stressful situations, such as receiving a medical diagnosis, may trigger high levels of anger and elevated symptoms of depression and anxiety. The reactivity hypothesis suggests that organic diseases that impact the quality of life may generally display somatic disorders or somato-psychic reactions (Quinto *et al.*, 2022).

Future studies should explore the causality of psychosomatic and somatopsychic disorders by including a control group and adequately monitoring the severity and duration of the disease, as well as the time since diagnosis. Moreover, multiple mediation models (Gullo *et al.*, 2023) could be tested to better assess the mechanisms responsible for psychological symptoms in hypertensive patients. Note that many disorders characterized by poor mind-body integration have measurable somatic repercussions. In closing, the analysis of data resulting from psychological and psychophysiological evaluation could manifest significant relationships to better explain the union between mind and body.

## Conclusions

The present study aimed to investigate the relationship between personality traits and psychological symptoms in hypertensive patients. This is the first research to examine distinct relationships among personality, coping strategies, anger management, and psychological symptoms in two subgroups of hypertensive patients, divided based on the severity of psychological distress. Notably, it also underscores the role of anger regulation even in individuals classified as non-clinical.

Although preliminary, these findings validated the complex

interplay of psychological factors impacting mental health in hypertension, emphasizing the importance of integrating psychological assessment alongside medical evaluation. Early identification of psychological distress symptoms through such integrated assessments could prevent worsening of mental and physical health outcomes.

Furthermore, psychological interventions could complement medical treatments by providing multi-level prevention, ultimately benefiting patients, communities, and the National Health System through improved psychological well-being and potential economic savings.

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