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Psychological risk and protective factors in people with hypertension

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Abstract

Backgrounds: Hypertension is a leading cardiovascular risk factor whose prevalence in global population doubled in the last 30 years. In addition to lifestyle and genetic factors, it can be caused or exacerbated by certain psychological factors. The aim of this study was to examine the relationship between resilience, coping strategies, emotional regulation and control and associated aspects of health status in people diagnosed with hypertension.

Methods and Measures: The study was conducted on 203 participants during their visit in the private clinic. Participants were mostly males (56.7%), and the mean age was 66 years (SD = 10.04). A structured protocol consisted of sociodemographic data, Brief Resilience Scale, Emotional Regulation and Control Questionnaire and Defense Style Questionnaire.

Results: Our findings showed that female participants, participants with other health problems in addition to hypertension, participants with heart attack history and those who do not engage in physical activity and rarely consume alcohol have less stress resistance. Men and frequent alcohol consumers are less prone to neurotic defense mechanism. Emotional regulation and neurotic defense mechanisms appear to be negative predictors of stress resilience, while mature defense style is strong, positive predictor.

Conclusion: Indication of significant relationship between certain aspects of health status and resistance to stress, defense mechanisms and emotional regulation was found. The study outcomes suggest an important role of defense mechanisms and emotional regulation in stress resilience which can contribute to improved stress resistance and health outcomes in people with hypertension.

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1. Introduction

Hypertension, also known as elevated blood pressure, is a medical condition in which the force caused by circulating blood pushing the arteries, is persistently high (WHO, 2021). Hypertension is diagnosed when the values of systolic blood pressure (SBP) are ≥140 mmHg and the values

of diastolic blood pressure (DBP) are ≥ 90 mmHg (WHO, 2021). Hypertension is considered as a leading risk factor for cardiovascular diseases, such as atherosclerotic coronary artery disease and congestive heart failure (Benjamin et al., 2019; Liu et al., 2017; Xie et al., 2016). High blood pressure can also lead to chronic kidney disease, stroke, and intracerebral hemorrhage (Liu et al., 2017; Mozaffarian et al., 2016; WHO, 2021).

Considering the last 30 years, the number of people with high blood pressure doubled (NCD-RisC, 2021). According to the first comprehensive global analysis of trends in hypertension from 1990 to 2019, 626 million women and 652 million men have this condition (NCD-RisC, 2021). In other words, 1.28 billion adults, aged from 30 to 79 years worldwide have hypertension. In 2019, Croatia was ranked as the eighth country with highest hypertension prevalence in men, with the percentage of 51.4% (NCD-RisC, 2021). In 2020, high blood pressure was the fourth most prevalent cause of death in Croatia, accounting for 7.9% of all deaths (Croatian Institute of Public Health, 2021). Moreover, hypertension is one of the leading causes of death in women and men in Croatia (Croatian Institute of Public Health, 2021). With population growth and increasing lifespan, the prevalence of hypertension is expected to rise.

The most frequently mentioned risk factors for developing hypertension include genetic factors, lower education and socioeconomic status, tobacco and alcohol use, weight gain, and physical inactivity (Benjamin et al., 2019; Dullius et al., 2018; Mozaffarian et al., 2016; van Oort et al., 2020). Moreover, exposure and coping with various psychosocial stressors is also highlighted (Ariff et al., 2011; Jabbarifard et al., 2015).

Advancement in cardiovascular research overtime has led to the conclusion that, in addition to pharmacotherapy and lifestyle modifications, psychological factors play an important role in effective management of hypertension (Cao et al., 2021; Kukić & Pokrajac-Bulian, 2022; Mahmood et al., 2019; Merlo, 2019; Pokrajac-Bulian et al., 2022). They can affect adherence to treatment, beliefs about illness control, and contribute to the onset and trajectory of the disease (Kukić & Pokrajac-Bulian, 2022; Cuevas et al., 2017). Among the most important psychological correlates of progression of hypertension are anxiety and depression, both of which can be linked to higher level of heart sensations, irregular heart rate, rehospitalization and increased mortality (Awuah et al., 2019; Carvalho et al., 2016; Kukić & Pokrajac-Bulian, 2022; Pokrajac-Bulian et al., 2022).

Numerous studies have also emphasized the association of alexithymia, anger and type D personality with exacerbation of certain chronic conditions (Di Giuseppe & Conversano, 2022; Gangemi et al., 2021; Martino et al., 2020, Romeo et al., 2022; Vita et al., 2020). Several studies

indicate that individuals with high levels of alexithymia could be at greater risk of developing chronic diseases due to their impairment in emotion processing and inability to distinguish adequate responses to external stressors (Di Giuseppe & Conversano, 2022; Gangemi et al., 2021; Martino et al., 2021; Romeo et al., 2022).

Exposure and coping with various psychological stressors are found to be important contributors to the onset and maintenance of chronic diseases, especially cardiovascular conditions (Ariff et al., 2011; Cuevas et al., 2017; Di Giuseppe et al., 2020; Jabbarifard et al., 2015; Kukić & Pokrajac-Bulian, 2022). Stress affects blood pressure through the hypothalamic–pituitary–adrenal (HPA) axis and sympatho-adrenomedullary axes. Activation of these systems induces the release of glucocorticoid, such as cortisol, which consequently raises blood pressure (Cuevas et al., 2017; Liu et al., 2017). Impact of internal conflicts and external stressors due to existing chronic condition on the physical functioning can be mediated by individuals' coping resources and ability to easily adjust to adversities, i.e., resilience (Casagrande et al., 2019; Di Giuseppe et al., 2021; Islam et al., 2020; Pokrajac-Bulian et al., 2022; Svensson et al., 2016; Qiu et al., 2021). Results from an extensive study conducted on 237,980 men indicated that lower levels of resilience in adolescence is associated with increased risk of cardiovascular diseases in middle age (Bergh et al., 2015). Resilient individuals are more successful in coping with negative emotions and stress caused by adverse life events, such as impaired health, by implementing adequate defense mechanisms (Carvalho et al., 2016). They could be less susceptible to diseases (Carvalho et al., 2016), more likely to adopt healthy behaviors and have better recovery from certain heart conditions (Malik & Afzal, 2015; Qiu et al., 2021). According to previous studies (Dullius et al., 2018; Love et al., 2021; Nouri-Saeed et al., 2015), factors associated with resilience to stress include gender, education level, economic status, physical activity, coping strategies and history of hypertension.

Additionally, use of maladaptive defense strategies, such as neurotic and immature style can lead to impairment of endocrine and immune systems, worse treatment outcome and lower survival rates (Conversano et al., 2020; Conversano & Di Giuseppe, 2021; Di Giuseppe & Conversano, 2022; Svensson et al., 2016). On the other hand, adaptive coping strategies, such as rationalization and reaction formation, are associated with patient adherence to treatment, higher physical and psychological functioning (Di Giuseppe et al., 2019; Di Giuseppe et al., 2020; Rong et al., 2018). Svensson et al. (2016) found an association between avoidance coping strategies and increased risk of ischemic heart disease mortality, but only among participants with hypertension. In comparison to healthy people, individuals with hypertension tend to adopt maladaptive coping strategies, such as emotion-oriented coping (Ariff et al., 2011;

Jabbarifard et al., 2015). Those suffering from both hypertension and heart diseases were less prone to effective, task-focused coping strategies and reported less use of emotion-oriented coping style, compared to the groups with uncontrolled and untreated hypertension (Casagrande et al., 2019). Individuals who tend to use task-focused coping strategies and have higher resilience to stress could adapt better to the onset of illness and changes to their lifestyle (Dullius et al., 2018; Ghanei Gheshlagh et al., 2016).

According to Casagrande at al. (2019), reduced use of emotional-oriented coping in severe forms of hypertension could be due to dysfunctional emotional regulation strategy. Several recent studies point to emotion regulation as contributor to the progression, recurrence, and severity of chronic conditions (Di Giuseppe & Conversano, 2022; Ciuluvica et al., 2019; Roy et al., 2018). Emotion regulation, defined as the ability to monitor one's emotional experiences and responses, could be associated with risk of developing hypertension (Luque et al., 2020; Trudel-Fitzgerald et al., 2015). It represents a process in which individuals effortfully or automatically monitor and control their emotional response to environmental demands, for instance implementation of defense mechanisms in stressful situations (Di Giuseppe & Conversano, 2022). Habitual use of maladaptive emotion regulation strategies, such as rumination and blaming others, is associated with stronger negative affect as a response to a stressor (Krkovic et al., 2018). Individuals who manage their emotions and behavior in an adaptive way can face adversities, such as impaired health, more efficiently (Trudel-Fitzgerald et al., 2015). In addition, individuals with adaptive emotion regulation may be more inclined to adopt and maintain healthy lifestyle behaviors, such as regular physical activity and reduction in alcohol intake and smoking which are protective factors for the risk of onset or progression of hypertension (Roy et al., 2018).

Considering the role of psychosocial variables in development and potential worsening of hypertension, more attention should be paid to risk and protective factors associated with resilience, effective coping, and emotional skills. In this study, neurotic and immature defense styles were considered as risk factors, while mature defense styles and effective emotional regulation were viewed as protective factors for onset and progression of hypertension (Conversano & Di Giuseppe, 2021; Cuevas et. al, 2017; Di Giuseppe & Conversano, 2022).

Therefore, the aim of our study is to analyze the relation between resilience, coping strategies, emotional regulation and control among individuals with hypertension. An additional objective is to examine whether individual differences in certain aspects of health are associated with resilience, coping strategies and emotional regulation and control.

2. Methods

2.1 Participants and procedure

All participants were recruited from a private clinic where they received an invitation to participate in our study. Participants were interviewed after they confirmed they had read the informed consent and agreed to participate in the study. All participants confirmed that they were 18 years of age or older. Participation in this study was completely voluntary, and participants did not receive any monetary compensation. The study included 203 participants with hypertension, with a mean age of 66 years (SD = 10.04), of which there were 115 men (56.7%) and 88 women (43.3%). For the most part, these are people who have completed high school (57.1%) are employed (44.8%) or retired (47.8%). Most participants were married (72.4%) and have children (84.2%) (Table P1., Supplemental Data).

Table 1. Participants' health status and habits (n=203)

		f	%
Regular visit to cardiologist	Yes	69	34.0
	No	134	66.0
Heart attack	Yes	24	11.8
	No	179	88.2
Family history of heart diseases	Yes	156	76.8
	No	47	23.2
Healthy diet	Yes	120	59.1
	No	83	40.9
Comorbidity	Yes	100	49.3
	No	103	50.7
Smoking	Yes	21	10.3
	No	182	89.7

Descriptive data of certain aspects of participants' health status and habits showed that 66% of participants did not regularly visit their cardiologist. Further, 76.8% of participants confirmed cardiovascular disease heredity and 11.8% have had a heart attack, whereas 40.9% of participants did not have healthy diets (Table 1). In addition to high blood pressure, 49.3% of participants reported the presence of other diseases, and only 10.3% said they smoke. When asked about the frequency of alcohol use in the last year, 21.2% of participants indicated that they consumed alcohol every day or almost every day, 21.7% consumed alcohol three to four times a week, 14.8% once or twice a week, 32.5% of participants consumed alcohol several times a month, while 9.9% said they consumed rarely or not consumed alcoholic beverages at all. Most participants reported not engaging in physical activity (45.8%), 22.7% were physically active

once or twice a week, and 31.5% of participants reported that they engage in physical activity every day or almost every day.

Participants' body mass index ranged from 19.26 to 39.26, with an average value of 30.0 (SD = 3.56). These values indicate that body mass index ranges from malnutrition to obesity, with an average value indicating overweight.

Table 2. Participants' comorbidities (n=100)

	f
Eye diseases	53
Endocrine, nutritional, and metabolic diseases	34
Malignant neoplasms	7
Diseases of the musculoskeletal system	25
Other	7
Not answered	3

Of the 203 participants, 100 reported that, in addition to hypertension, they had additional health problems. Participants' responses to the comorbidity question were grouped into five categories: (1) Eye Diseases ("Glaucoma", "Iron Cataract"); (2) Endocrine, nutritional and metabolic diseases ("Diabetes", "Increased Fat"); (3) Malignant Neoplasms ("Meningioma", "Breast Cancer"); (4) Diseases of the musculoskeletal system ("Multiple Sclerosis", "Rheumatism"); (5) Other ("Depression", "Asthma", "Psoriasis", "Hepatitis"). Three participants declared that, in addition to hypertension, they had additional diseases, but did not specify what they were (Table 2).

2.2 Measures

For the purposes of this study, we used a sociodemographic questionnaire, the Emotional Regulation and Control Questionnaire – ERIK (Takšić, 2003), the Defense Styles Questionnaire-DSQ-40 (Andrews et al., 1993) and the Brief Resilience Scale (Slišković & Burić, 2018). The sociodemographic questionnaire included questions about age, gender, marital status, number of children, occupation, and health habits, such as smoking, alcohol use, frequency of physical activity, regularity of check-ups in cardiologists and medication.

2.2.1 Emotional Regulation and Control Questionnaire- ERIK

The Emotional Regulation and Control Questionnaire (ERIK; (Takšić, 2003) consists of 20 items that measure the regulation and control of negative emotions and moods. The purpose

of the questionnaire is to estimate the magnitude of the effect of emotions and mood on an individuals' thinking, memory, and behavior as well as assessing the ability to control emotions (Takšić, 2003). Participants answered questions using a Likert type scale (1- Not at all, 2-Mostly not, 3-Depending, 4- Mostly yes and 5- Completely yes) and estimated how much each claim applied to them. The overall score of the scale is formed by a simple linear combination of estimates on each item, with a higher score representing poorer regulation of negative emotions (Takšić, 2003). The values of Cronbach alpha for the current sample indicates satisfactory reliability of the influence of emotions and mood on the thinking subscale (α=0.899) and slightly lower reliability of the influence of emotions and mood on memory subscale (α=0.76) and the emotional reaction control subscale (α=0.72).

2.2.2 Defense Style Questionnaire 40- DSQ-40

The Defense Style Questionnaire (DSQ-40, Andrews, et al., 1993) measures the hierarchy of defense styles, namely individuals' typical ways of coping with different life difficulties. The DSQ-40 scale consists of 40 questions that represent 20 different defense mechanisms. Each of the mechanisms is covered by two questions and can be grouped into three broad categories of defense styles: Mature, Immature and Neurotic (Andrews et al., 1993). Participants assess the extent to which they agree with the items using a scale of 1 (Strongly disagree), over 5 (Neutral) to 9 (Strongly agree). Higher scores indicate more frequent use of the specified defense style. Total result for each of the defense styles is calculated as the average value of the defense mechanisms calculated within each defense style. Mature defense style includes sublimation, anticipation, humor, and suppression (Andrews et al., 1993). Furthermore, the neurotic defense style is characterized by mechanisms of denial, pseudo altruism, idealization, and reactive formation. The immature defense style includes mechanisms of projection, passive aggression, acting out, isolation, devaluation, autistic fantasies, denial, relocation, dissociation, splitting, and somatization. Internal consistency for the current sample was as follows: α=0.84 for mature defense style, α=0.77 for neurotic defense style, and α=0.69 for immature defense style.

2.2.3 Brief Resilience Scale

Brief Resilience Scale (Smith et al., 2008) is a six-item measure of resilience, operationalized in the context of successful recovery from a perceived stressful situation. Participants assessed items on a 5-degree Likert type scale (1- I completely disagree, 2- I disagree, 3- I neither agree nor disagree, 4- I agree and 5- I completely agree). Negative-worded questions are recoded, and the total score is calculated as an average result on all items, with higher scores reflecting a higher

degree of resilience (Slišković & Burić, 2018). The Cronbach alpha for the current study indicates satisfactory reliability of the Brief Resilience Scale (α=0.93).

2.3 Statistical analyses

The data was analyzed using the IBM SPSS Statistics program (version 26). Based on the value of Mahalanobis' distance and box-plot display, the presence of three extreme values (M=2; F=1) was determined, which were excluded from further analyses. The final sample included 200 participants, of which 113 were men (56.5%) and 87 were women (43.5%). For the purpose of controlling for multiple comparisons following the multivariate analysis of variance (MANOVA), false discovery rate was corrected by the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995).

To check for differences in stress resilience regarding gender and certain aspects of health in people with hypertension, a t-test was performed on independent samples and a one-way analysis of variance (ANOVA). The implementation of the Shapiro-Wilk test identified deviations from the normality of distribution at certain levels of independent variables attributable to the number of participants surveyed. With the normality of distributions, it should be noted that the distributions are predominantly symmetrical. In situations of t-test implementation where the assumption of homogeneity of the variance was not met, the results of the t-test with corrected degrees of freedom were considered. If there were deviations from the homogeneity of the variances, when conducting a one-way ANOVA (Table 3), the values of the Welch's t-test were observed.

In order to examine the differences in emotional regulation and control and defense styles with regard to gender and certain aspects of the health, a MANOVA was carried out. The distributions of observed dependent variables by levels of independent variables were predominantly normal and symmetrical. Dependent variables are low to moderately related, and the amounts of associated correlation coefficients do not exceed the value of 0.9 which would indicate the existence of multicollinearity (Hair et al., 2014). The dominant equivalence of the variance-covariance matrix and homogeneity of variances of dependent variables between groups were established. In the analyses where the homogeneity of the variance-covariance matrix and approximately equal sizes of independent samples deviated from the assumption of homogeneity of the variance-covariance matrix and approximately equal sizes of independent samples the values of Pillai's trace test were considered (Field, 2018).

In order to examine the contribution of emotional regulation and control and defense styles in explaining stress resilience, a hierarchical regression analysis was carried out. A two-block set

was used, with the first block encompassing the influence of emotions and mood on thinking and memory and controlling emotional reactions, while the second block contained defense styles: neurotic, mature and immature.

3. Results

3.1 Stress resilience

The average level of stress resilience in this study is slightly higher than the assumed arithmetic mean (Table P2, Supplemental Data). The results of the t-test and one-way ANOVA indicate a statistically significant difference in stress resilience with respect to gender (t= 4.08, $p< 0.001$), comorbidity (t= -6.504, $p<0.001$), heart attack (t=-3.802, $p< 0.001$), weekly physical activity (Welch t-test= 13.38; df1= 2, df2= 118.14, $p< 0.001$) and the frequency of alcohol use ($F(4,195)= 7.45$, $p< 0.001$).

Men have a significantly higher degree of stress resilience compared to women. Participants who do not have additional health problems on top of hypertension and who have not suffered a heart attack show greater resilience to stress. Due to the uneven sizes of independent samples, a nonparametric Wilcoxon sum test was performed (W= 18617.5; z=3.54; $p< 0.001$) which confirmed a significant difference in stress resilience with respect to the experienced heart attack. Participants with hypertension who engage in physical activity every day or almost every day have significantly higher stress resilience compared to participants who engage in physical activity once or twice a week ($p< 0.05$) or do not engage in physical activity ($p< 0.001$) (Table P3a, Supplemental Data). The latter two groups do not differ significantly from each other in stress resilience ($p = 0.357$). Participants who rarely or do not consume alcohol at all have lower stress resilience compared to participants who consume alcoholic beverages every day or almost every day ($p< 0.001$), three to four times a week ($p< 0.001$), once or twice a week ($p< 0.01$) and participants who consume alcohol several times a month ($p< 0.05$) (Table P3b, Supplemental Data). No differences were found between the remaining levels of alcohol use frequency. In view of the uneven sizes of independent samples, a nonparametric Kruskal-Wallis test was also performed (H=24.08; df=4, $p<0.001$) which confirmed a significant difference in stress resilience with regard to the alcohol use frequency in the last 12 months. Although participants who take care of a healthy diet achieve slightly higher results on a stress resilience scale compared to participants who do not take care of their diet, the difference was not statistically significant (t= -1.71, $p = 0.089$).

Table 3. Differences in stress resilience with respect to certain aspects of participants' health status and habits (n=200)

	Descriptive statistics			Levene's test of homogeneity of variance
		n	*M(SD)*	*F*
Gender	M	113	3.03(0.32)	0.104
	F	87	2.84(0.33)	
Comorbidity	Yes	99	2.8(0.35)	10.59***
	No	101	3.09(0.26)	
Heart attack	Yes	24	2.71(0.32)	0.03
	No	176	2.98(0.33)	
Healthy diet	Yes	118	2.98 (0.35)	5.11*
	No	82	2.9(0.35)	
Physical activity	No physical activity	92	2.85(0.39)	12.06***
	1-2 times a week	46	2.94(0.27)	
	Every day or almost every day	64	3.1(0.24)	
Alcohol use frequency	Every day or almost every day	43	3.07(0.3)	0.03
	3-4 times a week	44	3(0.33)	
	1-2 times a week	30	2.99(0.33)	
	Several times a month	64	2.91(0.31)	
	Rare or never	19	2.61(0.34)	

Note: M, mean; SD, standard deviation; *$p \leq 0.05$; ***$p \leq 0.001$

To determine differences in emotional regulation and control depending on gender and certain aspects of the health in people with hypertension, six MANOVA were carried out. There was a significant multivariate gender effect (Wilks' Lambda = 0.73, F(3, 196) = 24.77, $p < 0.001$, partial $\eta^2 = 0.28$), comorbidity (Pillai's Trace = 0.17, F(3, 196) = 13.08, $p < 0.001$, partial $\eta^2 = 0.17$), heart attack (Pillai's Trace = 0.09, F(3, 196) = 6.56, $p < 0.001$, partial $\eta^2 = 0.09$), healthy diet (Wilks' Lambda = 0.93, F(3, 196) = 5.07, $p < 0.001$, partial $\eta^2 = 0.07$), weekly physical activity (Pillai's Trace = 0.15, F(6, 392) =5.2, $p < 0.001$, partial $\eta^2 = 0.07$) and alcohol use frequency (Pillai's Trace = 0.36, F(12,585) = 6.57, $p < 0.001$, partial $\eta^2 = 0.12$).

In view of significant multivariant models, the results of one-way ANOVA were also observed. We found a significantly greater influence of emotions and mood on thinking (F(1,198)= 26.53, $p < 0.001$) and better control of emotional reactions in women than in men (F(1,198)= 13.5, $p < 0.001$). In terms of the influence of emotions and mood on memory, no significant differences were found with respect to gender (F (1,198) = 0.64, $p = 0.424$). Significant

differences with respect to comorbidity were found to influence emotions and mood on thinking (F (1, 198) =37.96, p<0.001) and memory (F(1, 198)= 21.35, p<0.001), but not emotional reaction control (F(1, 198)= 3.57, p = 0.06). These effects are greater in the case of participants with hypertension in whom additional health problems are present. The influence of emotions and mood on thinking (F (1, 198) =17.6, p< 0.001) and memory (F(1, 198)= 10.47, p<0,001) is significantly higher, and the control of negative emotional reactions is significantly less (F(1, 198)= 7.33; p< 0.001) in participants who suffered a heart attack. The results of one-way ANOVA indicate a significantly lower influence of emotions and mood on the thinking (F (1, 198)= 6.85, p< 0.05) and memory (F(1, 198)=7.72, p< 0.001) and greater control of emotional reactions (F(1, 198)= 12.81, p< 0.001) in participants who take care of their diet. The difference in emotional regulation and control was also observed regarding the frequency of physical activity.

The findings of the three univariate analyses indicate significant differences with respect to weekly physical activity in case of influence of emotions and mood on the thinking (F(2, 197)= 15.14, p<0.001), memory (F(2, 197)=8.73, p<0.001) and emotional reaction control (F(2, 197)= 5.55, p<0.01). The influence of emotions and mood on thinking (p<0.001) and memory (p<0.001) was significantly greater, and the control of emotional reactions was significantly less (p<0.01) in participants who do not engage in physical activity compared to participants who engage in physical activity every day or almost every day. In addition, the influence of emotions and mood on thinking (p<0.05) was significantly higher in participants who do not engage in physical activity compared to those who engage in physical activity once or twice a week (Table P3a, Supplemental Data). Significant differences with regard to the alcohol use frequency were found in terms of the influence of emotions and mood on thinking (F (4, 195) = 6.06, p< 0.001) and control of emotional reactions (F(4, 195)= 7.11, p<0.001), but not in case of influence of emotions and mood on memory (F(4, 195)= 1.45, p = 0.221). The influence of emotions and mood on thinking is significantly less in participants who rarely consume alcohol, i.e., do not consume alcoholic beverages at all compared to participants who consume alcohol every day or almost every day (p< 0.001), three to four times a week (p<0.01) and once or twice a week (p<0.01). Control of emotional reactions is significantly lower in participants who consume alcohol every day or almost every day compared to participants who consume alcohol several times a month(p<0.001) and rarely or never (p< 0.05). In addition, participants who consume alcohol three to four times a week have less control over negative emotions compared to participants who consume alcohol several times a month (p<0.01) (Table P3b, Supplemental Data). Further at MANOVA, a discriminatory analysis was carried out, which established two

discriminatory functions. The first function explained 99.4% of the total variance with canonical R2 in the amount of 0.15. The combination of observed discriminatory functions significantly discriminated against belonging to the observed groups (Wilks' Lambda= 0.85, χ 2 (6) = 31.21, p<0.001), but by turning off the first function, the second ceases to be a significant discriminatory (Wilks' Lambda =0.999, χ 2 (2) = 0.2, p = 0.903). The first function, to which all three scales of emotional regulation and control belong, distinguish participants who do not engage in physical activity from participants who engage in physical activity every day or almost every day. A discriminatory analysis was also carried out regarding alcohol use, and three discriminatory functions were found. The first function explained 90.4% of the total variance (canonical R2= 0.31), the second explained 5.8% of variance (canonical R2= 0.03), and the third function explained only 3.8% of the total variance (canonical R2= 0.02). The combination of these discriminatory functions significantly discriminated against belonging to the observed groups (Wilks' Lambda = 0.66, χ 2 (12) = 81.5, p<0.001), but by turning off the first function, the remaining two cease to be significant discriminators. The first function discriminated against participants who rarely or never consume alcohol from participants who consume alcohol three to four times a month, or every day.

4.3 Defense styles

To investigate differences in defense styles regarding gender and certain health habits, six MANOVA were carried out. There was a significant multivariate gender effect (Wilks' Lambda = 0.74, F(3, 196) = 23.4, p<0.001, partial η^2= 0.26), comorbidity (Pillai's Trace = 0.18, F(3, 198) = 14.11, p<0.001, partial η^2= 0.178), heart attack (Pillai's Trace = 0.55, F(3, 196) = 3.83, p < 0.05, partial η^2 = 0.055), healthy diet (Wilks' Lambda = 0.87, F(3, 196) = 9.83, p< 0.001, partial η^2 = 0.13), frequency of physical activity (Wilks' Lambda = 0.88, F(6, 390) = 4.41, p<0.001, partial η^2 = 0.06) and the alcohol use frequency in the last year (Pillai's Trace = 0.38, F(12,585) = 7.07, p<0.001, partial η^2 = 0.13) .

By conducting one-way analyses, we found that women used a neurotic defense style to a significantly greater extent (F (1, 198) = 50.96, p<0.001), whereas no differences were found in the use of mature (F(1, 198)= 2.21, p =0.139) and immature defense styles (F(1, 198)= 0.08, p = 0.778). Participants who have other health problems on top of hypertension used mature defense styles to a lesser extent compared to participants who do not have comorbidity (F(1, 198)=35.68, p<0.001). In terms of immature (F(1, 198)= 0.4, p = 0.526) and neurotic defense style (F(1, 200)= 0.32, p = 0.573), no significant differences were found. Participants with hypertension who have suffered a heart attack used mature defense styles to a significantly lesser

extent (F(1, 198)=11.42, p<0.001) and did not differ in use of neurotic style (F(1, 198)= 1.65, p =0.2) and immature styles (F(1, 198)= 0.89, p = 0.347). The results of one-way ANOVA indicated that participants with healthy diets used mature (F(1, 198)= 13.66, p< 0.001) and neurotic (F(1, 198)= 10.2, p<0.001) defense styles to a significantly greater extent and immature style (F(1, 198)= 15.32, p<0.001) to a significantly lesser extent. Participants with hypertension who engage in physical activity every day or almost every day used more mature (p<0.001) and less immature defense styles (p< 0.05) compared to participants who do not engage in physical activity. In addition, participants who engage in physical activity every day used a mature defense style to a significantly greater extent compared to participants who engage in physical activity once or twice a week (p<0.05) (Table P3a, Supplemental Data). The findings of one-way analyses by indicated that participants who consume alcohol every day or almost every day used neurotic defense styles to a significantly lesser extent compared to participants who do not consume alcohol (p< 0.001) or consume it several times a month (p<0.001). In addition, participants who consume alcoholic beverages three to four times a week were significantly less likely to use neurotic defense styles compared to participants who rarely, or do not consume alcohol at all (p< 0.001), consume it several times a month (p< 0.001) or once or twice a week (p<0.05) (Table P3b, Supplemental Data).

The discriminatory analysis regarding physical activity identified two discriminatory functions, with the first explaining 87.1% of the total variance with canonical R2 in the amount of 0.11. The combination of the aforementioned discriminatory functions significantly discriminated against belonging to the observed groups (Wilks' Lambda = 0.88, $\chi 2$ (6) = 25.76, p<0.001), but by turning off the first function, the second ceased to be a significant discriminator (Wilks' Lambda = 0.98, $\chi 2$ (2) = 3.46, p =0.178). The first function, which includes mature and immature defense styles, distinguishes participants who do not engage in physical activity from participants who engage in physical activity every day or almost every day. The discriminatory analysis regarding alcohol consumption revealed three discriminatory functions. The first function explained 88. 2% of total variance (canonical R2= 0.319), the second explained 8. 3% variance (canonical R2=0.04), and the third function explained only 3.5% of the total variance (canonical R2=0.02). The combination of the aforementioned discriminatory functions significantly discriminated against belonging to the observed groups (Wilks' Lambda = 0.64, $\chi 2$ (12) = 87.2, p< 0.001), but by excluding the first function, the remaining two do not significantly discriminate against the observed groups. The first function included neurotic defense style and distinguished participants who do not consume alcohol or consume it several times a month from the remaining groups.

Table 4. Correlations between certain aspects of health, stress resilience, emotional regulation and control, and defense styles (n=200)

	Comorbidity	Heart attack	Healthy diet	Education	Physical activity	Alcohol use	Resilience scale	ERIK thinking	ERIK memory	ERIK control	Mature DS	Neurotic DS
Heart attack	0.219**											
Healthy diet	0.029	0.068										
Education	0.206**	0.037	0.081									
Physical activity	0.22**	0.234**	0.378**	0.2**								
Alcohol use	-0.156*	0.09	0.354***	0.003	0.048							
Resilience scale	0.421***	0.261***	0.123	0.23***	0.259***	-0.247***						
ERIK thinking	-0.401***	-0.286***	-0.183**	-0.204***	-0.295***	0.217***	-0.649***					
ERIK memory	-0.312***	-0.224**	-0.194**	-0.096	-0.25***	0.037	-0.5***	0.65***				
ERIK control	-0.133	-0.189**	-0.246***	0.078	-0.178**	-0.251***	-0.186**	0.34***	0.537***			
Mature DS	0.389***	0.234**	0.254***	0.154**	0.213***	-0.077	0.641***	-0.615***	-0.519***	-0.313***		
Neurotic DS	-0.045	0.091	0.221**	-0.212***	-0.039	0.361***	-0.089	0.149*	-0.121	-0.421***	0.278***	
Immature DS	-0.045	-0.067	-0.268**	-0.024	-0.175**	-0.034	-0.183**	0.386***	0.452***	0.56***	-0.227**	-0.139*

Note: DS-defense style; ERIK- Emotion and regulation control questionnaire; $^{*}p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$

To determine the correlation between certain aspects of participants' health, stress resilience, emotional regulation and control, and defense styles, the values of the Pearson correlation coefficient were observed and Kendall τ coefficient. Table 4 shows how stress resilience is significantly related to all aspects of health, except for healthy diet, and with all measures except neurotic defense style. Participants with higher levels of education, who are more likely to engage in physical activity and consume alcohol to a greater extent, have greater resilience to stress. The influence of emotions and mood on thinking and on memory is less the higher the stress resilience, and those participants who use a more mature defense style and less immature defense style possess greater resilience to stress. Participants with hypertension who are more likely to engage in physical activity and less frequently consume alcohol have greater control over emotional reactions, and the influence of emotions and mood on thinking is less.

Significant intercorrelations of emotional regulation and control and defense styles were also identified. The influence of emotions and mood on thinking and memory in participants suffering from hypertension is lower with higher control of negative emotions and the lower if the individual uses a mature defense style. The use of an immature defense style leads to a greater influence of emotions and mood on thinking and memory and less control of negative emotions.

3.4 Regression

The hierarchical regression analysis indicated the significance of both blocks of predictors (Table 5). All predictors covered by the analysis explain 54.9% (R2adj. = 0.54, $p<0.001$) of stress resilience variance, with the first block of predictors explaining 44% variance (R2adj. = 0.43, $p<0.001$). Within the first block of predictors entered, the influence of emotions and mood on thinking and the influence of emotions and mood on memory were significant, while the control of emotional reactions did not prove to be a significant predictor in explaining stress resilience. Within the second block of predictors, mature and neurotic defense style turned out significant, while the immature style was not a significant contribution in explaining stress resilience. With the introduction of the second block of predictors, the predictor of the influence of emotions and mood on memory was no longer significant. The smaller the influence of emotions and mood on thinking and the more often a person uses mature defense style, and less neurotic defense style, the greater is the stress resilience.

Table 5. Results hierarchical regression analyses in predicting stress resilience in hypertension participants (n=200)

	Model 1	Model 2
	B	*β*
Influence of emotions and mood on thinking	-0.6**	-0.27**
Influence of emotions and mood on memory	-0.2*	-0.14
Control of emotional reactions	0.11	0.02
Mature defense style		0.47**
Neurotic defense style		-0.18**
Immature defense style		-0.05
R	0.66***	0.74***
R^2	0.44***	0.55***
$R^2_{adj.}$	0.43***	0.54***

Note:*p<0.05; **p<0.01; ***p<0.001

4. Discussion

This study sought to establish the relation between stress resilience, defense styles, emotional regulation and control, and certain aspects of health in people diagnosed with hypertension. We found that individuals with hypertension exhibited moderate levels of stress resilience. Previous research (Dullius et al., 2018) shows that 36.7% of adults with high blood pressure have low stress resilience and 39.7% have low to moderate stress resilience. In the case of people suffering from cardiovascular disease, moderate to high stress resilience was found (Boima et al., 2023; Carvalho et al., 2016; Malik & Afzal, 2015; Qiu et al., 2021).

Regarding defense styles, participants most often used a mature defense style. This is supported by the findings of Svensson et al. (2016) whereby people with cardiovascular disease make the most of problem-oriented coping, with planning and positive reappraisal being the most prevalent defensive behaviours. However, several studies indicate a more frequent use of maladaptive coping strategies in patients with chronic condition (Di Giuseppe et al., 2020; Jabbarifard et al., 2015; Rong et al., 2018). Individuals with hypertension receiving treatment and those who have additional cardiovascular problems make less use of strategies aimed at actively addressing stressful situations compared to people with hypertension who do not receive treatment (Jabbarifard et al., 2015). Patients with heart failure are more likely to use avoidance coping strategies in comparison to confrontation (Rong et al., 2018).

The results obtained on gender differences in stress resilience are consistent with the findings of the research so far (Allabadi et al., 2019; Carvalho et al., 2016; Love et al., 2021; Malik & Afzal, 2020). Less resilience in the case of female participants can be partly explained by a greater tendency to use inadequate emotion-oriented strategies when dealing with stressful situations as well as higher levels of frustration and anxiety (Allabadi et al., 2019; Carvalho et al., 2016; Hamdani et al., 2022). On the other hand, men are more focused on actively solving the existing problem, taking actions to reduce or eliminate the source of the stress (Allabadi et al., 2019; Carvalho et al., 2016). Lower stress resilience in female participants can also be associated with gender differences in emotional regulation and control where better self-efficacy of men in the regulation of negative emotions was found (Luque et al., 2020). This was confirmed in the framework of this study since our finding show lower influence of negative emotions and mood on thinking in male participants.

People who have suffered a heart attack and, on top of hypertension, have additional health problems, show lower stress resilience. In previous studies conducted with adults suffering from cardiovascular disease, no association between comorbidities and stress resilience was found (Carvalho et al., 2016; Al Ali & Al Ramamneh, 2022). In addition, these groups use mature defense styles to a lesser extent and have poorer regulation and control of negative emotions and moods, which could have contributed to lower levels of stress resilience. Casagrande et al. (2019) point out that participants who have cardiovascular problems in addition to hypertension use problem-oriented coping strategies to a lesser extent. People who have additional health problems and have suffered a heart attack may be exposed to greater stress due to impaired health and significant changes in lifestyle habits, which could have resulted in lower stress resilience.

We also found a significant correlation between participants' health habits (i.e., alcohol use and physical activity) and stress resilience. People who rarely consume alcoholic beverages have a lower degree of stress resilience compared to people who consume alcohol frequently. Research on adults with high blood pressure, showed that there is no correlation between the alcoholic use and the level of stress resilience (Dullius et al., 2018). These results are confirmed by the on a sample of people with cardiovascular disease (Carvalho et al., 2016). Qiu et al. (2021) emphasize that the tendency to adopt better health habits, such as smoking cessation and reduced alcohol consumption, depend on the individual's level of resilience, but also on its employment status, family structure and exposure to different stressful life events, in addition

to diagnosed cardiovascular condition. One possible explanation for the lack of conformity of the results lies in the way how the variable of alcohol use frequency is formulated.

An interesting finding is that people with hypertension who frequently consume alcoholic beverages use neurotic defense styles to a lesser extent compared to participants who do not consume alcoholic beverages. This can be associated with greater representation of male participants in the group of people who consume alcohol frequently, and who use a neurotic defense style to a lesser extent.

Looking at the relationship between weekly physical activity and stress resilience, it was found that people who engage in physical activity frequently are also more resistant to stress. These findings are confirmed by the results of Dullius et al. (2018). The probability of low stress resilience is three times higher in people with hypertension who do not engage in physical activity, compared to individuals who are physically active (Dullius et al., 2018).

Defense strategies and emotional regulation and control contribute significantly to the explanation of stress resilience in people with hypertension. Mature defense styles have proven to be strong positive predictors, and neurotic defense style and influence of emotions and mood on thinking as negative predictors of stress resilience. According to Macía et al. (2021) adaptive coping strategies, such as acceptance and positive revaluation were strongly associated with overall stress resilience. Relationship between coping strategies and resilience was confirmed on patients with hypertension (Boima et al., 2023). Cognitive debriefing and collective coping were positively associated with personal resilience, while spiritual coping was associated with rational resilience (Boima et al., 2023).

5. Strengths and limitations

When interpreting the obtained results, it is necessary to consider the methodological limitations of the current study. The inconsistency of the results identified with the existing literature could be attributed to differences in the instruments used to measure defense styles, stress resilience and emotional regulation and control. The way certain variables are operationalized, such as the frequency of physical activity and the frequency of alcoholic beverage consumption differs from previous studies. In addition, participants were collected within a single clinic, which limits generalizability of the obtained findings. Within the framework of this study, attention was focused on certain aspects of the health behavior of people with hypertension, without considering certain psychosocial factors, such as anxiety, depressiveness, personality traits and social support.

Future research could explore in more detail the relationship between the presence of additional health problems on top of hypertension and the time elapsed since the diagnosis of hypertension and variables associated with stress and regulation of emotions. It is also necessary to consider factors that have not been observed in this study and may contribute to greater resilience of people with hypertension such as anxiety, depressiveness (Carvalho et al., 2016) and social support (Bergh et al., 2015). The proposal for future research includes longitudinal monitoring of participants, to gain better insight into the relationship between risk and protective factors and stress resilience in people with hypertension.

6. Conclusion

The obtained results indicate a significant correlation between certain aspects of health status and stress resilience, defense styles and emotional regulation. It is also necessary to point out gender differences in the observed variables, where male participants were more resistant to stress, had better regulation of negative emotions and used neurotic defense styles to a lesser extent. The finding on the usual contribution of defense styles and emotional regulation in stress resilience could contribute to strengthening stress resilience and improving health outcomes in people with hypertension. The use of adequate strategies for coping with stress and regulating and controlling negative emotions should be considered when forming guidelines for the prevention of hypertension and the occurrence of additional cardiovascular difficulties.

Ethical approval

Study was approved by the Ethical Committee of the University of Zagreb, Faculty of Croatian Studies, Croatia (protocol number: 9832-21-02)

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

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

Conflict of interest statement

The authors report no conflict of interest.

Author Contributions

VK: concept and design, acquisition and interpretation of the data, and drafting the manuscript. VK, LB, and DK: critical revision of the manuscript. LB, DK: statistical analysis. All authors have read and approved the final manuscript.

References

1. Allabadi, H., Probst-Hensch, N., Alkaiyat, A., Haj-Yahia, S., Schindler, C., Kwiatkowski, M., & Zemp, E. (2019). Mediators of gender effects on depression among cardiovascular disease patients in Palestine. *BMC psychiatry*, *19*(1), 284. https://doi.org/10.1186/s12888-019-2267-4
2. Al Ali, N. M., & Al Ramamneh, I. S. (2022). Resilience of patients with coronary heart diseases in Jordan: A cross-sectional study. *International Journal of Nursing Sciences*, *9*(1), 86–91. https://doi.org/10.1016/j.ijnss.2021.12.003
3. Andrews, G., Singh, M., & Bond, M. (1993). The defense style questionnaire. *Journal of Nervous and Mental Disease*, *181*(4), 246–256. https://doi.org/10.1097/00005053-199304000-00006
4. Ariff, F., Suthahar, A., & Ramli, M. (2011). Coping styles and lifestyle factors among hypertensive and non-hypertensive subjects. *Singapore medical journal*, *52*(1), 29–34. https://pubmed.ncbi.nlm.nih.gov/21298238/
5. Awuah, R. B., de-Graft Aikins, A., Dodoo, F. N., Meeks, K. A., Beune, E. J., Klipstein-Grobusch, K., Addo, J., Smeeth, L., Bahendeka, S. K., & Agyemang, C. (2019). Psychosocial factors and hypertension prevalence among Ghanaians in Ghana and Ghanaian migrants in Europe: The RODAM study. *Health psychology open, 6*(2), 2055102919885752. https://doi.org/10.1177/2055102919885752
6. Benjamini, Y., & Hochberg, Y. (1995). Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society. Series B (Methodological)*, *57*(1), 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x
7. Benjamin, E. J., Muntner, P., Alonso, A., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Chang, A. R., Cheng, S., Das, S. R., Delling, F. N., Djousse, L., Elkind, M. S. V., Ferguson, J. F., Fornage, M., Chaffin Jordan, L., Khan, S. S., Kissela, B. M., Knutson, K. L.,… Virani, S. S. (2019). Heart Disease and Stroke Statistics—2019 Update: A Report from the American Heart Association. *Circulation*, *139*(10), 56–528. https://www.ahajournals.org/doi/10.1161/CIR.0000000000000659
8. Bergh, C., Udumyan, R., Fall, K., Almroth, H., & Montgomery, S. (2015). Stress resilience and physical fitness in adolescence and risk of coronary heart disease in middle age. *Heart (British Cardiac Society)*, *101*(8), 623–629. https://doi.org/10.1136/heartjnl-2014-306703
9. Boima, V., Yorke, E., Ganu, V., Gyaban-Mensah, A., Ekem-Ferguson, G., Kretchy, I. A., & Mate-Kole, C. C. (2023). Coping strategies and resilience among patients with hypertension in Ghana. *Frontiers in psychology*, *13*, 1038346. https://doi.org/10.3389/fpsyg.2022.1038346
10. Carvalho, I. G., Bertolli, E. S., Paiva, L., Rossi, L. A., Dantas, R. A., & Pompeo, D. A. (2016). Anxiety, depression, resilience and self-esteem in individuals with cardiovascular diseases. *Revista latino-americana de enfermagem*, *24*, e2836. https://doi.org/10.1590/1518-8345.1405.2836
11. 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: journal of the International Society for the Investigation of Stress*, *35*(4), 560–568. https://doi.org/10.1002/smi.2889

12. Ciuluvica, C., Fulcheri, M., & Amerio, P. (2019). Expressive Suppression and Negative Affect, Pathways of Emotional Dysregulation in Psoriasis Patients. *Frontiers in psychology, 10*, 1907. https://doi.org/10.3389/fpsyg.2019.01907
13. Conversano, C., Di Giuseppe, M., Miccoli, M., Ciacchini, R., Di Silvestre, A., Lo Sterzo, R., Gemignani, A., & Orrù, G. (2020). Retrospective Analyses of Psychological Distress and Defense Style Among Cancer Patients. *Clinical neuropsychiatry, 17*(4), 217–224. https://doi.org/10.36131/cnfioritieditore20200403
14. Conversano, C., & Di Giuseppe, M. (2021). Psychological factors as determinants of chronic conditions: clinical and psychodynamic advances. *Frontiers in Psychology, 12*, 635708. https://doi.org/10.3389/fpsyg.2021.635708
15. Croatian Institute of Public Health. (2020, November 10). *Dead persons report in Croatia for the year 2020.* https://www.hzjz.hr/periodicne-publikacije/izvjesce-o-umrlim-osobama-u-hrvatskoj-u-2020-godini/
16. Di Giuseppe, M., Di Silvestre, A., Lo Sterzo, R., Hitchcott, P., Gemignani, A., & Conversano, C. (2019). Qualitative and quantitative analysis of the defensive profile in breast cancer women: A pilot study. *Health psychology open, 6*(1). https://doi.org/10.1177/2055102919854667
17. Di Giuseppe, M., Miniati, M., Miccoli, M., Ciacchini, R., Orrù, R., Lo Sterzo, R., Di Silvestre, A., Conversano, C. (2020). Defensive responses to stressful life events associated with cancer diagnosis. *Mediterranean Journal of Clinical Psychology, 8(*1). https://doi.org/10.6092/2282-1619/mjcp-2384
18. Di Giuseppe, M., Perry, J. C., Prout, T. A., & Conversano, C. (2021). Editorial: Recent Empirical Research and Methodologies in Defense Mechanisms: Defenses as Fundamental Contributors to Adaptation. *Frontiers in psychology, 12*, 802602. https://doi.org/10.3389/fpsyg.2021.802602
19. Di Giuseppe, M., Conversano, C. (2022). Psychological components of chronic diseases: the link between defense mechanisms and alexithymia. *Mediterranean Journal of Clinical Psychology 10*(3). https://doi.org/10.13129/2282-1619/mjcp-3602
20. Dullius, A. A., Fava, S., Ribeiro, P. M., & Terra, F. S. (2018). Alcohol consumption/dependence and resilience in older adults with high blood pressure. *Revista latino-americana de enfermagem*, *26*, e3024. https://doi.org/10.1590/1518-8345.2466.3024
21. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE Publications.
22. Gangemi, S., Ricciardi, L., Caputo, A., Giorgianni, C., Furci, F., Spatari, G., Martino, G. (2021). Alexithymia in an unconventional sample of Forestry Officers: a clinical psychological study with surprising results. *Mediterranean Journal of Clinical Psychology, 9*(3). https://doi.org/10.13129/2282-1619/mjcp-3245
23. Ghanei Gheshlagh, R., Ebadi, A., Dalvandi, A., Rezaei, M., & Nourozi Tabrizi, K. (2016). A Systematic Study of Resilience in Patients with Chronic Physical Diseases. *Nursing and Midwifery Studies*, *6*(2). https://doi.org/10.5812/NMSJOURNAL.36401
24. Hair Jr., J. F., Black, W.C., Babin, B., J., & Anderson, R. E. (2014). MANOVA and GLM. In J. F. Hair Jr., W. C. Black, B. J. Babin, & R. E. Anderson (Eds.), *Multivariate Data Analysis* (pp. 665–729). Pearson Education Limited.

25. Hamdani, A., Khawar, R. & Rubab, H. (2022). Aggressive behavior and coping strategies among cardiac patients with type A and type B behavior pattern. *Pakistan Heart Journal, 55*(3), 242-246. https://doi.org/10.47144/phj.v55i3.2242
26. Islam, S. J., Kim, J. H., Topel, M., Liu, C., Ko, Y., Mujahid, M. S., Sims, M., Mubasher, M., Ejaz, K., Morgan-Billingslea, J., Jones, K., Waller, E. K., Jones, D., Uppal, K., Dunbar, S. B., Pemu, P., Vaccarino, V., Searles, C. D., Baltrus, P., … Taylor, H. (2020). Cardiovascular risk and resilience among Black adults: Rationale and design of the MECA study. *Journal of the American Heart Association*, *9*(9), e015247. https://doi.org/10.1161/jaha.119.015247
27. Jabbarifard, F., Sharif, T., Rezaee, A., M., & Fathi Hafshejani, S. (2015). Lifestyle and Coping Styles among Hypertension Patients and Normal Individuals. *International Journal of Applied Psychology, 5*(6), 178–182. https://doi.org/10.5923/j.ijap.20150506.06
28. Krkovic, K., Clamor, A., & Lincoln, T. M. (2018). Emotion regulation as a predictor of the endocrine, autonomic, affective, and symptomatic stress response and recovery. *Psychoneuroendocrinology*, *94*, 112–120. https://doi.org/10.1016/j.psyneuen.2018.04.028
29. Kukić, M., Pokrajac-Bulian, A. (2022). Heart-Focused Anxiety as a Mediator Between Illness Perception and Negative Affect in Cardiac Patients. *Mediterranean Journal of Clinical Psychology, 10*(1). https://doi.org/10.13129/2282-1619/mjcp-3374
30. Liu, M. Y., Li, N., Li, W. A., & Khan, H. (2017). Association between psychosocial stress and hypertension: A systematic review and meta-analysis. *Neurological research*, *39*(6), 573–580. https://doi.org/10.1080/01616412.2017.1317904
31. Love, M. F., Wood, G. L., Wardell, D. W., & Beauchamp, J. E. (2021). Resilience and associated psychological, social/cultural, behavioural, and biological factors in patients with cardiovascular disease: A systematic review. *European journal of cardiovascular nursing*, *20*(6), 604–617. https://doi.org/10.1093/eurjcn/zvaa008
32. Luque, B., Castillo-Mayén, R., Cuadrado, E., Gutiérrez-Domingo, T., Rubio, S. J., Arenas, A., Delgado-Lista, J., Pérez Martínez, P., & Tabernero, C. (2020). The Role of Emotional Regulation and Affective Balance on Health Perception in Cardiovascular Disease Patients According to Sex Differences. *Journal of Clinical Medicine*, *9*(10), 3165. https://doi.org/10.3390/jcm9103165
33. Mahmood, S., Shah, K. U., Khan, T. M., Nawaz, S., Rashid, H., Baqar, S. W. A., & Kamran, S. (2019). Non-pharmacological management of hypertension: in the light of current research. *Irish journal of medical science*, *188*(2), 437–452. https://doi.org/10.1007/s11845-018-1889-8
34. Macía, P., Barranco, M., Gorbeña, S., Álvarez-Fuentes, E., & Iraurgi, I. (2021). Resilience and coping strategies in relation to mental health outcomes in people with cancer. *PloS one, 16*(5), e0252075. https://doi.org/10.1371/journal.pone.0252075
35. Martino, G., Caputo, A., Schwarz, P., Bellone, F., Fries, W., Quattropani, M. C., & Vicario, C. M. (2020). Alexithymia and Inflammatory Bowel Disease: A Systematic Review. *Frontiers in psychology, 11*, 1763. https://doi.org/10.3389/fpsyg.2020.01763

36. Martino, G., Caputo, A., Vicario, C. M., Feldt-Rasmussen, U., Watt, T., Quattropani, M. C., Benvenga, S., & Vita, R. (2021). Alexithymia, Emotional Distress, and Perceived Quality of Life in Patients With Hashimoto's Thyroiditis. *Frontiers in psychology, 12*, 667237. https://doi.org/10.3389/fpsyg.2021.667237
37. Merlo, E. M. (2019). Opinion article: The role of psychological features in chronic diseases, advances and perspectives. *Mediterranean Journal of Clinical Psychology, 7*(3), 1–6. https://doi.org/10.6092/2282-1619/2019.7.2341
38. Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., Das, S. R., de Ferranti, S., Després, J. P., Fullerton, H. J., Howard, V. J., Huffman, M. D., Isasi, C. R., Jiménez, M. C., Judd, S. E., Kissela, B. M., Lichtman, J. H., Lisabeth, L. D., Liu, S., …Turner, M. B. (2016). Heart Disease and Stroke Statistics-2016 Update: A Report from the American Heart Association. *Circulation*, *133*(4), 38–360. https://doi.org/10.1161/CIR.0000000000000350
39. NCD Risk Factor Collaboration (NCD-RisC) (2021). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet (London, England)*, *398*(10304), 957–980. https://doi.org/10.1016/S0140-6736(21)01330-1
40. Nouri-Saeed, A., Salari, A., Nouri-Saeed, A., Rouhi-Balasi, L., & Moaddab, F. (2015). Resilience and the associated factors in patients with coronary artery disease. *Journal of Nursing and Midwifery Sciences*, *2*(2), 23–28. https://doi.org/10.7508/jnms.2015.02.003
41. Pokrajac-Bulian, A., Zaninović Jurjević, T., Dvornik, S., VodopijaKrstanović, I., Ružić, A. (2022). Psychological, Medical and Laboratory Predictors of Cardiac Anxiety in Patients with Heart Failure During the COVID-19 Pandemic. *Mediterranean Journal of Clinical Psychology 10*(3). https://doi.org/10.13129/2282-1619/mjcp-3415
42. Qiu, R., Tang, L., Wang, X., & Ye, Z. (2021). Life Events and Adaptive Coping Approaches to Self-Management from the Perspectives of Hospitalized Cardiovascular Patients: A Qualitative Study. *Frontiers in psychiatry, 12*, 692485. https://doi.org/10.3389/fpsyt.2021.692485
43. Romeo, A., Benfante, A., Geminiani, G. C., & Castelli, L. (2022). Personality, defense mechanisms and psychological distress in women with fibromyalgia. *Behavioral Sciences, 12*(1). https://doi.org/10.3390/bs12010010
44. Rong, X., Peng, Y., Yu, H., & Li, D. (2018). Factors associated with adoption of coping strategies among Chinese patients with heart failure in ethnic minority regions. *Journal of clinical nursing, 27*(17-18), 3324–3334. https://doi.org/10.1111/jocn.14199
45. Roy, B., Riley, C., & Sinha, R. (2018). Emotion regulation moderates the association between chronic stress and cardiovascular disease risk in humans: a cross-sectional study. *Stress, 21*(6), 548-555. https://doi.org/10.1080/10253890.2018.1490724
46. Slišković, A., & Burić, I. (2018). Kratka skala otpornosti. In A. Slišković, I. Burić, V. Ćubela Adorić, M. Nikolić, & I. Tucak Junaković (Eds.), *Zbirka psihologijskih skala i upitnika* (pp. 7–13). Sveučilište u Zadru.

47. Svensson, T., Inoue, M., Sawada, N., Yamagishi, K., Charvat, H., Saito, I., Kokubo, Y., Iso, H., Kawamura, N., Shibuya, K., Mimura, M., & Tsugane, S. (2016). Coping strategies and risk of cardiovascular disease incidence and mortality: The Japan public health center-based prospective study. *European Heart Journal*, *37*(11), 890–899. https://doi.org/10.1093/eurheartj/ehv724

48. Takšić, V. (2003). Skala emocionalne regulacije i kontrole (ERIK): provjera faktorske strukture. *Psihologijske teme*, *12*(1), 43–54. https://hrcak.srce.hr/48023

49. Trudel-Fitzgerald, C., Gilsanz, P., Mittleman, M. A., & Kubzansky, L. D. (2015). Dysregulated Blood Pressure: Can Regulating Emotions Help? *Current hypertension reports*, *17*(12), 92. https://doi.org/10.1007/s11906-015-0605-6

50. van Oort, S., Beulens, J., van Ballegooijen, A. J., Grobbee, D. E., & Larsson, S. C. (2020). Association of Cardiovascular Risk Factors and Lifestyle Behaviors with Hypertension: A Mendelian Randomization Study. *Hypertension*, *76*(6), 1971–1979. https://doi.org/10.1161/HYPERTENSIONAHA.120.15761

51. Vita, R., Caputo, A., Quattropani, M.C., Watt, T., Feldt-Rasmussen, U., Puleio, P., Benvenga, S., Martino, G. (2020). Quality of Life in Patients with Hyperthyroidism: Where do we stand?. *Mediterranean Journal of Clinical Psychology, 8*(2). https://doi.org/10.6092/2282-1619/mjcp-2521

52. World health organization. (2021, August 25). *Hypertension.* https://www.who.int/news-room/fact-sheets/detail/hypertension

53. Xie, X., Atkins, E., Lv, J., Bennett, A., Neal, B., Ninomiya, T., Woodward, M., MacMahon, S., Turnbull, F., Hillis, G. S., Chalmers, J., Mant, J., Salam, A., Rahimi, K., Perkovic, V., & Rodgers, A. (2016). Effects of intensive blood pressure lowering on cardiovascular and renal outcomes: Updated systematic review and meta-analysis. *The Lancet*, *387*(10017), 435–443. https://doi.org/10.1016/s0140-6736(15)00805-3

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Supplementary Materials

Table P1. Participants' sociodemographic data (n=203)

		f	%
Gender	Male	115	56.7
	Female	88	43.3
Education	Primary school	21	10.3
	Secondary school	116	57.1
	University	66	32.5
Employment	Employed	91	44.8
	Unemployed	15	7.4
	Retired	97	47.8
Marital status	Married	147	72.4
	Single	17	8.4
	Widowed	29	14.3
	Extramarital union	2	1.0
	Divorced	8	3.9
Children	Yes	171	84.2
	No	32	15.8

Table P2. Descriptive data and Shapiro-Wilk test for resilience, emotional regulation and defense styles (n=200)

	M	*SD*	Min	Max	Asymmetry	Shapiro-Wilk test
					$\tilde{\chi}$	*p*
Brief resilience scale	2.95	0.34	1.83	3.67	-2.17	<0.001
ERIK:						
Thinking	26.2	4.92	15	40	1.15	0.05
Memory	21.34	2.74	13	29	0.84	0.01
Control	20.53	3.21	12	28	0.33	0.04
Defense styles:						
Mature	5.8	0.84	3.75	7.5	-1.35	0.01
Neurotic	5.25	0.88	2.88	7.38	-0.17	0.13
Immature	4.71	0.42	3.17	5.58	3.33	0.003

Note: ERIK-Emotion and regulation control questionnaire

Table P3a. *Multiple comparisons for significant univariate analysis with respect to the frequency of physical activity (n=200)*

Dependent variable	Physical activity frequency	*M*	*p*
Stress resilience	None	2.85	<0.001
	Every day or almost every day	3.1	
	Every day or almost every day	3.1	0.029
	1-2 times a week	2.93	
ERIK thinking	None	28.04	0.015
	1-2 times a week	25.67	
	None	28.04	<0.001
	Every day or almost every day	23.97	
ERIK memory	None	22.12	<0.001
	Every day or almost every day	20.33	
ERIK control	None	21.3	0.004
	Every day or almost every day	19.62	
Mature defense style	None	5.61	<0.001
	Every day or almost every day	6.12	
	Every day or almost every day	6.12	0.039
	1-2 times a week	5.72	
Immature defense style	None	4.79	0.01
	Every day or almost every day	4.6	

Table P3b. Multiple comparisons for significant univariate analysis with respect to the alcohol use frequency (n=200)

Dependent Variable	Alcohol use frequency	*M*	*p*
Stress resilience	Rarely or never	2.61	<0.001
	Every day or almost every day	3.07	
	Rarely or never	2.61	<0.001
	3-4 times a week	3.00	
	Rarely or never	2.61	0.001
	1-2 times a week	2.99	
	Rarely or never	2.61	0.01
	Few times per month	2.91	
ERIK thinking	Rarely or never	30.05	0.003
	1-2 times a week	25.03	
	Rarely or never	30.05	0.003
	3-4 times a week	25.3	
	Rarely or never	30.05	<0.001
	Every day or almost every day	24.67	
ERIK control	Rarely or never	19.42	0.02
	Every day or almost every day	22.02	
	Every day or almost every day	22.02	<0.001
	Few times per month	19.47	
	Few times per month	19.47	0.004
	3-4 times a week	21.61	
Neurotic defense style	Rarely or never	5.78	<0.001
	Every day or almost every day	4.81	
	Rarely or never	5.78	<0.001
	3-4 times a week	4.74	
	Every day or almost every day	4.81	<0.001
	Few times per month	5.72	
	3-4 times a week	4.74	0.028
	1-2 times a week	5.29	
	3-4 times a week	4.74	<0.001
	Few times per month	5.72	

Note: ERIK-Emotion and regulation control questionnaire