ORIGINAL ARTICLE

Religiosity and Spirituality: The Relationship Between Psychosocial Factors and Cardiovascular Health

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Abstract

Background: Religiosity and Spirituality (R/S), despite being different entities, are multidimensional constructs, whose influence on cardiovascular health has been increasingly studied in recent decades.

Objectives: To discriminate patients into subgroups according to R/S levels, in order to compare them regarding the distribution of cardiovascular comorbidities and clinical events.

Methods: This is an observational, cross-sectional, analytical study. Two R/S scales were applied to a sample of patients seen at cardiology outpatient clinics. A cluster analysis was used to discriminate individuals into subgroups regarding R/S levels, which were subsequently compared regarding the frequencies of clinical variables related to cardiovascular health. A significance level of 5% was set for the statistical tests.

Results: The sample included 237 patients with a mean age of 60.8 years (±10.7), of which 132 were female (55.7%). Cluster analysis (C) distinguished two groups: C1, with lower levels of R/S, and C2, with higher levels of R/S (p<0.001). C2 had a lower frequency of alcohol consumption (29.5% vs. 76.0%; p<0.001), smoking (12.9% vs. 51.0%; p<0.001), systemic arterial hypertension (SAH — 65.5% vs. 82.3%; p=0.005), dyslipidemia (58.3% vs. 77.1%; p=0.003), chronic coronary syndrome (36.7% vs. 58.3%; p=0.001), and prior cardiovascular events (15.8% vs. 36.5%; p<0.001) when compared to C1. There was also a higher frequency of females in C2 (82.0% vs. 17.7%; p<0.001).

Conclusions: A better cardiovascular morbidity profile was observed in the group of patients with higher R/S levels, suggesting a probable positive relationship between R/S and cardiovascular health.

Keywords: Religion and Medicine; Spirituality; Cardiovascular Diseases; Coronary Artery Disease; Heart Disease Risk Factors.

Introduction

The concepts of Religiosity and Spirituality (R/S) are broad and heterogeneous. In summary, R/S can be understood as a set of feelings, thoughts, experiences, and behavioral factors motivated by the search for the "sacred".[1]

Religiosity has an organizational dimension, related to participation in collective ceremonies in churches, temples, or other religious services, and a non-or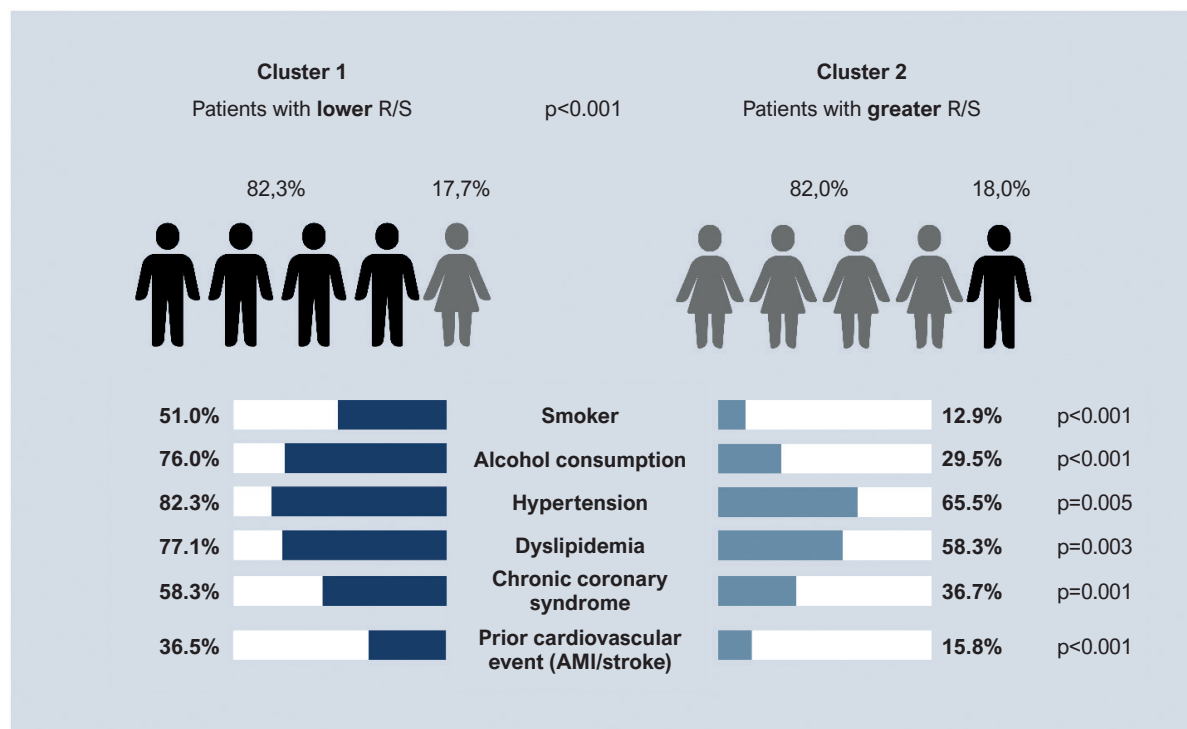ganizational dimension, related to the individual practice of prayers, religious readings, and consumption of religious programs on their own.[2] Religiosity can also be classified as intrinsic, which refers to subjective and individual aspects, and extrinsic, which refers to social aspects and religious association.[3] In this context, the concepts of religion and religiosity are different: while the former refers to a construct formed by beliefs, behaviors, dogmas, rituals, and ceremonies derived from traditions established throughout history,[4] the latter refers to how much an individual believes, follows, and practices a religion.[2]

Central Illustration: Religiosity and Spirituality: The Relationship Between Psychosocial Factors and Cardiovascular Health

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	Cluster 1			Cluster 2	
	Patients with **lower** R/S	p<0.001		Patients with **greater** R/S	
	82,3%	17,7%		82,0%	18,0%
51.0%	Smoker		12.9%	p<0.001	
76.0%	Alcohol consumption		29.5%	p<0.001	
82.3%	Hypertension		65.5%	p=0.005	
77.1%	Dyslipidemia		58.3%	p=0.003	
58.3%	Chronic coronary syndrome		36.7%	p=0.001	
36.5%	Prior cardiovascular event (AMI/stroke)		15.8%	p<0.001	

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R/S: Religiosity and Spirituality; AMI: acute myocardial infarction.

Spirituality, in turn, has a less well-established meaning. The term may vary in meaning according to religion, culture, and time, which makes its measurement difficult.[5] Currently, with the prominence attributed to individualism in the Western world, spirituality has been disconnected from religion and the link between these two entities is no longer considered mandatory.[6] According to the 2019 update of the Cardiovascular Prevention Guideline of the Brazilian Society of Cardiology (SBC, in Portuguese), spirituality consists of the moral, mental, and emotional values that guide thoughts and behaviors in intrapersonal and interpersonal contexts.[2]

There are a growing number of studies that point to relationships between R/S and a lower prevalence of dyslipidemia, hypertension, diabetes, and general and cardiovascular mortality.[7-12] However, more formal recommendations are still needed to address these issues in order to promote a better outpatient health status. Thus, this study aimed to discriminate groups according to R/S levels from a sample of patients from outpatient cardiac care and subsequently determine the differences in the distribution of cardiovascular comorbidities and clinical events between groups.

Methodology

This is an observational, cross-sectional, analytical study, whose sample included patients over 18 years of age who received medical care in cardiology offices in four hospital centers in Sergipe (Brazil) in 2022 – two hospitals in the public health network and two from the supplementary health network. Inclusion criteria were age equal to or greater than 18 years of age and the ability to understand the applied instruments. Patients younger than 18 years of age and those with clinical instability at the time of data collection were excluded. Sampling was consecutive and non-probabilistic.

The R/S of the volunteers were evaluated, respectively, using numerical scales: Duke Religiosity Index (DUREL)[3,13] and Brief Multidimensional

Measure of Religiousness/Spirituality (BMMRS).[14] The participants of this study answered these scales in person and individually, during an outpatient consultation.

Sociodemographic and clinical variables were obtained through the analysis of medical records, outpatient consultations, and interviews. From these data, medical professionals established the diagnoses of systemic arterial hypertension (SAH), type 2 diabetes mellitus (DM), and dyslipidemia, according to the diagnostic criteria established in the SBC's Brazilian Guidelines on Arterial Hypertension (2020),[15] in the Guidelines of the Brazilian Diabetes Society (2019-2020)[16] and in the SBC's Update of the Brazilian Guideline on Dyslipidemias and the Prevention of Atherosclerosis (2017).[17]

Patients with a body mass index equal to or greater than 30.0 kg/m² were considered obese and sedentary those with time dedicated to the practice of moderate physical exercise of less than 150 minutes per week.[18,19] Smoking was defined when there was a report of the consumption of nicotine-based products with some degree of behavioral disorder that indicated some form of dependence.[20] Alcohol consumption was considered when there was a report of the consumption of alcoholic beverages at least once a month, regardless of the volume intake.

The diagnosis of chronic coronary syndrome was established when one or more functional or anatomical tests were positive, including physical or pharmacological stress echocardiography, coronary computed tomography angiography or coronary cineangiography. Previous cardiovascular events were defined as previous acute myocardial infarction (AMI) and/or stroke.

DUREL

This is a brief ordinal scale consisting of five items that evaluate an individual's religiosity. The first item on the scale corresponds to the organizational religiosity index (OR), the second item corresponds to the non-organizational religiosity index (NOR), and the sum of the last three items corresponds to the intrinsic religiosity index (IR). On this scale, RO and RNO vary between 1 and 6, while IR varies between 3 and 15. The version used of the DUREL corresponds to the adaptation translated and validated for Brazilian samples by Taunay et al. (2012).[21]

BMMRS

BMMRS is a scale consisting of 38 items divided into 11 dimensions: BMMRS 1 – Daily spiritual experiences; BMMRS 2 – Values and beliefs; BMMRS 3 – Forgiveness; BMMRS 4 – Private religious practices; BMMRS 5 – Religious/spiritual coping; BMMRS 6 – Religious support; BMMRS 7 – Religious/Spiritual History; BMMRS 8 – Commitment; BMMRS 9 – Organizational religiousness; BMMRS 10 – Religious preferences; BMMRS 11 – Overall self-ranking. The sums of the items in each dimension produce a score directly proportional to the level of R/S in that aspect. Therefore, each dimension is evaluated individually. The BMMRS version used is the translation validated for Brazilian samples by Curcio (2013).[22]

The items on this scale were arranged so that the scores in each dimension are directly proportional to the R/S level, that is, the higher the scores in each dimension of the BMMRS, the higher the R/S level.

Statistical analysis

The descriptive analysis was presented in terms of means and standard deviation (SD) for quantitative variables, considering that they demonstrated normal distribution. Categorical variables were described as relative and absolute frequencies. Data normality was verified using the Shapiro-Wilk test and histogram analysis.

The DUREL and BMMRS scales were validated for this study's sample through reliability analysis (Cronbach's α).

Considering the relevance of some risk factors and cardiovascular diseases classically described in multivariate models, the following variables were included in a two-step cluster analysis model: sex, age, sedentary lifestyle, current or former smoker, alcohol consumption, SAH, DM, dyslipidemia, obesity, cardiovascular events (AMI and/or stroke), in addition to the DUREL and BMMRS domains. The two-step cluster analysis technique is an automatic method of grouping data according to their degree of similarity. This multivariate analysis grouped individuals with similar R/S levels into common clusters and separated those with different R/S levels. The clusters were then compared regarding clinical variables related to cardiovascular health, using the chi-square test and

Student's t test for independent samples. All analyzes were performed using the SPSS software, version 22.0 (SPSS Inc., Chicago, IL, USA). The significance level adopted for the statistical tests was 5% (0.05).

Ethical aspects

This study was developed under the auspices of the local Research Ethics Committee, having been approved under the Ethical Appreciation Certificate number 57968222.1.0000.5546.

Results

The sample included 237 patients, of which 132 were female (55.7%). The mean age of the sample was 60.8 (± 10.7 years). The distributions of other clinical and sociodemographic variables are shown in Table 1 – high frequencies of cardiovascular diseases and risk factors were observed in the sample, especially SAH (72.7%), dyslipidemia (65.8%), and sedentary lifestyle (61.6%).

The instruments used to evaluate the R/S were analyzed quantitatively according to their respective domains. The characterization of the sample in terms of R/S levels according to DUREL and BMMRS is described in Table 2, where high means are verified for the R/S domains, which suggests a moderate to high level of R/S in the sample. Data related to the internal consistency of the scales are represented by Cronbach's α, which were comparable to those obtained in the samples of validation studies, as shown in Table 3.

Two-Step Cluster Analysis

A total of 235 patients met the entry criteria for the cluster analysis model. The multivariate model differentiated two groups: cluster 1, comprised of 96 patients (40.9%), and cluster 2, comprised of 139 patients (59.1%).

The silhouette index obtained for the model was 0.20, which suggests that the objects are well located in their groups.[23] The relative importance of the variables in the discrimination of the clusters is shown in Figure 1, with the most important ones in estimating the method being: gender, the domain of particular religious practices of the BMMRS, and the domains of organizational religiosity of both instruments used.

Table 1 – Demographic and clinical data from the general sample.

Variable	n = 237
Age, years	60.8 ± 10.7
Sex, female	132 (55.7%)
Insurance	
Public Health Network	121 (51.3%)
Supplementary Health Network	115 (48.7%)
Race/Color	
White	74 (31.6%)
Non-white	160 (68.4%)
Religious affiliation	
Catholic	159 (67.4%)
Evangelical	41 (17.4%)
Spiritist	10 (4.2%)
Umbanda/Candomblé	2 (0.8%)
Atheism	3 (1.3%)
Other	21 (8.9%)
Marital Status	
Single	32 (13.6%)
Married	122 (51.9%)
Divorced	31 (13.2%)
Widow	28 (11.9%)
Stable union	21 (8.9%)
Others	1 (0.4%)
Comorbidities	
Current or previous smoker	67 (28.3%)
Alcohol consumption	114 (48.1%)
Sedentary lifestyle	146 (61.6%)
Obesity	67 (28.3%)
SAH	171 (72.2%)
DM	76 (32.1%)
Dyslipidemia	156 (65.8%)
Chronic coronary syndrome	109 (46.0%)
Prior cardiovascular event (AMI and/or stroke)	59 (24.9%)

Data expressed as simple frequencies (absolute value) and relative frequencies (percentage) or as averages and SD. AMI: acute myocardial infarction; SAH: systemic arterial hypertension; DM: diabetes mellitus. Source: Drafted by the authors.

Table 2 – Characterization of the sample regarding the R/S levels, according to DUREL and BMMRS.

Domain	Mean ± SD (n = 237)
DUREL	
Organizational Religiosity	3.99 ± 1.49
Non-Organizational Religiosity	4.64 ± 1.42
Intrinsic Religiosity	13.54 ± 2.21
BMMRS	
Daily spiritual experiences	29.09 ± 6.29
Values and beliefs	7.18 ± 1.10
Forgiveness	10.41 ± 1.84
Private religious practices	26.13 ± 7.16
Religious/spiritual coping	20.58 ± 3.20
Religious support	11.42 ± 2.67
Religious/Spiritual history	5.16 ± 0.84
Commitment	5.95 ± 1.35
Organizational religiousness	5.95 ± 2.92
Overall self-ranking of R/S	6.24 ± 1.30

Data expression. As averages and SD. DUREL: Duke Religiosity Index; BMMRS: Brief Multidimensional Measure of Religiousness/Spirituality; SD: standard deviation; R/S: Religiosity and Spirituality. Source: Drafted by the authors

Cluster 1 vs. Cluster 2

A difference was found between the two clusters regarding the level of R/S, both according to the DUREL and according to the BMMRS, with cluster 1 consisting of individuals with lower levels of R/S and cluster 2 consisting of individuals with higher levels of R/S in all domains of the scales, as shown in Figure 2.

Cluster 1, made up of volunteers with a lower R/S, had a lower frequency of female individuals when compared to cluster 2 (17.7% vs. 82.0%; p<0.001). In addition, cluster 2, made up of individuals with a higher R/S, showed a lower prevalence of alcohol consumption, being a current or former smoker, hypertension, dyslipidemia, chronic coronary syndrome and cardiovascular events (AMI and/or stroke) (Table 4).

Discussion

The main findings of this study consist of a lower prevalence of alcohol consumption, being a current or former smoker, hypertension, dyslipidemia, chronic coronary syndrome, and previous cardiovascular events (AMI and/or stroke) among individuals grouped in the cluster with higher levels of R/S (cluster 2), according to the DUREL and BMMRS scales. Furthermore, females were more prevalent in the group of patients with higher R/S levels.

Over the years, R/S have been consolidated as some of the factors related to the process of becoming ill beyond scientific biomechanical models of health. Some studies, including systematic reviews, demonstrate that R/S are associated with lower levels of blood pressure, C-reactive protein, cortisol, cholesterol, and other markers of cardiovascular health, in addition to being related to lower intima-media thickness measurements through ultrasound images of the carotid arteries, a lower prevalence of DM, and lower mortality in the general population.[7-11] In addition, it is well-known that spirituality can improve one's quality of life and clinical outcomes, in addition to consolidating itself as the main domain of palliative care in patients with heart failure.[12] Other studies have also shown that R/S are associated with therapeutic adherence, more time dedicated to physical activities, and other healthy lifestyle habits.[24-27] Despite compatible findings related to blood pressure and dyslipidemia, no significant relationships were observed between DM and physical inactivity with R/S levels in the study sample, possibly due to particular and unknown characteristics of the sample or due to sample size limitations.

Smoking and alcohol consumption are well-known risk factors for cardiovascular diseases.[28,29] Studies show that R/S are inversely related to smoking and alcohol consumption,[30-33] with lower levels of R/S determining up to a 315% greater chance of daily cigarette use and up to a 400% greater chance of alcohol consumption.[31] These R/S relationships with smoking and alcohol consumption were also observed in this study.

The association between R/S and blood pressure has been investigated since the last century. One of the pioneering studies to evaluate this association showed that elderly people who attended religious services, prayed, and studied the Bible more frequently had lower

Domain	α n = 237	α Taunay et al. (2012) Clinical sample (n = 323)	α Taunay et al. (2012) Non-clinical sample (n = 102)
DUREL			
Organizational Religiosity			
Non-Organizational Religiosity	0.828	0.87	0.89
Intrinsic Religiosity			

	α n = 237	α Curcio (2013) Amostra clínica (n = 262)	α Curcio (2013) Amostra não clínica (n = 389)
BMMRS			
Daily spiritual experiences	0.908	0.83	0.88
Values and beliefs	0.393	0.40	0.43
Forgiveness	0.678	0.53	0.54
Private religious practices	0.744	0.69	0.70
Religious/spiritual coping	0.685	0.63	0.65
Religious support	0.594	0.73	0.68
Religious/Spiritual history	0.221	0.12	0.20
Commitment	0.398	0.14	0.42
Organizational religiousness	0.649	0.57	0.66
Overall self-ranking of R/S	0.687	0.59	0.79

Table 3 – Internal consistency data from DUREL and BMMRS from the sample of this study and from the samples from validations studies.

The data express the Cronbach's α of the scales in the specific samples. DUREL: Duke Religiosity Index; BMMRS: Brief Multidimensional Measure of Religiousness/Spirituality; R/S: Religiosity and Spirituality. Sources: Drafted by the authors; Taunay et al. (2012);[21] Curcio (2013).[22]

blood pressure levels.[24] Since then, other investigations have established similar associations between R/S and SAH, reporting lower blood pressure levels among patients with higher levels of R/S,[8,34-36] a relationship analogous to that observed for the sample of this study. In contrast, a study conducted in Chicago (USA) found that the association between R/S and blood pressure can be positive or negative according to the evaluated domain, by demonstrating that the "Act of praying" and "Spirituality" were associated with a greater chance of SAH, while "Purpose in life" and "Forgiveness" were associated with lower levels of diastolic blood pressure and lower chances of hypertensive outcomes, which emphasizes the need for R/S to be studied as a multidimensional phenomenon.[37]

It is possible that the relationship between psychosocial factors, such as R/S, and clinical variables is mediated by covariates that act as confounding factors. For example, the lower prevalence of SAH and dyslipidemia in a population with higher R/S may not be directly explained by this fact, but rather due to the fact that this population possibly has better lifestyle habits (diet and physical activity). Studies suggest that such associations could be explained mainly by the fact that religious means of dealing with adversity are related to psychological adaptation and that minimizing the disruptive effects of stress and depression on the inflammatory processes would correlate with better health.[7,8,38,39]
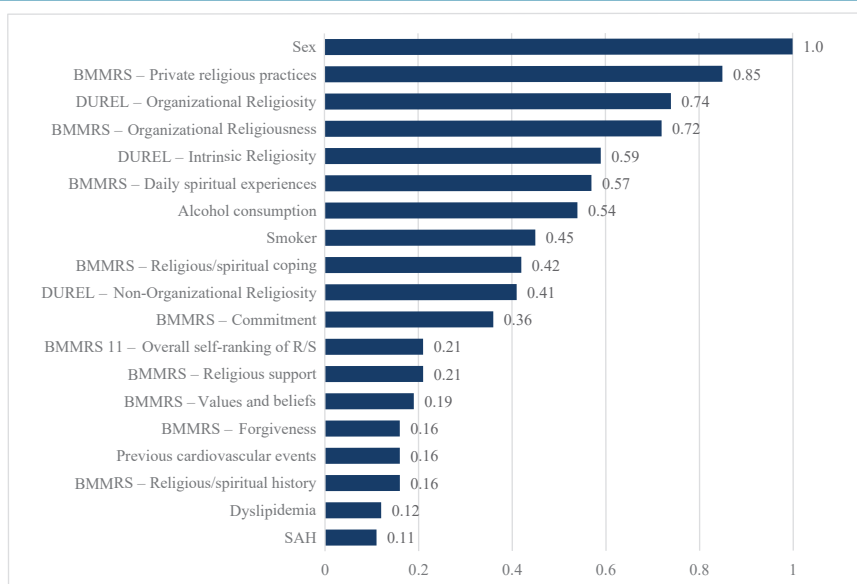
Figure 1 – Relative importance of the variables in the discrimination of clusters.
Data expressed as values of relative importance in the discrimination of the subjects of the model; the values are adimensional. DUREL: Duke Religiosity Index; BMMRS: Brief Multidimensional Measure of Religiousness/Spirituality; SAH: systemic arterial hypertension. Source: Drafted by the authors.
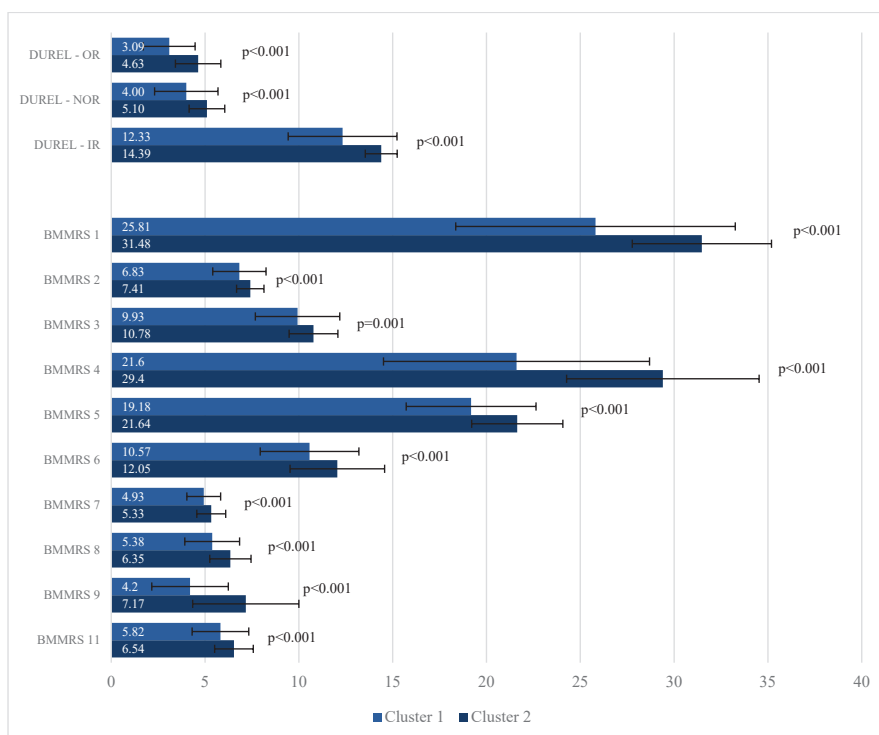

Figure 2 – Difference among the clusters for the means of the DUREL and BMMRS domains.
BMMRS 1: Daily spiritual experiences; BMMRS 2: Values and beliefs; BMMRS 3: Forgiveness; BMMRS 4: Private religious practices; BMMRS 5: Religious/spiritual coping; BMMRS 6: Religious support; BMMRS 7: Religious/Spiritual history; BMMRS 8: Commitment; BMMRS 9: Organizational religiousness; BMMRS 10: Religious preferences; BMMRS 11: Overall self-ranking of R/S. Data expression shown as means and SD. DUREL: Duke Religiosity Index; BMMRS: Brief Multidimensional Measure of Religiousness/Spirituality; OR: Organizational Religiosity; NOR: Non-Organizational Religiosity; IR: Intrinsic Religiosity. Source: Drafted by the authors.

Table 4 – Differences between clusters for clinical and demographic variables			
Variable	Cluster 1 (n = 96)	Cluster 2 (n = 139)	p
Female sex	17 (17.7%)	114 (82.0%)	<0.001
Alcohol consumption	73 (76.0%)	41 (29.5%)	<0.001
Current or previous smoker	49 (51.0%)	18 (12.9%)	<0.001
Prior cardiovascular event	35 (36.5%)	22 (15.8%)	<0.001
Chronic coronary syndrome	56 (58.3%)	51 (36.7%)	0.001
Dyslipidemia	74 (77.1%)	81 (58.3%)	0.003
SAH	79 (82.3%)	91 (65.5%)	0.005
Age	62.28 ± 10.31	59.74 ± 10.88	0.074
DM	35 (36.5%)	41 (29.5%)	0.262
Obesity	30 (31.3%)	33 (26.6%)	0.440
Sedentary lifestyle	61 (63.5%)	85 (61.2%)	0.710

Data expressed as simple frequencies (absolute value) and relative frequencies (percentage) or as the average and SD. SAH: systemic arterial hypertension; DM: diabetes mellitus. Source: Drafted by authors.

Another possible hypothesis would be that more religious or spiritualized individuals would have better ways of dealing with stressful life situations and could better adhere to the instituted treatment.[40,41] The study by Alvarez et al. (2016) may justify this hypothesis, as it concluded that spirituality was independently associated with better therapeutic adherence in outpatients with heart failure in a Brazilian sample.[26]

The relationships between cardiovascular comorbidities and R/E observed in this study were not adjusted for the influence of other variables, which represents a limitation of this study. In view of this, further studies are needed to determine whether the association between these factors is independent or determined by confounding factors.

The restricted sample sizes of most Brazilian studies to date limit the evaluation of the isolated influence of R/S on cardiovascular health. In addition, studies with designs that enable the evaluation of causality between R/S and cardiovascular diseases, such as

cohorts and clinical trials, are not yet available at the national level. Thus, it is necessary that research in this area be expanded at the national level and that more research participants be included in studies in order to better understand the relationships between R/S and cardiovascular health. It is also our aim to develop a quantitative screening tool for R/S in order to identify patients at risk of spiritual distress who could most likely benefit from interventions based on this psychosocial aspect.

Based on this study, it was possible to infer that, for this sample, R/S are related to a lower prevalence of comorbidities, such as SAH, dyslipidemia, and chronic coronary syndrome, as well as a lower frequency of cardiovascular events, such as AMI and stroke, which confirms the importance of addressing this topic during outpatient follow-up as a form of health promotion, in line with the recommendations of the 2019 update of the SBC Cardiovascular Prevention Guideline.[2]

Conclusions

The group consisting of outpatients with higher levels of R/S had a higher frequency of females, as well as a lower prevalence of alcohol consumption, smoking, arterial hypertension, dyslipidemia, chronic coronary syndrome and previous cardiovascular events (AMI and/or stroke). Therefore, these findings suggest a probable positive relationship between R/S and cardiovascular health, which justifies the recommendation to address these psychosocial factors with the aim of promoting health in an outpatient setting.

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Author Contributions

Conception and design of the research: Cruz JIN, Cardozo ACL, de Melo EV, Lira JMC, Santos GV, Salazar GO, Oliveira JLM; acquisition of data: Cruz JIN, Cardozo ACL, Lira JMC, Santos GV, Salazar GO, Oliveira B, Reis MCS, Lima DMB, Soares OS, Oliveira

JLM; analysis and interpretation of the data and statistical analysis: Cruz JIN, de Melo EV; writing of the manuscript: Cruz JIN, Cardozo ACL, Sousa ACS, Oliveira JLM; critical revision of the manuscript for intellectual content: Cruz JIN, Cardozo ACL, Salazar GO, Sousa ACS, Oliveira JLM.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

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Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the Comitê de Ética em Pesquisa da Universidade Federal de Sergipeunder the protocol number 57968222.1.0000.5546. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

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