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The association between spirituality and religiousness and mental health

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The present study aims to investigate how different levels of spirituality and religiousness (high spirituality and high religiousness –S/R, high spirituality and low religiousness –S/r, low spirituality and high religiousness s/R and low spirituality and low religiousness – s/r) are associated with quality of life, depressive symptoms, anxiety, optimism and happiness among adults. A cross-sectional study was carried out among 1,046 Brazilian adults. Concerning the different levels of spirituality and religiousness, 49.2% had s/r, 26.5% S/R, 17.2% S/r and 7.1% s/R. Participants with S/R had better outcomes as compared to those with s/r and those with S/r in WHOQOL Psychological, Social Relationship and Environment, Optimism and happiness. Participants with s/R had better outcomes as compared to those with s/r in WHOQOL Psychological and Social Relationship, Optimism and happiness. Participants with S/r were different from those with s/r, with higher levels of WHOQOL Environment and happiness but also anxiety. The results revealed that, having higher levels of both spirituality and religiousness were more correlated to better outcomes than having just one of them or none of them. Likewise, having higher levels of religiousness in detriment of higher levels of spirituality was also associated with better outcomes in comparison to others.

Several studies have been assessing the role of spirituality and religiousness (S/R) on well-being, quality of life (QoL), survival and physical and mental health worldwide^{1–8}. Likewise, there is promising evidence that spirituality may enhance positive clinical outcomes in clinical practice^{3,9–12}.

Despite the growing interest of the scientific community on S/R and health¹³, the literature still shows no consensus on the concepts of spirituality while there is a partial consensus for religiousness. Religiousness is defined as the “extension to which an individual believes, follows, and practices a religion¹ and usually these beliefs influence how people seek to live out their lives and treat others¹⁴. Spirituality, on the other hand, is a more complex concept. According to Koenig *et al.*¹, spirituality is to seek for a meaning in life, about the relations with the sacred or transcendent, and the connection with a higher power or supreme-being. A broader concept is provided by Puchalski *et al.*¹⁵ who defines spirituality as the aspect of humanity that refers to the way individuals seek and express meaning and purpose and the way they experience their connectedness to the moment, to self, to others, to nature, and to the significant or sacred. These different definitions have been discussed by several authors in the last decades and no consensus has been reached^{15,16}.

Trying to better understand these concepts and whether they are important in the clinical practice, some studies started to investigate if there are differences between those with higher levels of religiousness but lower levels of spirituality and those with higher levels of spirituality and lower levels of religiousness¹⁷. However, the literature remains very controversial regarding this topic. On one hand, some authors have found that those with high levels of religiosity but low levels of spirituality had better health outcomes (i.e. low prevalence of substance and alcohol use, and lower levels of anxiety, phobia and others mental disorders)^{18,19}. On the other hand, other authors have found the exact opposite, as those individuals with high levels of spirituality even with low levels of religiosity were associated with better health (i.e. better physical functioning, QoL, self-reported health status and less depressive symptoms)^{20,21}.

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Variables	n (%)
Age group	
18–24	228 (21.8)
25–39	309 (29.5)
40–59	370 (35.4)
≥60 years	139 (13.3)
Gender	
Female	544 (52.0)
Male	502 (48.0)
Marital Status	
Married	607 (58.0)
Widowhood/divorced	97 (9.3)
Single (never married)	342 (32.7)
Education	
With university graduate	591 (56.5)
No university graduate	455 (43.5)
Spirituality and religiousness levels	
Low spirituality and low religiousness	515 (49.2)
Low spirituality and high religiousness	74 (7.1)
High spirituality and low religiousness	180 (17.2)
High spirituality and high religiousness	277 (26.5)

Table 1. Participant’s socio-demographic characteristics ($N = 1046$).

Recently, a Brazilian study with 782 adults further investigated this area and used the Duke Religion Index to assess religiousness and the FACIT-SP 12 to assess spirituality. As a result, “meaning” and “peace” were more important and associated with QoL and mental health than religiousness levels. The participants with higher levels of religiousness, but lower levels of “meaning” and “peace” presented worse outcomes compared to those with lower levels of religiousness and higher levels of meaning or peace². However, the FACIT-Sp 12 has been criticized by some authors due to overlapping concepts with well-being measures, and therefore it would be appropriate to investigate if self-report S/R measures would have the same results.

Understanding these differences could help to elucidate these concepts and the discussion in the field. However, despite the fact that thousands of studies have been published showing that spirituality and religiosity together could result in better outcomes, there are still few studies investigating which component, if any, would be more important. This could be relevant to the field of “Spirituality and Health” as well as to the clinical practice, since we will be able to understand individuals that carry out specific components of spirituality or religiosity, instead of including a “one size fits all” approach. Although these individuals are common in the clinical practice, they are seldom included in scientific studies and we have still little evidence concerning this matter. In addition, to our knowledge, there is a lack of studies trying to understand this concept of “spiritual but not religious” and “religious but not spiritual” in Latin America and within broader ethnic/religious contexts, given that most studies have involved American/European and Christian populations. Likewise, most published studies are including a more restricted concept of religiousness and spirituality. Finally, in the present study, the levels of S/R and mental health outcomes were assessed using a self-administered online survey, which could potentially minimize the social desirability bias of these participants, as noted in a previous study²².

Therefore, aiming to fill these gaps, the present study investigates how different levels of S/R (high spirituality and high religiousness – S/R, high spirituality and low religiousness – S/r, low spirituality and high religiousness s/R and low spirituality and low religiousness – s/r) are associated with QoL, depressive symptoms, anxiety, optimism and happiness among adults.

Results

From 1,252 participants of this study, 1,046 (83.5%) completed all items of questionnaires. The mean age of participants was 40.7 years (SD 15.2). Table 1 shows the socio-demographic profile. Most participants were female (52%), 86.7% were between 18–59 years old and had a university level education (56.5%). Concerning the levels of spirituality and religiousness of each participant, they were allocated in four subgroups: 49.2% had s/r, 26.5% S/R, 17.2% S/r and 7.1% s/R. Table 2 presents the unadjusted mean scores of all outcomes.

In univariate GLM regression, Optimism - LOT-Revised ($F = 5.42, p = 0.001$) had a significant main effect, but Depression-PHQ-9 ($F = 1.06, p = 0.535$) and Anxiety-GAD-7 ($F = 1.59, p = 0.189$) had not. Multivariate GLM regression model revealed a significant main effect for the domains of WHOQOL-BREF with Wilks’s Lambda = 0.953, $F = 4.221, p < 0.001$; dimensions of Happiness (Wilks’s Lambda = 0.954, $F = 8.308, p < 0.001$); subscales of DUREL (Wilks’s Lambda = 0.736, $F = 37.635, p < 0.001$) and sub-domains of FACIT (Wilks’s Lambda = 0.803, $F = 26.429, p < 0.001$). Covariate-adjusted mean score for all dependent variables and mean differences scores for levels of S/R are reported in Table 3.

Participants with high spirituality and high religiousness (S/R) had better outcomes as compared to those with low spirituality and low religiousness (s/r) and compared to those with high spirituality and low religiousness

Dependents Variables ^a	Mean (SD) CI 95%
WHOQOL-BREF	
Physical health	69.49 (17.31) 68.52–70.53
Psychological	67.20 (17.35) 66.19–68.24
Social relationships	64.68 (21.13) 63.44–66.01
Environment	60.43 (17.17) 59.43–61.49
Depression (PHQ-9)	
Total score	7.06 (6.02) 6.70–7.44
Anxiety (GAD-7)	
Total score	6.32 (5.29) 6.01–6.64
Optimism – TOV-Revised	
Total score	15.74 (2.38) 15.51–15.98
Happiness	
Happiness today	7.39 (2.09) 7.18–7.42
Happiness in future (5 years)	8.72 (1.57) 8.63–8.82
P-Durel	
OR	3.45 (1.58) 3.36–3.55
NOR	3.25 (1.70) 3.15–3.36
IR	6.68 (3.50) 6.49–6.90
Total score	13.40 (5.96) 13.03–13.75
Facit	
Faith	10.12 (4.26) 9.86–10.36
Meaning	11.55 (3.23) 11.36–11.75
Peace	10.44 (3.13) 10.26–10.63
Total score	32.12 (8.80) 31.59–32.66

Table 2. Mean^a scores for quality of life, depression, anxiety, optimism, happiness, religious beliefs, faith, meaning and peace ($N = 1046$). ^aUnadjusted scores for all dependent variables. SD = Standard Deviation; CI 95%: Confidence Interval; WHOQOL = World Health Organization Quality of Life; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = General Anxiety Disorder-7; LOT-Revised = Life Orientation Test-Revised; OR = Organizational religious; NOR = Nonorganizational religious; IR = Intrinsic religious.

(S/r) in the following instruments: WHOQOL Psychological, Social Relationship and Environment, Optimism and happiness. Participants with low spirituality and high religiousness (s/r) had better outcomes as compared to those with s/r in the following instruments: WHOQOL Psychological and Social Relationship, Optimism and happiness. Participants with S/r were different from those with s/r, with higher levels of anxiety, WHOQOL Environment and happiness. Finally, we detected no differences between those with s/R compared to those with S/r and between those with s/R as compared to those with S/R.

Discussion

The present study has investigated whether different levels of spirituality and religiousness were associated with several health outcomes. Our results revealed that, in general, having higher levels of both spirituality and religiousness were associated with better outcomes than having just one of them or none of them. Likewise, having higher levels of religiousness in detriment of higher levels of spirituality were also associated with better outcomes in comparison to other levels. Higher levels of spirituality but not religiousness were associated with better social and environmental QoL, but also with more anxiety. Finally, lower levels of both spirituality and religiousness were associated with worse outcomes. These results advance further the understanding of the concepts of spirituality and religiousness and will be explored below.

The fact that those with S/R have been associated with higher QoL, optimism and happiness when compared to people with s/r level is widely supported by the current scientific literature^{2–4,23,24}. The practice of an organized religion (e. g., public or private religious practice) or individual religion, formally structured, with doctrines to be followed by common group, enhance social support, healthy behaviors, better lifestyle and happiness. Likewise, religiousness and spirituality also help to deal with stress situations, fear, anguish, sadness, fury, and anger^{1,25}. It is believed that individuals with high S/R levels tend to have better mental health and QoL outcomes because they develop internal and external mechanisms that help them cope with the adversities on life course^{1,24,25}. Spirituality and religiousness are also components of people's psychological well-being and there is evidence showing an association between low levels of spiritual and religious beliefs with mental health impairment²⁶.

In fact, there is strong evidence that S/R together generally leads to better outcomes. However, if these positive outcomes would persist even after a missing component is still under investigation. In our study, the study population with s/R level, although with lower intensity than those with S/R level, presented better self-perception of QoL, optimism and happiness when compared against the study population with S/r and s/r levels, suggesting that higher levels of religious practices seems to be more important for QoL and mental health aspects than the levels of spirituality. A possible explanation for these findings is that group activities, coexistence with other

Dependent Variables	Mean (SD)				F	p	Mean differences
	Sr	sR	Sr	SR			
Physical health	68.85 (16.91)	70.18 (18.60)	69.22 (18.20)	70.68 (18.81)	1.01	0.385	sr × sR p = 0.460; sr × Sr p = 0.767; sr × RS p = 0.093
							Rs × rS p = 0.631; Rs × RS p = 0.792; rS × RS p = 0.295
Psychological	64.94 (17.43)	68.81 (18.45)	66.78 (17.46)	71.26 (15.23)	11.972	<0.001	sr × sR p = 0.029; sr × Sr p = 0.135; sr × SR p < 0.001
							SR × Sr p = 0.301; sR × SR p = 0.190; Sr × SR p = 0.001
Social relationships	61.91 (20.74)	68.57 (22.01)	64.08 (21.65)	69.18 (19.69)	9.657	<0.001	sr × sR p = 0.005; sr × Sr p = 0.188; sr × SR p < 0.001
							sR × Sr p = 0.089; sR × SR p = 0.808; Sr × SR p = 0.006
Environment	58.52 (16.54)	60.34 (18.66)	60.60 (17.16)	63.89 (16.82)	7.916	<0.001	sr × sR p = 0.317; sr × Sr p = 0.002; sr × SR p < 0.001
Depression (PHQ-9)							sR × Sr p = 0.899; sR × SR p = 0.065; Sr × SR p = 0.020
Total score	7.01 (5.98)	6.57 (5.85)	7.55 (6.27)	6.97 (5.94)	0.728	0.535	sr × sR p = 0.515; sr × Sr p = 0.250; sr × SR p = 0.931
Anxiety (GAD-7)							sR × Sr p = 0.191; sR × SR p = 0.571; Sr × SR p = 0.270
Total score	6.09 (5.28)	6.66 (5.34)	6.97 (5.58)	6.25 (5.08)	1.596	0.189	sr × sR p = 0.351; sr × Sr p = 0.037; sr × SR p = 0.678
Optimism - LOT-Revised							sR × Sr p = 0.636; sR × SR p = 0.519; Sr × SR p = 0.120
Total score	15.35 (3.85)	16.33 (3.53)	15.62 (3.98)	16.40 (3.81)	5.423	0.001	sr × sR p = 0.033; sr × Sr p = 0.411; sr × SR p < 0.001
Happiness							sR × Sr p = 0.160; sR × SR p = 0.819; Sr × SR p = 0.028
Today	7.08 (2.07)	7.58 (2.42)	7.18 (2.37)	7.75 (1.61)	1.307	0.002	sr × sR p = 0.029; sr × Sr p = 0.036; sr × SR p < 0.001
							sR × Sr p = 0.063; sR × SR p = 0.486; Sr × SR p < 0.001
In future (5 years)	8.44 (1.72)	8.95 (1.50)	8.79 (1.62)	9.13 (1.03)	1.293	0.002	sr × sR p = 0.006; sr × Sr p = 0.007; sr × SR p < 0.001
PDurel							sR × Sr p = 0.433; sR × SR p = 0.341; Sr × SR p = 0.016
OR	3.97 (1.50)	2.73 (1.41)	3.67 (1.47)	2.53 (1.31)	67.223	<0.001	sr × sR p < 0.001; sr × Sr p = 0.017; sr × SR p < 0.001
							sR × Sr p < 0.001; sR × SR p = 0.285; Sr × SR p < 0.001
NOR	3.87 (1.71)	2.60 (1.30)	3.18 (1.67)	2.30 (1.14)	67.100	<0.001	sr × sR p < 0.001; sr × Sr p < 0.001; sr × SR p < 0.001
							sR × Sr p = 0.006; sR × SR p = 0.136; Sr × SR p < 0.001
IR	8.17 (3.83)	4.72 (1.49)	6.69 (2.74)	4.45 (1.44)	1003.9	<0.001	sr × sR p < 0.001; sr × Sr p < 0.001; sr × SR p < 0.001
							sR × Sr p < 0.001; sR × SR p = 0.476; Sr × SR p < 0.001
Continued							

Dependent Variables	Mean (SD)				F	p	Mean differences
	Sr	sR	Sr	SR			
WHOQOL-BREF							
Total score	16.16 (6.24)	9.94 (3.14)	13.60 (4.73)	9.03 (2.87)	4.24	0.04	sr × sR p < 0.001; sR × Sr p < 0.001; sr × SR p < 0.001
Facit							sR × Sr p < 0.001; sR × SR p = 0.996; Sr × SR p < 0.001
Meaning	10.92 (3.32)	11.70 (2.97)	11.80 (3.09)	12.52 (2.80)	18.352	<0.001	sr × sR p = 0.031; sr × Sr p = 0.001; sr × SR p < 0.001
							sR × Sr p < 0.807; sR × SR p = 0.033; Sr × SR p = 0.011
Peace	9.97 (3.15)	10.43 (3.16)	10.67 (3.08)	11.18 (2.85)	11.527	<0.001	sr × sR p = 0.190; sr × Sr p = 0.004; sr × SR p < 0.001
							sR × Sr p = 0.526; sR × SR p = 0.039; Sr × SR p = 0.057
Faith	8.40 (4.35)	12.26 (2.94)	10.57 (3.65)	12.44 (2.85)	82.202	<0.001	sr × sR p < 0.001; sr × Sr p < 0.001; sr × SR p < 0.001
							sR × Sr p = 0.001; sR × SR p = 0.699; Sr × SR p < 0.001
Total score	28.93 (8.71)	34.55 (7.91)	32.82 (7.88)	36.95 (7.15)	91.667	<0.001	sr × sR p < 0.031; sr × Sr p = 0.001; sr × SR p < 0.001
							sR × Sr p = 0.807; sR × SR p = 0.033; Sr × SR p = 0.011

Table 3. Effect of different levels of spirituality and religiousness on quality of life and mental health aspects ($N = 1046$). Note: SD = Standard deviation; S/r = high spirituality and low religiousness level; s/R = low spirituality and high religiousness level; S/R = high spirituality and high religiousness level and r/s = low spirituality and low religiousness level. Covariates: age, gender, marital status, education and perceived health. Note: SD = Standard deviation; S/r = high spirituality and low religiousness level; s/R = low spirituality and high religiousness level; S/R = high spirituality and high religiousness level and r/s = low spirituality and low religiousness level. Covariates: age, gender, marital status, education and perceived health.

people with the same belief, and philosophy of life can unleash functional behaviors, positive feelings, social support and emotion of gratitude^{1,26,27}.

Comparing these results with previous studies, we found that this is a very controversial topic in the scientific community. A previous Brazilian study including 782 adults showed that “meaning” and “peace” (components of the FACIT-Sp 12 spiritual well-being scale) were more strongly associated with health outcomes, in a sense that those with high levels of intrinsic religiosity but low levels of meaning/peace have worse outcomes than those with low religiousness and high meaning/peace. The authors also found that religious participants found greater meaning and peace than nonreligious participants². Therefore, the previous study concluded that the components of spirituality (meaning and peace) were more important than faith and religiousness. These findings are different from ours and we believe that the most probable reason is that we used a self-reported spirituality measure instead of a spiritual well-being scale. This approach was designed to avoid the tautological criticisms of this kind of questionnaire (i.e. using some questions associated with well-being).

Other international studies have also investigated this topic with conflicting results. A British study conducted between 2006 and 2007, investigated the association between spirituality and religiosity and psychiatric symptoms among 7,403 persons. Authors found that those participants with higher spirituality and lower religiousness were more prone to suffer from mental disorders, such as generalized anxiety disorder (OR = 1.50, 95% CI 1.09–2.06), phobia (OR = 1.72, 95% CI 1.07–2.77) and neurotic disorders (OR = 1.37, 95% CI 1.12–1.68)¹⁸. Same results were noted by Leurent *et al.*¹⁹ who evaluated 8,318 people from seven countries and found that people who were spiritual but not religious were 2.73 times more likely to develop depression than those who were neither religious nor spiritual. In the same direction, a recent American study including 1,013 healthy adults identified that people who self-rated spiritual but not religious were more likely to hold paranormal and supernatural beliefs and had greater schizophrenia symptoms than religious or non-religious people²⁸.

On the other hand, some authors have found the opposite. Another British study investigated 203 participants and found that people who had higher levels of spirituality showed significantly stronger social support and did not present depressive symptoms and anxiety when compared with religious persons. Likewise, an American study carried out in 277 older adults identified that geriatric outpatients who report greater spirituality (OR = 1.15, 95% CI 1.10–1.21, $P < 0.01$), but not religiosity (OR = 0.93, 95% CI 0.85–1.02, $P = 0.12$), were more likely to perceive their health as good²⁰.

Although we found no consensus in this area of research as reported above, we have some hypotheses to our findings. First, people who have greater prevalence of spiritual experiences (e. g. have mystical or supernatural

experiences and feelings of universal connectedness), but do not profess an organized religion may have a certain predisposition to mental disorders²⁹, such as, Schizophrenia^{28,30–32} and depression^{19,33,34}. Second, according to Saucier and Skrzypińska³⁵ people with greater spirituality but with lower levels of religiousness are more prone to present fantasy-proneness, dissociation, and beliefs of a magical or superstitious sort, as well as eccentricity and high openness to mystical experiences. This kind of people can have difficulty to follow an organized religions practices, because it is necessary to follow traditionalism and, more moderately, with collectivism versus individualism and with low openness to experience.

Our study has some limitations that should be explored. This is a cross-sectional study, avoiding cause-effect conclusions. A longitudinal approach would be important to understand if those participants with high spirituality but low religiosity are those who do not fit in organized traditions due to mental health problems. Another limitation of our study is the fact that data collection was carried out only in people who had online access to email, social media or online websites. Nevertheless, when comparing our study with other studies that have investigated the general population, our findings revealed similar scores concerning the levels of QoL^{36,37}, depression³⁸, anxiety^{39,40}, optimism⁴¹, religiousness⁴² and faith, peace and meaning⁴³, which supports the generability of our data. Despite these limitations, this study has addressed a significant gap in understanding the associations of different levels of spirituality and religiousness of adults' QoL and mental health.

In conclusion, our findings revealed that having high levels of both spirituality and religiosity are associated with better QoL (psychological, social and environment), optimism, and happiness as compared to those having only spirituality, only religiousness or none of them. Nevertheless, it seems that having high levels of religiousness instead of high levels of spirituality is more related to better outcomes. These findings could bring the modern medicine to the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"⁴⁴. In addition, the finds may help in the future discussion of the definitions and concepts in the field.

Methods

Study Design. A cross-sectional online study was undertaken between June and August 2016 and is part of the project "Spiritual and Religious Beliefs, Practices and Experiences in the General Population" sponsored by "Brazilian Interfaith Coalition on Spirituality and Health" (coalizaointerfe.org). This non-profit coalition is composed of health care professionals and representative members of religious or non-religious faith practices. This study was approved by the Institutional Review Board of the Albert Einstein Hospital (São Paulo, Brazil) and all participants gave online informed consent. All study procedures involving humans were performed in accordance with the ethical regulations of the institutional and Brazilian national research committee and with the 1964 Helsinki declaration.

Study population, sample and procedures. Qualtrics® (<https://www.qualtrics.com>) sent invitations to participate in the survey through its panel partner organizations to the targeted Brazilian population, inviting the study population to complete an online survey. As surveys were being completed, response patterns were monitored and decisions were made about sampling in order to meet the establish population quota. Quotas were set in order to limit the respondents according to social class distribution, age, gender and geographic location so the population surveyed could meet the same profile of the general adult population in Brazil, according to the 2010 census⁴⁵.

Quality check questions and attention filters were added. Questions were divided into five randomized blocks so the impact of tiredness of respondents equally affected all questions. Forced response validation was included in all questions. The length of interview was less than 30 minutes. The study population included if they had online access to email, social medias or online websites. Participants were excluded from the study if they have missing data, if their email was not valid, if they did not reply or sent incomplete answers to the questionnaire.

Independent variables. The questionnaire included the following instruments:

- A sociodemographic questionnaire: including age (years), gender (female and male), marital status (married; widowhood/divorced; single) and education level (with university graduation and no university graduation).
- Self-reported levels of spirituality and religiousness: In order to investigate the levels of S/R, two questions were used: "How religious are you?" and "How spiritual are you?" with the possible answers: "1 (not at all), 2 (a little bit), 3 (moderately), 4 (quite a lot), and 5 (very much)". For the present study, we separated the levels of S/R as follows^{46,47}: high spirituality and low religiousness (S/r) – those who answered "quite a lot" or "very much" for spirituality and "not at all", "a little bit" and "moderately" for religiousness; low spirituality and high religiousness (s/R) – those who answered "quite a lot" or "very much" for religiousness and "not at all", "a little bit" and "moderately" for spirituality; high spirituality and high religiousness (S/R) – those who answered "quite a lot" or "very much" for spirituality and religiousness; and low spirituality and low religiousness (s/r) – those who answered "not at all", "a little bit" and "moderately" for spirituality and religiousness.
- Self-reported health status: The self-reported health status was measured using a single question from the Brazilian version of the WHOQOL-BREF⁴⁸. The question was Q2 = "How satisfied are you with your health?" (1 = very dissatisfied; 2 = dissatisfied; 3 = neither satisfied nor dissatisfied; 4 = satisfied; 5 = very satisfied). Item response reflects assessments over the past 2 weeks, on a 5-point Likert-type scale. The higher the Likert Scale score, means the higher self-perceived health^{48,49}.
- QOL was assessed using the Brazilian version of the WHOQOL-BREF^{48,49}. This generic instrument of QOL with 26-item (5-point Likert), two of which are general and the others representing each one of the 24 aspects

which make up the original instrument, which covers four domains: physical, psychological, social relationships and the environment. The higher score represents better self-perception of QoL; however, there is no cut-off point for its classification. The Brazilian version presented good reliability ($\alpha = 0.77$)⁴⁸. In the present study, the Cronbach's alpha revealed high level ($\alpha = 0.85$).

- Depression was screened using the “Patient Health Questionnaire-9” (PHQ-9)⁵⁰, this instrument was validated in Brazil⁵¹. PHQ-9 has 9-item to evaluate the frequency of depressive symptoms in the last two weeks using the DSM-IV criteria as “0” (not at all) to “3” (nearly every day). PHQ-9 presented excellent reliability in previous Brazilian studies ($\alpha \geq 0.80$)^{52,53}.
- Anxiety was assessed through “General Anxiety Disorder (GAD-7)”⁵⁴ validated for the Brazilian population⁵⁵. This is a 7-item instrument investigating anxiety disorders over the past two weeks using the DSM-IV criteria as “0” (not at all) to “3” (nearly every day). GAD-7 presents excellent reliability among Brazilian adults ($\alpha = 0.916$)⁵⁶.
- Optimism using the Life Orientation Test-Revised (LOT-R)⁴¹, validated for the Brazilian population⁵⁷. This instrument evaluates individual differences in optimism/pessimism. LOT-R has 10-item, consisting of three items for optimism, three for pessimism and four filler items. Each item is rated on a 5-point Likert scale from strongly agree to strongly disagree. The total sum score was calculated by adding the raw scores of the optimism subscale with the inverted pessimism raw scores⁵⁸. LOT-R presents appropriate reliability (Optimism $\alpha = 0.70$ and Pessimism $\alpha = 0.80$)⁵⁹. In the present study the LOT-R total scale Cronbach's alpha coefficients was $\alpha = 0.80$.
- Happiness was assessed through the “Subjective Happiness Scale”⁶⁰ validated into Portuguese⁶¹. This scale has a 4-item (7-point likert) scale, measuring the subjective happiness. This scale presented reasonable reliability in the Brazilian validation ($\alpha = 0.67$)⁶¹. In this study the Cronbach's alpha showed slightly higher ($\alpha = 0.70$).
- Religiousness was assessed through the Duke University Religion (DUREL) Index⁶² validated into Portuguese and called PDUREL⁴². This is a 5-item measure of religious involvement, which capture three subscales: (1) Organizational religious behavior (public religious activities) (1 item), (2) Nonorganizational religious behavior (religious activities performed in private, such as prayer) (1 item) and (3) Intrinsic religious motivation (pursuing religion as an ultimate end in itself). Higher scores represent lower levels of religiousness. The Brazilian version and the present study showed a good internal consistency: $\alpha = 0.73$ ⁴² and $\alpha = 0.75$ respectively.
- Faith, peace and meaning were assessed through the FACIT-Sp 12⁶³ validated for Brazilian population⁶⁴. It is a self-administered questionnaire composed of 12 items, divided equally between three dimensions: Meaning, Peace and Faith. Participants assess the items on a five-point Likert scale (from 0 “not at all” to 4 “enormously”). The questionnaire provides four scores: one per dimension and one global. A high global score reflects a higher level of faith, peace and meaning. Participants were instructed to indicate how true an item had been for them during the past 7 days, using a 5-item response format ranging from not at all (0) to very much (4). Some examples of statements include: “I feel peaceful” (Peace), “I have a reason to Live” (Meaning) and “I find comfort in my faith or spiritual beliefs” (Faith). FACIT-Sp 12 demonstrated high reliability in Brazilian context ($\alpha = 0.89$)⁶⁴ and good reliability in this study ($\alpha = 0.75$).

Data analysis. Data was analyzed using the Statistical Package for Social Sciences - SPSS 23 (SPSS Inc.). We performed the descriptive statistics for the socio-demographic characteristics, levels of spirituality and religiousness, health and for all dependents variables (QoL, depression, anxiety, optimism, happiness, religious beliefs, faith, meaning and peace).

First, an univariate General Linear Models (GLM)⁶⁵ was used to compare the scores of depression (PHQ-9 total score), anxiety (GAD-7 total score) and Optimism (LOT-Revised total score), through the four different levels of spirituality and religiousness (S/r; s/R; S/R and s/r). Then, a multivariate GLM, procedure used to assess multi-level effects was used for the following dependent variables: QoL (four domains of WHOQOL-BREF), happiness (two items of Subjective Happiness Scale), religiousness (three subscales of PDUREL) and Faith, Peace and Meaning (three sub-domains of FACIT-Sp 12) in order to compare the same four levels of spirituality and religiousness. These levels of spirituality and religiousness were treated as fixed factors and the models were adjusted for the following covariates: age, gender, marital status, education and self-reported health status, resulting in covariate-adjusted mean scores for the dependents variables. Data was also evaluated for linearity, multicollinearity, homogeneity of variance-covariance matrices, and outliers⁶⁶. A significance level of 5% was chosen for the test, with a 95% confidence interval.

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Author Contributions

L.M.V. analyzed the data, interpreted the results and wrote the main manuscript. G.L. developed the project, analyzed the data, interpreted the results and conducted the critical review. F.C.L. and H.V. developed the project, managed the data collection, and conducted the critical review and M.F.P.P. developed the project, managed the data collection, interpreted the results and conducted the critical review.

Additional Information

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