



## Article

# Quality of Life in Multiple Sclerosis: The Predictive Roles of Positive Body Image and Meaning in Life

Maria Carolina Barbosa , Sandra Torres , Raquel Barbosa , Filipa Vieira , Leonor Lencastre and Marina Prista Guerra \*

Center for Psychology at University of Porto (CPUP), Faculty of Psychology and Education Sciences, University of Porto, 4200-135 Porto, Portugal; carolinabarbosassilva99@gmail.com (M.C.B.); storres@fpce.up.pt (S.T.); raquel@fpce.up.pt (R.B.); fvieira@fpce.up.pt (F.V.); leonor@fpce.up.pt (L.L.)

\* Correspondence: mguerra@fpce.up.pt

**Abstract:** Multiple sclerosis (MS) is a chronic neurological disease with a global prevalence that has risen over the past decade. The literature suggests that in comparison with a healthy control (HC) group, people with MS experience lower levels of quality of life (QoL). The purpose of this study was (1) to investigate the differences in QoL and a set of psychosocial variables between MS patients and an HC group; (2) to examine the correlations between QoL and psychosocial, sociodemographic, and clinical variables; and (3) to assess the predictive value of a set of psychosocial, sociodemographic, and clinical variables for the QoL of patients with MS. Participants in the clinical group ( $n = 135$ ) and the HC group ( $n = 170$ ) filled in a sociodemographic questionnaire and self-report assessments measuring QoL, body appreciation, body acceptance by others, functionality appreciation, body responsiveness, meaning in life, and difficulties in emotion regulation. The results show that the MS group had lower general, physical, psychological, and social QoL than the HC group and that body appreciation, body acceptance by others, body functionality, meaning in life, and difficulties in emotion regulation are important predictors of QoL.

**Keywords:** multiple sclerosis; quality of life; positive body image; meaning in life; emotional dysregulation



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## 1. Introduction

Multiple sclerosis (MS) is a chronic autoimmune disease of the central nervous system (CNS) characterized by inflammation, demyelination, and neurodegeneration [1–3]. An epidemiological report estimates that 2.8 million people worldwide live with MS, that between 2013 and 2020 the prevalence increased by 500,000, and that people are diagnosed at a rate of 2.1 per 100,000 every year [4]. Other studies have shown that Portugal is a country with medium and high prevalence [5,6], that MS is the leading neurological cause of disability in young adults [4], that the average age range of diagnosis is between 20 and 50 years old, with the mean age being approximately 32 years [4,7,8], and that with regards to the gender ratio, the prevalence is at least twice as high in women than in men [4,8].

There is no consensus on the etiology of MS, but it seems to be multifactorial, given the interaction between environmental, genetic, infectious, and immunological factors [3,9,10]. The clinical course and symptomatic manifestation during the disease's progression can differ between individuals as the immune response in MS is unpredictable [8,10]. There are four MS disease types: (1) Relapsing-remitting MS (RRMS) is the most common course with 85% of individuals with MS being diagnosed with this type. It consists of periods of exacerbation of symptoms followed by periods of recovery, in which there is partial or complete recovery from the symptoms. (2) Secondary progressive MS (SPMS) occurs in people who initially had RRMS but, due to the progression of the disease, the disability

gradually increases over time, with or without relapses. (3) Primary progressive MS (SPMS) is characterized by the accumulation of disability from the early stage of the disease, without relapses. (4) Benign multiple sclerosis (BMS) is often described as a mild RRMS due to a long-lasting low level of disability [3,11].

The disease diagnosis causes a “biographical disruption” [12] (p. 169) that brings a set of professional, familial, social, physical, and psychological challenges to the person’s adaptation.

The existing literature has indicated that individuals with MS, in comparison with healthy controls (HC), experience lower levels of quality of life (QoL) [13–15].

QoL is a broad construct that refers to an individual’s perception of six domains: physical, psychological, level of independence, social relationships, environment, and spirituality/religion/personal beliefs [16]. QoL is related to multiple variables, including sociodemographic, clinical, and psychosocial correlates.

Among the sociodemographic variables, age shows no relationship with the QoL of MS patients [15,17,18]. Regarding the impact of education level on the QoL of MS patients, the literature is contradictory. In a study by Strober [18], the results showed no significant relationship with QoL; however, in a study by Zengin et al. [19], the results showed that an increased level of education was associated with increased scores in every domain of QoL.

In terms of clinical correlates, regarding disease duration, the evidence shows mixed results: some studies found no significant association with QoL [15,17,20], while others, such as the study by Szilasiova et al. [21], found that patients with a disease duration of less than 10 years had a significantly higher score in the dimensions of physical health than those with a disease duration over 10 years.

One important psychological variable in MS is body image. The degenerative course of MS progressively deteriorates the physical capacity of the individual, and, as such, there are many physical changes that impact the patient: locomotion problems, sexual problems, difficulty in the coordination of body members, weakness, and muscle numbness [3,7]. Nava et al. [22] studied the presence of bodily self-consciousness disorders in people with MS. Participants in the clinical group (CG) showed difficulties in self-location, which is one of the components of bodily self-consciousness, as they were not able to distinguish between the location of their hand and a rubber hand in space. This can be explained by the fact that MS is an immune-mediated disease, and the brain areas responsible for the multisensory integration of body signals, which is one of the mechanisms that allow bodily self-consciousness, are interconnected with those of the immune system.

In a comparative study by Pfaffenberger et al. [23], individuals with MS showed lower levels of self-confidence and satisfaction regarding their bodies, higher levels of concerns regarding physical and sexual deficits, and lower body appraisal abilities.

Research on the relationship between body image and QoL in MS has analyzed the subject through a pathological lens, which does not consider the positive feelings that one may have toward their body. Positive body image (PBI) emerges as a multidimensional construct that involves acceptance and respect toward one’s body and the functions it is capable of, as well as praising the unique characteristics of one’s body [24]. Four dimensions have been identified as important to study regarding PBI: (1) body appreciation, which is the unconditional acceptance of one’s body’s characteristics, functionality, and health [25]; (2) the perception of body acceptance by others, which facilitates an attitude of acceptance, respect, and positive feelings in the individual toward his or her body and, at the same time, directs attention to the needs of the body and what it is capable of doing at that moment, rather than its physical appearance [25]; (3) body functionality, which consists of the acceptance and appreciation of body functions, what the body does, and what the person can do with their body [26]; and finally, (4) body responsiveness, which is the ability to recognize body sensations that are experienced (body awareness) and subsequently taking action through behaviors that value the body’s signals and give them an adaptive response [27]. Paying attention to body signals seems to give primacy to body functions over physical appearance [28].

Despite the central role of body image in an individual's life, little is known about its role in promoting the QoL of individuals with MS. Cunha et al. [29] studied this construct in a population with chronic renal failure and found that body appreciation and acceptance of the body by others correlated significantly with all domains of QoL. The only exception was the null correlation between acceptance of the body by others and psychological QoL. Similar findings about the correlation of body appreciation and acceptance by others with QoL are reported for inflammatory bowel disease [30].

The study of the impact of meaning in life on the adaptation to MS should be emphasized, given the evidence that points to its protective role in chronically ill patients' QoL [13,30–35]. Meaning in life has its roots in the humanistic psychology of Viktor Frankl, who defines it as the presence of or the search for meaning or a reason that guides an individual's existence (Frankl, 1959, as cited in [36]). Guerra and collaborators have interpreted it [32] (p. 3) as "The perception that one has goals in life, a mission to pursue and develop their potentials within a humanistic framework".

The complex nature of MS is demarcated by the unpredictability of the crisis and the diagnosis at a young age, which prompts the re-examination of the individual's expectations and plans for their future. Pinto and Guerra [31] and Batista et al. [13] found lower mean values for the variable in the Portuguese population than those found in other chronic people [30,32].

Studies on the role of meaning in life in the QoL of individuals with MS are scarce.

The research by Batista et al. [13] and Pinto and Guerra [31] is pioneering in the study of the construct's relationship with QoL in this population, wherein the construct presented itself as a significant predictor of all QoL's domains and of the psychological and environmental domains, respectively. As for other chronic conditions, in a sample of individuals living with spinal cord injury, meaning in life was shown to correlate with greater psychological well-being [33]. In another study, a positive association was found in both clinical and healthy populations with QoL, life satisfaction, optimism, and social support [32]. In the study by Matos et al. [30], it was a significant predictor of variance in the psychological domain of QoL and the only predictor of QoL in inflammatory bowel disease. Reis et al. [35] studied the predictive power of this variable in a population with HIV and found it to be a significant predictor of both the psychological and environmental domains.

Difficulty in emotion regulation is another construct whose importance in the adaptation to MS has been understudied. Emotion regulation is the ability to be aware and assess affective states and to implement behaviors that influence them, which allows individuals to exercise control over the emotions they experience [37].

In the MS population, the prevalence of symptoms indicative of a lack of emotional control, which include euphoria, pathological laughter and crying, drastic mood swings, and irritability, have been reported [38]. The results of Feinstein and Feinstein's [39] study indicated a prevalence of symptoms related to emotional lack of control in 73% of participants in the sample with MS, wherein 57% of the 100 participants reported irritability, 40% reported crying, and 36% reported sadness.

Phillips et al. [40] studied the predictive ability of emotional regulation for the QoL of participants with MS. The variable of emotional reappraisal strategies was a significant predictor of the psychological and environmental domains of QoL. In a study by Phillips et al. [41], participants with MS had more difficulties in emotional regulation than the control group, and difficulties in emotion regulation predicted poorer social QoL.

As we observed in the literature review, there is a lack of research on the role of PBI, meaning in life, and difficulties in emotional regulation in the adaptation to MS, and some of the relationships between the presented variables and QoL displayed mixed results. Regarding the aforementioned PCI constructs, it is pertinent to study their roles in MS, since research on other chronic diseases reveals that body appreciation and body acceptance by others correlate with all domains of QoL. It is crucial to examine the protective role of meaning in life in a patient's adaptation to the disease because it has emerged as a

predictor of QoL, and, simultaneously, lower mean values were found for the construct in MS compared with healthy populations and other chronic diseases. Finally, the capacity for emotional regulation presented itself as a predictor of psychological, social, and environmental QoL. Therefore, this study aimed to (1) identify differences in QoL and other study variables in patients with MS compared with a healthy group; (2) examine the associations between QoL and psychosocial variables (positive body image, meaning in life, and difficulties in emotional regulation), sociodemographic (age and educational level), and clinical (disease duration) variables in the clinical group; and (3) determine the predictive power of a set of psychosocial (body appreciation, body acceptance by others, body functionality, body responsiveness, meaning in life, and difficulties in emotional regulation), sociodemographic (age and level of education), and clinical variables (disease duration) for the QoL of patients with MS.

## 2. Materials and Methods

### 2.1. Participants

The present study included a group of MS patients (CG;  $n = 135$ ) and an HC group ( $n = 170$ ). There was no a priori sample size determination. All available MS patients who met the inclusion criteria were included in the sample ( $n = 135$ ). Subsequently, a sample of HCs was collected ( $n = 170$ ), resulting in a total sample size of 305 participants. The CG had members of three Portuguese multiple sclerosis associations. The inclusion criteria for the HC group were having sociodemographic characteristics comparable to those of the clinical group (i.e., age, gender, level of education, and marital status) and absence of disease.

A posteriori power analysis was conducted for unpaired  $t$ -tests and multiple linear regression models using G\*Power 3.1. software [42]. For the  $t$ -tests, considering the sample size of 305, the significance level ( $\alpha$ ) of 0.05, the lowest effect size found ( $d = 0.078$ ), and the allocation ratio of  $N1/N2 = 1.26$ , the obtained statistical power was 0.945. Similarly, for the linear multiple regression models that involved only the MS patients ( $n = 135$ ), considering the significance level ( $\alpha$ ) of 0.05, the reported effect sizes ( $R^2$ ), and the number of predictors (three or four), the obtained statistical power was  $(1 - b) > 0.99$ .

As shown in Table 1, no statistically significant differences existed between the two groups in any of the analyzed variables. Most participants of the MS group indicated a diagnosis of RRMS (21.6%,  $n = 66$ ), 6.2% ( $n = 19$ ) presented SPMS, 5.6% ( $n = 17$ ) had PPMS, 2.6% ( $n = 8$ ) had benign MS, and 8.2% ( $n = 25$ ) of the participants did not know their MS type. The disease duration was 123.72 months (SD = 115,134; range = 2–480 months). The sample, therefore, included recently diagnosed participants, as well as individuals who have lived with the diagnosis for 40 years.

**Table 1.** Comparison between MS participants and healthy participants based on sociodemographic variables ( $n = 305$ ).

Variable	Clinical Group ( $n = 135$ )	HC Group ( $n = 170$ )	Group Comparisons				
			X <sup>2</sup>	T	Df	P	Effect Size
Age M $\pm$ SD (years) Min.–max.	46.13 $\pm$ 11.81 21–74	45.14 $\pm$ 11.35 21–72		0.736	301	0.463	0.085 <sup>a</sup>
Education level M $\pm$ SD (years) Min.–max.	14.56 $\pm$ 4.40 2–23	15.17 $\pm$ 9.82 4–23		−0.670	301	0.503	−0.078 <sup>a</sup>
Gender, $n$ (%) Male Female	40 (30.1%) 93 (69.9%)	48 (28.2%) 122 (71.8%)	0.050		1	0.824	−0.020 <sup>b</sup>
Marital status, $n$ (%) Single Married/partnered Divorced/separated Widowed	38 (28.6%) 76 (57.1%) 17 (12.8%) 2 (1.5%)	39 (22.9%) 112 (65.9%) 17 (10.0%) 2 (1.2%)	2.425		3	0.489	0.089 <sup>c</sup>

<sup>a</sup> Cohen's  $d$ . <sup>b</sup> Phi coefficient. <sup>c</sup> Cramer's  $V$ .

## 2.2. Measures

In both groups, a questionnaire was administered to gather sociodemographic information, such as age, gender (1 = female; 2 = male), marital status (1 = single; 2 = married/partnered; 3 = divorced/separated; 4 = widowed), level of education, and professional status (1 = active; 2 = inactive). The clinical questionnaire, which contained questions on disease type (1 = relapsing-remitting; 2 = secondary progressive; 3 = primary progressive; 4 = benign; 5 = don't know), duration of illness (since diagnosis), current treatment (1 = injectable administration; 2 = oral administration; 3 = not receiving treatment), number of previous relapses, relapse recovery (1 = completely; 2 = partially), and presence of neurocognitive impairment (1 = yes; 2 = no; 3 = don't know), was administered only to the clinical group. Moreover, both groups filled out the following assessments to evaluate psychosocial factors.

To assess QoL in the two groups, the World Health Organization Quality of Life–BREF (WHOQOL-BREF) [43] (Portuguese adaptation by Serra et al. [44]) was used.

WHOQOL-BREF is a self-report measure that consists of 26 items, comprising 24 that address the four domains of QoL, physical, psychological, social relations, and environmental, and 2 that assess the overall perception of QoL and the overall perception of health. Each item is organized according to a 5-point Likert scale. The score obtained in each domain ranges between 0 and 100, with higher scores representing higher perceived QoL. As for the psychometric analysis, the correlations between the domains in the Portuguese and original versions of the instrument were high ( $r = 0.77$  to  $0.86$ ). In the present study, Cronbach's alpha was 0.94 for all items ( $\alpha = 0.79$  in Serra et al.'s study [44]), 0.63 for the general domain, 0.81 for the physical domain, 0.77 for the psychological domain, 0.62 for the social relations domain, and 0.84 for the environmental domain.

Body appreciation was assessed using the Body Appreciation Scale-2 (BAS-2, developed by Tylka and Wood-Barcalow [24]; Portuguese versions developed by Lemoine et al. [45] and Meneses et al. [46]), which presents a positive view of body image. It consists of 10 items assessed on a 5-point Likert scale, where 1 = never and 5 = always. A higher score reflects higher body appreciation [47]. The present study's internal consistency value was  $\alpha = 0.95$  for all items.

Body acceptance by others was assessed using the Body Acceptance by Others Scale (BAOS, developed by Avalos and Tylka [47]; Portuguese version developed by Barbosa et al. [48]), which is an instrument that aims to assess subjects' perceptions of their body acceptance by external sources. It consists of 10 items rated on a 5-point Likert scale (1 = never and 5 = always). The subject has to answer two items regarding five significant groups that he/she considers to influence the perception of his/her body. The present study's internal consistency value was  $\alpha = 0.94$  for all items.

Body functionality was assessed using the Functionality Appreciation Scale (FAS, developed by Alleva et al. [26]; Portuguese version developed by Marta-Simões et al. (2023) [49]). The instrument is composed of 7 items assessed on a 5-point Likert scale (1 = strongly disagree and 5 = strongly agree), with a higher score representing a better appreciation of body functionality. The items of the instrument were constructed to include the body's functions and abilities. In the present study, the internal consistency value was  $\alpha = 0.93$  for the totality of the items ( $\alpha = 0.91$  in Alleva et al.'s study [26]).

Body responsiveness was assessed using the Body Responsiveness Scale (BRS) [27] (Portuguese version developed by Torres et al. [50]). The instrument integrates 7 items assessed on a 7-value Likert scale (1 = not at all true about me and 7 = very true about me). Higher scores reflect a person's better ability to respond to bodily sensations. The present study's internal consistency value was  $\alpha = 0.63$  ( $\alpha = 0.83$  in Daubenmier's study [27]).

Meaning in life was measured using the Meaning of Life Scale developed by Guerra et al. [32] in the Portuguese population. The scale includes 7 items presented on a 5-point Likert scale (1 = agree very much; 2 = agree; 3 = not sure; 4 = disagree; 5 = disagree very much). The scores range from 7 to 35, with a higher value indicating increased self-

perceived meaning in life. The present study's internal consistency value was  $\alpha = 0.85$  for all items.

Difficulties in emotion regulation were assessed using the Difficulties of Emotional Regulation Scale (DERS, developed by Gratz and Roemer [37]; Portuguese version developed by Coutinho et al. [51]). The instrument conceptualizes emotion dysregulation in 6 domains: "non-acceptance of negative emotions, inability to engage in goal-directed behaviors when experiencing negative emotions, difficulties in controlling impulsive behavior when experiencing negative emotions, limited access to emotion regulation strategies that are perceived as effective, lack of emotional awareness, and lack of emotional clarity" [51] (p. 147). The DERS consists of 36 items that are distributed among the 6 dimensions and assessed according to a 5-point Likert scale, where 1 = almost never applies to me and 5 = applies almost always to me. Higher values indicate more significant difficulties in emotional regulation [38]. In the present study, the internal consistency value was  $\alpha = 0.94$  for all items, and all the instrument items were used instead of the subscales ( $\alpha = 0.93$  in Coutinho et al.'s study [51]).

### 2.3. Procedure

The current study is part of a larger project entitled "Body acceptance in disease: Study of positive body image in different clinical conditions", which was approved by the ethics committee in the Faculty of Psychology and Educational Sciences (FPCEUP) (Ref. 2018/12-6b). Data were collected through an online questionnaire on the LimeSurvey online platform. Before filling out the research protocol, a brief explanation of the purpose of the data collection was provided and ensured the confidentiality of information, the anonymity of participants, the voluntary nature of participation, and the exemption from any cost. Free and informed consent was also requested.

The *Sociedade Portuguesa de Esclerose Múltipla* (SPEM—Portuguese Society of Multiple Sclerosis) and the *Associação Todos com Esclerose Múltipla* (TEM—All with Multiple Sclerosis Association) were invited via telephone and e-mail to participate in this study, and an in-person invitation was sent to the *Associação Nacional de Esclerose Múltipla* (ANEM—Portuguese Nacional Association of Multiple Sclerosis) (convenience sampling). The three associations volunteered to participate in this study. The link to the questionnaire was shared via e-mail with the associations to be disseminated to their respective members. The link was also disseminated via the Facebook page of ANEM, and face-to-face data collection was conducted among its members ( $n = 10$ ). Data collection for the HC group took place via chains of reference, by sharing the questionnaire link in group chats, or by sending individual messages to family, college classmates, and friends (snowball sampling [52]). Data collection for both groups took place between November 2021 and March 2022.

### 2.4. Data Analysis

The coding and statistical treatment of the data was performed using the statistical analysis program IBM SPSS (Statistical Package for the Social Sciences) Statistics, version 27.

First, data were screened for outliers and missing data. We eliminated 4 outliers for level of education in the CG ( $n = 131$ ) and HC ( $n = 136$ ). Four outliers were eliminated for disease duration in the CG ( $n = 131$ ).

All statistical assumptions relevant to the analyses were tested and met. Descriptive analyses were performed, presenting the mean, standard deviation, minimum and maximum values for age and level of education and the values of the frequencies observed for each variable category, gender, and marital status.

Two tests analyzed the significant differences between the clinical and HC groups. Parametric tests (Student's *t*-test for independent samples) were performed to explore the differences between the groups regarding the following sociodemographic and clinical variables: age, level of education, stress, emotional regulation, body appreciation, functionality, and responsiveness, body acceptance by others, meaning in life, and QoL. Non-parametric tests (chi-square for independence) were performed to explore the relationship between the

groups and two categorical variables: gender and marital status. To determine effect sizes, Cohen's *d* values were calculated. The effect magnitude measures were analyzed according to Cohen's criteria [53]: a value between 0.20 and 0.50 corresponds to a weak effect, a value between 0.50 and 0.80 to a moderate effect, and a value higher than 0.80 to a strong effect.

Pearson's correlation coefficients were calculated to study the relationships between the variables in the clinical group and the QoL dimensions. The criteria proposed by Cohen [53] to assess the strength of the association are as follows: 0.10 to 0.29 corresponds to a weak relationship, 0.30 to 0.49 to a moderate relationship, and 0.50 to 1.0 to a strong relationship.

Then, multiple linear regression analyses with the enter method were performed to identify which independent variables significantly predicted QoL domains and their contributions to the model. The predictors for each regression model were selected according to the following criteria: first, considering the rule of thumb for social science research of using at least 15 subjects per predictor [54]; second, they should be associated with the dependent variable, QoL, and its dimensions (for continuous predictors, the correlations should be at least above 0.30 and below 0.90, but the most robust associations should be preferred) [55]; and last, they should be selected based on their theoretical relevance. The adjusted R-squared value was reported to explain how much of the variance in the dependent variable was explained by the model [55].

### 3. Results

#### 3.1. QoL and Psychosocial Variables in MS vs. HC Group

Table 2 compares the mean scores between the CG and the HC group for QoL and the other study variables. Bonferroni adjustment to the alpha level was performed ( $p < 0.0045$ ). The HC group had higher levels of general, physical, psychological, and social QoL than the CG. General QoL showed the most significant effect size. For body appreciation, body acceptance by others, body functionality, body responsiveness, meaning in life, and difficulties in emotional regulation, cross-group differences did not reach significance, and the effect sizes were small and medium.

**Table 2.** Descriptive statistics for QoL domains (means, standard deviation, and ranges) and other psychosocial variables, and comparison between MS and healthy participants based on QoL and other psychosocial scores.

Variable	Clinical Group ( <i>n</i> = 135)		HC Group ( <i>n</i> = 170)		Group Comparisons			
	Mean ± SD	Minimum–Maximum	Mean ± SD	Minimum–Maximum	T	Df	<i>p</i>	<i>d</i>
BAS-2	3.71 ± 0.80	1.00–5.00	3.89 ± 0.62	2.10–5.00	−2.107	242.595	0.036	−0.0252
BAOS	3.75 ± 0.94	1.00–5.00	3.80 ± 0.75	1.00–5.00	−0.351	247.484	0.726	−0.042
FAS	4.12 ± 0.83	1.00–5.00	4.36 ± 0.51	2.71–5.00	−2.851	207.753	0.005	−0.349
BRS	4.81 ± 1	2.57–7.00	4.88 ± 1.04	2.43–7.00	−0.532	301	0.595	−0.062
MLS	26.34 ± 5.25	7.00–35.00	27.66 ± 4.38	15.00–35.00	−1.974	237	0.049	−0.257
DERS	80.09 ± 22.93	37.00–141.00	77.39 ± 20.33	40.00–136.00	1.083	301	0.280	0.125
QoL_G	59.63 ± 21.38	0.00–100.00	75.07 ± 13.36	37.50–100.00	−7.060	208.518	<0.001	−0.872
QoL_P	61.27 ± 21.53	10.71–100.00	76.55 ± 13.37	39.29–100.00	−7.217	212.80	<0.001	−0.863
QoL_Psy	67.00 ± 17.98	16.67–95.83	74.36 ± 13.72	29.17–100.00	−3.757	241.415	<0.001	−0.449
QoL_S	62.59 ± 23.41	0.00–100.00	71.86 ± 17.13	16.67–100.00	−3.700	233.443	<0.001	−0.445
QoL_E	66.71 ± 18.12	0.00–100.00	71.32 ± 12.75	10.63–100.00	−2.284	231.100	0.023	−0.275

QoL\_G = general QoL; QoL\_P = physical QoL; QoL\_Psy = psychological QoL; QoL\_S = social QoL; QoL\_E = environmental QoL.

#### 3.2. Correlations between Psychosocial Variables and QoL in MS

Table 3 shows the correlations between QoL and the variables under study (body appreciation, body functionality, body acceptance by others, body responsiveness, meaning in life, difficulties in emotional regulation, age, education level, and disease duration) for the MS group.

**Table 3.** Correlations between independent variables and the QoL domains.

	General Domain	Physical Domain	Psychological Domain	Social Domain	Environmental Domain
BAS-2	0.459 *	0.377 *	0.802 *	0.565 *	0.534 *
BAOS	0.440 *	0.331 *	0.600 *	0.549 *	0.509 *
FAS	0.612 *	0.491 *	0.622 *	0.544 *	0.489 *
BRS	0.312 *	0.294 *	0.515 *	0.434 *	0.385 *
MLS	0.525 *	0.355 *	0.771 *	0.631 *	0.616 *
DERS	-0.297 *	-0.290 *	-0.665 *	-0.435 *	-0.420 *
Age	-0.343 *	-0.236 *	-0.037	-0.064	-0.106
Level of education	0.077	-0.052	0.015	0.077	0.076
Disease duration	-0.084	-0.111	0.009	0.026	0.029

\*  $p < 0.01$ .

General QoL and its domains established significant, positive correlations with body appreciation, body acceptance of others, body functionality, body responsiveness, and meaning in life, and negative associations with difficulties in emotional regulation.

Age correlated significantly with general QoL within the sociodemographic variables, presenting a negative and moderate association. Therefore, older individuals have lower overall QoL. Age also correlated negatively and moderately with the physical domain of QoL. Level of education did not significantly correlate with QoL.

The clinical variable of disease duration did not significantly affect QoL.

### 3.3. Regression Models for QoL

Based on the strongest significant associations observed with QoL dimensions, the independent variables were chosen, and multiple linear regressions and the confirmatory method (enter) were performed to analyze the predictive ability of these variables for QoL, as shown in Table 4.

**Table 4.** Multiple regression models for the QoL domains.

Regression Model	B	t	p	Adjusted R2	F(d1, d2)	p	Part r2
General domain				0.406	23.399 (4, 127)	<0.001	
FAS	0.410	4.316	<0.001				0.084
MLS	0.234	2.568	0.011				0.029
BAOS	0.126	1.270	0.206				0.008
BAS-2	-0.015	-0.133	0.894				-0.0001
Physical domain				0.229	10.717 (4, 127)	<0.001	
FAS	0.398	3.681	<0.001				0.078
MLS	0.071	0.690	0.492				0.003
BAOS	0.018	0.164	0.870				0.00017
BAS-2	0.065	0.514	0.608				0.00015
Psychological domain				0.781	156.583 (3, 128)	<0.001	
MLS	0.387	7.111	<0.001				0.085
BAS-2	0.438	7.844	<0.001				0.103
DERS	-0.211	-4.149	<0.001				-0.029
Social domain				0.472	40.096 (3, 128)	<0.001	
MLS	0.439	5.386	<0.001				0.117
BAOS	0.276	3.041	0.003				0.037
BAS-2	0.097	0.944	0.347				0.0036
Environmental domain				0.420	32.632 (3, 128)	<0.001	
MLS	0.465	5.443	<0.001				0.013
BAOS	0.221	2.325	0.022				0.024
BAS-2	0.072	0.675	0.501				0.002

The predictor model for general QoL revealed that 40.6% of the variance in the outcome variable was explained by all the independent variables in the model. Body functionality and meaning in life presented the following unique explanatory contributions to the model: 8.4% and 2.9%.



In the model for physical QoL, 22.9% of the variance found was explained by the presence of body functionality, which presented a unique contribution of 7.8% to the explanation of variance in the outcome variable.

For psychological QoL, 78.1% of the variance was explained by the presence of all the independent variables in the model. Body appreciation, meaning in life, and difficulties in emotional regulation presented the following unique explanatory contributions to the model: 13%, 8.5%, and 2.9%.

An amount of 47.2% of the variance in social QoL was explained by meaning in life and body acceptance by others, which presented the following unique explanatory contributions to the model: 11.7% and 3.7%.

For environmental QoL, 42.0% of the variance was explained by body acceptance by others and meaning in life, with the variables presenting the following unique explanatory contributions to the model: 2.4% and 1.3%.

#### 4. Discussion

The present study aimed to identify differences in QoL and other psychosocial variables between a group of people with MS and a group with HC. Significant differences were found between the two groups in overall QoL and its dimensions, except environmental QoL, with lower levels of QoL present in the MS patients compared with the healthy patients. These results align with the studies conducted by Batista et al. [13] and McCabe and McKern [14]. These differences may be explained by the multidimensional impact of MS. Its physical impact causes pain and discomfort, increases fatigue, affects mobility, and compromises the activities of daily living, such as the performance of household chores or the ability to maintain a job [3,7,56]. Psychologically, MS is associated with cognitive difficulties in learning, memory, and concentration, self-esteem and body image impairment, and negative feelings and moods [10,23,57,58]. Socially, sexual dysfunction can inhibit the development of intimate personal relationships, and the loss of physical functionality and cognitive decline can hinder the ability to maintain a social life, supportive social networks, and employment [59]. Regarding the environmental dimension, factors such as the physical conditions of the home, economic resources, access to and quality of health and social care and transportation, and the ability to participate in recreational activities (items that are covered by the environmental domain of WHOQOL-BREF) are important to protect a patient's QoL. The lack of significant differences found in environmental QoL can be explained by the fact that most of the population in the CG were members of MS associations that support these areas.

No significant differences were found in body appreciation, body acceptance by others, body functionality, and body responsiveness between the two groups. These results are in line with a study on the facets of PBI in other chronic diseases [29]. The absence of differences between the groups regarding body appreciation can be explained by the concept of body appreciation, which includes the presence of important components, such as holding favorable and positive opinions toward one's body, acceptance and respect of one's body, and rejecting media-promoted appearance ideals as the only form of human beauty [24]. In addition, the perception of body acceptance by others may facilitate an attitude of acceptance, respect, and positive feelings in the individual toward his or her body which, at the same time, directs attention to the needs of the body and what it is capable of doing at the moment rather than its physical appearance [25]. The lack of significant differences found in body acceptance by others can be interpreted by the fact that the CG members are mostly part of associations and therapeutic groups, where cognitive and physical rehabilitation and psychological intervention activities are provided. Specifically, the subliminal and direct messages that users receive from health professionals—psychologists, physiotherapists, etc.—may be of acceptance of their body's current capabilities rather than focusing on its physical appearance and/or deteriorated functions. Furthermore, physical therapy sessions, which are an integral part of an MS patient's rehabilitation program, may foster effects like those of exercises such as yoga or techniques such as mindfulness. In yoga

practice, instructions are given to the practitioner to learn to attend to the bodily sensations experienced before, during, and after performing the posture asked of them [27]. The attention paid to bodily feedback guides their performance. Mind–body practices promote body awareness and responsiveness and emphasize automatic processes and physical abilities, encouraging body acceptance [60]. To establish this parallelism, the instructions provided by the physiotherapist direct the patient’s attention to certain parts of his or her body, which may positively affect their bodily self-care ability. Another conclusion that may arise is related to the course of the disease and the diversity of symptoms. Likewise, the lack of significant differences found in body functionality can also be explained by hypothesizing that the majority of the population in the CG were MS association members and, as a result, participate in physical activity and yoga-based programs that draw participants’ attention toward appreciating their body’s functionality, shifting their focus away from body appearance [25]. Regarding body responsiveness, participants could have been at a stage in which this body facet was still preserved. However, it should be noted that the absence or reduced perception of physical sensations is not a limiting factor for the positive effects on body responsiveness of mindfulness practices [61]. Adapting exercises to the bodily needs of MS patients through imagery exercises—creating mental representations of the body—is related to increased sensory awareness. Like the previous interpretation, in a guided manner, daycare and rehabilitation centers include techniques such as relaxation guided by imagery in their interventions, which may be partly responsible for these results.

No significant differences were found between the two groups in meaning in life with both groups presenting high means of ML, above the midpoint. This finding is supported by the literature on other chronic diseases and healthy populations regarding this concept [30,32]. Heintzelman and King [62], when studying the construct in groups of people, including college students and adults, concluded that when experiencing challenges—such as the diagnosis of an illness—and traumatic situations, in the search for adaptation, individuals tend to find value and meaning in the resources they still have in their favor and the people around them.

As for difficulties in emotional regulation, no differences were found between the two groups, with similar scores. A reasonable explanation may be found in the deficits in awareness and assessment of affective states caused by the lack of emotional understanding reported in MS. Another reason may be that regular practice of mind–body exercises in rehabilitation centers may decrease the use of maladaptive emotion regulation strategies [63].

This study’s second objective was to determine how QoL relates to clinical, sociodemographic, and psychosocial factors in MS patients, and the third was to determine the predictive power of a set of psychosocial, sociodemographic, and clinical variables for the QoL of patients with MS.

Body appreciation, body functionality, body acceptance by others, and body responsiveness correlated positively and moderately or strongly with overall QoL and all its dimensions. These findings align with studies on patients with other chronic diseases [29]. In a Portuguese sample of people with inflammatory bowel disease, Trindade et al. [64] discovered a correlation between higher levels of body-image-related distress and lower scores in physical and psychological QoL domains. Moreover, PBI’s facets stood out as predictor variables in the regression models for overall QoL and its domains. Body functionality was a significant predictor of the general domain of QoL. The role of body functionality emphasizes what authors have already determined regarding other chronic conditions. In the study by Cunha et al. [29] in a population with chronic renal failure, FAS was the only statistically significant predictor of the positive body image facets of overall QoL. Tiggemann [65] argues that as the loss of body function occurs, there is a greater focus by the individual on the functional aspects of their body, to the detriment of their body’s appearance. Body functionality was the only predictor of the physical domain of QoL. The literature tells us that in chronic diseases with a significant increase in physical disability, appreciating the body’s ability to function to the best it can instead of

having appearance-focused attitudes and behavior is essential for physical QoL [26]. Body appreciation presented itself as a significant predictor of psychological QoL. The significant role of this variable is supported by the results found in other chronic populations. In the study by Matos and colleagues [30] on inflammatory bowel disease, BAS-2 significantly contributed to psychological QoL. Body acceptance by others was a predictor of both social and environmental QoL. As positive body image research has shown, there is an essential role of perceptions of body acceptance by others in predicting an individual's body appreciation [48], which is a relationship that must be nurtured to promote a person's social QoL. In line with the findings mentioned above regarding the social domain, the perception that others accept one's body contributes to positive feelings towards one's body, and it is an important factor for an individual's evaluation of the quality of their environment.

Meaning in life positively correlated with all domains of QoL. The analysis of the psychosocial correlates of QoL highlighted the importance of meaning in life; it was the only variable that correlated strongly with all dimensions of QoL, except for physical QoL, with which it correlated moderately. The associations in this study that demonstrate the protective role of meaning in life in QoL align with other studies conducted in this population. In a recent study, it correlated positively and moderately or strongly with all domains of QoL [13]. Also, in other chronically ill people, it has been shown to have significant associations with QoL, such as in vertebral-modular [66], HIV [35], and colorectal cancer patients [32]. Regarding its protective role, meaning in life presented itself as a significant predictor of the overall psychological, social, and environmental domains of QoL. The predictive role of the variable in the general domain of QoL is sustained by the study by Batista et al. [13]. Regarding psychological QoL, the protective role of meaning in life is supported by previous studies in the population with MS [13,31]. Regarding QoL's social and environmental domains, meaning in life was the predictor with the most significant contribution. In Batista's study [13], it was a significant predictor in all explanatory models of the QoL domains. Pinto and Guerra [31] discovered the promoting role of meaning in life in the environmental QoL of individuals.

Difficulties in emotional regulation correlated negatively, weakly, moderately, or strongly with the general, physical, psychological, social, and environmental domains of QoL. Furthermore, the prevalence of difficulties in emotion regulation in MS has been illustrated in the literature [40,41]. On the one hand, the literature supports the existence of significant and positive associations between the use of adaptive emotion regulation strategies, such as emotion reappraisal, and psychological and environmental QoL, and a negative association between emotion dysregulation and the social domain of QoL [40,41]. In a study by Phillips and collaborators [40], emotional reappraisal, which is an adaptive emotion regulation skill, presented itself as a predictor variable for the psychological domain of QoL.

In this study, the analysis of the sociodemographic correlates of QoL pointed to the relevance of age but not the level of education. Age demonstrated negative and moderate correlations with the general and physical domains of QoL. Most of the previous studies in the MS population found opposite results, wherein age did not correlate with QoL [15,18]. However, similar results were found in the study by Batista et al. [13]. An explanation of the association that was found may lie in the fact that with increasing age, there is an accumulation of lesions and loss of functionality and, consequently, loss of QoL. No significant relationships were shown between the QoL domains and the level of education, a result that is supported by the literature [13,18].

Finally, the clinical variable of disease duration showed no associations with the domains of QoL. This result is backed by the literature on MS [13,15,17,20].

In light of these outcomes, this study has made what can be considered an important contribution to clinical practice and future research by identifying potential protective and debilitating factors for MS adaptation. It is essential to consider the elements of a positive body image while developing assessment and intervention plans for this disease.

Body functionality stands out because it proved to be a predictive factor for both general and physical QoL. The literature suggests that when body functions are nourished, other aspects of body image improve [26]. In therapeutic contexts, it is crucial to examine the significance patients ascribe to their physical attributes and fragilities to help them embrace and value their bodies and better cope with MS.

Empirical contributions show that body appreciation can be promoted by emphasizing acceptance of the body by the most significant people in a patient's life, which, in turn, focuses the individual's attention on their body's functionality [25,28]. Moreover, patients' body appreciation should be promoted as body appreciation is shown to correlate with life satisfaction [67], QoL [30], and, in this study, psychological QoL. Also, a patient's social and environmental QoL can be improved by promoting PBI's notion of body acceptance by others. On the one hand, if an individual perceives that their body is accepted by significant people in their life, such as family, friends, and romantic partners, they may be less preoccupied with changing their outer appearance and pay more attention to the functionality of their body. The perception of acceptance by others can be fostered by external sources in the patient's life via subtle acceptance-based messages, infrequent appearance-related talk, and general messages about beauty and love for the body [24]. Thus, the presence of this kind of dialogue between family, friends, researchers, and clinicians could act as a driving force for the improvement of patients' perceptions of their social QoL, such as in sexual activity, social support, and personal relationships. On the other hand, the existence of a personal residence and transportation, the participation in activities that a patient perceives as pleasurable—which are items that represent the environmental domain in WHOQOL-BREF—and being a member of MS associations may translate into a perception of greater support from a support network, as observed in the studies by Matos et al. [30] and Trindade et al. [64]. Also, meaning in life was a significant predictor of all domains of QoL, except physical QoL. Consequently, in a clinical setting, it is critical to regularly assess a person's perspective of their life's purpose and goals. At a research level, even though the levels obtained for meaning in life in the CG are consistent with the literature on MS, more research on how it affects people's ability to adapt should nevertheless be encouraged because they are lower than the values reported for other chronic conditions and healthy populations. Lastly, given the prevalence of difficulties in emotion regulation in MS, adaptive emotion regulation strategies, such as the ability to reassess emotions, should be assessed and developed in clinical settings, given their protective role in an individual's psychological QoL [38–40].

Despite the significance of our findings, it is crucial to note this study's limitations. One of the concerns is the fact that the majority of participants in the CG were in facilities that provided specialized psychological assistance in addition to physical and cognitive therapy, which may have excluded population members who did not have the privilege of being observed (almost) daily by a multidisciplinary team. Additionally, because the clinical sample was primarily composed of members of national associations, it was expected that these participants would reflect the sex-specific epidemiological reality of the disease. Women comprised most of this group because the illness affects them more frequently than men. To ensure that more inclusive and representative research in the population suffering from MS is conducted, future studies should be heterogeneous regarding the gender of participants and include samples with both men and women to analyze gender effects. Another aspect that needs to be interpreted carefully is the Cronbach alpha's values found for the general and social relations domains of QoL and body responsiveness because, in social sciences, values should be above 0.7 (and preferably above 0.8) to be considered reliable, and in the present study, they were below this value. Despite this, it should also be taken into account regarding the interpretation of values that Cronbach's alpha values are sensitive to the number of items in the scale, i.e., scales with less than 10 items usually have low Cronbach's values, which was the case for the three scales mentioned above.

## 5. Conclusions

The present study contributes to a better understanding of QoL in the MS population by assessing a set of psychosocial, sociodemographic, and clinical variables, whose role in disease adaptation has been documented in the literature to a limited extent. The research findings emphasize the significance of meaning in life, body appreciation, body acceptance by others, and body functionality for the dimensions of the QoL of a person with MS and strengthen the argument that QoL is lower in MS patients than in healthy individuals that has already been stated in the literature. Future research should focus on examining these and other potential correlations between psychological, clinical, and sociodemographic variables and QoL and their roles in QoL prediction, as well as examining any differences between clinical and healthy groups to improve an individual's response to MS.

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