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# Impact of surfing volume on health-related quality of life: a study on Brazilian recreational surfers

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**Abstract**

**Introduction. Surfing may be an alternative therapy for achieving balance, well-being, and stress reduction. However, the dose response for surfing to have a positive effect on the health-related quality of life (HRQoL) of recreational surfers is still unclear. Aim of Study. To analyze the influence of the volume of surfing (frequency × duration) on the HRQoL of Brazilian recreational surfers. Material and Methods. An ex post facto study was conducted with 29 recreational surfers, who completed an electronic form comprising three sections: i) sociodemographic and economic characteristics, ii) characteristics of surfing (experience and International Physical Activity Questionnaire – short form), and iii) HRQoL (SF-36). Differences in HRQoL between volume of surfing (low/high by the median), controlled for drinking status and economic status, were analyzed using analysis of covariance. Moreover, a corrected effect size was estimated by Hedges' g. Results. The median for volume was 180 minutes/week. The overall HRQoL (g = 0.98, p = 0.033) and the domain of 'vitality' (g = 0.99, p = 0.049) were statistically higher for recreational surfers with a higher volume of practice. Furthermore, 'role physical' (g = 0.81, p = 0.034) and 'bodily pain' (g = 0.60, p = 0.189) showed moderate effect sizes. Conclusions. Increasing weekly surfing volume enhances HRQoL among recreational surfers, particularly in the 'vitality' and 'bodily pain' domains.**

**KEYWORDS: mental health, physical activity, quality of life, water sports.**

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## Introduction

Sedentary lifestyle is associated with a higher incidence of chronic cardiovascular and/or metabolic diseases, increasing the risk of mortality [9, 30]. A growing body of evidence suggests that physical activity (PA) is an effective preventive strategy for these health problems, improving weight control, physical function, longevity, and quality of life [13]. Furthermore, the existing literature has demonstrated an association between the level of participation in PA and the subsequent mental health outcomes [16, 21].

Some research has shown that PA improves health-related quality of life (HRQoL) and therefore suggests benefits for health in general [22]. Although not the only one, physical health is a key component in an individual's quality of life. Culture, finances, religion, education and environment are also dimensions that can influence the quality of life [27]. In addition, higher HRQoL scores have been associated with regular practice and higher levels of PA [4, 21, 22]. Given the differing effects of each type of PA, it is speculated that the benefits may affect different dimensions of HRQoL. Surfing has emerged as a particular PA in scenic natural environment. The practice has attracted numerous practitioners due to its multifaceted nature,

encompassing social, spiritual, physical, and other challenges [12, 20, 26]. Although surfing has certain limitations (e.g., risk of injury, sun-related diseases, special equipment and beach access), previous studies have indicated that surfing may be an effective form of therapy for achieving mental and physical health, which implies improvements in the quality of life [6, 10, 19]. However, there is limited research exploring the benefits of surfing on the HRQoL of recreational surfers [6, 19, 20, 23].

In order to achieve more effective outcomes, it is crucial to comprehend of the dose-response relationship between PA and health-related benefits [21]. The hypothesis of this study is that higher levels of surfing are associated with better HRQoL and it assumes that such studies could potentially provide valuable information for healthcare therapists and the promotion of health and sport among the general public.

**Aim of Study**

This study analyzed the influence of the volume of surfing (frequency × duration) on the HRQoL of Brazilian recreational surfers.

## Material and Methods

*Study design and ethical issues*

This is an ex post facto study. Comparative and correlational analyses between surfing characteristics and HRQoL were carried out. This survey was conducted online with adults who practice recreational surfing on beaches on the northern coast of the state of Paraíba and the southern coast of Rio Grande do Norte (located in the Northeast Region of Brazil). These beaches are often used by surfers due to the favorable sea conditions for producing waves. Furthermore, it was from the amateur competitions held on these beaches that the Olympic champion Italo Ferreira emerged. This study followed the guidelines of *Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)* [28]. The study was approved by the local ethics committee for research involving human subjects (protocol CAAE: 61236222.1.0000.5179). All the participants virtually consented to voluntary participation in the study by completing an informed consent form, in accordance with Resolution 466/12 of the National Health Council.

*Participants*

Thirty-four adults who practiced recreational surfing were included. The classification of 'recreational' represents a non-competitive activity that does not require systematic training or the pursuit of excellence [15]. Recreational surfers included: a) adults of both sexes (18 to 60 years old); b) with more than 12 months' experience of surfing; c) apparently healthy; and d) who had surfed in the last 3 months at least 1 × /week. Surfers were excluded if they returned the form with questionable information (e.g., a typo as body mass of 13 kg) or incomplete data.

An a priori sample size was estimated using the Power Analysis and Sample Size Software 2021 (NCSS, LLC, Kaysville, USA). Based on practical guidelines for assessing the clinical significance of HRQoL in clinical trials [24], and assuming a statistical power ($1 - \beta$) of 0.8 and an $\alpha$ of 0.05, a total of 28 participants were required to detect a difference of 10 (SD = 2.5) points using an F test in the analysis of covariance (ANCOVA). It was presumed that the four covariates have a combined $R^2$ of 0.2.

*Procedures*

Data collection occurred from September to November 2022. Recruitment was carried out through digital media, as well as by word of mouth with surfers at the selected beaches. The information was collected using a form in a virtual environment (via the Google Forms), which took an estimated 15 minutes to complete. The individuals filled out the electronic form, which included questions in three sections: i) sociodemographic and economic characteristics and general health; ii) characteristics of surfing; and iii) HRQoL.

The participants were initially requested to provide information regarding their age (completed years), body mass (kg), height (cm), sex (male/female), level of education (completed primary school, completed secondary school or completed higher education), skin color (white, brown/black or other), marital status (single, married, widowed or divorced), economic status (points) [1], smoking and drinking status (current smoker/drinker, never smoker/drinker, or previous smoker/drinker), and PA readiness (PAR-Q+). Level of education was categorized in low (completed primary school or completed secondary school) and high (completed higher education). Economic status was assessed using a points system of the Brazilian Economic Classification Criteria of the Brazilian Association of Research Companies [1]. This system considers all items in working order in the household (bathroom, monthly domestic worker, car, computer, dishwasher, refrigerator, freezer, washing machine, DVD player, microwave oven, motorcycle and clothes dryer), level of education of the head of the household and access

to public services. At the time of data collection, the average household income estimation for the strata in the Brazilian Criteria was: Class A (45-100 points, USD 4055), B1 (38-44 points, USD 1923), B2 (29-37 points, USD 1020), C1 (23-28 points, USD 569), C2 (17-22 points, USD 338) and DE (0-16 points, USD 154). Apparently healthy individuals were screened using the PAR-Q and had no identified primary disease condition (positive response to PAR-Q).

Surfing was characterized here as a leisure-time PA [25] and classified as a moderate-intensity activity (3.0-5.9 METs) [3]. The data collected included information on the length of experience (years), frequency (days/week), and duration of the session (minutes) over the previous week. The questions from the Brazilian version of the International Physical Activity Questionnaire (IPAQ – short form) [18] were adapted to the context of surfing (On how many days in a typical week do you surf for at least 10 minutes continuously? On days when you surf for at least 10 minutes continuously, how much time in total do you spend doing this activity per day?). Participants were asked only to report activities lasting 10 minutes or longer in the previous 7 days. Volume (minutes/week) was expressed as the product of frequency × duration. For the purposes of analysis, two groups of surfing participants were created based on the median volume of surfing per week: a low-volume group and a high-volume group.

For HRQoL, the Brazilian version of the SF-36 questionnaire was applied [8]. The reliability coefficients of this instrument ranges between $0.44 < r < 0.85$ (intraobserver) and $0.55 < r < 0.81$ (interobserver) [8]. The SF-36 assesses HRQoL over the past four weeks. It consists of 36 self-administered questions, with the appropriate weights, distributed on a scale of 0 (zero) to 100 (one hundred). The components are: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. HRQoL scores were calculated for each subscale and the total, and reported as T-scores ($T = 50 + 10Z$), in which the higher the score, the better the HRQoL. Moreover, the arithmetic mean of the eight domains was employed to compute the overall HRQoL, with a higher score indicating better overall HRQoL.

*Data analysis*

Data on categorical variables was reported using absolute (n) and relative (%) frequencies, and median and interquartile range (IQR) or mean and standard error (SE) were used for quantitative variables. The chi-square test for heterogeneity was used to compare the proportion of recreational surfers in volume groups according to the sociodemographic characteristics. Correlations between possible confounders and each domain of the HRQoL were analyzed by Pearson's r. The differences in HRQoL between volume of surfing (low/high), controlled for sex, drinking status and economic status (points), were analyzed using analysis of covariance (ANCOVA). In this model, the distribution of the confounders was the same in each group. The Levene's test was employed to assess the homogeneity of variances between the comparison groups. Moreover, corrected effect size (ES) was estimated by Hedges' g and interpreted as $g < 0.20$ trivial, $g = 0.20$-$0.59$ small, $g = 0.60$-$1.19$ moderate, $g = 1.20$-$1.99$ large, $g = 2.00$-$3.99$ very large and $g \geq 4.0$ almost perfect [11]. The statistical analysis was carried out using the IBM Statistical Package of the Social Sciences (SPSS) 25.0 (IBM, Armonk, USA). A $p < 0.05$ was considered statistically significant.

## Results

Of the 34 electronic forms received, five had no responses to some of the SF-36 items. The sociodemographic characteristics of the recreational surfers in both groups were found to be statistically similar ($p > 0.05$) (Table 1). Overall, the sample was predominantly male (89.7%), with a higher level of education (62.1%), brown/black (55.2%), single (51.7%), never/previous smoker (41.4%), and current drinker (62.1%). Moreover, 72.4% of the participants were aged 33 years or less (Table 1).

**Table 1.** Sociodemographic characteristics of recreational surfers from the Northeast Region of Brazil, 2022

| Variable | All (n = 29) | Low volume (n = 15) | High volume (n = 14) |
|---|---|---|---|
| Age (y) | 30 (13) | 31 (7) | 32 (10) |
| Height (m) | 1.75 (0.09) | 1.76 (0.09) | 1.72 (0.08) |
| Body mass (kg) | 75 (21) | 74.1 (12.2) | 74.1 (11.9) |
| Body mass index (kg/m$^2$) | 23.8 (3.4) | 23.8 (3.4) | 25.0 (3.2) |
| Surfing experience (y) | 10 (14) | 10 (12) | 7 (14) |
| Economic status (ABEP points) | 32 (5) | 31 (4) | 33 (6) |
| Sex | | | |
| male | 26 (89.7%) | 14 (93.3%) | 12 (85.7%) |
| female | 3 (10.3%) | 1 (6.7%) | 2 (14.3%) |
| Level of education | | | |
| low | 11 (37.9%) | 4 (26.7%) | 7 (50.0%) |
| high | 18 (62.1%) | 11 (73.3%) | 7 (50.0%) |

| | | | |
|---|---|---|---|
| Skin color | | | |
| white | 10 (34.5%) | 7 (46.7%) | 3 (10.3%) |
| brown/black | 16 (55.2%) | 5 (17.2%) | 11 (38.0%) |
| other | 3 (10.3%) | 3 (10.3%) | 0 (0.0%) |
| Marital status | | | |
| single | 15 (51.7%) | 7 (46.7%) | 8 (57.1%) |
| married | 12 (41.4%) | 8 (53.3%) | 4 (28.6%) |
| divorced | 2 (6.9%) | 0 (0.0%) | 2 (14.3%) |
| Smoking status | | | |
| never/previous smoker | 23 (37.9%) | 10 (66.7%) | 13 (92.9%) |
| current smoker | 6 (20.7%) | 5 (33.3%) | 1 (7.1%) |
| Drinking status | | | |
| never/previous drinker | 11 (3.4%) | 4 (6.7%) | 7 (50.0%) |
| current drinker | 18 (62.1%) | 11 (73.3%) | 7 (50.0%) |

Quantitative variables reported by median (IQR). Categorical variables presented as absolute (n) and relative (%) frequencies. There were no statistical differences between the low- and high-volume groups for any of the variables (chi-square test for heterogeneity, $p > 0.05$).

Overall, the median (IQR) for frequency, duration, and volume were 2 (1.5) times/week, 150 (60) minutes and 180 (255) minutes/week, respectively. Moreover, 65.5% of the participants had a mean of 150 minutes/week of recreational surfing.

The data analysis did not find evidence to suggest that age ($r = -0.21$ to $0.21$, $p > 0.05$), surfing experience ($r = -0.10$ to $0.24$, $p > 0.05$), and smoking status ($r = -0.29$ to $-0.02$, $p > 0.05$) are strongly correlated with the domains or overall HRQoL. Level of education presented high collinearity with economic status ($r = 0.61$, $p = 0.004$). Thus, the best fit for the ANCOVA model only included sex, drinking status and economic status. Moreover, the normality of the raw residuals was checked by using Q-Q plots and deemed plausible.

The domains of Role physical and Vitality (Table 2) and overall HRQoL (Figure 1) were found to be statistically higher for recreational surfers with a higher volume

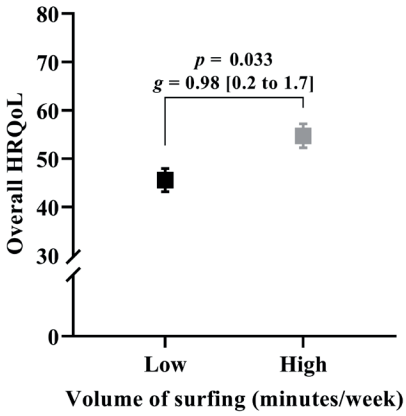


**Figure 1.** Overall health-related quality of life (HRQoL) of recreational surfers from the Northeast Region of Brazil, 2022 (n = 29)

**Table 2.** Health-related quality of life (HRQoL) scores of recreational surfers from the Northeast Region of Brazil, 2022

| HRQoL domains | Volume of surfing | | Parameter estimates ANCOVA† | | |
|---|---|---|---|---|---|
| | Low (n = 15) | High (n = 14) | t | p | ES [95%CI] |
| Physical functioning | 46.7 (2.4) | 53.5 (2.5) | 1.39 | 0.178 | 0.729 [−0.02 to 1.48] |
| Role physical | 46.1 (2.6) | 54.1 (2.6) | 2.24 | **0.034** | 0.807 [0.05 to 1.57] |
| Bodily pain | 46.9 (2.7) | 53.2 (2.8) | 1.35 | 0.189 | 0.602 [−0.14 to 1.35] |
| General health | 48.3 (2.8) | 51.8 (2.9) | 0.78 | 0.444 | 0.323 [−0.41 to 1.06] |
| Vitality | 45.5 (2.4) | 54.8 (2.5) | 2.07 | **0.049** | 0.997 [0.22 to 1.77] |
| Social functioning | 47.6 (2.7) | 52.5 (2.8) | 1.07 | 0.297 | 0.468 [−0.27 to 1.21] |
| Role emotional | 47.7 (2.5) | 52.5 (2.6) | 1.71 | 0.095 | 0.495 [−0.25 to 1.23] |
| Mental health | 47.3 (2.7) | 52.9 (2.9) | 1.39 | 0.177 | 0.526 [−0.22 to 1.26] |

T-scores for the HRQoL presented as mean (SE). The volume of surfing is classified into two categories: low (≤180 minutes/week) and high (>180 minutes/week). ES (effect size) from the Hedges' g and its 95% confidence interval (95%CI). Significant difference for high volume ($p < 0.05$). Bold denotes significant difference ($p < 0.05$).

†Analysis of covariance (ANCOVA) adjusted for sex, drinking status and economic status (ABEP [Brazilian Market Research Association] points).

of practice ($p < 0.05$). Moreover, Physical functioning ($g = 0.73$), Role physical ($g = 0.81$), Bodily pain ($g = 0.60$), Vitality ($g = 1.0$), Mental health ($g = 0.60$) and overall HRQoL showed moderate effect sizes (Table 2, Figure 1). Except for Role physical ($F(1, 27) = 12.1$, $p < 0.05$), the error variance of the dependent variable was equal across the groups.

Compared to a lower level of surfing, surfing for more than 180 minutes/week provided an average increase of approximately nine points in the overall HRQoL (Figure 1).

**Discussion**

The field of PA and health promotion that has focused specifically on the benefits of surfing for quality of life, is relatively limited in scope [6, 19, 20, 23]. In this ex post facto study, we analyzed the influence of volume of surfing on the HRQoL of adult recreational surfers. The main finding of the study was that a high volume of practice has a greater impact on most domains of the HRQoL of recreational surfers. Thus, these results partially support the hypothesis that higher levels of surfing are associated with better HRQoL. Our findings provide a pioneering insight into the relationship between an increase in surfing and the way in which recreational surfers perceive their HRQoL, adjusted for sex, drinking status and economic status.

HRQoL is a multifaceted construct of overall health that is influenced by a range of factors beyond the individual's subjective perception. In view of this, it is crucial to emphasize that surfing can manifest characteristics that extend beyond the physical dimension. These include sociocultural implications, spirituality and transcendent experiences, which may also contribute to different domains of the HRQoL [19, 23]. Consequently, the observed effects on the HRQoL of the group with the highest volume of practice are consistent with those demonstrating that surfing enhances mental, physical, and social aspects [6, 19, 20].

The interplay of PA and physical and mental health is well-established in the literature [16, 17, 21]. Surfing represents a moderate-intensity PA that has the potential to enhance well-being through the activation of a number of physiological mechanisms. For instance, a recent review has highlighted the role of brain-derived neurotrophic factor (BDNF), anti-inflammatory effects and physical conditioning in the potential underlying mechanisms of some of the reported benefits of surfing [19]. In this context, it is recommended that recreational surfers engage in more weekly surfing in order to obtain greater benefits in terms of HRQoL [13].

The current study observed a considerable effect size in the 'Vitality' domain of HRQoL for a greater volume of surfing practice. These results are in line with those of other studies which have demonstrated that individuals with higher scores in this domain were more physically active [2, 16]. In the SF-36, this domain measures the respondent's perceived energy and fatigue [7], which is essential for overall well-being and the ability to engage in daily activities. Furthermore, it can be hypothesized that practicing PA outdoors in an unstructured manner may be associated with alterations in the satisfaction of fundamental needs and may be more advantageous for the 'Vitality' domain [5, 19].

A recent review has confirmed strong associations between moderate-to-vigorous PA and the 'Role physical' domain and general health from the SF-36 [4]. In this instrument, this domain assesses role limitations due to physical health problems [7]. In comparison to the low-volume group, our findings indicate that recreational surfers with a higher volume of surfing may exhibit greater resilience to the physical limitations that can interfere with their daily lives. Moreover, a previous study suggests that long-term recreational surfing may cause specific adaptations that benefit participants by maintaining or improving their neuromuscular function, which would ultimately result in an improved quality of life [10]. This supposition is corroborated by the relationship between quality of life and coping strategies [14].

The scores for the 'Bodily pain' and 'Mental health' domains also showed moderate effect sizes for recreational surfers who had engaged in a greater volume of practice. It is thought that surfing may help to reduce bodily pain, due to the benefits of physical exercise associated with the sport. These include increased flexibility, strength and muscular endurance, as well as the therapeutic effects of scenic natural environments [19]. With regard to mental health, surfing can provide a form of escapism from everyday stress, allowing surfers to develop an emotional relationship with the aquatic environment, relax and enjoy a sense of freedom and adventure, even when they do not involve immersion of the face or the body into the water [19]. Furthermore, surfing involves an element of challenge and coping, which can contribute to a sense of achievement and psychological well-being [5].

Another noteworthy aspect of the study was that a notable proportion of recreational surfers reported engaging in surfing for a minimum of 150 minutes/week. Given that surfing is a moderate-intensity leisure-time PA, this practice alone would be sufficient to meet

the Brazilian guidelines for PA practice. Nevertheless, those who engage in more frequent recreational surfing may potentially derive benefits in terms of HRQoL, especially for the 'Vitality', 'Role physical', 'Bodily pain' and 'Mental health' domains. This finding is corroborated by the observation that PA sessions exceeding 90 minutes demonstrated a more pronounced improvement in the quality of life compared to sessions of up to 90 minutes [21].

Notwithstanding the intrinsic hazards associated with PA in the ocean, it offers significant benefits for human health [6, 10, 19, 20]. The emotional and well-being benefits associated with PA, water immersion, exposure to sunlight appear to overwhelm the potential risks [19, 20]. Surfers in Monterey Bay (California, USA) reported that the ocean benefited their emotional health, and >96% reported that the ocean increased their life satisfaction, happiness, and decreased their stress level [20]. Thus, in a broader context, the insights of the present study suggest a comprehensive health promotion strategy, emphasizing that engagement in more than 180 minutes per week can be integrated into mental health interventions and wellness programs, particularly for stress reduction and emotional well-being.

A body of evidence suggests that ageing is associated with a range of negative effects, including cognitive and physical decline, negative perceptions of self and increased risk of disorders [29]. These changes can collectively lead to a reduction in quality of life. The results of our data analysis did not indicate a strong correlation between age and the HRQoL domains or overall HRQoL. Nevertheless, given the relatively limited number of amateur surfers over the age of 33, it would be prudent to consider the applicability of the findings to middle-aged adults with a degree of caution. In order to corroborate the findings of the present study, it would be beneficial to conduct further studies with more middle-aged surfers.

Our data, obtained mainly from young adult male recreational surfers, suggests that there is a relevant relationship between volume of surfing and HRQoL, when adjusted for sex, drinking status and economic status. However, since this is a cross-sectional study, it is not possible to accurately identify the precise nature of this relationship (reverse causality). Moreover, a retrospective approach can be a problem when respondents are asked to remember past events (recall bias) and it may have affected the data accuracy. It is crucial to highlight that those other PAs, in addition to surfing, can contribute to HRQoL. Nevertheless, this aspect was not addressed in the study. Finally, the data was collected from a small sample of adult male recreational surfers on beaches in Brazil's Northeast Region, and therefore our findings may not be generalizable to other populations and regions of the country.

## Conclusions

Increasing weekly surfing volume enhances HRQoL among recreational surfers, particularly in the 'Vitality' and 'Bodily pain' domains. Health professionals, recreational sport organizers, and policy makers can promote recreational surfing and similar activities as part of a broader strategy, emphasizing that engagement in more than 180 minutes per week may be integrated into mental health interventions and wellness programs, particularly for stress reduction and emotional well-being.

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## Conflict of Interest

The authors have no conflicts of interest to report.

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