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# Correlations between the intensity of health behaviour and the quality of life of people practicing karate, football and physical recreation

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B Data Collection
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**Abstract:**

**Background and Study Aim:** Lifestyle involves making personal behavioural choices that can influence the development of health and quality of life. Research does not fully resolve the problem of discrepancies between health behaviours and quality of life (defined in four dimensions), depending on the form of physical activity. The aim of the study was to obtain knowledge concerning the relationship between the intensity of health-related behaviours and the quality of life of individuals practicing karate, football, and physical recreation, in the context of promoting a health-oriented lifestyle.

**Material and Methods:** The study covered 500 people, aged 18-50 years, practicing karate (K) football players (F) and physical recreation (PR). The standardized questionnaires: Health Behavior Inventory (HBI) and WHOQOL-BREF (World Health Organization Quality of Life), were used. Non-parametric statistics were applied.

**Results:** Individuals practicing karate demonstrated a higher quality of life in the physical, psychological, and environmental dimensions, whereas football players reported a higher quality of life in the social dimension. Positive moderate correlations were found between quality of life in the physical domain and the intensity of preventive behaviours; in the psychological domain and HBI point score (HBIps) for people practicing karate. Among football players, moderate correlations were observed between: overall quality of life and (HBIps), positive mental attitude (PMA) and health practices; in the social domain and PMA. For people practicing physical recreation, moderate correlations were observed between the psychological and environmental domains and the HBIps ($r = 0.426$ and $r = 0.428$, respectively). In the psychological domain, for both karate practitioners and physical recreation, correlations were observed with category HBI (PMA) ($r = 0.411$ and $r = 0.425$, respectively).

**Conclusions:** Moderate correlations between the intensity of health behaviours and the respondents' quality of life do not fully explain these relationships. Exploring the relationships between these factors in relation to motivation, perceived life values, and socio-demographic variables –particularly in the context of longitudinal studies – could provide significant evidence for promoting healthy lifestyles in society.

**Keywords:** combat sport, lifestyle, team sport, well-being

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**Dictionary:**

**HBI (Health Behavior Inventory)** – based on the frequency of individual behaviours, it allows determining the overall intensity of health-promoting behaviours and the degree of severity in four categories: correct eating habits (CEH), preventive behaviours (PB), positive mental attitudes (PMA) and health practices (HP) [23].

**Correct eating habits (CEH)** – include the type of food consumed - vegetables, fruits, animal fats, sugars, salt, wholegrain bread [23].

**Preventive behaviours (PB)** – following medical recommendations, avoiding colds, knowing emergency numbers, obtaining information on health and illness, regular medical examination [23].

**Positive mental attitude (PMA)** – concerns avoiding too strong emotions, depressing situations, stresses, and tensions [23].

**Health practices (HP)** – include daily habits of rest, sleep, recreation, physical activity, maintaining a healthy weight, avoiding the use of stimulants, smoking [23].

**The WHOQOL-BREF** (World Health Organization Quality of Life) questionnaire is used to determine the perception of quality of life, satisfaction with health and four areas of life: physical, psychological, social, and environmental [24].

**Physical domain** – includes drug and treatment dependence, mobility, rest and sleep, activities of daily living, ability to work [24].

**Psychological domain** – includes joy of life, meaning of life, concentration, body image, self-esteem, feeling of sadness [24]. Social domain – concerns personal relationships, sexual intercourse, social support [24].

**Environmental domain** – includes security, financial resources, recreation and leisure time, housing conditions, access to medical care, transport [24].

**Team sport** – noun any sport that is played between two or more teams, e.g. football, tennis or hockey [47].

## 1. Introduction

The World Health Organization (WHO) defines quality of life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns [1]. Quality of life is perceived in the context of self-assessment of satisfaction with life and health and in relation to the physical, psychological, social, and environmental domains [2, 3]. The studies have indicated that the impact of physical activity on health is more accurately assessed when considering four distinct dimensions of health (physical, psychological, social, and environmental), rather than using an aggregated health index. Socio-demographic variables also play a significant role, influencing both physical activity and quality of life [4]. It is associated with the preferred lifestyle, in which it is possible to make behavioural choices, e.g. in the sphere of work, education, family life and leisure time [5, 6].

An important role in the quality of human life is played by physical activity [7-9], which is part of a healthy lifestyle [10-12]. Preferred health behaviours may be the result of socialization, a response to social requirements, fads or constitute intentional behaviours, conditioned by knowledge and health awareness [13, 14]. Personal choices regarding avoiding risky behaviours (use of drugs, smoking, alcohol consumption, non-compliance with transport safety rules, improper diet), undertaking health-promoting practices (physical exercises, brushing teeth, environmental hygiene) and preventive actions (regular check-ups with a general practitioner and dentist, self-monitoring of health, etc.) are important in shaping the health of the individual and society [15, 16]. Doing sport is associated with permanent evaluation of one's choices, e.g. health-promoting behaviours [17].

Both individual and team forms of physical activity possess significant health and educational potential. In studies involving karate practitioners, the BAS (Behavioural Activation System) questionnaire was utilized, which is associated with positive emotions, optimism, and happiness. A higher BAS level was observed among karate practitioners compared to physical education students practicing other sports and individuals who do not engage in exercise. Karate training demonstrates a preventive effect against mental health disorders and is associated with the promotion of well-being. It can be employed as a form of health intervention (physical, psychological, mental, and social health) [18], as well as in stress reduction. The contemporary research perspective recognizes the presence of karate across all areas of physical culture. Karate functions as a combat sport, a hand-to-hand combat system, especially as a form of self-defence. Karate aligns with the core goals of physical culture, which are oriented toward health maintenance through physical activity. The educational and traditional values positively influence the social functioning of karate practitioners [19]. These directions of karate's development are consistent with the views of J. Harasymowicz [20]. The indicated axiological, ethical, and pedagogical criteria emphasize the promotion of Olympic sport values as well as the original values of budo that support health. The author opposes the spread of violence-based cultural patterns. The objectives of combat sports (beyond achieving sporting excellence) have been previously defined, emphasizing the comprehensive development of practitioners' personalities (psychophysical, moral, and spiritual) [21].

Football is the most popular team sport, attracting the attention of a wide global audience (fans and television viewers). In the pursuit of optimal performance, factors determining sporting success are being actively investigated. Elite football players are aware of the impact of psychological preparation on their performance and seek to expand their knowledge in this area through collaboration with sports psychologists. Mental toughness is crucial for football players' performance, as it enables them to cope with difficult situations and periods [22].

The aforementioned studies [6, 8-10, 4] do not fully address the gap concerning health behaviours and quality of life among individuals participating in individual and team sports, as well as those engaging in physical recreation. There is a lack of research examining the correlation between the intensity of health behaviours and health satisfaction, as well as quality of life defined across four dimensions, among individuals practicing various sports disciplines at different levels of athletic involvement.

The aim of the study was to obtain knowledge concerning the relationship between the intensity of health-related behaviours and the quality of life of individuals practicing karate, football, and physical recreation, in the context of promoting a health-oriented lifestyle.

We verify the hypothesis: the intensity of health behaviours will correlate with the quality of life among individuals practicing individual sport (karate), team sport (football), and engaging in physical recreation.

## 2. Materials and Methods

### Participants

The study covered 500 people practicing karate, football, and physical recreation. The respondents came from the northern and western parts of Poland, aged 18-50 years. Among the respondents, 141 practiced karate (mean age 24.7 ±10.2 years); 196 played football (mean age 24.4 ±4.0 years), and 193 people practiced physical recreation (mean age 26.4 ±7.9 years). Most of the respondents were men (55.6%). In this study, only individuals practicing karate, football players, and participants in physical recreation were included. Questionnaires that were incomplete or contained unreliable responses were excluded from the analysis. After these exclusions, out of the initial 570 individuals, a final total of 500 respondents were included in the study.

### Methods

The research was conducted by applying the diagnostic survey method using standardized questionnaires: Health Behavior Inventory (HBI) [23], WHOQOL-BREF (World Health Organization Quality of Life) [24] and the author's questionnaire. The HBI contains descriptions of 24 different health-related behaviours. Each behaviour was rated on a five-point scale. The frequency of occurrence of behaviours determines the overall intensity of health-promoting behaviours and individual categories. Due to the underestimation of reliability by Cronbach's alpha [25], we used McDonald's $\omega$ [26]. Internal consistency of HBI, determined on the basis of McDonald's $\omega$, was 0.875 for the entire HBI (point score), and for its four subscales (CEH – correct eating habits, PB – preventive behaviours, PMA − positive mental attitudes, HP – health practices) as follows: 0.822; 0.650; 0.691; 0.578. The WHOQOL-BREF questionnaire [24] contains 26 questions. They refer to the degree of satisfaction with life and health and 4 domains of quality of life: physical, psychological, social, and environmental. The domain scoring has a positive trend: the higher the score, the better the quality of life. Internal consistency of quality of life (WHOQOL-BREF), determined on the basis of McDonald's $\omega$, was 0.875, and for four domains of quality of life (physical, psychological, social, and environmental) it was as follows: 0.660; 0.775; 0.712; 0.695) [24].

The author's survey technique concerned personal data and lifestyle of people doing competitive or recreational physical activity. The research was conducted in accordance with the Helsinki Declaration of 1975. Prior to the study, a written informed consent was obtained from the subjects, who were also informed that they could stop participating in the study at any time without consequences.

### Statistical analysis

Non-parametric statistics were applied in the analyses of the results (distribution that differs from normal). The Kruskal-Wallis test ($H$) was used to compare several independent samples. In the case of determining statistical significance of differences for the comparison of two independent samples, the Mann-Whitney ($U$) test was employed. The trait frequency and the independence chi-square test were used. The effect size was calculated for each test: $\varepsilon^2$ for the Kruskal-Wallis $H$ test, Glass rank biserial correlation ($rg$) for the Mann-Whitney $U$ test, *Cramér's V* ($CV$) for the $\chi^2$ test.

The Spearman rank-order correlation was used to show the relationship between the severity of health behaviours (HBI) and the quality of life (WHOQOL-BREF) of people practicing karate, football, and physical recreation. The value of $p<0.05$ was assumed to be statistically significant. Statistical calculations were performed using Statistica 13.3 (TIBCO Software INC. 2017), Krakov, Poland), and JASP 0.8.1.2 (https://jasp-stats.org) (accessed December 2024).

## 3. Results

### The socio-demographic characteristics

Most of the respondents were men (55.6%), people aged 29 and younger (81.6%), predominantly city dwellers (82.8%). About 20% of karate and football practitioners lived in the countryside. Respondents were mostly single (78%) and most often football players (91%). More than half of the respondents had higher education, mainly those doing football (60.7%) and physical recreation (52.2%). People still learning accounted for 40% (slightly more often those practicing karate 48.9%); 14.6% of the respondents combined work and education; 53.4% of respondents assessed their situation as good. Karate competitors more often perceived their situation as very good (41.4%), while those doing physical recreation as sufficient (51.9%). Relationships ($p<0.05$ for $\chi^2$) were observed between the discussed variables and practiced sports, showing an average ($CV = 0.3$) and small effect strength ($CV = 0.2$) (Table 1).

**Table 1.** Socio-demographic statistics of people practicing karate (K), football (F) and physical recreation (PR) (independence $\chi^2$ test, and CV).

| Variables | Forms of physical activity | | | Total (n = 500) | | p for $\chi^2$ | Cramér's V |
|---|---|---|---|---|---|---|---|
| | Karate (*n* = 141) | football (*n* = 196) | PR (*n* = 193) | *n* | % | | |
| **Sex:** | | | | | | | |
| man | 48.2 | 64.8 | 50.9 | 278 | 55.6 | 0.003 | 0.2 |
| woman | 51.8 | 35.2 | 49.1 | 222 | 44.4 | | |
| **Age:** | | | | | | | |
| ≤19 years old | 44.7 | 11.2 | 15.9 | 111 | 22.2 | 0.000 | 0.3 |
| 20-29 | 31.9 | 79.6 | 58.9 | 297 | 59.4 | | |
| 30-39 | 9.2 | 8.2 | 17.8 | 58 | 11.6 | | |
| ≥40 | 14.2 | 1.0 | 7.4 | 34 | 6.8 | | |
| **Place of residence:** | | | | | | | |
| city | 80.9 | 77.4 | 90.8 | 413 | 82.8 | 0.003 | 0.2 |
| village | 19.1 | 22.6 | 9.2 | 86 | 17.2 | | |
| **Relationship status:** | | | | | | | |
| I am not in a relationship | 69.5 | 91.0 | 70.2 | 384 | 78.0 | 0.000 | 0.2 |
| married | 27.0 | 7.9 | 24.8 | 93 | 18.9 | | |
| I have a partner | 3.5 | 1.1 | 5.0 | 15 | 3.1 | | |
| **Education:** | | | | | | | |
| below secondary | 26.9 | 9.2 | 11.0 | 74 | 14.8 | 0.000 | 0.2 |
| secondary | 27.7 | 30.1 | 36.8 | 158 | 31.6 | | |
| above secondary | 45.4 | 60.7 | 52.2 | 268 | 53.6 | | |
| **Job type:** | | | | | | | |
| learning/studying | 48.9 | 43.9 | 27.6 | 200 | 40.0 | **0.000** | 0.2 |
| intellectual work | 7.8 | 17.3 | 25.8 | 87 | 17.4 | | |
| physical work | 24.8 | 10.7 | 27.0 | 100 | 20.0 | | |
| studying & working | 13.5 | 15.3 | 14.7 | 73 | 14.6 | | |
| not working | 5.0 | 12.8 | 4.9 | 40 | 8.0 | | |
| **Financial situation:** | | | | | | | |
| very good | 41.4 | 33.0 | 26.9 | 164 | 33.4 | 0.000 | 0.1 |
| good | 47.2 | 59.2 | 26.2 | 262 | 53.4 | | |
| sufficient | 11.4 | 7.8 | 51.9 | 65 | 13.2 | | |

### Differences in the severity of health behaviours (HBI) among karate, football, and physical

Football players achieved a higher overall score in the HBI point score compared to karate practitioners (p = 0.040, for the *U* test). Individuals practicing karate, football, and physical recreation differed significantly in the intensity of preventive behaviours (PB) ($p<0.05$, for the *U* test). Football players were more frequently engaged in health practices (HP) compared to those practicing karate and physical recreation ($p = 0.000$ and $p = 0.049$ for the *U* test, respectively). The effect size for HBI (point score) and HP ranged from small to negligible ($rg = -0.130$ to $rg = -0.2$). Participants practicing karate, football, and physical recreation exhibited similar behaviours in the domains of CEH, PMA, and HP; differences among respondents were not significant (Table 2).

**Table 2.** Intensification of health behaviours for practicing karate, football, and physical recreation (the H test, $\varepsilon^2$, the U test, rg).

| HBI and its categories | Forms of physical activity | Value of p for U statistics | | Glass rank biserial correlation (rg) | | Rank means |
|---|---|---|---|---|---|---|
| | | Football | PR | Football | PR | |
| HBI (point score) | Karate | 0.040 | 0.565 | −0.130 | −0.038 | 231.7 |
| $H(2,495) = 4.44$ | Football | | 0.145 | | 0.089 | 263.9 |
| $p = 0.108$<br>$\varepsilon^2 = 0.009$ | PR | | | | | 242.9 |
| HP | Karate | 0.000 | 0.060 | −0.231 | −0.124 | 215.9 |
| $H(2,496) = 13.82$ | Football | | 0.049 | | 0.120 | 274.4 |
| $p = 0.001$<br>$\varepsilon^2 = 0.028$ | PR | | | | | 245.6 |

The highest values of the general indicator of health behaviours (HBI point score: HBIps) were recorded among football players (85.6 ±15.6 points). Practitioners of karate and physical recreation achieved lower values of the index (respectively: 82.4 ±11.3; 82.9 ±16.3). For all subjects, the HBIps was 83.6 ±14.8 points. These differences are confirmed by the values of the arithmetic means of CEH, PB, PMA and HP for karate (K), football (F), physical recreation (PR) – Figure 1.


Explanations of abbreviations: CEH – correct eating habits, PB – preventive behaviours, PMA – positive mental attitude, HP – health practices.

**Figure 1.** Descriptive statistics for CEH, PB, PMA, HP depending on the physical activity.

**Differences in the quality of life of karate, football, and physical recreation practitioners**

Respondents reported similar self-assessments of overall quality of life and health satisfaction. Differences in overall quality of life were observed at a statistical trend level (0.05< to p<0.1) between karate practitioners and individuals engaging in physical recreation (p = 0.070, for the *U* test). Similar trend-level differences were found between karate practitioners and football players, as well as between karate practitioners and physical recreation exercisers (p = 0.065 and p = 0.087 for the *U* test, respectively). Karate practitioners rated their overall quality of life and health higher compared to football players and physical recreation exercisers. These findings suggest the need to investigate other determinants influencing self-assessment of quality of life and health. Overall differences in the quality of life in the physical, psychological, social, and environmental domains (p<0.001 for the *H* test) were found for the practitioners of karate, football, and physical recreation. The strongest effect size was observed in the physical domain ($\varepsilon^2$ = 0.147). In the physical domain, differences were found between the practitioners of K and F (p = 0.000 for the *U* test; *rg* = 0.518) and PR (p = 0.000 for the *U* test; *rg* = 0.270), as well as between F and PR (p = 0.000 for the *U* test; *rg* = −0.313). Karate practitioners (K) achieved higher scores compared to F and PR. These differences are supported by large and medium effect sizes. Individuals engaging in PR also scored better in the physical domain compared to football players (F), but the superior results of football players in this domain were not accompanied by improved scores in PR (*rg* = −0.313). In the physical domain, the best results were achieved by karate practitioners, and the weakest by football players. Similar results have been observed in the psychological domain. Differences concerned the practitioners of K and F (p = 0.000 for the *U* test; *rg* = 0.268) and F and PR (p = 0.010 for the *U* test). In the psychological domain, the best results were achieved by people practicing karate, while weaker results were achieved by football players. In the social domain, differences were found between K and F practitioners (p = 0.000 for the *U* test), K and PR practitioners (p = 0.027 for the *U* test). These differences also occurred between F and PR practitioners (p = 0.040 for *U* test). In the social domain, football players achieved the best results and karate practitioners the worst (moderate effect strength). In the environmental domain, differences between K and F (p = 0.004 for the *U* test) and K and PR *(*p = 0.000 for the *U* test) were observed, with a small effect size. The karate practitioners achieved the best results in the physical, psychological, and environmental domains. Football players had better results in the social domain (Table 3).

**Table 3.** Satisfaction with life, health, and particular domains of quality of life (WHOQOL-BREF) of practicing karate, football, and physical recreation (the *H* test, $\varepsilon^2$, the *U* test, *rg*).

| Quality of life and its domains | Forms of physical activity | Value of p for *U* statistics | | Glass rank biserial correlation (*rg*) | | Rank means |
|---|---|---|---|---|---|---|
| | | Football | PR | Football | PR | |
| **Satisfaction with life** | | | | | | |
| $H(2,500) = 3.87$ | Karate | 0.118 | 0.070 | 0.088 | 0.108 | 267.9 |
| $p = 0.144$ | Football | | 0.651 | | 0.023 | 246.2 |
| $\varepsilon^2 = 0.007$ | PR | | | | | 240.6 |
| **Satisfaction with health** | | | | | | |
| $H(2,500) = 4.08$ | Karate | 0.065 | 0.087 | 0.105 | 0.101 | 269.1 |
| $p = 0.129$ | Football | | 0.959 | | −0.002 | 242.9 |
| $\varepsilon^2 = 0.008$ | PR | | | | | 243.6 |
| **Physical domain** | | | | | | |
| $H(2,499) = 73.26$ | Karate | 0.000 | 0.000 | 0.518 | 0.270 | 322.8 |
| $p = 0.000$ | Football | | 0.000 | | −0.313 | 188.2 |
| $\varepsilon^2 = 0.147$ | PR | | | | | 261.8 |
| **Psychological domain:** | | | | | | |
| $H(2,499) = 17.94$ | Karate | 0.000 | 0.147 | 0.268 | 0.096 | 284.2 |
| $p = 0.000$ | Football | | 0.010 | | −0.155 | 218.5 |
| $\varepsilon^2 = 0.036$ | PR | | | | | 258.5 |
| **Social domain:** | | | | | | |
| $H(2,500) = 17.47$ | Karate | 0.000 | 0.027 | −0.260 | −0.145 | 213.1 |
| $p = 0.000$ | Football | | 0.040 | | 0.123 | 279.0 |
| $\varepsilon^2 = 0.034$ | PR | | | | | 248.6 |
| **Environmental domain** | | | | | | |
| $H(2,500) = 12.69$ | Karate | 0.004 | 0.000 | 0.181 | 0.223 | 286.5 |
| $p = 0.001$ | Football | | 0.517 | | 0.039 | 240.9 |
| $\varepsilon^2 = 0.025$ | PR | | | | | 230.9 |

As far as quality of life defined by physical and environmental domains is concerned, respondents scored high (higher medians); there were also fewer outliers and extremes. The medians for the psychological domain were lower (without outliers and extremes), and the lowest for the social domain, with outliers (and extremes for F) (Figure 2).

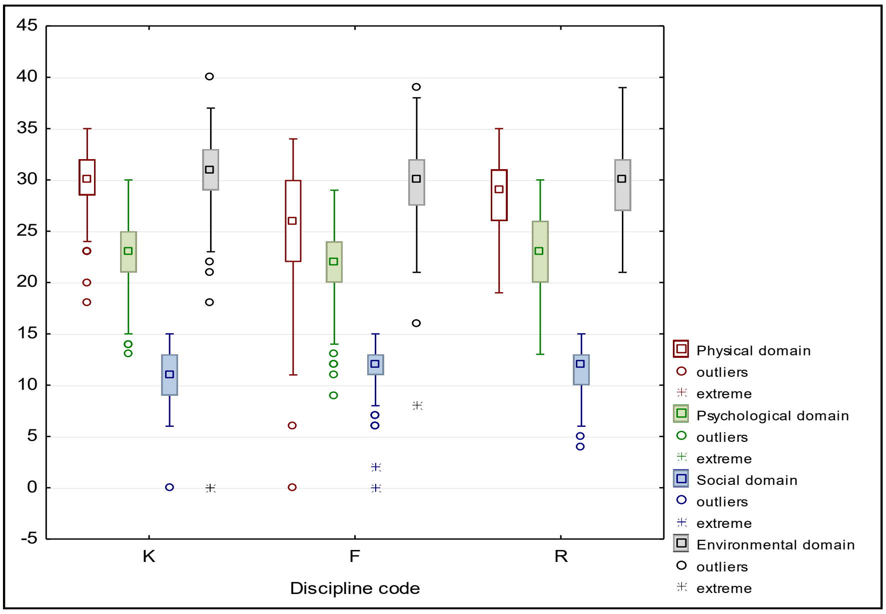


**Figure 2.** Descriptive statistics for the quality of life (domains: physical, psychological, social, environmental) depending on the sports practiced.

**Intra-group correlations between the intensity of health behaviours and the quality of life**

Among karate practitioners, moderate positive correlations were found between quality of life in the physical domain and the HBI (point score) (r = 0.323), as well as its subscales: preventive behaviours (PB) (r = 0.373) and positive mental attitude (PMA) (r = 0.319). Moderate positive correlations were also observed between the psychological domain and the HBI point score (r = 0.372), preventive behaviours (PB) (r = 0.275), and positive mental attitude (PMA) (r = 0.411). Weaker positive correlations were identified between overall life satisfaction and PMA (r = 0.294) among karate practitioners. No significant correlations were found between the social domain and health behaviours in this group. Correlations between the intensity of health behaviours and quality of life in the environmental domain were weak or non-existent. Among football players, moderate positive correlations were observed between overall life satisfaction and the intensity of all health behaviours: HBI (point score) (r = 0.354), CEH (r = 0.316), PB (r = 0.291), (PMA) (r = 0.368), (HP) (r = 0.356). Health behaviours (HBI and its subscales) among football players showed positive (however weak) correlations with health satisfaction. All health behaviours were weakly negatively correlated with the physical domain (r ranging from −0.196 to −0.246), and moderately negatively correlated with CEH (r = −0.290) and PB (r = −0.305). These behaviours (HBI and its subscales) were positively correlated with the social domain, with moderate correlations found for HBI point score (r = 0.288), PMA (r = 0.377), and HP (r = 0.269). No significant correlations were found between HBI or its subscales and the environmental domain. The highest number of moderate positive correlations was observed among individuals engaging in physical recreation, particularly between overall life satisfaction, health satisfaction, and the physical, psychological, and environmental domains, and health behaviours. All health behaviours correlated positively with overall life satisfaction in this group (r ranging from 0.232 to 0.331). Similar correlations were observed between health satisfaction and the intensity of health behaviours (r = 0.214 to r = 0.305), (except for PB). Moderate positive correlations were also found between all health behaviours and the physical (r = 0.248 to r = 0.387), psychological (r = 0.318 to r = 0.426), and environmental (r = 0.284 to r = 0.428) domains. The strongest correlations between the HBI point score and both the psychological and environmental domains were recorded among physical recreation exercisers (r = 0.426 and r = 0.428, respectively). Additionally, the highest correlations within the psychological domain for both karate practitioners and physical exercisers (PR) were observed in PMA subscale (r = 0.411 and r = 0.425, respectively). No correlations – or only very weak ones – were found between health behaviours and the social domain among those engaging in physical recreation (Table 4).

**Table 4.** Intergroup correlations (r) of the intensity of health behaviours (HBI point score and its categories) and quality of life (including its domains) and health satisfaction for karate, football, and physical recreation practitioners.

| **Forms of physical activity** | HBI and its categories | **Quality of life and particular domains (WHOQOL-BREF)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | satisfaction with life | satisfaction with health | physical domain | psychological domain | social domain | environmental domain |
| Karate | HBI(point score) | **0.176*** | **0.237*** | **0.323*** | **0.372*** | 0.115 | **0.206*** |
| | CEH | **0.182*** | **0.195*** | **0.207*** | **0.199*** | 0.081 | **0.184*** |
| | PB | 0.094 | 0.133 | **0.373*** | **0.275*** | 0.067 | 0.137 |
| | PMA | **0.294*** | **0.181*** | **0.319*** | **0.411*** | 0.123 | **0.206*** |
| | HP | 0.076 | **0.199*** | 0.090 | **0.196*** | 0.092 | 0.098 |
| Football | HBI(point score) | **0.354*** | **0.238*** | **−0.246*** | 0.005 | **0.288*** | 0.093 |
| | CEH | **0.316*** | **0.190*** | **−0.290*** | −0.038 | **0.230*** | 0.043 |
| | PB | **0.291*** | **0.190*** | **−0.305*** | −0.040 | **0.199*** | 0.039 |
| | PMA | **0.368*** | **0.242*** | **−0.196*** | 0.043 | **0.377*** | 0.096 |
| | HP | **0.356*** | **0.186*** | **−0.206*** | −0.056 | **0.269*** | 0.080 |
| Physical recreation | HBI (point score) | **0.331*** | **0.305*** | **0.387*** | **0.426*** | **0.157*** | **0.428*** |
| | CEH | **0.244*** | **0.214*** | **0.333*** | **0.318*** | 0.091 | **0.284*** |
| | PB | **0.232*** | 0.147 | **0.248*** | **0.345*** | 0.149 | **0.314*** |
| | PMA | **0.288*** | **0.305*** | **0.329*** | **0.425*** | **0.181*** | **0.362*** |
| | HP | **0.274*** | **0.294*** | **0.283*** | **0.342*** | 0.138 | **0.374*** |

*statistically significant for $p \leq 0.05$

Explanations of abbreviations: HBI (point score) – intensity of health behaviours, CEH – correct eating habits, PB – preventive behaviours, PMA – positive mental attitude, HP – health practices.

## 4. Discussion

The article attempts to obtain knowledge concerning the correlation between the intensity of health behaviours and the quality of life of people practicing karate, football, and physical recreation. In our research, an average level of health behaviours was recorded, defined by the general index of health behaviours (HBI point score) (average 83.5 points).

A better overall score was obtained by football players compared to karate practitioners. Football players also more often implemented health practices (HP) in comparison with those doing karate and physical recreation. A similar level of HBIps (pints: women 84.2; men 83.3) was found among karate and team sports practitioners (football, volleyball, basketball, handball) [27]. People practicing team sports (wheelchair basketball players, wheelchair rugby) also obtained better results in health behaviour (HBIps) and its categories compared to those who play individual sports (para-rowers) [28]. It is possible that team sports athletes who share a common goal are more mobilized to implement health practices.

Athletes practising combat sports and other hand-to-hand combat systems demonstrated a moderate level of health behaviour. A higher intensity of health behaviours (HBIps was observed among karate practitioners (83.61 points), and a significantly lower intensity among those practising Muay Thai (77.86 points) [29]. The study of judo practitioners (101 people, including 24 at master level) showed that the average values of the general index of health behaviours (87.8 points) were much higher for them compared to the population of adult Poles (81.8 points) [23], however the level of these behaviours decreased with age, increase in sports results and training experience [30].

Our results, along with those of other authors [15, 7, 30, 12, 28] indicate a positive relationship between the intensity of health behaviours and engagement in various forms of physical activity, including professional sport, amateur sport, and physical recreation. No differences in health satisfaction were observed between karate, football, and physical recreation practitioners. Studies on health perception among athletes have shown that karate practitioners perceive health in holistic terms (physical fitness, favourable laboratory test results, inner peace), whereas judo practitioners view health through a biomedical lens (favourable laboratory results, physical performance, normal body weight). The authors conclude that the departure from traditional values of combat sports and hand-to-hand combat systems in favour of increased athleticism leads to a less favourable, biomedical perception of health among athletes [31]. Differences in health perception among individuals practicing various sports disciplines should be the subject of further research.

No differences in life satisfaction were observed between karate, football, and physical recreation practitioners. In other studies, it was found that adults doing recreational sports had a better overall quality of life compared to those who were physically inactive [32]. Research conducted among karate practitioners did not show a direct impact of karate training on life satisfaction. The karate training was indirectly associated with life satisfaction via the indirect paths that lead through self-control and reappraisal. Karate practitioners had higher self-control and reappraisal, which were associated with greater satisfaction with life and improving well-being [33]. Studies of a large group of teenagers (2659) have shown that athletes, compared to a group of healthy, non-training people, achieved a better overall quality of life and in all its spheres [34]. A relationship has been confirmed between physical activity and health-related quality of life among individuals aged 18 and older. Older adults rated their quality of life higher compared to younger and middle-aged individuals [35]. It appears that individuals who engage in physical activity report similar levels of health satisfaction and overall quality of life, which are higher compared to those who are physically inactive.

Differences between karate, football and physical recreation were found in individual domains of quality of life. Karate athletes achieved the best results in the physical, psychological, and environmental domains. These findings may be the result of the methods used to work with karate practitioners, for whom mental training, taking mental exercises related to the karate culture and cooperation with specialists is a daily event, especially among national team players [36]. Regular training taekwondo promotes good results in all domains of quality of life [37]. Higher quality of life was found in all domains (physical, psychological, social, environmental) when using the Brazilian version of the WHOQOL-BREF questionnaire, among 922 men doing Brazilian jiu-jitsu, judo, karate, kung-fu and taekwondo in all groups, and applying the total sample as compared to normative national data [38]. In studies involving karate practitioners and football players, researchers aimed to determine whether perceived benefits and risks of aggression associated with their respective sports influenced their sport involvement and quality of life. Both groups of athletes perceived similar physical and psychological benefits from practicing their sports.

Among karate practitioners, the perceived benefits of practicing karate had a direct impact on their sport involvement, quality of life, satisfaction with training, and overall well-being [39]. The better outcomes observed among karate practitioners were partially confirmed in our study, primarily in relation to the physical and psychological domains. On the other hand, the poorer results of karate practitioners in the social domain obtained in our research (lower ratings of personal relationships, sexual intercourse, social support) may be due to, among others, the younger age of karate practitioners.

Football players had the best results in the social domain. This outcome may have been influenced by the nature of the sport. As a team sport, football can serve as a carrier of many universal values. In cross-sectional studies involving middle-aged and older football players, individuals engaged in individual sports, and those not physically active, no significant differences were found in the physical dimension of quality of life. However, a relationship was confirmed between participation in football and health-related quality of life in men, particularly in the psychological domain. An important feature of team sports is their potential to facilitate social interaction and enhance a sense of community among individuals. Football, in particular, requires close on-field communication between players without coach instructions during gameplay, which continues uninterrupted except for halftime. The pursuit of victory may further strengthen the unity involved in carrying out a shared task [40]. Interpersonal relationships and interactions between athletes during training and competition with the common goal of defeating an opponent can influence these results. The obtained results require further research.

The hypothesis about the correlation between the intensity of health behaviours and the quality of life of people practicing karate, football and physical recreation was partially confirmed. In karate practitioners, preventive behaviours related to health care – such as following medical recommendations, avoiding colds, and undergoing regular medical check-ups – were correlated with the physical dimension of quality of life (including pain and discomfort, dependence on medication and treatment, energy and fatigue, mobility, rest and sleep, activities of daily living, and ability to work). The psychological domain (which encompasses aspects such as joy and meaning in life, concentration, body image, self-esteem, and feelings of sadness) was correlated with a positive mental attitude, including the avoidance of intense emotions, depressing situations, stress, and tension.

Among football players, moderate positive correlations were observed between overall life satisfaction and the intensity of all health behaviours (HBI and its subscales), with the strongest correlations found in the categories of PMA and HP. These two HBI categories – PMA and HP – were also positively correlated with the social domain, which includes personal relationships, sexual activity, and social support. Health behaviours among football players showed weak negative correlations with the physical domain. Higher scores in the category of correct eating habits (CEH) were not accompanied by improved outcomes in the physical domain.

Among individuals engaging in physical recreation, health behaviours were found to be associated with overall life satisfaction, health satisfaction, and quality of life in the physical, psychological, and environmental domains. The best results in the environmental domain were observed in the physical recreation group. In the social domain, individuals practicing physical recreation and karate showed weak outcomes. This indicates that individuals engaging in physical recreation were motivated by different factors, such as health maintenance, body shape, and psychophysical fitness. However, the low scores in the social domain suggest the need to further investigate the motivations and life values held by the participants.

Karate and physical recreation competitors had similar results in the psychological domain, HBIps and positive mental attitude. Some studies emphasize the relationship between the choices of pro-health behaviours and the quality of life of people practicing sports at various levels [41, 34, 38]. The Paper-and-Pen Interview, HBI and BREF questionnaires were used in the study of 110 leading Polish team sports players and 90 karate (kyokushin i shotokan) practitioners. Among the predictors of the quality of life, the following were significant: positive mental attitude, correct eating habits and sex [27]. The authors conclude that the quality of life of people practicing team sports and karate is not related to the practiced sport. Our results differ somewhat.

The type of practiced sport is not a significant quality of life predictor, perhaps because high-level sports activities are professional in nature, which makes the professional and sports activities uniform. In the light of our research, positive mental attitude correlated with the psychological domain of karate and physical recreation practitioners and with the social domain of football players. In contrast, the correlations between correct eating habits and the quality of life of karate, football and physical recreation practitioners were weak. There was also no correlation between proper eating habits and the level of physical activity of Turkish students [42]. On the other hand, students practicing sports had a much higher level of pro-health behaviours and quality of life [43].

**Limitations of the study**

Cross-sectional studies of individuals aged 18-50 years engaging in various forms of physical activity do not allow for cognition determining the direction of the relationship between the intensity of health behaviours and quality of life; however, they do establish their mutual association. In the search for factors improving quality of life, variables such as age, sex, education, financial status, access to sports infrastructure, and availability of psychological and physiotherapeutic support – which may have influenced differences in perceived quality of life and health satisfaction – were not taken into account. The presented study results are applicable to this specific sample and warrant further investigation.

Although our research is to some extent characterized by a complementary approach, we believe that when solving the problems mentioned above, a complementary research methodology would be appropriate [44-46].

**Conclusions**

Moderate correlations between the intensity of health behaviours and the quality of life of people practicing karate, football and physical recreation may indicate that the practiced type of physical activity is not the only factor influencing these relationships. Weak relationships between the quality of life and the correct eating habits of the respondents suggest the need for health education in this area. In the development of optimal strategies to improve the quality of life of athletes, as well as the general public, it is necessary to cooperate with many educational entities (coaches, physical education teachers, psychologist, health care professionals) and to continue research in this area. Future studies on health behaviours and quality of life among individuals engaging in various forms of physical activity should consider the sport discipline, athletic level, training experience, frequency of participation in training sessions and competitions, as well as the socio-demographic characteristics of respondents. Clarifying the relationships between the intensity of health behaviours and quality of life in physically active individuals, with regard to their motivations and valued life principles – particularly within the context of longitudinal research – would provide important evidence to support the promotion of a health-enhancing lifestyle in society.

**Data Availability Statement:** The data supporting this study's findings are available from the corresponding author upon reasonable request.

**Institutional Review Board Statement**: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institute of Psychology Ethical Committee for Research Projects of the University of Szczecin (KB 14/21).

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