








Article

# Functional Characteristics and Coping Strategies among Rugby Athletes: A Cluster Analysis Approach

Walter Sapuppo <sup>1,2</sup> , Davide Giacconi <sup>1</sup>, Vincenzo Monda <sup>3</sup>, Antonietta Messina <sup>4</sup>, Salvatore Allocca <sup>5</sup>, Sergio Chieffi <sup>5</sup>, Mariateresa Ricci <sup>5</sup>, Ines Villano <sup>6</sup> , Daniele Saccenti <sup>1</sup> , Claudia Maria Mineo <sup>1</sup>, Margherita Boltri <sup>1,7,8</sup> , Marcellino Monda <sup>5</sup> , Girolamo Di Maio <sup>5,\*</sup> , Antonietta Monda <sup>9,†</sup> and Marco La Marra <sup>5,†</sup> 

- <sup>1</sup> Department of Psychology, Sigmund Freud University Wien, 20143 Milan, Italy  
<sup>2</sup> Studi Cognitivi, Cognitive Psychotherapy School and Research Center, 20121 Milan, Italy  
<sup>3</sup> Department of Economics, Law, Cybersecurity, and Sports Sciences, University of Naples “Parthenope”, 80133 Naples, Italy  
<sup>4</sup> Department of Precision Medicine, University of Campania “Luigi Vanvitelli”, 80138 Naples, Italy  
<sup>5</sup> Department of Experimental Medicine, University of Campania “Luigi Vanvitelli”, 80138 Naples, Italy  
<sup>6</sup> Department of Wellness, Nutrition and Sport, Telematic University Pegaso, 80143 Naples, Italy  
<sup>7</sup> Istituto di Ricovero e Cura a Carattere Scientifico (I.R.C.C.S.) Istituto Auxologico Italiano, Experimental Laboratory for Metabolic Neurosciences Research, 28824 Piancavallo, Italy  
<sup>8</sup> Department of Psychology, Università Cattolica del Sacro Cuore, 20123 Milan, Italy  
<sup>9</sup> Department for the Promotion of Human Science and Quality of Life, Telematic University San Raffaele, 00166 Rome, Italy  
\* Correspondence: girolamo.dimaio@unicampania.it  
† These authors contributed equally to this work.

**Abstract:** The developing domain of mental health in sports has gained much interest, acknowledging its pivotal role in athlete performance and well-being. The aim of this research is to provide a quantitative description concerning the levels of mental health, physical activity, cognitive fusion, cognitive flexibility, and coping strategies that characterize rugby athletes by using a data-driven approach. A total of 92 rugby athletes took part in this study and filled out a set of self-administered questionnaires. A correlational analysis showed that general well-being was positively associated with years spent playing rugby ( $r = 0.23$ ) and coping mechanisms ( $r = 0.29$ ). Athletes’ well-being was also negatively correlated with cognitive inflexibility ( $r = -0.41$ ) and cognitive fusion ( $r = -0.39$ ). A k-means cluster analysis identified two unique groups: group 1, characterized by higher levels of psychological well-being, lower levels of physical activity, greater cognitive flexibility, improved coping techniques, and reduced cognitive fusion, and group 2, which exhibits opposite characteristics. The discrepancies observed in psychological characteristics such as coping strategies, cognitive fusion, and cognitive inflexibility highlight their potential impact on the general health of rugby players. To comprehend the complex interplay between psychological and physical elements in rugby athletes, long-term studies with larger samples are crucial.

**Keywords:** cognitive flexibility; cognitive fusion; coping strategies; mental health; physical activity; rugby; sport; athletes



**Citation:** Sapuppo, W.; Giacconi, D.; Monda, V.; Messina, A.; Allocca, S.; Chieffi, S.; Ricci, M.; Villano, I.; Saccenti, D.; Mineo, C.M.; et al. Functional Characteristics and Coping Strategies among Rugby Athletes: A Cluster Analysis Approach. *J. Pers. Med.* **2024**, *14*, 292. <https://doi.org/10.3390/jpm14030292>

Academic Editor: Angelos Halaris

Received: 14 February 2024

Revised: 2 March 2024

Accepted: 8 March 2024

Published: 9 March 2024



**Copyright:** © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The subject of mental health in sports is becoming more relevant and receiving greater focus from sports psychologists, athletes, coaches, and sports clubs. The World Health Organization (WHO) has defined mental health, referring to a condition of optimal psychological well-being, characterized by an individual’s awareness and utilization of their abilities, effective management of everyday pressures, productive work performance, and active participation in their community. The reason for such interest lies in the fact that empirical research has consistently shown that emotional and cognitive factors play a crucial

role in influencing athletes' performance and career trajectory [1–5]. Indeed, through the integration of physical, cognitive, and emotional aspects, athletes can attain the intended degree of psychological equilibrium and optimize their performance [6–8].

Physical activity encompasses any slight bodily movement that results in energy expenditure for the individual. The significance of physical activity is substantial as it has the potential to offset athletes' adverse encounters and enhance their bodily and mental well-being [5,9–13]. Engaging in regular physical activity yields numerous bodily benefits, such as the prevention of various health-threatening conditions (e.g., cardiovascular issues, high blood pressure, type 2 diabetes) [14–18]. Additionally, it significantly influences mood and mental well-being [19–23]. Furthermore, particularly in adolescents, engaging in physical exercise is crucial as it facilitates the enhancement of motor abilities, such as coordination, agility, explosiveness, dynamic and static balance, and the growth of muscular mass [24–30].

Turning to athletes' cognitive processes, cognitive fusion and cognitive flexibility emerge as crucial elements in terms of their influence on athletes' mental states and performance outcomes [31]. Cognitive flexibility is widely recognized as an important cognitive ability that can significantly contribute to successful adaptation to changes in the environment [32–34]; cognitive fusion, conversely, denotes the state in which individuals erroneously “merge” with their ideas and emotions, impeding their ability to regulate their behaviors [35]. In the sport psychology research strand, cognitive fusion is often referred to as the occurrence of excessive self-criticism, self-doubt, or intrusive distractions that might hinder an athlete's capacity to concentrate and perform optimally, ultimately resulting in burnout. Cognitive flexibility serves as an opposing force to the construct previously mentioned by prioritizing the improvement of cognitive skills [36–39]. This cognitive ability allows for nearly simultaneous multitasking, creative or divergent thinking, and the ability to shift perspectives [40]. Studies conducted on team athletes have highlighted that players who demonstrate higher levels of cognitive flexibility correlate with the experience of enhanced performance [40]. Cognitive flexibility, as defined here, pertains to a wide range of modifications in behavior rather than specific reactions. It enables individuals to effectively manage both external and internal stressors [41]. These cognitive abilities play a crucial role in both healthy and unhealthy behavior and are closely linked to the functions of the prefrontal lobes [42–45]. Strong interpersonal abilities positively influence the mental, emotional, and physical health of athletes in both direct and indirect ways. Hence, the significance of cognitive flexibility in achieving individual objectives is purportedly founded [41]. In sports that involve tactical reaction patterns, such as rugby, soccer, or basketball, cognitive flexibilities seem to play a pivotal role, since they enable individuals to assess and adjust to new situations with greater speed and effectiveness [41]. Test outcomes of accomplished athletes can be extrapolated to encompass general cognitive domains, enabling comparisons with the average performance of the general population. An effective team player can be identified by their exceptional spatial attention, split attention, working memory, and mentalizing skills. The individual must possess the ability to swiftly adjust, alter tactics, and suppress reactions. These qualities are commonly known as “game intelligence”, referred to synergistically as executive functions in neuropsychology [46–56]. Athletes encounter several obstacles throughout their careers, such as physical ailments, intense competition, declining performance, and the need to maintain a balance between personal and professional commitments. Coping methods are therefore crucial to the way in which athletes handle these difficulties and uphold their overall well-being and performance [57]. Coping strategies encompass the intellectual and behavioral actions that individuals employ to effectively handle or adjust to challenging circumstances, pressures, or requirements [2]. In the field of sport psychology, coping refers to the various psychological, emotional, and behavioral reactions that players employ to manage the pressures associated with their athletic pursuits [2,58]. Observing problem-focused coping methods is crucial due to their beneficial impact on athletes' health and their effectiveness in addressing burnout and stress in general [59]. These coping techniques

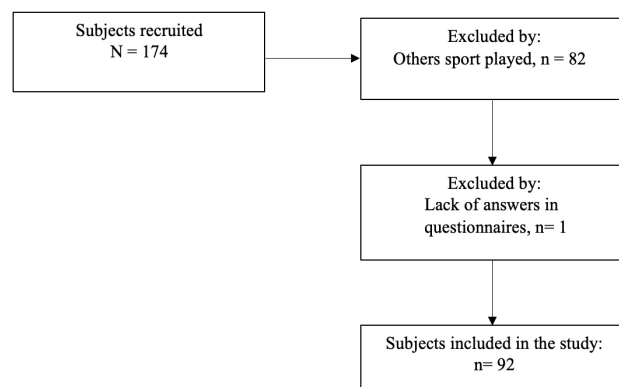
involve the athlete's deliberate actions to directly manage or alter the stressor or scenario that is producing distress [60]. Athletes often employ problem-focused coping mechanisms such as goal planning, problem solving, seeking social support, time management, and seeking professional aid [61]. Emotion-focused coping techniques represent another category of coping strategies; these techniques encompass endeavors to control emotions and handle emotional suffering linked to the stressor [57,62]. Emotion-focused coping strategies employed by athletes include several tactics such as relaxation methods, constructive self-dialogue, mental imagery, mindfulness practices, and seeking social support to find solace in emotional distress [2,63].

To date, the scientific literature has deepened the role of the abovementioned cognitive and behavioral processes in heterogeneous populations of athletes (e.g., soccer players, tennis players, basketball players, combat athletes, swimmers, and skiers) [64–71], but not specifically among rugby practitioners. Therefore, this research aims to provide a quantitative description concerning the levels of mental health, physical activity, cognitive fusion, cognitive flexibility, and coping strategies that characterize rugby athletes by using a data-driven approach.

## 2. Materials and Methods

### 2.1. Participants

Participants were recruited on a voluntary basis from the general population and through contact with rugby players and clubs. The subjects were recruited online through platforms such as social media and email, and completed the questionnaires online. The study focused on adult subjects aged 18 years or older who have participated in sports at a competitive or amateur level, either currently or in the past. From the initial sample of 174 individuals, 92 rugby athletes were identified and included in this study. It is worth noting that only one subject was excluded due to incomplete questionnaire responses. For further details on the inclusion criteria, please refer to Figure 1.



**Figure 1.** Flow chart: inclusions of study participants (February–April 2023).

### 2.2. Study Design and Procedure

This is a non-clinical cross-sectional study conducted between February and April 2023. Individuals who met the inclusion criteria were kindly requested to provide their informed consent for their data to be processed for scientific and research purposes. The purpose of this study, as well as the strict confidentiality of data collection and analysis, were thoroughly explained to the participants. The document, questionnaires, and methods of data collection and storage were approved by the Ethics Committee of Sigmund Freud University, Ethics Commission of the Faculty of Psychotherapy Science and the Faculty of Psychology. The reference for this approval is GCP4Q7JFBO3P6I90070.

### 2.3. Data Collection

For the purpose of this cross-sectional study, a 24-item questionnaire was created to investigate (1) the level of physical activity, (2) the type of sport practiced, and (3) the frequency and duration of sports activity. Basic information such as nationality, age, gender, weight, and height was also collected to provide a more precise description of the surveyed population. Participants completed six self-administered questionnaires online, which took approximately 20 min. The questionnaires used were the Short Form of International Physical Activity Questionnaire Italian version (IPAQ-7) [72]; the Short-Form Health Survey Italian version (SF-36) [73]; The Acceptance and Action Questionnaire Italian version (AAQ-II) [74]; the Cognitive Fusion Questionnaire Italian version (I-CFQ) [75]; and the Coping Orientation to Problems Experienced Inventory Italian version (Brief-COPE) [76].

### 2.4. Psychometric Instruments

Short Form of International Physical Activity Questionnaire Italian version (IPAQ-7) [72]: This 7-item questionnaire aims to measure the type and amount of physical activity an individual usually performs. Questions refer to physical activity during the past 7 days at work, moving from place to place, and during leisure time.

Short-Form Health Survey Italian version (SF-36) [73]: This self-report questionnaire is designed to assess health-related quality of life and health status. The questionnaire consists of 36 questions that can be divided into 8 scales: physical functioning (10 items), psychological well-being (5 items), general health perception (5 items), limitations due to physical health (4 items), energy and dissatisfaction (4 items), limitations due to emotional issues (3 items), social engagement (2 items), and pain (2 items).

The Acceptance and Action Questionnaire Italian version (AAQ-II) [74]: This is a 10-item self-administered questionnaire and represents a basic instrument for assessing cognitive flexibility, and is used on an international scale for both clinical and research purposes. The items are evaluated on a scale ranging from 1 to 7, where 1 represents “never true” and 7 represents “always true”. Greater psychological rigidity, experience avoidance, and possible psychological distress are all indicated by higher overall AAQ-II scores. More psychological flexibility is indicated by lower overall scores.

Cognitive Fusion Questionnaire Italian version (I-CFQ) [75]: This is a 7-item self-report questionnaire intended to identify cognitive fusion, which is the process of considering one’s thoughts as literally and objectively true. Each item is rated on a 7-point Likert scale ranging from 1 (never) to 7 (always), and the total score is calculated by aggregating all factors. Higher total scores indicate greater cognitive fusion.

Coping Orientation to Problems Experienced Inventory Italian version (Brief-COPE) [76]: This is a 25-item self-report questionnaire divided into 5 scales, each consisting of 2 items. The questionnaire is scored from 1 to 4, ranging from “Not at all” to “Very much”, and is designed to measure effective and ineffective coping mechanisms for stressful life events. Every scale is examined independently: (1) avoidance strategies, (2) transcendent orientation, (3) positive attitude, (4) social support, (5) problem orientation.

### 2.5. Data Analysis

Descriptive statistics were calculated on the sample in the first instance. Subsequently, correlational analyses were performed on physical activity, cognitive fusion, coping strategies, cognitive inflexibility, and general health. Log transformation was used to achieve better normal distributions of data when values of skewness and kurtosis exceeded the conventional parameters of the Gaussian curve [77]. A *k*-means cluster analysis was then computed to find distinctive subject groups based on weekly physical activity, cognitive inflexibility, coping strategies, cognitive fusion, and general health. A canonical discriminant analysis was conducted to examine potential multivariate group differences. Additionally, univariate group differences were assessed for significance using unpaired two-sample *t*-tests or Wilcoxon rank sum tests, depending on the distribution of the variables. Normality was evaluated using the Shapiro–Wilk test and visual inspection of Q-Q plots. The last

step of the analysis was to outline the descriptive statistics regarding the groups identified as a result of the clustering procedure. The statistical significance cut-off level was set at  $p < 0.05$ , 2-tailed. Data analysis was performed using statistical software, including SPSS for macOS (Version 28.0), R (Version 4.3.1), and RStudio for macOS (Version 2023.12.1).

### 3. Results

#### 3.1. Sample Descriptive Statistics

The characteristics of the study participants (N = 92), with respect to their age, gender, nationality, body mass index (BMI), and physical activity-related aspects, are outlined in Table 1.

**Table 1.** Summary of the sample characteristics.

Variable	Mean ± Standard Deviation, or Frequency (%)
Age, years	33.01 ± 13.52
Gender	
Male	83 (90.2%)
Female	9 (9.8%)
Nationality	
Italian	90 (97.8%)
British	1 (1.1%)
French	1 (1.1%)
Prevailing motivation related to the practice of physical activity	
Competition	15 (16.3%)
Entertainment, social occasions	11 (12.0%)
Improvement in body image	2 (2.2%)
Improvement in physical and psychological health	49 (53.3%)
Improvement in athletic performance	15 (16.3%)
Body Mass Index	28.08 ± 4.17
Time spent practicing regular physical activity, years	18.74 ± 10.17
Time spent practicing rugby, years	14.28 ± 8.65

#### 3.2. Correlations among Physical Activity, General Health, Coping Strategies, Cognitive Fusion, and Cognitive Flexibility

Several zero-order bivariate correlations were calculated to explore the potential relationship between physical activity, general health, coping strategies, cognitive fusion, and cognitive flexibility in the sample. Variables whose distribution did not approach statistical normality were log-transformed to be included in these analyses [77]. Statistically significant positive correlations were observed between participants' levels of well-being and their coping capacities ( $r(90) = 0.29, p < 0.01$ ). The number of years athletes spent practicing rugby positively correlated with their levels of well-being ( $r(90) = 0.23, p < 0.05$ ). Negative moderate correlations were detected between general health and cognitive fusion ( $r(90) = -0.39, p < 0.001$ ), as well as between general health and cognitive inflexibility ( $r(90) = -0.41, p < 0.001$ ). A comprehensive portrait of the results of this analysis is shown in Table 2.

Table 2. Zero-order bivariate correlations.

	Years Practicing Regular Physical Activity	Years Practicing Rugby	IPAQ Total	ICFQ Total	BC Total	AAQ2 Total	SF36 Global Score
Years Practicing Regular Physical Activity	1.00						
Years Practicing Rugby	0.472 ***	1.00					
IPAQ Total	0.017	−0.082	1.00				
ICFQ Total	−0.051	−0.184	0.140	1.00			
BC Total	0.044	0.167	0.040	−0.127	1.00		
AAQ2 Total	−0.171	−0.198	0.129	0.783 ***	−0.155	1.00	
SF36 Global Score	0.073	0.229 *	0.058	−0.391 ***	0.289 **	−0.405 ***	1.00

Note. ICFQ = Italian Cognitive Fusion Questionnaire; BC = Coping Orientation to Problems Experienced Inventory Italian version; AAQ2 = Acceptance and Action Questionnaire Italian version; SF36 = Short-Form Health Survey Italian version; \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$ .

### 3.3. Sample Clustering

A k-means cluster analysis was conducted to investigate the relationship between weekly physical activity, cognitive flexibility, coping strategies, cognitive fusion, and general health among rugby players. The analysis resulted in the identification of two distinct groups (group 1 and group 2), as shown in Figure 2.

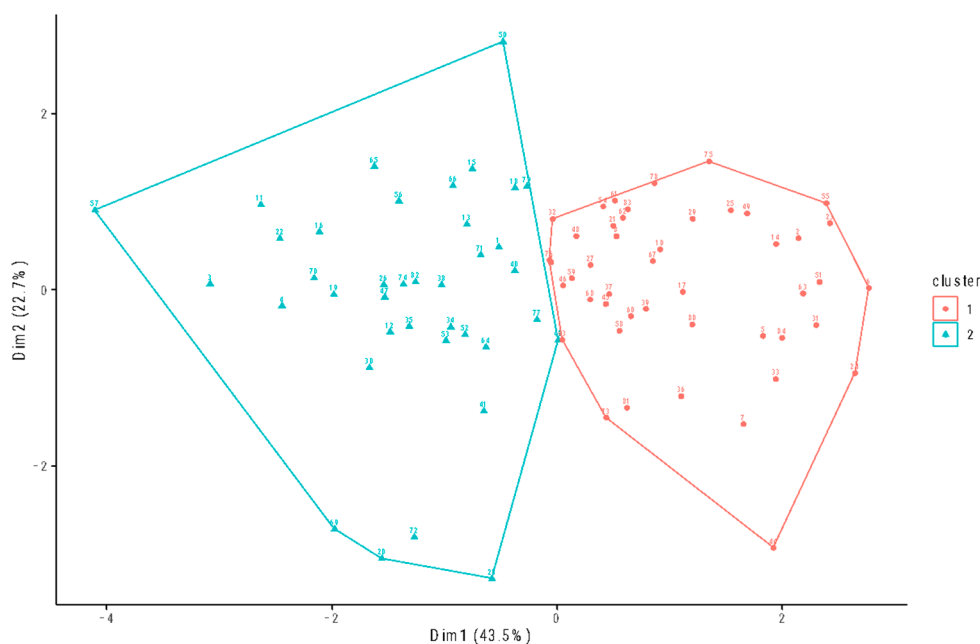
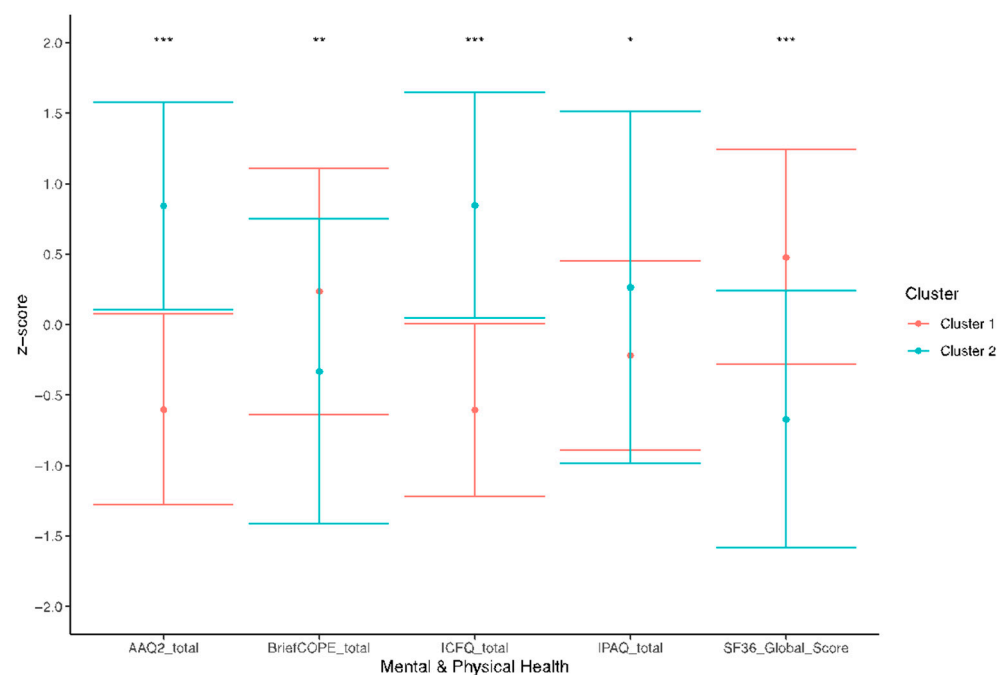


Figure 2. Cluster plot depicting the two groups of rugby players extracted by k-means cluster analysis (i.e., group 1, in red; group 2, in blue). The majority of the variance is likely explained by the first two principal components, which are utilized to plot the data points. The first dimension explains 43.5% of the variance, while the second dimension explains 22.7% of the variance. The two dimensions were identified following a principal component analysis automatically performed by the R function fviz\_cluster.

Before computing the cluster, it was necessary to standardize each variable. Furthermore, it was necessary to exclude eight subjects from the analysis due to missing values. Once the z scores were extracted, an estimation of the optimal number of clusters ( $k$ ) was performed by making use of two methods. According to the average silhouette method, the optimal number of clusters,  $k$ , is the value that maximizes the average silhouette over a range of possible values of  $k$  [78]. The gap statistic method has been employed to compare the overall intra-cluster variation for various values of  $k$  with their expected values under the null reference distribution of the data [79].

According to the results of the canonical discriminant analysis, there were notable distinctions between the two groups of rugby players that were identified through the clustering procedure (canonical discriminant function summary: canonical correlation: 0.83, Wilks's Lambda = 0.31,  $\chi^2(5, N = 84) = 93, p < 0.001$ ). Overall, 97.8% of the first group and 100% of the second group were classified correctly, yielding an overall correct classification of 98.8% by weekly physical activity, cognitive flexibility, coping strategies, cognitive fusion, and general health. The canonical discriminant function exhibited the strongest correlation with the discriminant variables in relation to cognitive fusion ( $r(82) = 0.76$ ). Univariate differences between the two groups of rugby players were also assessed in the discriminant analysis. Unpaired two-sample *t*-tests highlighted a statistically significant difference in weekly physical activity ( $t(82) = 2.25, p < 0.05$ ), cognitive flexibility ( $t(82) = 8.52, p < 0.001$ ), coping strategies ( $t(82) = 2.80, p < 0.01$ ), cognitive fusion ( $t(82) = 9.03, p < 0.001$ ), and general health ( $t(82) = 6.71, p < 0.001$ ) between the groups. See Figure 3 for a graphical representation.



**Figure 3.** Scatter plot representing the means  $\pm$  standard deviation of the standardized scores obtained by the two groups of rugby players yielded by the *k*-means cluster analysis. The variables considered are as follows: weekly physical activity (IPAQ\_total), cognitive inflexibility (AAQ2\_total), coping strategies (BriefCOPE\_total), cognitive fusion (ICFQ\_total), and general health (SF36\_Global\_Score). \* =  $p < 0.05$ ; \*\* =  $p < 0.01$ ; \*\*\* =  $p < 0.001$ .

### 3.4. Clusters Description

Overall, the first group of rugby players (i.e., group 1) showed high cognitive flexibility, high coping strategies, low cognitive fusion, low weekly physical activity, and high general health. In contrast, the second group (i.e., group 2) featured low cognitive flexibility, low coping strategies, high cognitive fusion, high weekly physical activity, and low general health (for a graphical representation, see Figures 2 and 3). The Wilcoxon rank sum tests showed no significant differences between the two groups of rugby players regarding BMI and years of regular physical activity practice, but concerning age ( $p < 0.001$ ) and years of rugby practice ( $p < 0.05$ ), higher levels were observed in group 1. No statistically significant associations were found between group and gender. Socio-demographic data as well as unstandardized values of weekly physical activity, cognitive flexibility, coping strategies, cognitive fusion, and general health are reported in Table 3.

**Table 3.** Summary of the group characteristics after *k*-means clustering.

Variable	Group 1, Mean ± Standard Deviation, or Frequency (%)	Group 2, Mean ± Standard Deviation, or Frequency (%)
n	46 (54.76%)	38 (45.24%)
Age, years	37.61 ± 13.31	27.05 ± 11.10
Gender		
Males	44 (95.70%)	32 (84.20%)
Females	2 (4.3%)	6 (15.80%)
Body Mass Index	28.42 ± 4.56	27.53 ± 3.52
Time spent practicing regular physical activity, years	20.10 ± 11.27	18.09 ± 9.62
Time spent practicing rugby, years	16.48 ± 9.85	11.97 ± 7.10
IPAQ_Total; MET minutes/week	5484.18 ± 3626.83	8082.12 ± 6739.93
AAQ2_Total	23.85 ± 6.90	37.47 ± 7.76
ICFQ_Total	14.61 ± 4.62	25.37 ± 6.29
BC_Total	82.22 ± 11.08	74.87 ± 12.98
SF36_Global_Score	78.23 ± 7.90	65.27 ± 9.81

Note. ICFQ = Italian Cognitive Fusion Questionnaire; BC = Coping Orientation to Problems Experienced Inventory Italian version; AAQ2 = Acceptance and Action Questionnaire Italian version; SF36 = Short-Form Health Survey Italian version; IPAQ = Short Form of International Physical Activity Questionnaire Italian version.

#### 4. Discussion

The present study aims to provide a quantitative description concerning the levels of mental health, physical activity, cognitive fusion, cognitive flexibility, and coping strategies that characterize rugby athletes by using a data-driven approach. Given the lack of scientific studies regarding rugby athletes specifically, these findings provide insight into the complex interaction between these elements and define specific characteristics within the rugby player group.

Upon examining the descriptive statistics, 53.3% of participants reported that they participate in physical activity to enhance both their bodily and mental well-being. This result highlights the shift in individuals’ attention towards the significance of mental well-being rather than solely focusing on performance. Such awareness likely assumes significant importance in the field of sports psychology, as certain athletes endure repercussions on their mental and physical well-being from a life defined by the pursuit of sporting excellence [1]. If the drive to enhance athletic performance and engage in competition exhibits comparable patterns, it is likely to suggest that, for these athletes, (1) the need for challenge and the need for excellence are inherently interconnected and (2) competition may play a crucial role in motivating individuals to enhance their athletic ability [80–82].

Consistent with the existing literature [19,83], the correlational analyses conducted in this study highlight that those athletes who reported higher levels of general health also showed higher levels of physical activity, enhanced coping capacities, elevated cognitive flexibility, and reduced cognitive fusion. In addition, cognitive flexibility may impact adherence and performance in physical activity, hence increasing the motivation for people of all age groups to participate in physical endeavors. Cognitive flexibility may facilitate individuals in adjusting more readily to alterations in exercise regimens, approaching obstacles with a more receptive mindset, and rebounding more swiftly from setbacks or losses, thus promoting the sustenance of a physically active lifestyle over an extended period. The correlation between physical activity and cognitive flexibility has been documented throughout several age groups, spanning from adulthood to old age. Existing research has established a correlation between engaging in physical activity and various executive functions, including but not limited to selective attention, task switching, the inhibition of prepotent responses, and working memory capacity [84–94]. This indicates the positive impact of physical activity on cognitive flexibility throughout one’s entire lifespan [95–97]. Such a strong association between physical activity and cognitive flexibility highlights



the need to view exercise not only as a means of preserving physical fitness but also as a valuable means of enhancing mental health and well-being [98–104].

The application of k-means clustering revealed the presence of two separate clusters within the population of rugby players, with each cluster exhibiting distinct psychological and physical characteristics. Group 1 displayed a profile that suggested higher psychological well-being and lower levels of physical activity in comparison to group 2. Our results also indicate that group 1 exhibited higher cognitive flexibility, increased use of coping techniques, decreased cognitive fusion, higher scores in general health, and lower levels of weekly physical activity. In contrast, group 2 exhibited lower cognitive flexibility, reduced utilization of coping techniques, increased cognitive fusion, worse overall health scores, and higher levels of weekly physical activity. The disparities revealed in psychological factors such as coping mechanisms, cognitive fusion, and cognitive flexibility highlight their potential influence on the general health of rugby players. The utilization of coping mechanisms and reduced cognitive fusion in group 1 may enhance their ability to handle stress, thereby leading to improved performance and health outcomes. On the other hand, the increased cognitive inflexibility and cognitive fusion in group 2 may make them more prone to responding poorly to stressors, which could have a negative impact on their performance and health. It is crucial to note that the participation of young athletes in a competitive sports environment does not result in the same experience for all individuals. Different young athletes may undergo unique emotional and cognitive changes throughout regular-season games [105]. The contrasting levels of physical activity among the two groups emphasize the complex correlation between exercise patterns and psychological well-being among rugby players. Group 1's lower physical activity levels may appear contradictory to health outcomes, but they could be indicative of deliberate rest intervals or customized training programs [106,107]. On the other hand, the greater levels of physical activity in group 2 may imply a more intense training program, but they could also suggest excessive training or behavior to cope with psychological problems [108–110]. Hence, when examining young athletes engaged in competitive play, it is plausible that the intensity of their training impacts the emotions and thoughts they experience because of the daily biological, social, and psychological challenges they encounter, as well as the pressure to attain "victory at any expense" [105,111–113]. Analyzing the psychological characteristics of each group, this study suggests that rugby players in group 1, who exhibited elevated levels of cognitive flexibility, deflation, and coping, showed higher levels of mental well-being compared to those in group 2, who displayed lower coping abilities and cognitive flexibility, but high cognitive fusion. The characteristics displayed in group 1 could enable athletes to make rapid decisions and readily adapt to unexpected changes that occur during gameplay; individuals with enhanced cognitive flexibility also have the ability to effectively navigate field problems and promptly respond to unforeseen circumstances, resulting in decreased stress levels and enhanced mental well-being.

Regarding coping strategies, individuals in group 1, who demonstrated elevated levels of adaptability, might possess a broader repertoire of tactics to effectively address the problems and obstacles they face in rugby, both within and outside the playing area. These can encompass problem-solving techniques, interpersonal assistance, and emotional self-control, all of which are crucial for effectively handling the pressures of athletics and sustaining a sound mental equilibrium. In contrast, individuals belonging to group 2, who exhibited low coping abilities and high degrees of inflexibility and cognitive fusion, may experience an unfavorable state in terms of general well-being. Inadequate coping mechanisms for stress and inflexibility of the mind can impair their ability to adjust to the demands of rugby and handle the stressors linked to competition, hence heightening their vulnerability to mental health issues like anxiety and depression [114,115].

Overall, the results seem to validate the significance of cognitive flexibility and coping abilities in enhancing the mental health and overall well-being of rugby players. Athletes who exhibit these traits are likely to be more prone to confront the demands of their sport, sustaining a favorable psychological state. Conversely, individuals with limited proficiency

in these abilities may be more susceptible to emotional health concerns. This emphasizes the relevance of promoting the development of these abilities through supportive and instructional efforts to enhance the psychological well-being of athletes [116–120].

Analyzing the psychological characteristics of rugby players might provide valuable insights for implementing specific interventions to enhance performance and overall mental health. Interventions that prioritize improving coping techniques and decreasing cognitive fusion may be advantageous for group 2 players to alleviate the negative impact of stress on their performance and well-being.

The present study suffers from the following main limitations: this study's cross-sectional design restricts the ability to establish causality, highlighting the necessity for longitudinal investigations to elucidate temporal associations. Furthermore, the omission of some variables (i.e., Brief Cope's "Transcendental Orientation" sub-scale, IPAQ total score, years spent practicing regular physical activity, and years spent practicing rugby) because of non-normal distributions may have disregarded possible correlations. To address these limitations and gain a more comprehensive picture of the psychological and physical profiles of rugby players, future research could utilize further data-driven statistical methods or increase the size and the heterogeneity of the sample. Implementing these changes may enhance the study's contributions to the field by providing a more thorough understanding of the dynamics and potentially identifying causal relationships.

## 5. Conclusions

According to this study, in order to gain a comprehensive understanding of rugby players' overall well-being, it is important to consider psychological factors in addition to physical attributes. This research identified eight necessary characteristics that are required to establish a conducive atmosphere for fostering positive development. The list includes various criteria to ensure physical and psychological well-being, establishing a clear and consistent framework with appropriate adult oversight, fostering supportive relationships, providing opportunities for individuals to feel a sense of belonging, promoting positive social norms, offering support for personal effectiveness and significance, facilitating skill development, and integrating the efforts of families, schools, and communities. This study's findings could be useful in the development of interventions and supportive strategies aimed at improving the physical and mental outcomes of players. Furthermore, this research has identified distinct profiles among this group of athletes, which could inform more focused approaches for intervention and support.

**Author Contributions:** Conceptualization, W.S., D.G., G.D.M., A.M. (Antonietta Monda) and M.L.M.; methodology, W.S., D.G., C.M.M., D.S. and M.B.; software, W.S., D.G., C.M.M., D.S. and M.B.; formal analysis, D.G. and W.S.; investigation, W.S., D.G., C.M.M., D.S. and M.B.; data curation, S.A., V.M. and M.R.; writing—original draft preparation, W.S., D.G., G.D.M., A.M. (Antonietta Monda) and M.L.M.; writing—review and editing, S.C., I.V. and A.M. (Antonietta Messina); supervision, M.M. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** This study was conducted in accordance with the Declaration of Helsinki and approved by was approved by the Ethics Committee of Sigmund Freud University, Ethics Commission of the faculty of Psychotherapy Science and the Faculty of Psychology (protocol code GCP4Q7JFBO3P6I90070).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in this study.

**Data Availability Statement:** Collected data are available by contacting the corresponding author under proper request.

**Acknowledgments:** We express our gratitude to A.S. Rugby Milano for their cooperation in facilitating and promoting the distribution of the questionnaires via direct communications with other rugby teams, which has greatly contributed to the completion of this research study.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## References

1. Turner, M. *The Rational Practitioner: The Sport and Performance Psychologist's Guide to Practicing Rational Emotive Behaviour Therapy*; Routledge: New York, NY, USA, 2023; ISBN 978-1-00-081681-5.
2. Daumiller, M.; Rinas, R.; Jaitner, D. The Relevance of Stability and Change of Achievement Goals for Self-Regulated Motor Learning Processes and Outcomes. *Sport Exerc. Perform. Psychol.* **2021**, *10*, 519–535. [[CrossRef](#)]
3. Etnier, J.L.; Chang, Y.-K. The Effect of Physical Activity on Executive Function: A Brief Commentary on Definitions, Measurement Issues, and the Current State of the Literature. *J. Sport Exerc. Psychol.* **2009**, *31*, 469–483. [[CrossRef](#)]
4. Kramer, A.F.; Erickson, K.I. Capitalizing on Cortical Plasticity: Influence of Physical Activity on Cognition and Brain Function. *Trends Cogn. Sci.* **2007**, *11*, 342–348. [[CrossRef](#)] [[PubMed](#)]
5. Latino, F.; Tafuri, F. Physical Activity and Academic Performance in School-Age Children: A Systematic Review. *Sustainability* **2023**, *15*, 6616. [[CrossRef](#)]
6. Warburton, D.E.R.; Bredin, S.S.D. Health Benefits of Physical Activity: A Systematic Review of Current Systematic Reviews. *Curr. Opin. Cardiol.* **2017**, *32*, 541–556. [[CrossRef](#)] [[PubMed](#)]
7. Aka, S.T.; Sarier, A. Study on Emotional Intelligence Levels of Physical Education Teachers in Terms of Various Variables. *Int. Educ. Stud.* **2020**, *13*, 111. [[CrossRef](#)]
8. Best, J.R. Effects of Physical Activity on Children's Executive Function: Contributions of Experimental Research on Aerobic Exercise. *Dev. Rev.* **2010**, *30*, 331–351. [[CrossRef](#)] [[PubMed](#)]
9. Marchetti, R.; Forte, R.; Borzacchini, M.; Vazou, S.; Tomporowski, P.D.; Pesce, C. Physical and Motor Fitness, Sport Skills and Executive Function in Adolescents: A Moderated Prediction Model. *Psychology* **2015**, *6*, 1915–1929. [[CrossRef](#)]
10. Chaddock, L.; Pontifex, M.B.; Hillman, C.H.; Kramer, A.F. A Review of the Relation of Aerobic Fitness and Physical Activity to Brain Structure and Function in Children. *J. Int. Neuropsychol. Soc.* **2011**, *17*, 975–985. [[CrossRef](#)]
11. Francavilla, V.C.; Genovesi, F.; Asmundo, A.; Di Nunno, N.R.; Ambrosi, A.; Tartaglia, N.; Tafuri, D.; Monda, V.; Monda, M.; Messina, A.; et al. Fascia and Movement: The Primary Link in the Prevention of Accidents in Soccer. Revision and Models of Intervention. *Med. Sport* **2020**, *73*, 291–301. [[CrossRef](#)]
12. Khan, N.A.; Hillman, C.H. The Relation of Childhood Physical Activity and Aerobic Fitness to Brain Function and Cognition: A Review. *Pediatr. Exerc. Sci.* **2014**, *26*, 138–146. [[CrossRef](#)]
13. Latino, F.; Tafuri, F.; Saraiello, E.; Tafuri, D. Classroom-Based Physical Activity as a Means to Improve Self-Efficacy and Academic Achievement among Normal-Weight and Overweight Youth. *Nutrients* **2023**, *15*, 2061. [[CrossRef](#)] [[PubMed](#)]
14. Polito, R.; Scarinci, A.; Ambrosi, A.; Tartaglia, N.; Tafuri, D.; Monda, M.; Messina, A.; Cimmino, F.; Catapano, A.; Sessa, F.; et al. The Beneficial Effects of Physical Activity and Weight Loss on Human Colorectal Carcinoma Cell Lines. *J. Hum. Sport Exerc.* **2020**, *15*, S252–S260.
15. Villano, I.; La Marra, M.; Allocca, S.; Ilardi, C.R.; Polito, R.; Porro, C.; Chieffi, S.; Messina, G.; Monda, V.; Di Maio, G.; et al. The Role of Nutraceutical Supplements, Monacolin K and Astaxanthin, and Diet in Blood Cholesterol Homeostasis in Patients with Myopathy. *Biomolecules* **2022**, *12*, 1118. [[CrossRef](#)] [[PubMed](#)]
16. Akyuz, A. Exercise and Coronary Heart Disease. In *Physical Exercise for Human Health*; Xiao, J., Ed.; Advances in Experimental Medicine and Biology; Springer: Singapore, 2020; Volume 1228, pp. 169–179, ISBN 9789811517914.
17. Adams, V.; Linke, A. Impact of Exercise Training on Cardiovascular Disease and Risk. *Biochim. Biophys. Acta BBA-Mol. Basis Dis.* **2019**, *1865*, 728–734. [[CrossRef](#)]
18. Carbone, S.; Del Buono, M.G.; Ozemek, C.; Lavie, C.J. Obesity, Risk of Diabetes and Role of Physical Activity, Exercise Training and Cardiorespiratory Fitness. *Prog. Cardiovasc. Dis.* **2019**, *62*, 327–333. [[CrossRef](#)]
19. Eather, N.; Wade, L.; Pankowiak, A.; Eime, R. The Impact of Sports Participation on Mental Health and Social Outcomes in Adults: A Systematic Review and the 'Mental Health through Sport' Conceptual Model. *Syst. Rev.* **2023**, *12*, 102. [[CrossRef](#)]
20. Schuch, F.B.; Vancampfort, D. Physical Activity, Exercise, and Mental Disorders: It Is Time to Move On. *Trends Psychiatry Psychother.* **2021**, *43*, 177–184. [[CrossRef](#)]
21. Ignácio, Z.M.; Da Silva, R.S.; Plissari, M.E.; Quevedo, J.; Réus, G.Z. Physical Exercise and Neuroinflammation in Major Depressive Disorder. *Mol. Neurobiol.* **2019**, *56*, 8323–8335. [[CrossRef](#)]
22. Maugeri, G.; Musumeci, G. Adapted Physical Activity to Ensure the Physical and Psychological Well-Being of COVID-19 Patients. *J. Funct. Morphol. Kinesiol.* **2021**, *6*, 13. [[CrossRef](#)]
23. Ciria, L.F.; Román-Caballero, R.; Vadillo, M.A.; Holgado, D.; Luque-Casado, A.; Perakakis, P.; Sanabria, D. An Umbrella Review of Randomized Control Trials on the Effects of Physical Exercise on Cognition. *Nat. Hum. Behav.* **2023**, *7*, 928–941. [[CrossRef](#)]
24. Robinson, L.E.; Stodden, D.F.; Barnett, L.M.; Lopes, V.P.; Logan, S.W.; Rodrigues, L.P.; D'Hondt, E. Motor Competence and Its Effect on Positive Developmental Trajectories of Health. *Sports Med.* **2015**, *45*, 1273–1284. [[CrossRef](#)]
25. Jaakkola, T.; Yli-Piipari, S.; Huotari, P.; Watt, A.; Liukkonen, J. Fundamental Movement Skills and Physical Fitness as Predictors of Physical Activity: A 6-year Follow-up Study. *Scand. J. Med. Sci. Sports* **2016**, *26*, 74–81. [[CrossRef](#)]
26. Latino, F.; Saraiello, E.; Tafuri, F. Outdoor Physical Activity: A Training Method for Learning in an Experiential and Innovative Way. *J. Phys. Educ. Sport* **2023**, *23*, 1852–1860. [[CrossRef](#)]
27. Lin, C.; Hsieh, S.; Huang, C.; Kao, S.; Chang, Y.; Hung, T. The Unique Contribution of Motor Ability to Visuospatial Working Memory in School-age Children: Evidence from Event-related Potentials. *Psychophysiology* **2023**, *60*, e14182. [[CrossRef](#)]

28. Lesinski, M.; Prieske, O.; Granacher, U. Effects and Dose–Response Relationships of Resistance Training on Physical Performance in Youth Athletes: A Systematic Review and Meta-Analysis. *Br. J. Sports Med.* **2016**, *50*, 781–795. [[CrossRef](#)]
29. McQuilliam, S.J.; Clark, D.R.; Erskine, R.M.; Brownlee, T.E. Free-Weight Resistance Training in Youth Athletes: A Narrative Review. *Sports Med.* **2020**, *50*, 1567–1580. [[CrossRef](#)]
30. Tingelstad, L.M.; Raastad, T.; Till, K.; Luteberget, L.S. The Development of Physical Characteristics in Adolescent Team Sport Athletes: A Systematic Review. *PLoS ONE* **2023**, *18*, e0296181. [[CrossRef](#)] [[PubMed](#)]
31. Bodenlos, J.S.; Hawes, E.S.; Burstein, S.M.; Arroyo, K.M. Association of Cognitive Fusion with Domains of Health. *J. Context. Behav. Sci.* **2020**, *18*, 9–15. [[CrossRef](#)]
32. Miyake, A.; Friedman, N.P.; Emerson, M.J.; Witzki, A.H.; Howerter, A.; Wager, T.D. The Unity and Diversity of Executive Functions and Their Contributions to Complex “Frontal Lobe” Tasks: A Latent Variable Analysis. *Cognit. Psychol.* **2000**, *41*, 49–100. [[CrossRef](#)] [[PubMed](#)]
33. Diamond, A. Executive Functions. *Annu. Rev. Psychol.* **2013**, *64*, 135–168. [[CrossRef](#)]
34. La Marra, M.; Ilardi, C.R.; Villano, I.; Carosella, M.; Staiano, M.; Iavarone, A.; Chieffi, S.; Messina, G.; Polito, R.; Scarinci, A.; et al. Functional Relationship between Inhibitory Control, Cognitive Flexibility, Psychomotor Speed and Obesity. *Brain Sci.* **2022**, *12*, 1080. [[CrossRef](#)] [[PubMed](#)]
35. Zhang, C.-Q.; Li, X.; Si, G.; Chung, P.-K.; Huang, Z.; Gucciardi, D.F. Examining the Roles of Experiential Avoidance and Cognitive Fusion on the Effects from Mindfulness to Athlete Burnout: A Longitudinal Study. *Psychol. Sport Exerc.* **2023**, *64*, 102341. [[CrossRef](#)] [[PubMed](#)]
36. Inoue, K.; Yamada, T.; Ohtsuki, T. Relationships Between Throwing Yips in Baseball, Experiential Avoidance, Cognitive Fusion, Values, and Social Factors. *J. Clin. Sport Psychol.* **2023**, *in print*. [[CrossRef](#)]
37. Di Maio, G.; Villano, I.; Ilardi, C.R.; Messina, A.; Monda, V.; Iodice, A.C.; Porro, C.; Panaro, M.A.; Chieffi, S.; Messina, G.; et al. Mechanisms of Transmission and Processing of Pain: A Narrative Review. *Int. J. Environ. Res. Public Health* **2023**, *20*, 3064. [[CrossRef](#)]
38. Dajani, D.R.; Uddin, L.Q. Demystifying Cognitive Flexibility: Implications for Clinical and Developmental Neuroscience. *Trends Neurosci.* **2015**, *38*, 571–578. [[CrossRef](#)] [[PubMed](#)]
39. Uddin, L.Q. Cognitive and Behavioural Flexibility: Neural Mechanisms and Clinical Considerations. *Nat. Rev. Neurosci.* **2021**, *22*, 167–179. [[CrossRef](#)] [[PubMed](#)]
40. Król, W.; Gruszka, A. Is Running a State of Mind? Sports Training as a Potential Method for Developing Cognitive Flexibility. *Psychol. Sport Exerc.* **2023**, *67*, 102425. [[CrossRef](#)]
41. Aslan, Ş. Examination of Cognitive Flexibility Levels of Young Individual and Team Sport Athletes. *J. Educ. Train. Stud.* **2018**, *6*, 149. [[CrossRef](#)]
42. La Marra, M.; Ilardi, C.R.; Villano, I.; Polito, R.; Sibillo, M.R.; Franchetti, M.; Caggiano, A.; Strangio, F.; Messina, G.; Monda, V.; et al. Higher General Executive Functions Predicts Lower Body Mass Index by Mitigating Avoidance Behaviors. *Front. Endocrinol.* **2022**, *13*, 1048363. [[CrossRef](#)]
43. Fari, G.; Latino, F.; Tafuri, F.; Dell’Anna, L.; Raelle, M.V.; Fai, A.; De Serio, C.; Intonti, G.; De Salvo, A.L.; Ricci, V.; et al. Shoulder Pain Biomechanics, Rehabilitation and Prevention in Wheelchair Basketball Players: A Narrative Review. *Biomechanics* **2023**, *3*, 362–376. [[CrossRef](#)]
44. Ilardi, C.R.; La Marra, M.; Amato, R.; Di Cecca, A.; Di Maio, G.; Ciccarelli, G.; Migliaccio, M.; Cavaliere, C.; Federico, G. The “Little Circles Test” (LCT): A Dusted-off Tool for Assessing Fine Visuomotor Function. *Aging Clin. Exp. Res.* **2023**, *35*, 2807–2820. [[CrossRef](#)]
45. Ciccarelli, G.; Federico, G.; Mele, G.; Di Cecca, A.; Migliaccio, M.; Ilardi, C.R.; Alfano, V.; Salvatore, M.; Cavaliere, C. Simultaneous Real-Time EEG-fMRI Neurofeedback: A Systematic Review. *Front. Hum. Neurosci.* **2023**, *17*, 1123014. [[CrossRef](#)]
46. Spielmann, J.; Beavan, A.; Mayer, J. The Relationship of Personality and Executive Functions in High-Level Soccer Athletes: Expertise-and Gender-Specific Differences. *Front. Sports Act. Living* **2023**, *5*, 1130759. [[CrossRef](#)]
47. Donka, D.B.; Balogh, L. Examination of Executive Functions Affecting Sports Performance in the Context of Athlete Experience. *Stad.-Hung. J. Sport Sci.* **2022**, *5*. [[CrossRef](#)]
48. Ilardi, C.R.; Di Maio, G.; Villano, I.; Messina, G.; Monda, V.; Messina, A.; Porro, C.; Panaro, M.A.; Gamboz, N.; Iavarone, A.; et al. The Assessment of Executive Functions to Test the Integrity of the Nigrostriatal Network: A Pilot Study. *Front. Psychol.* **2023**, *14*, 1121251. [[CrossRef](#)] [[PubMed](#)]
49. Montuori, S.; D’Aurizio, G.; Foti, F.; Liparoti, M.; Lardone, A.; Pesoli, M.; Sorrentino, G.; Mandolesi, L.; Curcio, G.; Sorrentino, P. Executive Functioning Profiles in Elite Volleyball Athletes: Preliminary Results by a Sport-Specific Task Switching Protocol. *Hum. Mov. Sci.* **2019**, *63*, 73–81. [[CrossRef](#)]
50. Radke, L.; Mertens, A.; Spielmann, J.; Mayer, J. Being Ahead of the Game—The Association between Executive Functions and Football Performance in High-Level Football Players. *Ger. J. Exerc. Sport Res.* **2023**, *53*, 288–300. [[CrossRef](#)]
51. Romero García, G.; Ortega Toro, E.; Alarcón López, F. Executive Functions and Sport Agents. *J. Sport Health Res.* **2023**, *15*, 657–682. [[CrossRef](#)]
52. Sartori, R.F.; Mezavilla, D.; Nobre, G.C.; Fonseca, R.P. Do Executive Functions Discriminate Sports Performance in Young Soccer Athletes? *J. Hum. Sport Exerc.* **2020**, *15*, S84–S93.

53. Scharfen, H.-E.; Memmert, D. Relationship of Executive Functions and Physical Abilities in Elite Soccer Players. *Ger. J. Exerc. Sport Res.* **2022**, *52*, 341–349. [[CrossRef](#)]
54. Furley, P.; Schütz, L.-M.; Wood, G. A Critical Review of Research on Executive Functions in Sport and Exercise. *Int. Rev. Sport Exerc. Psychol.* **2023**, 1–29. [[CrossRef](#)]
55. Venckunas, T.; Snieckus, A.; Trinkunas, E.; Baranauskiene, N.; Solianik, R.; Juodsnukis, A.; Streckis, V.; Kamandulis, S. Interval Running Training Improves Cognitive Flexibility and Aerobic Power of Young Healthy Adults. *J. Strength Cond. Res.* **2016**, *30*, 2114–2121. [[CrossRef](#)]
56. La Marra, M.; Villano, I.; Iardi, C.R.; Carosella, M.; Staiano, M.; Iavarone, A.; Chieffi, S.; Messina, G.; Polito, R.; Porro, C.; et al. Executive Functions in Overweight and Obese Treatment-Seeking Patients: Cross-Sectional Data and Longitudinal Perspectives. *Brain Sci.* **2022**, *12*, 777. [[CrossRef](#)]
57. Leprince, C.; D'Arripe-Longueville, F.; Doron, J. Coping in Teams: Exploring Athletes' Communal Coping Strategies to Deal With Shared Stressors. *Front. Psychol.* **2018**, *9*, 1908. [[CrossRef](#)] [[PubMed](#)]
58. Villano, I.; La Marra, M.; Di Maio, G.; Monda, V.; Chieffi, S.; Guatteo, E.; Messina, G.; Moscatelli, F.; Monda, M.; Messina, A. Physiological Role of Orexinergic System for Health. *Int. J. Environ. Res. Public Health* **2022**, *19*, 8353. [[CrossRef](#)]
59. Gaudreau, P.; Blondin, J.-P.; Lapierre, A.-M. Athletes' Coping during a Competition: Relationship of Coping Strategies with Positive Affect, Negative Affect, and Performance–Goal Discrepancy. *Psychol. Sport Exerc.* **2002**, *3*, 125–150. [[CrossRef](#)]
60. Pensgaard, A.M.; Ursin, H. Stress, Control, and Coping in Elite Athletes. *Scand. J. Med. Sci. Sports* **1998**, *8*, 183–189. [[CrossRef](#)] [[PubMed](#)]
61. Cosma, G.; Chiracu, A.; Stepan, R.; Cosma, A.; Nanu, C.; Păunescu, C. Impact of Coping Strategies on Sport Performance. *J. Phys. Educ. Sport* **2020**, *20*, 1380–1385. [[CrossRef](#)]
62. La Marra, M.; Messina, A.; Iardi, C.R.; Staiano, M.; Di Maio, G.; Messina, G.; Polito, R.; Valenzano, A.; Cibelli, G.; Monda, V.; et al. Factorial Model of Obese Adolescents: The Role of Body Image Concerns and Selective Depersonalization—A Pilot Study. *Int. J. Environ. Res. Public Health* **2022**, *19*, 11501. [[CrossRef](#)]
63. Villano, I.; La Marra, M.; Messina, A.; Di Maio, G.; Moscatelli, F.; Chieffi, S.; Monda, M.; Messina, G.; Monda, V. Effects of Vegetarian and Vegan Nutrition on Body Composition in Competitive Futsal Athletes. *Prog. Nutr.* **2021**, *23*, e2021126. [[CrossRef](#)]
64. Sille, R.A.; Turner, M.J.; Eubank, M.R. “Don't Be Stupid, Stupid!” Cognitive-Behavioral Techniques to Reduce Irrational Beliefs and Enhance Focus in a Youth Tennis Player. *Case Stud. Sport Exerc. Psychol.* **2020**, *4*, 40–51. [[CrossRef](#)]
65. Anshel, M.H.; Sutarso, T. Relationships between Sources of Acute Stress and Athletes' Coping Style in Competitive Sport as a Function of Gender. *Psychol. Sport Exerc.* **2007**, *8*, 1–24. [[CrossRef](#)]
66. Bernacka, R.E.; Sawicki, B.; Mazurek-Kusiak, A.; Hawlena, J. Conforming and Nonconforming Personality and Stress Coping Styles in Combat Athletes. *J. Hum. Kinet.* **2016**, *51*, 225–233. [[CrossRef](#)]
67. Henriksen, K.; Hansen, J.; Larsen, C.H. (Eds.) *Mindfulness and Acceptance in Sport: How to Help Athletes Perform and Thrive under Pressure*; Routledge: New York, NY, USA, 2019; ISBN 978-1-138-62400-9.
68. Lovecchio, N.; Manes, G.; Filipas, L.; Giuriato, M.; Torre, A.L.; Iaia, F.M.; Codella, R. Screening Youth Soccer Players by Means of Cognitive Function and Agility Testing. *Percept. Mot. Skills* **2021**, *128*, 2710–2724. [[CrossRef](#)]
69. Nuetzel, B. Coping Strategies for Handling Stress and Providing Mental Health in Elite Athletes: A Systematic Review. *Front. Sports Act. Living* **2023**, *5*, 1265783. [[CrossRef](#)]
70. Olmedilla, A.; Rubio, V.J.; Ortega, E. Predicting and Preventing Sport Injuries: The Role of Stress. In *Sports Injuries: Prevention Management Risk Factors*; Nova Science Pub. Inc.: New York, NY, USA, 2015; pp. 87–104.
71. Pramanik, P.; Chatterjee, S. Role of Mental Training in Sports Performance: A Critical Appraisal. *Int. J. Res. Pedagog. Technol. Educ. Mov. Sci.* **2023**, *12*, 121–130.
72. Mannocci, A.; Masala, D.; Mei, D.; Tribuzio, A.M.; Villari, P.; La Torre, G. International Physical Activity Questionnaire for Adolescents (IPAQ A): Reliability of an Italian Version. *Minerva Pediatr.* **2021**, *73*, 383–390. [[CrossRef](#)]
73. Apolone, G.; Mosconi, P. The Italian SF-36 Health Survey. *J. Clin. Epidemiol.* **1998**, *51*, 1025–1036. [[CrossRef](#)] [[PubMed](#)]
74. Pennato, T.; Berrocal, C.; Bernini, O.; Rivas, T. Italian Version of the Acceptance and Action Questionnaire-II (AAQ-II): Dimensionality, Reliability, Convergent and Criterion Validity. *J. Psychopathol. Behav. Assess.* **2013**, *35*, 552–563. [[CrossRef](#)]
75. Oppo, A.; Prevedini, A.B.; Dell'Orco, F.; Dordoni, P.; Presti, G.; Gillanders, D.T.; Moderato, P. Fusione e Defusione. Adattamento e Proprietà Psicometriche Della Versione Italiana Del Cognitive Fusion Questionnaire (I-CFQ). Fusione e Defusione. Adaptation and Psychometric Properties of the Italian Version of the Cognitive Fusion Questionnaire (I-CFQ). *Psicoter. Cogn. E Comport.* **2019**, *25*, 53–73. (In Italian)
76. Foà, C.; Tonarelli, A.; Caricati, L.; Fruggeri, L. COPE-NVI-25: Validazione Italiana Della Versione Ridotta Della Coping Orientation to the Problems Experienced (COPE-NVI). *Psicol. Della Salut.* **2015**, 123–140.
77. Kim, H.-Y. Statistical Notes for Clinical Researchers: Assessing Normal Distribution (2) Using Skewness and Kurtosis. *Restor. Dent. Endod.* **2013**, *38*, 52. [[CrossRef](#)] [[PubMed](#)]
78. Kaufman, L.; Rousseeuw, P.J. *Finding Groups in Data: An Introduction to Cluster Analysis*; John Wiley & Sons: Hoboken, NJ, USA, 2009; ISBN 0-470-31748-5.
79. Tibshirani, R.; Walther, G.; Hastie, T. Estimating the Number of Clusters in a Data Set Via the Gap Statistic. *J. R. Stat. Soc. Ser. B Stat. Methodol.* **2001**, *63*, 411–423. [[CrossRef](#)]

80. Van De Pol, P.K.C.; Kavussanu, M. Achievement Motivation across Training and Competition in Individual and Team Sports. *Sport Exerc. Perform. Psychol.* **2012**, *1*, 91–105. [[CrossRef](#)]
81. Olson, E.A.; Kaiser, R.H.; Pizzagalli, D.A.; Rauch, S.L.; Rosso, I.M. Regional Prefrontal Resting-State Functional Connectivity in Posttraumatic Stress Disorder. *Biol. Psychiatry Cogn. Neurosci. Neuroimaging* **2019**, *4*, 390–398. [[CrossRef](#)]
82. Ivanova, N.L.; Korostelev, A.A. The Impact of Competitive Approach on Students' Motivation in Sport. *Amaz. Investig.* **2019**, *8*, 483–490.
83. Omorou, Y.A.; Erpelding, M.-L.; Escalon, H.; Vuillemin, A. Contribution of Taking Part in Sport to the Association between Physical Activity and Quality of Life. *Qual. Life Res.* **2013**, *22*, 2021–2029. [[CrossRef](#)]
84. Yongtawee, A.; Park, J.; Kim, Y.; Woo, M. Athletes Have Different Dominant Cognitive Functions Depending on Type of Sport. *Int. J. Sport Exerc. Psychol.* **2022**, *20*, 1–15. [[CrossRef](#)]
85. Chieffi, S.; Messina, G.; La Marra, M.; Iavarone, A.; Viggiano, A.; De Luca, V.; Monda, M. Distractor Interference in Visual Motor Tasks. In *Horizons in Neuroscience Research*; Nova Science Publishers, Inc.: New York, NY, USA, 2014; Volume 13, pp. 151–160, ISBN 1-62948-427-X.
86. Chieffi, S.; Castaldi, C.; Di Maio, G.; La Marra, M.; Messina, A.; Monda, V.; Villano, I. Attentional Bias in the Radial and Vertical Dimensions of Space. *Comptes Rendus Biol.* **2019**, *342*, 97–100. [[CrossRef](#)]
87. Contreras-Osorio, F.; Guzmán-Guzmán, I.P.; Cerda-Vega, E.; Chiroso-Ríos, L.; Ramírez-Campillo, R.; Campos-Jara, C. Effects of the Type of Sports Practice on the Executive Functions of Schoolchildren. *Int. J. Environ. Res. Public Health* **2022**, *19*, 3886. [[CrossRef](#)]
88. Dalkılıç, M. The Effect of Cognitive Flexibility of Athletes on Person-Organization. *Int. J. Sci. Cult. Sport* **2017**, *5*, 213–224. [[CrossRef](#)]
89. Heilmann, F. Executive Functions and Domain-Specific Cognitive Skills in Climbers. *Brain Sci.* **2021**, *11*, 449. [[CrossRef](#)]
90. Jacobson, J.; Matthaeus, L. Athletics and Executive Functioning: How Athletic Participation and Sport Type Correlate with Cognitive Performance. *Psychol. Sport Exerc.* **2014**, *15*, 521–527. [[CrossRef](#)]
91. Koch, P.; Krenn, B. Executive Functions in Elite Athletes—Comparing Open-Skill and Closed-Skill Sports and Considering the Role of Athletes' Past Involvement in Both Sport Categories. *Psychol. Sport Exerc.* **2021**, *55*, 101925. [[CrossRef](#)]
92. Krenn, B.; Finkenzeller, T.; Würth, S.; Amesberger, G. Sport Type Determines Differences in Executive Functions in Elite Athletes. *Psychol. Sport Exerc.* **2018**, *38*, 72–79. [[CrossRef](#)]
93. Logan, N.E.; Henry, D.A.; Hillman, C.H.; Kramer, A.F. Trained Athletes and Cognitive Function: A Systematic Review and Meta-Analysis. *Int. J. Sport Exerc. Psychol.* **2023**, *21*, 725–749. [[CrossRef](#)]
94. Scharfen, H.; Memmert, D. Measurement of Cognitive Functions in Experts and Elite Athletes: A Meta-Analytic Review. *Appl. Cogn. Psychol.* **2019**, *33*, 843–860. [[CrossRef](#)]
95. Oliveira, J.S.; Gilbert, S.; Pinheiro, M.B.; Tiedemann, A.; Macedo, L.B.; Maia, L.; Kwok, W.; Hassett, L.; Sherrington, C. Effect of Sport on Health in People Aged 60 Years and Older: A Systematic Review with Meta-Analysis. *Br. J. Sports Med.* **2023**, *57*, 230–236. [[CrossRef](#)] [[PubMed](#)]
96. Balboa-Castillo, T.; León-Muñoz, L.M.; Graciani, A.; Rodríguez-Artalejo, F.; Guallar-Castillón, P. Longitudinal Association of Physical Activity and Sedentary Behavior during Leisure Time with Health-Related Quality of Life in Community-Dwelling Older Adults. *Health Qual. Life Outcomes* **2011**, *9*, 47. [[CrossRef](#)]
97. La Marra, M.; Messina, A.; Ilardi, C.R.; Verde, G.; Amato, R.; Esposito, N.; Troise, S.; Orlando, A.; Messina, G.; Monda, V.; et al. The Neglected Factor in the Relationship between Executive Functioning and Obesity: The Role of Motor Control. *Healthcare* **2022**, *10*, 1775. [[CrossRef](#)]
98. Brockett, A.T.; LaMarca, E.A.; Gould, E. Physical Exercise Enhances Cognitive Flexibility as Well as Astrocytic and Synaptic Markers in the Medial Prefrontal Cortex. *PLoS ONE* **2015**, *10*, e0124859. [[CrossRef](#)]
99. Buechner, B.M.; Traylor, M.K.; Feldman, R.I.; Overstreet, K.F.; Hill, B.D.; Keller, J.L. Examining Relationships between Cognitive Flexibility, Exercise Perceptions, and Cardiovascular Disease Risk Factors. *Eur. J. Investig. Health Psychol. Educ.* **2023**, *13*, 2276–2289. [[CrossRef](#)] [[PubMed](#)]
100. Lerche, S.; Gutfreund, A.; Brockmann, K.; Hobert, M.A.; Wurster, I.; Sünkel, U.; Eschweiler, G.W.; Metzger, F.G.; Maetzler, W.; Berg, D. Effect of Physical Activity on Cognitive Flexibility, Depression and RBD in Healthy Elderly. *Clin. Neurol. Neurosurg.* **2018**, *165*, 88–93. [[CrossRef](#)]
101. Mekari, S.; Neyedli, H.F.; Fraser, S.; O'Brien, M.W.; Martins, R.; Evans, K.; Earle, M.; Aucoin, R.; Chiekwe, J.; Hollohan, Q.; et al. High-Intensity Interval Training Improves Cognitive Flexibility in Older Adults. *Brain Sci.* **2020**, *10*, 796. [[CrossRef](#)]
102. Patar, S. Flexibility Exercise and Physical Activity Improve Older Adults Cognitive Function: 25 Years Overview. *Int. J. Inf. Res. Rev.* **2016**, *3*, 1745–1748.
103. Ángel Latorre-Román, P.; Berrios-Aguayo, B.; Aragón-Vela, J.; Pantoja-Vallejo, A. Effects of a 10-Week Active Recess Program in School Setting on Physical Fitness, School Aptitudes, Creativity and Cognitive Flexibility in Elementary School Children. A Randomised-Controlled Trial. *J. Sports Sci.* **2021**, *39*, 1277–1286. [[CrossRef](#)] [[PubMed](#)]
104. Federico, G.; Osiurak, F.; Brandimonte, M.A.; Salvatore, M.; Cavaliere, C. The Visual Encoding of Graspable Unfamiliar Objects. *Psychol. Res.* **2023**, *87*, 452–461. [[CrossRef](#)] [[PubMed](#)]

105. Cece, V.; Guillet-Descas, E.; Nicaise, V.; Lienhart, N.; Martinent, G. Longitudinal Trajectories of Emotions among Young Athletes Involving in Intense Training Centres: Do Emotional Intelligence and Emotional Regulation Matter? *Psychol. Sport Exerc.* **2019**, *43*, 128–136. [[CrossRef](#)]
106. McGuine, T.A.; Biese, K.M.; Petrovska, L.; Hetzel, S.J.; Reardon, C.; Kliethermes, S.; Bell, D.R.; Brooks, A.; Watson, A.M. Mental Health, Physical Activity, and Quality of Life of US Adolescent Athletes During COVID-19–Related School Closures and Sport Cancellations: A Study of 13,000 Athletes. *J. Athl. Train.* **2021**, *56*, 11–19. [[CrossRef](#)]
107. Kim, Y.S.; Park, Y.S.; Allegrante, J.P.; Marks, R.; Ok, H.; Ok Cho, K.; Garber, C.E. Relationship between Physical Activity and General Mental Health. *Prev. Med.* **2012**, *55*, 458–463. [[CrossRef](#)]
108. Paluska, S.A.; Schwenk, T.L. Physical Activity and Mental Health: Current Concepts. *Sports Med.* **2000**, *29*, 167–180. [[CrossRef](#)] [[PubMed](#)]
109. Hughes, J.R.; Casal, D.C.; Leon, A.S. Psychological Effects of Exercise: A Randomized Cross-over Trial. *J. Psychosom. Res.* **1986**, *30*, 355–360. [[CrossRef](#)]
110. Liu, P.; Yue, N. Psychological Side Effects of Intense Physical Training on Mental Health of Athletes. *Rev. Argent. Clínica Psicológica* **2020**, *29*, 207.
111. Smith, A.M.; Scott, S.G.; Wiese, D.M. The Psychological Effects of Sports Injuries: Coping. *Sports Med.* **1990**, *9*, 352–369. [[CrossRef](#)]
112. Quinn, A.M.; Fallon, B.J. The Changes in Psychological Characteristics and Reactions of Elite Athletes from Injury Onset until Full Recovery. *J. Appl. Sport Psychol.* **1999**, *11*, 210–229. [[CrossRef](#)]
113. Sagar, S.S.; Lavallee, D.; Spray, C.M. Coping With the Effects of Fear of Failure: A Preliminary Investigation of Young Elite Athletes. *J. Clin. Sport Psychol.* **2009**, *3*, 73–98. [[CrossRef](#)]
114. Mirshekari, K.; Zarezade, M.; Emami, A. Prediction of Athlete Burnout Based on Competitive Anxiety and Motivational Regulations in Elite Athletes. *J. Sport Psychol. Stud.* **2015**, *13*, 119–136.
115. Gustafsson, H.; DeFreese, J.; Madigan, D.J. Athlete Burnout: Review and Recommendations. *Curr. Opin. Psychol.* **2017**, *16*, 109–113. [[CrossRef](#)]
116. Tomalski, J.; Clevinger, K.; Albert, E.; Jackson, R.; Wartalowicz, K.; Petrie, T.A. Mental Health Screening for Athletes: Program Development, Implementation, and Evaluation. *J. Sport Psychol. Action* **2019**, *10*, 121–135. [[CrossRef](#)]
117. Breslin, G.; Shannon, S.; Haughey, T.; Donnelly, P.; Leavey, G. A Systematic Review of Interventions to Increase Awareness of Mental Health and Well-Being in Athletes, Coaches and Officials. *Syst. Rev.* **2017**, *6*, 177. [[CrossRef](#)]
118. Purcell, R.; Gwyther, K.; Rice, S.M. Mental Health In Elite Athletes: Increased Awareness Requires An Early Intervention Framework to Respond to Athlete Needs. *Sports Med.-Open* **2019**, *5*, 46. [[CrossRef](#)] [[PubMed](#)]
119. Lochbaum, M.; Stoner, E.; Hefner, T.; Cooper, S.; Lane, A.M.; Terry, P.C. Sport Psychology and Performance Meta-Analyses: A Systematic Review of the Literature. *PLoS ONE* **2022**, *17*, e0263408. [[CrossRef](#)] [[PubMed](#)]
120. Erickson, K.I.; Hillman, C.; Stillman, C.M.; Ballard, R.M.; Bloodgood, B.; Conroy, D.E.; Macko, R.; Marquez, D.X.; Petruzzello, S.J.; Powell, K.E. Physical Activity, Cognition, and Brain Outcomes: A Review of the 2018 Physical Activity Guidelines. *Med. Sci. Sports Exerc.* **2019**, *51*, 1242–1251. [[CrossRef](#)] [[PubMed](#)]

**Disclaimer/Publisher’s Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.