

International Sport Coaching Journal, (Ahead of Print)

Psychopathological Symptoms in Volleyball Coaches: An Approximation of Their Relationships With Coping Strategies and Psychological Inflexibility

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DOI. - <https://doi.org/10.1123/iscj.2025-0001>

Abstract:

Mental health in sports is a highly prevalent and significant issue, and coaches are no exception. This study examines how psychological inflexibility and coping strategies influence psychopathological symptoms in volleyball coaches. The sample includes 187 coaches (72.7% male) with a mean age of 42.72 years and an average coaching experience of 14.99 years. Psychopathological symptoms were assessed using the Symptom Assessment-45 Questionnaire, psychological inflexibility was measured with the Acceptance and Action Questionnaire, and coping strategies were evaluated through the Brief COPE-28 Inventory. The results show that neither the competitive category nor the level of coaching certification is associated with differences in the studied variables. Coaches with high levels of psychological inflexibility, compared to those with low levels, exhibit significantly higher scores in psychopathological symptoms ($p < .001$) and across all nine subscales. Similarly, regarding coping strategies, they score higher in ineffective coping ($p < .001$), avoidant style ($p < .001$), and social style ($p = .034$). Regression models reveal an explanatory capacity of 45.4% for psychopathological symptoms, with significant predictive contributions from psychological inflexibility ($\beta = .416$) and ineffective coping ($\beta = .365$). Effective coping strategies, however, do not show significant predictive value. As a conclusion, it can be said that coaches with higher psychological inflexibility are those who present greater psychopathological symptomatology and more ineffective coping strategies. An important aspect is that modifiable constructs have been analyzed; therefore, they are amenable to intervention.

Keywords. – Cope; Mental Health; Volley; Trainer; Clinical Disorders; Psychological Flexibility

Introduction

Mental health issues in sports, whether at the elite level (Poucher et al., 2021; Reardon et al., 2019) or in amateur practice (Lima & Rice, 2023; Moreno-Domínguez et al., 2023), are a prevalent and significant phenomenon (Kegelaers et al., 2021; Pilkington et al., 2022). Athletes face a wide range of challenges, pressures, and stressors (Gorczyński et al., 2017). This situation is no different for referees (Arbinaga et al., 2019; Lima, Devran, Webb et al., 2022; Lima, Devran, Öz et al., 2022) or coaches (Baumann et al., 2024; Carson et al., 2020; Frost et al., 2024; Purcell et al., 2024), although the latter group has been less frequently studied.

Coaches generally carry out their work in high-pressure environments (Norris et al., 2017; Santos & Costa, 2018). Psychological problems in coaches are influenced by risk and protective factors operating at individual, interpersonal, organizational, and societal levels (Frost et al., 2024). Poor mental health among coaches not only impacts their quality of life but also diminishes the effectiveness of the training they provide to athletes (Baumann et al., 2024; Frost et al., 2024). In this regard, coaches with high scores in anxiety, depression, and emotional instability predicted negative relationships with athletes (Yan et al., 2015). It has been observed that athletes' perceptions of their coaches' competence, both as technicians and as team leaders, worsened when coaches experienced such issues (Myers et al., 2011), which served as a strong indicator of athletes' satisfaction with them.

Existing reviews have explored the psychological health and experiences of coaches, summarizing key concepts related to stressors (Fletcher & Scott, 2010; Norris et al., 2017; Potts et al., 2021; Santos & Costa, 2018), well-being (Fletcher & Scott, 2010; Norris et al., 2017; Potts et al., 2021), coping strategies (Norris et al., 2017; Olsen et al., 2021; Potts et al., 2021), burnout (Olusoga et al., 2019), psychopathology, and how coaches' mental health affects athletes' performance and execution (Baumann et al., 2024; Frost et al., 2024). It should also be noted that research is beginning to examine coaches' mental health from an alternative, salutogenetic perspective, emphasizing individual functioning and well-being (Ackeret et al., 2024).

Previous studies have demonstrated that coaches experience a wide range of psychological problems. For instance, 55 % of coaches have reported experiencing mental health issues at some point in their lives, while 44 % are currently affected (Smith et al., 2020). Depressive and anxiety disorders are identified as the most common conditions (Åkesdotter et al., 2022; Pilkington et al., 2022). The literature reports varying prevalence rates of depressive symptoms among coaches. For example, 72.1 % of coaches

have exhibited symptoms compatible with depression (Smith et al., 2020), 43.6 % have been classified as probable cases (Pilkington et al., 2022), and 14.1 % have reported moderate depression (Kim et al., 2020). Additionally, Åkesdotter et al. (2022) found that 28 % of coaches seeking treatment met the criteria for major depressive disorder. Similarly, clinical levels of anxiety are a significant concern, with 69 % of coaches seeking treatment doing so for this reason (Åkesdotter et al., 2022).

In this context, several risk factors for the development of mental health problems in coaches have been identified. These include, among others, poor emotional regulation, years of experience and time dedicated to coaching, ineffective coping strategies, full-time coaching roles, and the lack of support from a psychologist, who could otherwise act as a protective factor. Additionally, stigma associated with seeking or requesting help further exacerbates the issue (Baumann et al., 2024; Frost et al., 2024; Purcell et al., 2019).

One approach to addressing this health issue is to consider how individuals interact with and manage relationships within a variable and potentially stressful environment (Gorczyński et al., 2017; Lee et al., 2023; Olsen et al., 2021; Potts et al., 2021; Vela & Arbinaga, 2018). Regarding the coping process, the three-dimensional model (task-oriented, emotion-oriented, and distraction-oriented) proposed by Lazarus and Folkman (1984) has dominated the field over recent decades. Coping can be defined as the effort to resolve psychological stress (Lazarus, 2000). It is important to distinguish between coping strategies and coping styles. When a particular coping strategy is habitually employed to address problems, it becomes a coping style. Additionally, personal dispositions may predispose individuals to respond to stress using certain strategies more frequently than others (Carver et al., 1989).

Based on the three-dimensional model, coaches who fail to develop effective coping strategies may experience greater psychological distress and increased vulnerability to mental health problems (Cuskelly & Hoye, 2013; Nuetzel, 2023). The positive impact of functional behaviors in managing adverse situations has been demonstrated in sports, where such behaviors are associated with a 10 % reduction in depressive symptoms (Kilic et al., 2021) and a decreased vulnerability to mental health issues (Cuskelly & Hoye, 2013; Johles et al., 2020; Nuetzel, 2023).

Athletes with higher scores in less effective coping strategies or styles (emotion-oriented or distraction-oriented) tend to experience greater cognitive anxiety (Hammermeister & Burton, 2001; Ntoumanis & Biddle, 2000; Nuetzel, 2023). Conversely, the use of adaptive rather than maladaptive coping strategies has been associated with more positive mental health outcomes and reduced distress (Cumming

et al., 2012). Similarly, coping self-efficacy has a positive effect on mental health, contributing to improved athletic performance (Guo et al., 2019).

It has been observed that adaptive or effective coping predicts positive affect, while ineffective coping predicts negative affect (Fogaca, 2021; Ntoumanis & Biddle, 1998). Thus, maladaptive coping can exacerbate the intensity of stress and have negative repercussions on emotional state and performance in the execution of a coach's tasks (Johles et al., 2020; Lee et al., 2023; Márquez, 2006; Olsen et al., 2021; Yan et al., 2023).

Conceptualizing coping as a contextual behavioral factor allows it to be linked to the construct of psychological flexibility, which can be defined as the ability to act in accordance with values and long-term goals in the presence of discomfort (Hayes et al., 2006). This conceptualization is of particular clinical relevance, as behaviors (operants) are under contextual control, meaning they can be directly modified (Gentili et al., 2019).

Psychological flexibility refers to the ability to contact with private events occurring in the present moment, consciously, fully, and without unnecessary defenses—accepting the event as it is, rather than as one might interpret it (Hayes et al., 2006). This involves choosing to either abandon or persist in an action that induces discomfort but serves values that an individual identifies as personal (Hayes et al., 2006; Hayes, 2012; Hayes et al., 2016). The psychological flexibility model promotes adaptive coping through various processes or skills (Hayes et al., 2006; Wicksell et al., 2010).

In contrast, psychological inflexibility refers to the rigid dominance of certain unhelpful private events over effective actions, long-term goals, useful thoughts, and emotions (Bond et al., 2011). It consists of the individual's inability to contact with private events (thoughts, emotions, and memories) in a functional and adaptive manner, primarily caused by a rigid, limited, and restrictive behavior pattern (inflexible) governed by unworkable verbal rules that are inherently dysfunctional (Hayes et al., 2012). Psychological rigidity is associated with an increase in distress-related symptoms, including pain perception, anxiety, and depression (Arbinaga, 2025; Cano-Manzano et al., 2024; Ruiz, 2010). Psychological inflexibility often manifests as a pattern of avoidance behaviors towards aversive stimuli and situations (Chen et al., 2017; McCracken, 2013; Zhang et al., 2014), and can be considered an operant under contextual control (Hayes et al., 2006). This behavioral pattern is not associated with a reduction in distress or dysfunction (Trompetter et al., 2015) and may lead to abandonment of the activity (Wicksell et al., 2010).

In this context, emotional regulation can become maladaptive due to the characteristics associated with psychological inflexibility (Cobos et al., 2022). Research has shown that psychological inflexibility, cognitive fusion, and experiential avoidance are positively correlated with the non-acceptance of negative emotions and limited emotional regulation strategies (Cobos et al., 2022; Teixeira et al., 2019).

In the sports domain, it has been observed that athletes with high psychological inflexibility tend to exhibit fewer effective behaviors, thereby missing opportunities for optimal performance (Moore, 2009), and this is also associated with the occurrence of injuries (Arbinaga, 2025). Similarly, a strong association has been reported with high scores in anxiety and depression (Chen et al., 2017; Zhang et al., 2014), highlighting the challenging coexistence of sport and health (Arbinaga & Cantón, 2013). In contrast, psychological flexibility positively influences physiological performance, psychological well-being, and direct sports performance (Bühlmayer et al., 2017). Low psychological inflexibility allows athletes to be more aware of their experiences and accept them in order to remain open and capable of pursuing effective performance, closely linked to their personal values and meanings (Johles et al., 2020; Lundgren et al., 2018).

Building on this background, the present study focuses on volleyball coaches, among whom it is observed that a significant portion of the challenges they face -challenges that require resources- do not have a technical or tactical origin or solution, but instead fall within the domain of psychological intervention (Díaz-Rodríguez, 2008). Therefore, the aim of this study is to characterize this group by examining the relationships between psychological inflexibility, coping strategies, and psychopathological symptoms.

Thus, the first hypothesis anticipates a higher level of psychopathological symptoms in coaches from higher competition categories compared to those from lower categories. The second hypothesis predicts that higher psychological inflexibility will be positively associated with elevated psychopathological symptom scores. Similarly, the third hypothesis proposes a negative relationship between effective coping strategies and psychopathological symptoms, and a positive relationship with ineffective coping strategies. Finally, the fourth hypothesis suggests that psychological inflexibility will be positively associated with ineffective coping strategies and negatively with effective coping strategies.

Method

Participants

The sample consists of 187 volleyball coaches ($n = 136$, 72.7% male), with a mean age of 42.72 years ($SD = 12.02$), ranging from 20 to 77 years. Regarding educational background, 31.6 % report having pre-university education, 50.8% have completed a graduate degree, and 17.6% have pursued postgraduate education (master's/Ph.D.); 38% report not working outside their coaching activity. Regarding coaching experience, the average tenure is 14.99 years ($SD = 11.91$), with a range from 3 to 52 years. Of the participants, 22.5% coach teams competing in national leagues (both men's and women's, e.g., Superliga 1 or Superliga 2), 38.5% coach in regional leagues (e.g., First Division, senior), and 39% coach in provincial leagues or beginner volleyball categories (e.g., youth, junior).

The inclusion criteria were being over 18 years of age, having more than three years of experience as a coach registered with the Royal Spanish Volleyball Federation or Territorial Federations, holding a coaching qualification, and signing the informed consent form. The exclusion criterion was being on sick leave due to an incapacitating illness or taking medication that would prevent the participant from completing the questionnaires and carrying out their duties as a coach.

All participants provided informed consent to be included in the study, and the research received approval from the Andalusian Ethics Committee of Biomedical Research.

Instruments

Data were collected on "sociodemographic variables" (age, sex, marital status, whether the individual works outside their coaching activity, highest level of education attained: a) Pre-university, b) University, c) Postgraduate: Master's/Doctorate) and "coaching variables" (1. Coaching qualification: Level I: Required to coach teams in the infant and cadet categories; minimum age requirement: 16 years. Level II: Required to coach teams in the youth and junior categories, or senior teams in National Phase of the Second Division; prerequisite: Level I qualification. Level III: Required to coach teams in the Honor Division, Superliga, and First Division; prerequisites: Level II qualification or express authorization by the Royal Spanish Volleyball Federation under other conditions); currently coaching: Yes/No; has an assistant coaching team: Yes/No; has a medical team (e.g., doctor, physiotherapists, psychologists): Yes/No; competition category of the team being coached: Provincial, Regional, National). Additionally, a question was included regarding whether the coach had ever considered seeking professional psychological help due to issues arising from their coaching activity.

Psychopathological symptoms were assessed using the Symptom Assessment-45 Questionnaire (SA-45, Davison et al., 1997, in the Spanish adaptation by Sandín et al., 2008), which is a 45-item self-

report instrument derived from the Symptom Checklist (SCL-90, Derogatis & Cleary, 1977). Participants were asked to indicate how much each symptom had been present during the past week (Likert scale: 0 = Not at all, 4 = Extremely), with a score range from 0 to 180 points. The questionnaire consists of nine scales with five items each, evaluating the dimensions of the SCL-90. In the Spanish population, the test has shown satisfactory results, with exploratory factor analyses reflecting indices in the Kaiser-Meyer-Olkin (KMO = 0.923) and Bartlett's sphericity test ($\chi^2(990) = 9389.152, p = 0.000$), highlighting the suitability of the data for factor analysis. The confirmatory factor analysis, in turn, was consistent with a nine-factor structural model and a global score, with indices $\chi^2/df = 1.63$, NNFI = 0.99, CFI = 0.99, SRMR = 0.091, AIC = 1813.24, and AGFI = 0.96 (Holgado-Tello et al., 2019). The reliability demonstrated in this study for the total score is Cronbach's $\alpha = 0.95$; for the depression dimension, Cronbach's $\alpha = 0.85$ (original Cronbach's $\alpha = 0.85$), for hostility Cronbach's $\alpha = 0.83$ (original Cronbach's $\alpha = 0.83$), for interpersonal sensitivity Cronbach's $\alpha = 0.80$ (original Cronbach's $\alpha = 0.84$), for somatization Cronbach's $\alpha = 0.83$ (original Cronbach's $\alpha = 0.80$), for anxiety Cronbach's $\alpha = 0.80$ (original Cronbach's $\alpha = 0.84$), for psychoticism Cronbach's $\alpha = 0.60$ (original Cronbach's $\alpha = 0.63$), for obsessive-compulsion Cronbach's $\alpha = 0.77$ (original Cronbach's $\alpha = 0.72$), for phobic anxiety Cronbach's $\alpha = 0.80$ (original Cronbach's $\alpha = 0.71$), and for paranoid ideation Cronbach's $\alpha = 0.75$ (original Cronbach's $\alpha = 0.71$).

Coping strategies were assessed using the Brief COPE Inventory (COPE-28; Carver, 1997), as adapted in Spanish by Morán et al. (2010). The COPE-28 is an inventory consisting of 28 items and 14 subscales, with responses rated on a four-point Likert scale (0 = "I never do this" to 3 = "I always do this"). Factor analyses conducted in Spanish populations have confirmed the 14-factor structure, consistent with the original version (Mate et al., 2016; Moran et al., 2010). In this regard, Mate et al. (2016) obtained indices in the Kaiser-Meyer-Olkin test (KMO = 0.852) and Bartlett's sphericity test of $\chi^2 = 6625.626, df = 378, p < .001$. In this study, the test demonstrated reliability, reflected by a Cronbach's $\alpha = 0.85$. The 14 subscales are: active coping, planning, emotional support, social support, religion, reevaluation, acceptance, denial, humor, self-distraction, self-blame, disengagement, venting, and substance use. These subscales are grouped as effective coping strategies (active coping, planning, emotional support, instrumental support, reevaluation, humor), in this research with a Cronbach's $\alpha = 0.82$; and ineffective coping strategies (self-distraction, self-blame, disengagement, venting, denial, religion, substance use) with a Cronbach's $\alpha = 0.77$. Furthermore, the 14 subscales are organized into four second-order factors, or coping styles. Within the effective coping strategies, the styles are: Cognitive with a Cronbach's $\alpha = 0.77$ (original Cronbach's $\alpha =$

0.74), social with a Cronbach's $\alpha = 0.73$ (original Cronbach's $\alpha = 0.74$), and within the ineffective coping strategies, the styles are: avoidant with a Cronbach's $\alpha = 0.71$ (original Cronbach's $\alpha = 0.71$), and passive with a Cronbach's $\alpha = 0.77$ (original Cronbach's $\alpha = 0.80$).

The Acceptance and Action Questionnaire (AAQ-II, Bond et al., 2011, in its adaptation to Spanish by Ruiz et al., 2013) was used to assess psychological inflexibility. This instrument provides a general measure of psychological flexibility-inflexibility consisting of a 7-item questionnaire concerned with how the individual relates to their private events and to what extent they perceive these events as an obstacle to leading the life they wish. Participants respond on a Likert-type scale (1 = never, to 7 = always) to indicate the extent they believe the statements to be true. Low scores on the questionnaire indicate greater psychological flexibility, while high scores indicate greater inflexibility. Factor analyses conducted in Spanish samples have confirmed the unifactorial structure (Menéndez-Aller et al., 2023; Ruiz et al., 2013). Considering the sample used in this study, the results of the confirmatory factor analysis ($\chi^2 = 60.878$, $df = 14$, $p < .001$, CFI = 0.941, TLI = 0.911, RMSEA = 0.134, $p < .001$, $\chi^2 = 811.718$, $df = 21$, $p < .001$, SRMR = 0.039) support the one-factor structure of the instrument.. On the other hand, the test used in this study has shown high internal consistency (Cronbach's $\alpha = 0.91$), compared to a Cronbach's $\alpha = 0.88$ observed in the original test.

Procedure

This study employs a non-probabilistic sampling methodology with a cross-sectional, anonymous, and online design, conducted in accordance with the Declaration of Helsinki. Data collection took place online from June 15, 2022, to January 31, 2024. The Royal Spanish Volleyball Federation and its Territorial Committees were contacted. Through its Training and Technical Department, the link to the questionnaires was sent to all active federated coaches, requesting their collaboration in completing the surveys. Participants had to accept informed consent in order to complete the tests; in the online survey, access was not allowed unless the consent option was accepted.

Data Analysis

The sample size for hypothesis testing was calculated using G*Power-3 (Faul et al., 2007). The sample size was adjusted for ANOVA analysis with three comparison groups, a significance level (α) of .05, and a medium effect size ($f = .30$). This resulted in statistical power ($1 - \beta$) of .96, indicating a 96 % probability of detecting an effect if one truly exists, given the final sample size. The achieved power is

considered adequate for this type of analysis, ensuring a low probability of committing a Type II error. The final sample size was 187 coaches, optimal for the objectives and hypotheses proposed.

The following was carried out descriptive analyses (frequencies, percentages, means, and standard deviation) were conducted to characterize the main research variables. The normality of the variables is confirmed when analysed using the Kolmogorov-Smirnov test. The Mann-Whitney U test and the Kruskal-Wallis test were used to analyse variables that did not conform to normality. The reliability of the tests was calculated using Cronbach's alpha (α). The comparison of quantitative variables was carried out using the Student's t -test for independent groups. The effect size was estimated using Cohen's d ($d < 0.2$ - small effect size; $d = 0.2$ to 0.8 - medium effect size and $d > 0.8$ - large effect size). A cluster analysis was conducted when considering the grouping of participants based on the psychological inflexibility variable for comparison based on the dependent variables. In the case of quantitative variables with more than two categories, an ANOVA test was conducted, with Snedecor's F statistic and Bonferroni's post hoc tests. The effect size was calculated using Eta Squared η^2 , where the η^2 effect size coefficients were evaluated as follows: $0.01 \leq \eta^2 < 0.06$ = a small effect size, $0.06 \leq \eta^2 < 0.14$ = a medium effect size, and $\eta^2 \geq 0.14$ = a large effect size. In the case of categorical variables, the Chi-Square test (χ^2) was used. For categorical variables, Cramer's V was used to estimate the effect size (< 0.2 - small effect size; between 0.2 and 0.6 - moderate effect size and > 0.6 - large effect size). Associations between the variables were analyzed by Pearson and Spearman's Rho correlations and Stepwise linear regression analysis was employed to determine the predictors of psychopathological symptoms. Analyses were conducted using the SPSS statistical package (IBM version 25.0, SPSS Inc Armonk, NY, USA).

Results

The sample, consisting of 187 volleyball coaches, shows statistically significant differences ($t = 4.13$, $p < .001$) in the age of men ($M_{\text{age}} = 44.85$, $SD = 12.13$) compared to women ($M_{\text{age}} = 37.04$, $SD = 9.73$). However, no differences were found in marital status ($\chi^2_{(2, 187)} = 3.06$, $p = .217$), with 58.8% reporting being married or living with a partner, 35.3% indicating they are single, and 5.9% divorced or separated. Similarly, no differences were found between men and women in the level of education achieved ($\chi^2_{(2, 187)} = 2.87$, $p = .238$), nor in the condition of working outside of sports ($\chi^2_{(2, 187)} = 1.51$, $p = 2.19$), where 62% reported working outside of their coaching activity.

As shown in Table 1, differences are indicated based on sex regarding the sports qualification achieved, where women tend to hold a Level I qualification, while men predominantly hold a Level III

qualification, with a moderate effect size of Cramér's $V = 0.234$. In relation to this, it is observed that male coaches are more likely to report having a medical team (e.g., doctor, physiotherapist, psychologist) compared to women, who report not having such resources, with a small effect size ($\Phi = 0.189$). Similarly, male coaches report having more years of coaching experience, with a medium effect size ($d = 0.40$), coach more days per week, also with a medium effect size ($d = 0.63$), and coach more hours per week than women, with a medium effect size ($d = 0.50$). However, no differences have been detected in terms of currently coaching, the category of competition they coach, or whether they have assistant coaches.

Table 1.- Sports characteristics of volleyball coaches according to sex

	TOTAL 187	MALE 136(72.7)	FEMALE 51(27.3)	χ^2	p
Sports qualification				$\chi^2_{(2,187)} = 10.097$	.006
Nivel I	27(14.4)	13(9.6)	14(27.5)		
Nivel II	78(41.7)	58(42.6)	20(39.2)		
Nivel III	82(43.9)	65(47.8)	17(33.3)		
Actually training				$\chi^2_{(1,187)} = 2.623$	.105
Yes	169(90.4)	120(88.2)	49(96.1)		
No	18(9.6)	16(11.8)	2(39.0)		
Auxiliar coach				$\chi^2_{(1,187)} = 0.419$	.517
Yes	79(46.7)	58(48.3)	21(42.9)		
No	90(53.3)	62(51.7)	28(57.1)		
Medical team				$\chi^2_{(1,187)} = 6.022$	.014
Yes	62(36.7)	51(42.5)	11(22.4)		
No	107(63.3)	69(57.5)	38(72.6)		
Category trained				$\chi^2_{(2,187)} = 4.321$	.115
Provincial	73(39.0)	47(34.6)	26(51.0)		
Regional	72(38.5)	57(41.9)	15(29.4)		
National	42(22.5)	32(23.5)	10(19.6)		
Years training	14.99(11.91)	16.18(12.70)	11.80(8.82)	$t = 2.265$	.024
Days/Week/Training	3.75(1.19)	3.94(1.17)	3.24(1.07)	$t = 3.753$	.001
Hours/Week/Training	8.38(5.31)	9.02(5.69)	6.66(3.64)	$t = 2.761$	.001

Note: For quantitative variables M(SD) and categorical variables n (%).

When asked whether, at any point during their coaching activity, they had considered seeking the help of a psychology professional due to not feeling well as a result of their coaching-related distress, 73.3% ($n = 137$) reported that they had. No significant differences were observed based on the coach's sex ($\chi^2_{(2,187)} = 1.82, p = .177$).

Kolmogorov-Smirnov test was conducted to assess the normality of the distribution of the evaluated variables. It was found that psychological inflexibility ($Z = 1.10, p = .181$) follows a normal distribution. However, the total score on the SA-45 ($Z = 1.60, p = .012$), as well as the subscales for hostility ($Z = 3.19, p < .001$), somatization ($Z = 2.01, p = .001$), depression ($Z = 2.03, p = .001$), obsession-compulsion ($Z = 2.05, p < .001$), anxiety ($Z = 1.98, p = .001$), interpersonal sensitivity ($Z = 2.13, p < .001$), phobic anxiety

($Z = 4.38, p < .001$), paranoid ideation ($Z = 1.98, p = .001$), and psychoticism ($Z = 3.48, p < .001$), do not follow a normal distribution. Regarding the COPE-28 test, the score for effective coping strategies follows a normal distribution ($Z = 0.77, p = .600$); however, ineffective coping strategies ($Z = 1.43, p = .034$) do not follow a normal distribution. Similarly, the coping styles for cognitive ($Z = 1.38, p = .046$), social ($Z = 1.81, p = .003$), avoidant ($Z = 1.46, p = .029$), and passive ($Z = 5.17, p < .001$) coping also do not follow a normal distribution.

Considering the relationships between psychopathological symptoms and variables such as the coach's age, significant correlations were observed ($r = -0.202, p = .006$), but no correlations were found with the number of years they have been coaching ($r = -0.063, p = .389$). Similarly, after applying the Mann-Whitney U test, no significant differences were observed in the total psychopathological symptoms, nor in the subscales, between those who report having a job outside their coaching activity and those who do not ($Z = -0.136, p = .891$).

On the other hand, the variables -psychological inflexibility, coping strategies, and psychopathological symptoms- according to the participants' sex (Table 2) show that women, compared to men, obtain higher scores in psychological inflexibility, with a medium effect size ($d = 0.36$). However, both men and women are equally distributed ($\chi^2_{(2,187)} = 3.452, p = .063$) in the resulting clusters, considered as high vs. low psychological inflexibility.

In the total score of the psychopathological symptoms questionnaire, differences are observed with a medium effect size ($d = 0.34$); and in the subscales of depression with a medium effect size ($d = 0.41$), somatization with a medium effect size ($d = 0.50$), and anxiety with a medium effect size ($d = 0.49$), where women obtain higher scores with statistical significance. On the other hand, in the test evaluating coping strategies, no differences are detected according to the sex of the coaches; however, there are some residual differences in the coping style termed "social" ($d = 0.29$), where women score higher than men.

Table 2.- Symptom Assessment-45 Questionnaire scores, Coping Inventory COPE-28, AAQ-II- Psychological Inflexibility according to the gender of the coaches

TOTAL	MALE	FEMALE	Z	
187	136(72.7)	51(27.3)	<i>U Mann-Whitney</i>	<i>p</i>

SA-45-TOTAL (range 0-180)	28.99(20.23)	27.10(19.32)	34.04(21.91)	-1.982	.048
Depression	4.10(3.62)	3.70(3.56)	5.16(3.59)	-2.751	.006
Hostility	1.91(2.63)	1.97(2.51)	1.76(2.94)	-1.629	.103
Interpersonal Sensitivity	3.74(3.02)	3.55(2.83)	4.25(3.48)	-0.996	.319
Somatization	3.91(3.44)	3.44(3.24)	5.16(3.69)	-3.213	.001
Anxiety	4.20(3.24)	3.76(2.99)	5.37(3.59)	-2.732	.006
Psychoticism	1.34(1.83)	1.38(1.85)	1.22(1.76)	-0.632	.527
Obsession-Compulsion	4.17(3.53)	3.89(3.23)	4.90(4.17)	-1.305	.192
Phobic Anxiety	0.98(2.08)	0.84(1.85)	1.37(2.57)	-1.241	.214
Paranoid Ideation	4.64(3.50)	4.57(3.58)	4.84(3.30)	-0.640	.522
COPE-28					
Cognitive style	13.76(4.24)	13.74(4.31)	13.82(4.09)	-0.339	.734
Social style	6.95(3.15)	6.71(3.14)	7.59(3.11)	-1.915	.055
Avoidant style	8.64(4.11)	8.41(4.07)	9.24(4.20)	-1.506	.132
Passive style	0.65(1.14)	0.66(1.11)	0.61(1.22)	-0.998	.318
Ineffective coping	9.27(4.97)	9.03(4.96)	9.90(4.99)	-1.147	.251
Effective coping	22.27(6.27)	22.10(6.30)	22.73(6.23)	$t = 0.611$	.542
AAQ-II (range 7-49)	18.46(8.16)	17.65(7.91)	20.61(8.51)	$t = 2.227$	.027
CAAQ-II				$\chi^2_{(1,187)} = 3.452$	.063
C1	75(40.1)	49(36.0)	26(51.0)		
C2	112(59.9)	87(64.0)	25(49.0)		

Note: For quantitative variables M(SD) and categorical variables n (%). COPE-28: Brief COPE Inventory; SA-45-TOTAL: Total score on the Symptom Assessment-45; Questionnaire; AAQ-II: Acceptance and Action Questionnaire (Psychological Inflexibility); CAAQ-II: Cluster of Psychological Inflexibility: C1.- Cluster 1 High Psychological Inflexibility; C2.- Cluster 2 Low Psychological Inflexibility.

If the scores obtained in the various tests are compared based on the competition level of the team coached (Table 3), it is found that no differences are detected in any of the scales or their respective subscales.

Table 3.- Symptom Assessment-45 Questionnaire scores, Coping Inventory COPE-28, AAQ-II-Psychological Inflexibility according to competition level

	Provincial 73(39.0)	Regional 72(38.5)	National 42(22.5)	Kruskal-Wallis $\chi^2_{(gl=2)}$	p
SA-45-TOTAL (range 0-180)	26.75(17.63)	30.17(21.69)	30.86(21.94)	0.740	.691
Depression	3.74(3.42)	4.33(3.83)	4.31(3.63)	1.029	.598
Hostility	1.49(2.28)	2.14(2.98)	2.26(2.51)	3.761	.153
Interpersonal Sensitivity	3.33(2.59)	3.82(3.21)	4.33(3.34)	1.965	.374
Somatization	3.81(3.59)	3.96(3.17)	4.00(3.69)	0.406	.816
Anxiety	3.86(3.08)	4.51(3.37)	4.24(3.29)	1.524	.462
Psychoticism	1.33(1.81)	1.38(1.81)	1.29(1.92)	0.421	.810
Obsession-Compulsion	3.89(3.36)	4.04(3.54)	4.86(3.79)	2.064	.356
Phobic Anxiety	0.89(1.64)	1.01(2.15)	1.10(2.60)	0.179	.914
Paranoid Ideation	4.41(3.24)	4.97(3.81)	4.48(3.44)	0.830	.660
COPE-28					
Cognitive style	13.90(4.15)	13.54(4.23)	13.88(4.48)	0.583	.747
Social style	7.12(3.12)	6.93(3.06)	6.69(3.40)	1.056	.590
Avoidant style	8.51(3.85)	8.58(4.01)	8.95(4.75)	0.047	.977
Passive style	0.52(1.02)	0.68(1.05)	0.81(1.45)	2.939	.302
Ineffective coping	8.75(4.32)	9.44(4.80)	9.86(6.19)	0.644	.725
Effective coping	22.64(6.07)	21.94(6.04)	22.17(7.07)	$F_{(2,186)} = 0.231$	.794
AAQ-II (range 7-49)	18.70(7.85)	18.56(8.71)	17.88(7.89)	$F_{(2,186)} = 0.140$	.869

Note: For quantitative variables M(SD) and categorical variables n (%). COPE-28: Brief COPE Inventory; SA-45-TOTAL: Total score on the Symptom Assessment-45 Questionnaire; AAQ-II: Acceptance and Action Questionnaire (Psychological Inflexibility).

Similarly, the qualification that enables them to coach (Level I, Level II, and Level III) does not lead to differences in the scores obtained in any of the tests, except for the subscale of Fobic Anxiety from the SA-45, where differences are observed ($F_{(2,186)} = 14.39, p = .034$). These differences are found between coaches with Level I qualifications ($M = 1.93, SD = 2.34$) and those with Level III qualifications ($M = 0.76, SD = 1.75$), with a $p = .033$.

When considering coaches according to the cluster -high vs. low- of psychological inflexibility (Table 4), and since women exhibited higher psychological inflexibility, an attempt was made to control for the potential influence of sex. It was found that in the high inflexibility cluster, 75 (40.1%) coaches were grouped (36.0% of men and 51.0% of women), and in the low inflexibility cluster, 112 (59.9%) coaches were grouped (64.0% of men and 49.0% of women). No statistically significant differences were found ($\chi^2_{(1,187)} = 3.452, p = .063$), indicating that the sex variable did not influence the comparison of variables between the inflexibility groups.

Table 4 shows the scores obtained in the evaluation of psychopathological symptoms and coping strategies according to the high psychological inflexibility cluster and Low psychological inflexibility.

Table 4.- Symptom Assessment-45 Questionnaire scores, Coping Inventory COPE-28, according to AAQ-II-Psychological Inflexibility Cluster

	CLUSTER 1	CLUSTER 2	Z		
	75(40.10)	112(59.90)	<i>U Mann-Whitney</i>	<i>p</i>	<i>Cohen's d</i>
SA-45-TOTAL (range 0-180)	41.31(21.49)	20.74(14.37)	-7.172	<.001	1.13
Depression	6.49(3.74)	2.49(2.48)	-7.355	<.001	1.26
Hostility	2.68(3.03)	1.40(2.19)	-4.060	<.001	0.48
Interpersonal Sensitivity	5.15(3.15)	2.80(2.55)	-5.351	<.001	0.82
Somatization	4.87(3.89)	3.27(2.96)	-2.842	.004	0.46
Anxiety	6.19(3.29)	2.87(2.43)	-6.910	<.001	1.15
Psychoticism	2.31(2.13)	0.69(1.22)	-6.190	<.001	0.93
Obsession-Compulsion	6.05(3.91)	2.90(2.58)	-6.057	<.001	0.95
Phobic Anxiety	1.57(2.66)	0.59(1.45)	-3.569	<.001	0.46
Paranoid Ideation	6.00(3.78)	3.73(2.99)	-4.212	<.001	0.67
COPE-28					
Cognitive style	14.20(4.34)	13.46(4.16)	-0.580	.562	0.17
Social style	7.55(3.46)	6.55(2.87)	-2.104	.035	0.32
Avoidant style	10.83(4.11)	7.17(3.41)	-6.049	<.001	0.97
Passive style	0.77(1.34)	0.56(0.98)	-0.597	.551	0.18
Ineffective coping	12.37(5.35)	7.19(3.37)	-7.242	<.001	1.16
Effective coping	22.4(6.44)	22.15(6.18)	$t = 0.307$	.759	0.04

Note: For quantitative variables M(SD) and categorical variables n(%). COPE-28: Brief COPE Inventory; SA-45-TOTAL: Total score on the Symptom Assessment-45 Questionnaire; AAQ-II: Acceptance and Action Questionnaire (Psychological Inflexibility); Cluster 1.- High Psychological Inflexibility; Cluster 2.- Low Psychological Inflexibility.

It can be observed that the scores obtained by coaches on the SA-45 questionnaire and its various subscales are higher in the high psychological inflexibility cluster compared to those in the low psychological inflexibility cluster. Regarding coping styles, coaches classified in the high inflexibility group also obtained higher scores in the social style, avoidant style, and ineffective coping.

Table 5 provides the correlations between the various analyzed variables. It is evident that psychological inflexibility shows significant and substantial correlations with the other variables, except for effective coping strategies and the passive style. Similarly, ineffective coping strategies correlate significantly with the scores obtained on the SA-45 questionnaire and all of its subscales. In this regard, the scores on the SA-45 also correlate significantly with cognitive style, social style, and avoidant style.

Table 5.- Bivariate Correlation between scores on psychological inflexibility, coping and psychopathological symptoms.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 AAQ-II-TOTAL	1															
2 Effective Coping	.031 .670	1														
3 Ineffective Coping	.571 <.001	.306 <.001	1													
4 Cognitive Style	.121 .099	.899 <.001	.361 <.001	1												
5 Social Style	.169 .021	.669 <.001	.477 <.001	.451 <.001	1											
6 Avoidant style	.517 <.001	.514 <.001	.846 <.001	.589 <.001	.421 <.001	1										
7 Passive style	.066 .370	.130 .076	.333 <.001	.114 .120	.128 .080	.127 .083	1									
8 SA-45-TOTAL	.632 <.001	.117 .111	.632 <.001	.198 .007	.286 <.001	.570 <.001	.125 .088	1								
9 Depression	.632 <.001	.085 .249	.457 <.001	.168 .022	.163 .026	.464 <.001	.010 .894	.822 <.001	1							
10 Hostility	.330 <.001	-.048 .517	.387 <.001	.027 .714	.080 .274	.301 <.001	.069 .350	.541 <.001	.410 <.001	1						
11 Interpersonal Sensitivity	.466 <.001	.112 .128	.554 <.001	.176 .016	.248 .001	.514 <.001	.110 .132	.844 <.001	.649 <.001	.421 <.001	1					
12 Somatization	.267 <.001	.100 .174	.335 <.001	.120 .103	.217 .003	.245 .001	.202 .006	.589 <.001	.361 <.001	.318 <.001	.396 <.001	1				
13 Anxiety	.603 <.001	.112 .126	.584 <.001	.163 .026	.313 <.001	.503 <.001	.133 .071	.851 <.001	.647 <.001	.403 <.001	.719 <.001	.488 <.001	1			
14 Psychoticism	.488 <.001	.172 .019	.493 <.001	.192 .009	.299 <.001	.410 <.001	.193 .008	.607 <.001	.480 <.001	.348 <.001	.467 <.001	.260 <.001	.489 <.001	1		
15 Obsessive-Compulsion	.503 <.001	.107 .145	.541 <.001	.126 .086	.281 <.001	.466 <.001	.086 .244	.793 <.001	.618 <.001	.355 <.001	.690 <.001	.386 <.001	.670 <.001	.495 <.001	1	
16 Phobic Anxiety	.357 <.001	-.010 .893	.326 <.001	.077 .297	.024 .748	.296 <.001	.140 .056	.460 <.001	.300 <.001	.181 .013	.368 <.001	.317 <.001	.395 <.001	.300 <.001	.357 <.001	1
17 Paranoid Ideation	.457 <.001	.071 .335	.427 <.001	.158 .031	.183 .012	.396 <.001	.085 .248	.782 <.001	.642 <.001	.473 <.001	.656 <.001	.355 <.001	.604 <.001	.516 <.001	.505 <.001	.317 <.001

Note: - r/p.- Pearson Correlation/Significance (Spearman's Rho in the SA-45, subscales and COPE-28- Ineffective Coping); COPE-28: Brief COPE

Inventory; AAQ-II-TOTAL- The Acceptance and Action Questionnaire (Psychological Inflexibility); SA-45-TOTAL. - Symptom Assessment-45 Questionnaire.

On the other hand, effective coping strategies show no statistically significant correlations with scores in psychopathological symptomatology.

Table 6 considers the significance of the three models generated in the stepwise linear regressions, with psychopathological symptoms as the predicted variable and psychological inflexibility and coping strategies as the predictor variables.

Table 6.- Lineal regression analysis, taking psychopathological symptoms (SA-45) as the predicted variable and psychological inflexibility and copy as predictor variables, in volleyball coaches.

		β	t	p	R^2	ΔR^2	p	F	p
Model 1					.369	.372	<.001	$F_{(1,186)} = 109.697$	<.001
	AAQ-II	.610	10.474	<.001					
Model 2					.381	.008	.116	$F_{(2,186)} = 56.541$	<.001
	AAQ-II	.607	10.461	<.001					
	COPE-28- Effective coping	.092	1.580	.116					
Model 3					.454	.074	<.001	$F_{(3,186)} = 50.816$	<.001
	AAQ-II	.416	6.223	<.001					
	COPE-28- Effective coping	-.052	-.844	.400					
	COPE-28- Ineffective coping	.365	4.976	<.001					

Note: AAQ-II.- The Acceptance and Action Questionnaire (Psychological Inflexibility); COPE-28: Brief COPE Inventory.

In Model 1, it can be observed that psychological inflexibility explains 36.9% of the variance and predicts 61.0% of psychopathological symptoms (semi-partial correlations of .61). Model 2, which includes both psychological inflexibility and effective coping strategies, increases the explanatory capacity to 38.1%, slightly reducing the predictive capacity of psychological inflexibility to 60.7%, and generates 9.2% of predictive capacity for effective coping strategies, although this latter value is not statistically significant; the semi-partial correlations are .607 for inflexibility and .092 for effective coping. Finally, in Model 3, the inclusion of ineffective coping strategies increases the explanatory power to 45.4%. It is observed that psychological inflexibility reduces its predictive capacity to 41.6% (semi-partial correlations of .340), effective coping strategies turn their predictability negative, though not significant (semi-partial correlations of -.046), and ineffective coping strategies reach a predictive capacity of 36.5% (semi-partial correlations of .272). Thus, it has been observed that effective coping strategies do not make a significant contribution to the models generated in the regressions, with the function falling on psychological inflexibility and ineffective coping strategies.

Discussion

The present study aimed to characterize volleyball coaches based on the relationships between psychological inflexibility, coping strategies, and psychopathological symptoms. The first hypothesis anticipated finding greater psychopathological symptoms in coaches of higher competition categories compared to those in lower categories. The data provided in this study do not support the proposed hypothesis; no differences were found in psychopathological symptoms among coaches based on the competition category in which they train and compete. Similarly, the qualification that qualifies them as coaches (Level I, Level II, and Level III) does not result in differences in the scores obtained in any of the tests, except for the Phobic Anxiety subscale of the SA-45, where differences are observed. Coaches with a Level I qualification, authorized to coach lower categories, obtain higher scores compared to those with a Level III qualification, authorized to coach higher and international categories.

These results contradict those presented in previous research (Carson et al., 2018; Purcell et al., 2019), which suggested that coaches of teams competing in higher categories would exhibit greater vulnerability to mental health problems. This was based on the assumption that they experience a higher number of stressors or pressures related to their sporting activity, as noted in other studies (Kaski & Kinnunen, 2021; Ruddock et al., 2018) and in systematic literature reviews (Baumann et al., 2024; Frost et al., 2024; Norris et al., 2017; Santos & Costa, 2018).

In this context, it has been observed that age shows a relationship with the total score on psychopathological symptomatology. It has been found that younger coaches correlate with a higher score on the symptom evaluation test. This supports the findings of Purcell et al. (2019) and Pilkington et al. (2022), who argue that age is a risk factor for the development of mental health issues in the sports context. This should not be unexpected, given the considerable overlap between years of active elite competition and the early ages at which most mental disorders emerge (Allen & Hopkins, 2015; Rice et al., 2016).

However, no relationships were found between the symptomatology and the number of years the coaches reported having been training, nor were there differences based on the level of sports certification held by the coaches. This lack of relationship does not support the findings of Nikolas (2012), who considered experience to be a protective factor, and it would have been expected that less experienced volleyball coaches might face greater mental health challenges than their more experienced counterparts.

The second hypothesis predicted that higher psychological inflexibility would be positively associated with higher scores in psychopathological symptoms. The obtained results confirm the proposed

hypothesis. Coaches who scored higher in psychological inflexibility obtained higher scores on the SA-45 assessment questionnaire and in each of the nine subscales or categories of symptoms.

The literature has already indicated, in the general population (Hayes, 2019; Lucas & Moore, 2020; Pakenham, et al., 2020), that psychological rigidity is strongly associated with mental health problems, particularly distress, anxiety, depression, etc. It was recognized that the behavioral pattern exhibited by individuals with high psychological inflexibility does not favor an improvement in mental health (Trompetter et al., 2015; Tyndall et al., 2020; Yao et al., 2023). In fact, it has been suggested that psychological inflexibility may maintain or exacerbate mental health issues (Wicksell et al., 2010).

In the sports context (Arbinaga, 2025; Manning et al., 2022; Oliveira et al., 2024; Ronkainen et al., 2024), it has also been indicated that low psychological flexibility is associated with lower behavioral efficacy and the loss of opportunities for optimal performance (Moore, 2009). A significant association has been observed with anxiety and depression problems among athletes (Chen et al., 2017; Zhang et al., 2014), particularly among female athletes (Ronkainen et al., 2024), as evidenced in the obtained results.

The third hypothesis proposed a negative relationship between effective coping strategies and psychopathological symptoms, and a positive relationship with ineffective strategies. The results obtained with volleyball coaches confirmed the hypothesis, indicating a highly significant positive correlation between ineffective coping strategies and scores on psychopathological symptoms, as well as with the nine dimensions associated with mental health problems. In this regard, effective coping strategies showed no relationship with the total score on the SA-45 test or with eight of the nine dimensions, except for the psychoticism scale, which did show significance, but with a low correlation.

This information was confirmed through regression analyses, where it was found that ineffective coping strategies make a significant contribution to the various models. Thus, the predictive capacity of ineffective strategies with respect to psychopathological symptoms can be considered relevant. However, the contributions made by effective strategies to the models were not significant, and their predictive capacity can be considered residual.

These results support findings in the literature indicating that a less adaptive coping strategy, such as emotion-focused coping, is associated with mental health problems, while more adaptive strategies, such as task-oriented coping, are associated with better mental health (Cuskelly & Hoye, 2013; Hammermeister & Burton, 2001; Kilic et al., 2021; Ntoumanis & Biddle, 2000). In this context, Nuetzel (2023) demonstrated that effective coping is associated with lower levels of anxiety, while ineffective coping is

linked to higher levels of neuroticism. Similarly, the use of adaptive coping strategies, rather than maladaptive ones, was associated with better mental health and less distress (Cumming et al., 2012).

It would be interesting to analyze, in greater depth, the absence of relationship observed in volleyball coaches between the total score obtained in symptomatology and the subscales, according to whether or not they report having technical staff or assistant coaches. This is especially relevant considering the buffering role that satisfaction with social support may play (Gouttebauge et al., 2017; Kilic et al., 2018).

Finally, the fourth hypothesis suggested that psychological inflexibility would be positively associated with ineffective coping strategies and negatively associated with effective coping strategies. This hypothesis has been partially confirmed, as coaches classified as more psychologically flexible reported significantly lower scores in ineffective strategies, but no differences were found in effective strategies, except in the social coping style, which showed a somewhat significant result. In any case, coaches with high or medium psychological inflexibility tend to use ineffective coping strategies, where the avoidant coping style predominates.

These results support the findings in the literature, which indicate that athletes with high scores in ineffective coping experience a greater number of psychological issues (Hammermeister & Burton, 2001; Ntoumanis & Biddle, 2000), which aligns with greater psychological inflexibility, also associated with mental health problems. In support of this argument, psychological inflexibility, which is often associated with avoidance patterns and behavioral persistence, has shown relationships with avoidance styles, which characterize behaviors defined as inflexible (Chen et al., 2017; McCracken, 2013; Zhang et al., 2014).

Similarly, previous studies have shown that effective coping predicts positive affect (Ntoumanis & Biddle, 1998); this seems to align with the fact that the psychological flexibility model promotes adaptive coping through various processes or skills (Hayes et al., 2006; Wicksell et al., 2010). It can be affirmed that these results indicate the need to continue working to clarify these relationships between coping and psychological inflexibility.

Finally, it should be noted that having a job outside of their sporting activity has not shown any relationship with the scores obtained in psychopathological symptomatology or in the dimensions of mental health problems. In this regard, it had been considered, albeit contradictorily, that having a part-time coaching job served as a protective factor (Hassmén et al., 2019), or that working as a full-time coach acted as protection (Hjälmsjö et al., 2007); an aspect that requires further study to determine how the coach's full-time or part-time employment might influence this.

This research is considered to make valuable contributions to the understanding of the mental health of coaches; however, it is not without aspects that may limit the generalization of its results. Among these limitations, it is important to highlight that the design and methodology used in the study prevent the establishment of causal relationships. Additionally, the data were collected through self-report measures, which can introduce response biases characteristic of these techniques. There is a need to increase control over the activity and context in which the coach operates, as well as the sources of perceived pressure based on the category in which the coaching occurs. It is essential to design studies that allow evaluations at various points during the season, considering the performance of the coached teams, travel, the significance of matches played, etc. One aspect not considered in this study is the management model employed by the coach for the development of their work, as well as their relationships with the club, the press, etc. When studying mental health, the extrinsic activities of the coach (such as family, work, and social life, relationships with the press, relationships with the federation, social support and how it is perceived, etc.) and clinical history should also be taken into account.

In conclusion, it is essential to recognize the importance of mental health, not only in athletes but also in the coaching staff. The well-being of those in technical leadership roles depends on it, influencing their personal performance and the performance of the team they coach. The literature demonstrates how the coach's situation affects the outcome and determines the behavior of the group of individuals involved in high-performance activities. In this regard, it has been found that a significant number of coaches have considered seeking help from a psychology professional due to not feeling well during their coaching duties. Moreover, since the analyzed variables are modifiable, both clubs and sports federations, as well as the relevant institutions, must be sensitive to this demand and design and implement measures to address this need. Similarly, it is always possible to integrate content related to coping strategies and contingency management into the training and accreditation processes for coaches.

Acknowledgements

The authors would like to thank all the participants for their willingness to share their experiences. To acknowledge the collaboration of the Royal Spanish Volleyball Federation.

Author contributions

All authors have read and agreed to this version of the manuscript. All authors conceptualised the study and methodology. All authors contributed to the design and collection of data. All authors were contributed to the analysis and writing of the manuscript.

Data Availability Statement: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding: This work was partly financed by the Estrategia de Política de Investigación y Transferencia de la Universidad de Huelva (EPIT-UHU) support to the Research Group CTS-980.

Informed Consent Statement: Informed consent was obtained from all individual participants included in the study.

Institutional Review Board Statement: All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and the Declaration of Helsinki of 1975, revised in 2013. Approved by the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Act: 05/24. Date of approval: May 14, 2024, Internal Code: SICEIA-2024-001020, Study code: 21071.

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