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ORIGINAL ARTICLE

The Construction of the Intellectual Competition Stress Scale for Handball Coaches

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ABSTRACT

Background. Mental stress during competition is a crucial psychological factor affecting the performance of both athletes and coaches. It influences focus, decision-making, and the ability to execute skills effectively. This stress often manifests as anxiety or pressure in high-stakes situations. Various psychological scales are used to measure mental stress in sports. **Objectives.** The study aims to construct an Intellectual Competition Stress (ICS) scale for handball coaches in Iraq. **Methods.** This study adheres to the Consensus-Based Standards for the Selection of Health Measurement Instruments (COSMIN) methodological guidelines. The research sample consisted of 60 coaches, representing 70.5% of the total study population (85), with an exploratory sample of 4 coaches. A total of 50 statements were developed. The pentatonic scale was used for response collection (always, often, sometimes, rarely, and never), with the corresponding weights being 1, 2, 3, 4, and 5. The chi-square test was used to assess the experts' agreement and statistically analyze their opinions. In the first stage, a preliminary scale was developed. In the second stage, the scale underwent reliability and validity tests. The proposed fields and their theoretical definitions were then presented to 11 experts to determine the validity of the proposed fields using the content validity index (CVI) (index 1). Test-retest reliability coefficients of 0.77 and Cronbach's alpha coefficient of 0.80 were calculated, indicating high reliability. The validity and reliability of the responses were assessed, and the scale was reviewed by 11 expert panel members. **Results.** The coaches' Intellectual Competition Stress index remained moderate (120.52 ± 18.01, $P < 0.05$). **Conclusion.** The final version of the ICS scale, comprising 38 statements, was deemed a suitable tool for measuring intellectual competition stress among handball coaches.

INTRODUCTION

The development that occurs with great leaps in the sports field results from research and studies examining various aspects of sports. The coach is the team's centre of attention (1). He plays a vital role in both the training process of a sports team, by designing and implementing practice plans to develop skills, motivating players, and providing leadership to ensure everyone works together towards a common goal, as well as guiding and leading the athletes to accomplish the goal. This necessitates that the coach has gained adequate experience and ability to withstand and bear the weight of each player's on-field errors, the assistant coaches' mistakes, and the competition's numerous variables, whether they pertain to offensive or defensive strategies. Coaches in elite sport should "ensure a balance between performance, high pressure and

well-being" (2). Stress plays a significant role in sports competitions. Mental stress is a form of stress that occurs because of how events in one's external or internal environment are perceived, resulting in the psychological experience of distress and anxiety (3). Different people in various situations experience stress in different ways. Stress is defined as a condition in which an individual is aroused and anxious by an uncontrollable aversive challenge. It leads to a feeling of fear and/or anxiety (4). It is often accompanied by physiological responses (5). The literature indicates that stress is primarily induced in professions and activities associated with a competitive environment (6, 7).

Since ICS affects the work environment and the trainer's brain, its impact on concentration in the many overlapping situations during handball competitions has increased its significance. This influences the coache's leadership and daily activities and may result in the coache's inability to perform his duties at the usual or critical level.

Sport fields contain many variables, including the training intensity and loads that make up the training process of preparing and building players, a training unit. Competitive stress is an ongoing transaction between an individual and the environmental demands directly associated with competitive performance. It is influenced by competitive stressors (environmental demands) and competitive strains (an individual's negative psychological, physical, and behavioral responses to competitive stressors). In many cases, it results in competitive anxiety—a negative emotional response to competitive stressors (8). In addition to the competition, there are many adverse effects on the psychology of the coach and the player. Nikola Foretića et al. state that the experiences of handball coaches during a match were more stressful than those during training (9). Thotis concluded that stressors, such as negative events, traumas, or strains, can have damaging effects on physical and mental health (10). Coaches may struggle to handle the game situation if they do not adjust to their circumstances.

The coach is impacted by the players' needs and interests while communicating his message to alter the team's emotions and behaviour to reach the goal (11). Reaching a certain level of the ICS is one of those issues that the coach must be able to handle and get past. The importance of this study lies in developing a tool to measure ICS for Iraqi handball coaches.

The importance of conducting this current study lies in keeping pace with the recent changes in handball, as it builds a measure of intellectual competitive stress following the developments that have occurred in handball and increasing its variables, especially the updates to the game's rules, such as the time-out; which stress on the coach to make the appropriate decision and communicate it to the players within one minute. Additionally, the amendment increased the number of players on the court to seven, allowing the goalkeeper to substitute with a field player. This imposes a new tactic that the coach must confront defensively and develop in terms of his team's attack. Additionally, the introduction of the circle in the middle of the field has significantly accelerated the pace of play and imposed extra stress on both teams to perform at this rapid rate, both offensively and defensively. These are the justifications for conducting the current study, which involves constructing a scale for ICS to determine the level of competitive stress following the update of the game's rules.

MATERIALS AND METHODS

Study Design. This study follows the COSMIN (Consensus-based Standards for Selecting Health Measurement Instruments) methodology guidance and has two phases. In the first phase, an item pool was formed through literature review, qualitative interviews, and group discussions. Two rounds were conducted to optimize items and develop an initial scale. Cognitive interviews were then conducted to understand the target population's comprehension of each item, addressing differences that arose during the development process, resulting in the first version of the scale. In the second phase, the scale underwent reliability and validity testing, and the results were analyzed to assess the current status of the handball coaches.

The proposed fields were presented with their theoretical definitions to 11 experts for assessment of their validity and exclusion of those that were not suitable. To analyze the experts' opinions statistically, the chi-square test was used to assess the agreement among the experts, as shown in Table 1.

Then, the items of the initial scale were formulated through cognitive interviews. The second phase focuses on testing the scale's reliability and validity, analyzing the questionnaire results, including item review and

improvement, and validating the scale in terms of content validity, construct validity, and reliability. Additionally, descriptive statistical analysis is conducted on the questionnaire data. Each phase will be briefly described in the following sections.

Table 1. Shows experts' opinions to obtain the validity of the proposed fields.

Fields	Experts opinion		Calculated chi value	Chi-tab value	Sig. level
	Agree	Disagree			
Stress and mental fatigue	11	0	11	3.84	0.001
Thinking[b]	11	0	11		0.000
Training environment	9	2	44.4		0.000
Attentional thinking	9	2	54.0		0.612
Sense of responsibility	10	1	36.7		0.003
Self-confidence[f]	9	2	4.44		0.000

a: A condition characterized by a decreased ability to maintain optimal cognitive performance, including attention, concentration, working memory, and decision-making, as a result of prolonged periods of intense or stressful mental activity (12); b: Internal processing or symbolic representation of events or things (13); c: A complex and dynamic set of social, cognitive, and behavioral influences that an athlete interacts with during training, which directly and indirectly affect their self-beliefs (especially self-efficacy), motivations, and behaviors, and thus their skill acquisition, development, and performance (14); d: Carron (2005) emphasizes the importance of "individual responsibility to the team" as a key component of optimal performance in his theory of group cohesion in sports teams; e: He argues that athletes who feel responsible are more committed to the team's goals and standards and more willing to put in the effort to achieve shared success (15); f: It reflects the degree of belief an individual has about their ability to succeed at a particular task or in specific situations (16).

The suggested scale was established using a descriptive methodology. The descriptive approach is suitable for the goal of this kind of study (17). Studying reality or the phenomena as it occurs in reality is the foundation of this scientific research methodology, the study focusses on accurately describing the phenomenon and expressing it either qualitatively that is, by describing the phenomenon and elucidating its features or quantitatively that is, by providing a numerical description that makes clear the magnitude or quantity of the phenomenon and the extent to which it is associated with other phenomena (18). The following was also done:

- KMO Measure of Sampling Adequacy: 0.82.
- Bartlett's Test of Sphericity: $\chi^2(10)=152.6$, $p<0.001$.
- Variance Explained: Two factors explain 71.5% of the total variance.
- Extraction Method: Principal Component Analysis.
- Rotation Method: Varimax with Kaiser Normalization.

Study Tools. The ICS scale initially contained 50 statements, categorized into five fields, and assessed using a five-point Likert scale (Always, Often, Sometimes, Rarely, Never), with corresponding weights of 1, 2, 3, 4, and 5.

Data Collection Procedures. The exploratory study was conducted on four coaches to ensure the clarity and relevance of scale items. Then, the survey was distributed, and participants responded to the ICS scale anonymously. Informed consent was obtained.

Training Protocol. No physical training intervention was included in this study, as it focused solely on measuring psychological stress.

Reliability Analysis. Test and retest 0.77, and Cronbach's alpha coefficient was calculated (0.80), indicating high reliability.

Comparative Analysis. To determine statistical significance, a t-test was conducted to compare the arithmetic mean (AM) and theoretical mean (TM).

- o Discriminatory power of the ICS scale was tested using an independent sample t-test, analyzing the top 27% highest and 27% lowest scores.
- o The Pearson correlation coefficient was used to confirm that all final scale items corresponded to their respective fields.

Participants. The Participants consist of 60 coaches, who comprise 70.5% of the research community, as defined by 85 handball coaches in Iraq. This number represents all active handball coaches included in the research. The rest of the research population had been out of training for a period and were therefore isolated. The exploratory sample consisted of four coaches from the main sample, representing a 4.70% percentage. The scale was tested on June 5, 2024, and repeated on June 13, 2024. It was done to get the

appropriateness of the scale and the difficulties the sample and the researcher will face during implementation. Identify the time required to obtain sample responses and how to calculate the results.

All participants were informed about the study objectives and procedures and provided written informed consent. The details of the answers were explained, and it was emphasized that their answers should be accurate and appropriate to the situations that occur during sports competition only. They were also informed that their names should not be revealed to ensure they get the correct answer. This study strictly adhered to the ethical guidelines of the Declaration of Helsinki.

Field Research Procedures.

Determining the ICS Scale. All scale phrases were divided into 11 and 9 statements in the first and second fields, respectively, and 10 statements in the third, fourth, and fifth fields.. The statements were formulated in a simple, reliable, and accurate way in the assessment. All the phrases of the ICS scale were constructed in a positive direction (19).

Discriminatory Power. The ability of the scale to discern a substantial difference between the categorical scale's responses is known as discriminatory power (DP). The DP is the capacity to differentiate between individuals with higher and lower levels of the characteristic being measured (20).

To extract the discrimination scale from 60 questionnaires. The response scores were initially arranged in descending order. A ratio of 27% was used to extract the highest and lowest values of the sample for constructing the scale. This represents the optimal ratio for obtaining the highest discrimination coefficients (21). The ability of the candidate test to distinguish between distinct and non-distinct groups in the measured phenomenon is one of the criteria that must be considered when selecting tests with high validity, and it is one of the indicators of their standardization (22).

Internal Consistency. Internal consistency (IC), or what is called the correlation of the phrase with the total degree, is one of the accurate methods, Which knowing whether a situation or phrase of the scales is on the same path as the test or scale as a whole, The most important factor in the process of constructing the test is the correlation coefficient of the phrase with the total degree (TD). The relationship between the phrase degree and TD of scale is one of the tools used in obtaining IC (23).

Honesty. Honesty of the scale depends on the honesty of the phrase that makes it up. It increases or decreases accordingly. Therefore, preparing a valid phrase increases the honesty of the scale. To ensure the honesty of the scale, it was presented to a group of experts, including professors in sports psychology and handball. They agreed on the appropriateness of the phrases and the honesty of the scale for application.

Reliability. The degree to which a test assesses the actual amount of the attribute it is intended to measure, or the degree to which it is free from irregular errors that affect measurement, is known as test score reliability. Test results are considered dependable if a test measures a certain attribute consistently under various conditions that could result in measurement mistakes. Reliability in this context refers to the precision and consistency of measurement (24).

The scale's dependability was confirmed through test and retest, and the extraction correlation between the two tests yielded a value of 0.77. It is dependable and of high quality. The reliability coefficient that can be relied upon is between 0.60 and 0.93 (25). A second method of confirming reliability was to compute the reliability coefficient for the phrases using the Cronbach's alpha formula (26). The Cronbach's alpha formula is one of the most common methods used to measure the reliability of a set of test items or scales, as it is characterized by the possibility of trusting its results (24). This method relies on calculating the correlation between the scores of all the scale phrases, considering each phrase as a separate scale. The reliability coefficient indicates the consistency of the individuals' performance, i.e., the consistency of the scale phrases. This method provides the upper limit of the reliability coefficient (27).

Statistical Analysis. A t-test is used for independent samples to assess discriminatory power by comparing the means of two groups. Cronbach's Alpha is used to measure reliability. This method relies on calculating the correlation between the scores of the scale phrases. The Pearson correlation coefficient measures the relationship between each phrase with the total degree (TD) of scale; the relationship between each field's phrase and the TD of the same field to which it belongs; and the relationship between each field's degree and the scale's TD. Data were analyzed using the SPSS 26.0 software (IBM Crop, Armonk, NY, USA). This scale was validated through exploratory experiments, expert reviews, and internal consistency checks to

ensure reliability and validity in measuring competition stress among handball coaches in Iraq.

RESULTS

The values of the content validity index (CVI) retrieved and the discrimination coefficients were tested using the independent samples t-test; significant at the level ($P<0.05$). All phrases were invalid except 3, 6, 9, 16, 19, 25, 42, 43, 45, 47, and 50. The following 11 phrases were excluded from the study, as shown in Table 2.

Table 2. Shows the content validity index for the scale statement.

Q	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	expert in Agreement	I-CVI	C	UA
q1	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q2	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q3	1	0	1	1	0	0	1	0	1	1	1	7	0.636	invalid	0
q4	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q5	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q6	1	1	1	0	1	0	1	0	1	0	1	7	0.636	invalid	0
q7	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q8	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q9	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q10	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q11	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q12	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q13	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q14	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q15	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q16	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q17	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q18	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q19	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q20	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q21	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q22	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q23	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q24	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q25	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q26	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q27	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q28	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q29	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q30	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q31	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q32	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q33	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q34	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q35	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q36	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q37	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q38	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q39	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q40	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q41	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1

Q	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	expert in Agreement	I-CVI	C	UA
q42	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q43	1	0	0	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q44	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q45	0	0	1	1	1	1	1	0	1	0	1	7	0.636	invalid	0
q46	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q47	1	1	1	1	1	0	0	0	1	0	1	7	0.636	invalid	0
q48	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q49	1	1	1	1	1	1	1	1	1	1	1	11	1	valid	1
q50	1	1	1	1	1	0	1	1	0	0	0	7	0.636	invalid	0
Total	0.86	0.8	1	0.98	0.98	0.9	0.98	0.78	0.98	0.78	0.98				
S-CVI/ Average						0.912727273									

Q: Question; E: Expert; C: Category; Sum of S-CVI = 10; Sum of UA = 38; S-CVI/Average = 0.91; S-CVI/UA = 0.8; Experts rate each item on a 4-point scale (1 = Not relevant, 4 = Highly relevant). Items with scores of 3 or 4 are coded as "1" (relevant), and scores of 1 or 2 are coded as "0". I-CVI: Number of experts rating the item as relevant / Total number of experts; S-CVI: Average of all I-CVI scores; A value ≥0.78 for I-CVI and ≥0.90 for S-CVI is acceptable.

Through the use of Pearson's correlation coefficient (PCC) to calculate the relationship between each phrase and the TD of the scale, it was determined that all phrases were significant ($P < 0.05$), except phrase 24, which was not significant. The scale became 39 phrases as shown in Table 3.

Table 3. Correlation coefficients between each phrase's degree and the scale's total degree.

No.	Correlation	Sig	No.	Correlation	Sig	No	Correlation	sig	No.	Correlation	Sig
1	0.604	0.000	**14**	0.671	0.000	**27**	0.859	0.000	**37**	0.946	0.000
2	0.421	0.001	**15**	0.720	0.000	**28**	-0.361	0.005	**38**	-0.906	0.000
4	0.748	0.000	**17**	0.641	0.000	**29**	0.801	0.000	**39**	0.933	0.000
5	0.859	0.000	**18**	0.831	0.000	**30**	0.484	0.000	**40**	0.602	0.000
7	0.432	0.001	**20**	0.587	0.000	**31**	0.594	0.000	**41**	0.773	0.000
8	0.411	0.001	**21**	0.558	0.000	**32**	0.459	0.000	**44**	0.836	0.000
10	0.777	0.000	**22**	0.748	0.000	**33**	0.593	0.000	**46**	0.919	0.000
11	0.725	0.000	**23**	0.933	0.000	**34**	-0.640	0.000	**48**	-0.483	0.000
12	0.905	0.000	**24**	0.195	0.135	**35**	0.797	0.000	**49**	0.459	0.000
13	0.437	0.000	**26**	0.412	0.001	**36**	0.479	0.000			

To ensure that each phrase corresponds to the field to which it belongs, PCC was utilized to determine the relationship between each field's phrase and the TD of the same field to which it belongs. It was found that there was a significant association between each phrase's degree and the field's overall degree ($P<0.05$), indicating that every phrase belongs to the field in which it was placed. Table 4 displays the statistically significant results for the 38 phrases, demonstrating the scale's appropriateness and IC as shown in Table 4.

PCC was used to confirm the association between each field's degree and overall degree, demonstrating the scale's greater comprehensiveness. All fields were confirmed to be statistically significant ($P<0.05$) as shown in Table 5.

The scale's reliability was confirmed through test-retest, and the extraction correlation between the two tests yielded a value of 0.77. It is dependable and of high quality. Also, using the Cronbach's alpha formula, the overall score for all phrases was 0.80, which was deemed satisfactory, as shown in Table 6.

Distribute the ICS scale forms after ensuring the scale meets its scientific standards. In addition to the fact that the highest degree on the scale was 190 and the lowest was 38, the coaches' degrees on the phrases were computed using the alternative degrees when the ICS was applied. The scale's theoretical mean (TM) was 114, calculated by averaging the answer alternatives.

The (TM) was calculated as follows: sum of alternative weights/number of alternatives ×

number of items (28). Additionally, Table 7 presents the most important statistical parameters of the Intellectual Competitive Stress Scale.

In Table 7 we can see summarized the most significant statistical characteristics, with the ICS scale's total degree (TD) being 190, the arithmetic mean (AM) being 120.52, the hypothetical mean (HM) being 114, the lowest degree falling between 87 and 114, the coefficient of skewness (COS) being -0.552, and the standard deviation (SD) being 18.006. The percentage law was used to obtain the relative efficiency of the sample, which reached 63.43%. The arithmetic mean of the differences (AMOD) was 6.517, standard error (SE) 0.309, while the t-value (T) was 2.803, and the error level (EL) was 2.325.

Table 4. The relationship between each field's phrase and its degree.

No.	Correlation	Sig	No.	Correlation	Sig	No.	Correlation	Sig	No.	Correlation	Sig
15	0.732	0.000	**34**	0.681	0.000	**29**	0.727	0.000	**30**	-0.805	0.000
48	0.516	0.000	**1**	0.769	0.000	**38**	0.616	0.000	**39**	0.896	0.000
32	0.783	0.000	**17**	0.638	0.000	**26**	0.481	0.000	**23**	0.831	0.000
5	0.862	0.000	**7**	0.876	0.000	**31**	0.689	0.000	**44**	0.683	0.000
18	0.547	0.000	**12**	0.644	0.000	**4**	0.443	0.000	**28**	0.743	0.000
8	0.426	0.001	**41**	0.645	0.000	**10**	0.720	0.000	**2**	-0.128	0.008
33	0.809	0.000	**22**	0.738	0.000	**14**	-0.479	0.000	**36**	0.570	0.000
11	0.807	0.000	**40**	0.851	0.000	**35**	0.790	0.000	**21**	0.576	0.000
20	0.905	0.000	**27**	0.777	0.000	**49**	0.503	0.000			
13	0.469	0.000	**46**	0.777	0.002	**37**	0.860	0.000			

Table 5. The correlation coefficients between each field and the total degree of the ICS scale.

No.	Fields	Correlation	Significant
1	SR	0.889	0.000
2	TE	0.957	0.000
3	S&MF	0.906	0.000
4	Th	0.870	0.000
5	SC	0.809	0.000

SR: Sense of responsibility; TE: Training environment; S&MF: Stress and mental fatigue; TH: Thinking; SC: Self-confidence.

Table 6. Shows the reliability coefficients of the five fields of ICS scales by the test and retest method.

Fields	SR	TE	S&MF	TH	SC
TTRC	0.79	0.82	0.77	0.69	0.80
CARC	0.79	0.82	0.80	0.79	0.80

SR: Sense of responsibility; TE: Training environment; S&MF: Stress and mental fatigue; TH: Thinking; SC: Self-confidence; TTRC: Test and retest reliability coefficient; CARC: Cronbach's alpha reliability coefficient.

Table 7. Statistical parameters of the intellectual competitive stress scale.

Unit of measurement	TD	AM	SD	COS	HS	LS	HM
Degree	190	120.52	18.006	-0.552	144	87	114

TD: Total degree; **AM:** Arithmetic mean; **SD:** Standard deviation; **COS:** Coefficient of skewness; **HS:** Highest score; **LS:** Lowest score; **HM:** Hypothetical mean.

DISCUSSION

Table 7 showed that the arithmetic mean was 120.52 degrees with a standard deviation of 18.006, and the TM was 114. Since the arithmetic mean (AM) is higher than the theoretical mean (TM), this indicates that the difference is statistically significant at $P < 0.05$, favoring the AM for handball coaches. The t-test was used to determine the significance of the differences between the arithmetic mean (AM) and the TM, and the results showed a statistically significant difference between the two means, amounting to 0.042 at $P < 0.05$. In normal circumstances, people have a distinctive 'sense of agency', or feeling of control, for events caused by their actions (29).

Our research findings revealed that elite coaches experience various types of stress throughout their sporting careers. Norris et al.

(2017) identified stressors related to athlete performance and injury, such as coach ability, athlete professionalism, attitude, commitment, and athlete injuries (30). In contrast, stressors related to personal coach performance included setting unrealistically high standards for themselves, communicating with others, making good decisions, self-criticism, organizational stress, administrative tasks, financial aspects, overload, a competitive environment, and balancing training and competition. The stressors and expectations related to performance and outcomes were as follows: stressors stemming from coaches' previous experiences, schedules, lack of resources, job security, age, coaching experience, and level of competition. Stressors related to personal experiences include social support, expectations from others (such as parents, media, and employees), and relationships with athletes. Finally, stressors related to personal experiences, performance outcomes, and lack of control (31). In addition, there are stressors related explicitly to athlete and team management (e.g., commitment, conflicts, player selection, job insecurity, and relationships with organizational stakeholders). Among the many stressors identified, organizational stressors (e.g., increased workload, difficulty finding a work-life balance, and the quality of the work environment) have been found to have a significant impact on coaches, as they are cumulative and chronic, leading to some long-term negative consequences (30). Some suggest that organizational stress is the most difficult to manage, as coaches have less control over these stresses than others, such as personal stress (32). Our findings are consistent with those of Chloé Leprince (2024), who reported that, to date, studies have been limited mainly to athletes and coaches or have often been overlooked (33). Given the complexity of their profession and recent findings regarding its impact on mental health and stress, further research is essential to help understand and clarify the causes and mechanisms that underpin any deterioration. The results of these studies could then be used to inform more targeted and potentially more effective interventions to help promote coaches' mental health and well-being in the short, medium, and long term (34).

Results of this study also found that the self-confidence index (psychological stress) was within the average level, and this may be due to many reasons, the most important of which is that it is an indication that the handball game contains many variables, much pressure that falls on the coach, and thus is reflected in the sample response. The impact of psychological pressures is direct on the nature of the human brain, and adapting to the pressures that the individual is exposed to can lead to a malfunction in brain function. However, stress is often manifested in the form of regret or loss of self-confidence (33). This effect was mainly attributed to either physiological arousal or psychological anxiety, both well-documented phenomena associated with a stronger psychological response to the anticipation of stressful situations (35, 36). The coach's interaction with the events of a difficult match differs from that of an easy match, as the match's difficulty is reflected and leaves a psychological and emotional impact that increases psychological tension and thus the difficulty of adapting to match situations. The emotional state of arousal is beneficial unless it induces anxiety (37). It is natural for an individual to feel fatigue after making a particular effort and reach a stage where they cannot regain their normal state (38).

The result of the study can be interpreted as these pressures taking two directions: the positive one, which supports the coach to solve the problems he faces in terms of defensive and offensive formations and strengthening them, in addition to the factor of experience that the coaches possess, as they are coaches in the Premier League and have a long history in the training process and have moved between more than one team, and before that they were assistants to other coaches or coaches of young age groups, as this was reflected in their acquisition of accumulated experiences It led to their good handling of different situations. In addition, the handball game involves many interrelated variables, and the difficulty of performance led to coaches' mastery in dealing with these situations; thus, the level of mental stress during competition did not rise to high levels, and there was a decline in tension and anxiety. Therefore, dealing with stress is of utmost importance to the success of coaches (39, 40).

The level of stress did not rise to high levels in this study. It is an indicator of the coach's ability to adapt to the events of handball matches and their requirements, as leading the team in experimental matches and competition supports the coach's self-confidence. In addition to obtaining external or internal feedback, which is reflected in correcting errors and enhancing successful decisions, thus

reducing the stress of competition. Individual-level factors have been identified as contributing to the improved well-being of elite coaches, including strong psychological skills, practical coping strategies, experience as an elite coach, and regular exercise. However, individual-level factors such as self-compassion and self-awareness can be improved to enhance coaches' well-being (41, 42).

The other direction to interpret pressure is negative, which affects the coach's performance as a result of the players' failure to implement the given instructions by the coach, whether offensively or defensively, and causes the coach's mental frustration, thus reducing the focus with the increase in the events of the match and its importance.

Analyses comparing psychological responses between competition and non-competition days revealed significantly higher ratings on competition days in several stress-related variables: external/internal tension stress, external/internal effort stress, felt arousal, preferred arousal, and unpleasant emotions (43).

Nikola Foretić et al. concluded that: 1) The handball match was more stressful than the training; 90 minutes was sufficient time for HR and Cortisol to establish normal dynamics, while alpha-amylase was still under the effect of the match stress. 2) The data from this study suggested that coaches are more anxious than frightened before and during matches. Hence, stress-coping strategies for handball coaches should be more focused on anxiety control and stress anticipation (9).

It is well known that stress is the individual's effort to control external and internal demands, and one of the components by which the individual interacts with the environment, and control through the perception of the demands and threats the coach faces (44). It is worth noting that organizational and societal influences may pose a greater risk to the health of elite coaches due to these factors and their systematic nature.

Several correlates were found to lower psychological distress, including satisfaction with life balance (i.e., well-being), satisfaction with social support, and older age (44, 45).

Stressful workloads have been identified as a common stressor among elite coaches (46-48). Previous studies have indicated that feelings of stress are influenced by performance, internal and personal matters, self-presentation, and organizational factors (49, 50).

Lundkvist et al. reported that coaches experiencing burnout may adopt a passive style of leadership, where coaches tended to be quieter when addressing or interacting with their athletes (51). Furthermore, the complex and stressful environment in which elite coaches exist can lead to stress (52, 53). Additionally, there are potentially significant health costs associated with the psychological stress that elite coaches may experience (51). So, coaches considerably influence the athletes' physical and psychological development (54). Their cultural and professional backgrounds are important (55, 56). In terms of a positive influence, supportive social interactions within the athletes' environment have the potential to enhance their performance and development (57). Negative social interactions with coaches (due to rejecting or neglecting behaviors) can hinder progress and result in a detrimental athletic experience (58).

The main limitation of this study is the small sample size of handball coaches in Iraq, given the total number of coaches available. This limits the generalizability of the results. Future studies should include a larger number of coaches.

CONCLUSION

This study concluded that the scale revealed the proper level of ICS for elite handball coaches in Iraq. This finding is consistent with the results, which revealed that elite-level coaches generally reported moderate levels of self-confidence and mental well-being. Stress is a highly personal phenomenon that varies between individuals depending on their vulnerability and ability to withstand different tasks. The study also concluded that handball coaches in Iraq have demonstrated a good understanding of the variables they encounter in their dealings with many matches. The five fields were suitable for measuring ICS for handball coaches, and the phrases were suitable for the response time on the scale.

APPLICABLE REMARKS

- Continuous updating of the scale, to evaluate coaches periodically, to keep pace with the development of handball, and ensure its continued use and application in the Handball Federation's evaluation programs for coaches to determine the psychological and mental level, and to support the training level for selecting national team coaches.

- Integrating artificial intelligence into designing scales and tests in scientific research. This step may help develop psychological scales that are different from the current reality and enhance the ability to obtain more accurate responses from the sample.
- Researchers in sports and physical education should consider integrating psychological tests, with the aid of AI, into the practical and applied aspects of their work. This can provide valuable insights into the creative psychological abilities of athletes and help coaches lay strong foundations for psychological aspects in their training programs.

AUTHORS' CONTRIBUTIONS

Study concept and design: Fouad Muttib Hussain. Acquisition of data: Fouad Muttib Hussain. Analysis and interpretation of data: Fouad Muttib Hussain. Drafting the manuscript: Fouad Muttib Hussain. Critical revision of the manuscript for important intellectual content: Fouad Muttib Hussain. Statistical analysis: Fouad Muttib Hussain. Administrative, technical, and material support: Fouad Muttib Hussain. Study supervision: Fouad Muttib Hussain.

CONFLICT OF INTEREST

The author affirms that they have no relationships or financial interests that could be perceived as conflicting with the work described in this paper.

FINANCIAL DISCLOSURE

The author affirms that they have no relationships or financial interests that could be perceived as conflicting with the work described in this paper.

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ETHICAL CONSIDERATION

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The Ethics Committee of the University of Baghdad/College of Physical Education and Sport Sciences reviewed and approved this study.

ROLE OF THE SPONSOR

There is no sponsor.

ARTIFICIAL INTELLIGENCE (AI) USE

No AI was used to prepare the manuscript.

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