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RESEARCH ARTICLE

Predicting Information Processing Skill Level Based On Training Age among Students Practicing Competitive Sports: A Field Study of Students in Physical Activities and Sports Sciences Practicing Competitive Sports at Setif- 2 University

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ABSTRACT

This investigation seeks to ascertain whether the level of information processing skills can be predicted based on training age. Utilizing a descriptive correlational methodology, the research involved 152 of the 251 students (accounting for 60.55%) enrolled in the Physical Activities and Sports Sciences program at Setif 2 University. The Schmeck Information Processing Scale was employed to establish a causal link between training age and information processing skills. The findings indicate that training age accounts for 8% of the variance in information processing skills, thus supporting the potential for prediction based on training age. According to the prediction equation formulated, for each unit increase in training age, information-processing skills improve by 0.36 units.

INTRODUCTION

Competitive sports practitioners, affiliated with various teams and clubs are mandated to follow training regimens prescribed by their coaches. These regimens encompass exercises and training focused on physical, skill-based, tactical preparation, and mental and psychological readiness for competitions. Such training enables athletes to assimilate a substantial volume of information and knowledge, which must be adeptly received, stored, and retrieved as necessary.

Information processing is contingent upon the role of internal cognitive processes and the mechanisms that regulate their functioning, along with the cognitive content managed by these processes. It is a crucial operation in managing internal mental components [1]. This process involves how an individual perceives, discriminates, transforms, stores learned material and employs associations between new and existing information to forge cognitive structures. [2]

Furthermore, the acquisition and processing of information across various stages of sports training, ranging from general and specific physical preparation to pre-competition phases and during actual competitions in matches, combats, and races, equip athletes with the necessary understanding to utilize this information effectively during training and competitive events, particularly under pressure. This highlights the significant role of competitive sports in enhancing and developing information processing skills.

Students engaged in competitive sports demonstrate a commendable level of information processing skills, a result of extensive exercises and knowledge gained during training, as evidenced by several studies. For instance, Al-Mubarak (2009) [3]. Identified a correlation between information processing and cognitive motivation.

The extensive theoretical and practical knowledge imparted through sports practice is affirmed by Sebaa (2008) [4], who found that sports practice notably enhances the ability to process relevant information, even surpassing academically superior non-athletes. Additionally, Mawahib and Tamarah (2018) [5]. Noted a direct link between information processing skills and reception and passing skills in volleyball.

Recent findings by Abdel Wahed (2023) [6] suggest that various information processing methods significantly influence the tactical performance accuracy of football players. Meanwhile, Al-Bayati and Al- Kinani (2017) [7] demonstrated that specialized mental exercises substantially boost the information processing speed of senior football players.

Despite the well-documented role of sports in fostering information processing skills, there remains a variation in athletes' abilities to process information, correlating with their physical, mental, and psychological capacities.

This research aims to investigate the impact of training age on information processing skills among students engaged in competitive sports within the field of Physical Activities and Sports Sciences, exploring the feasibility of predicting these skills based on training age and deriving a predictive equation using a simple regression model. The primary research question posed is:

Can the level of information processing skills be predicted based on the training age of students engaged in competitive sports?

Study Importance:

This research provides vital cognitive insights into information processing skills, emphasizing the pivotal role of sports as a strategic medium in the development of these capabilities. Comprehending how the duration of involvement in competitive sports influences the evolution of information processing skills is crucial.

This understanding aids researchers in devising effective training programs for athletes and guides students toward active participation in various teams and clubs within competitive sports. Such engagement not only aims to enhance mental skills broadly but also seeks to specifically augment information-processing abilities, thereby facilitating cognitive development through structured sports training.

Study Objectives

- To examine the correlation between training age in competitive sports and information processing skills.
- To explore the feasibility of predicting information processing levels based on the duration of training.
- To develop a predictive model through the formulation of a simple linear regression equation.

Study Concepts

Information Processing

This term refers to the array of methods employed by the brain to assimilate and manage information, spanning from superficial to in-depth processing strategies [8].

It includes cognitive strategies that reflect individual differences in performance strategies across various cognitive functions such as perception, thinking, memory, problem-solving, and the interpretation and management of environmental stimuli.[9]

The process involves selecting, interpreting, and making decisions about information, characterized by an intricate organization of reception and response in terms of time and space, executed under conscious or semi-conscious control to accomplish a specific objective.[10]

Training Age

This concept denotes the different stages of training an athlete undergoes throughout their sports career. [11] It is quantified by the number of years dedicated to purposeful and structured sports training. [12]

Competitive Sports:

Defined as a specific sports event or context governed by recognized rules, where athletes or teams strive to exhibit their utmost capabilities and skills resulting from structured training to achieve success or surpass competitors. [13]

This includes activities within a regulated competition framework, necessitating precise preparation [14], and is considered a contest among individuals to attain a desired goal or objective [15].

Field of Physical Activities and Sports Sciences:

This field at Algerian universities encompasses educational programs for students entering sports-related specializations. These include school sports activities, sports coaching, adapted sports activities, sports media, and management and administration in sports.

LITERATURE REVIEW

Amer Rachid Sabaa (2007) [4]: *"Information Processing in Sports Between Academic Excellence and Sporting Practice and its Effect on Performance and Learning of Single Movements."*

This study investigated the impact of information processing on the performance and learning of single movements, employing an experimental methodology with a sample of 40 students from the faculties of Medicine and Sports Education at Baghdad University. The findings highlighted distinctions in information processing between sports practitioners and non-practitioners, with an advantage observed in the former group.

Suleiman Saeed Al-Mubarak (2009) [3]: *"Information Processing and its Relationship with Cognitive Motivation among Students of the Faculty of Basic Education at Mosul University."*

Utilizing a descriptive methodology on a sample of 160 students, this study delved into the correlation between information processing and cognitive motivation. The results underscored a significant relationship between these two variables.

Ali Youssef Al-Bayati and Zaman Saleh Al-Kinani (2017) [7]: *"The Impact of Field Mental Training on the Development of Information Processing Speed According to the VTS System among Some Elite Football Players."*

This investigation explored the effects of field mental training on information processing speed, through an experimental approach with 20 elite league football players. The study concluded that specialized mental exercises markedly boost the information processing speed of football players.

Mawahib Hamid and Tamara Ahmed (2018) [16]: "*Information Processing and its Relationship with the Performance of Passing Skills of Both Types, Top and Bottom, in Volleyball for Female Students.*"

Employing a descriptive method with 21 female students from the Faculty of Physical Education at Baghdad University, this study examined the relationship between information processing and the performance of passing skills in volleyball. The findings indicated a significant association between these two aspects.

Study of Tamarah (2017) [5]: "*Measuring the Level of Mental Skills among High-Level Athletes in Algeria According to Training Age and Competition Level"*

This investigation delves into the influence of training age and competition level on the mental skills of high-level athletes in Algeria, providing an in-depth analysis using a descriptive methodology. The mental skills scale developed at the University of Ottawa, Canada, was administered to a sample of 401 athletes, encompassing members of national teams and professional athletes in Algeria.

The findings reveal significant distinctions in mental skills, with athletes possessing longer training durations and those competing at higher levels displaying superior mental skills. This study enriches our understanding by highlighting the direct benefits of prolonged and advanced level training on the cognitive capabilities of athletes.

Ahmed Amin Abdel Wahed and Saad Jassem Hamoud (2023) [6]: *"The Interactive Effect of Information Processing Styles on Tactical Performance in Football Players."*

This research aims to scrutinize the effects of various information processing styles on the tactical performance of football players. Using a descriptive methodology, the study assessed 70 football players from different clubs across central and southern Iraq, employing scales for information processing and tests for tactical performance.

The results indicated that most information processing styles, such as systematic study, factual retention, and extensive and detailed processing, substantially affect the accuracy of players' tactical performances. However, deep processing did not show a significant impact.

The compilation of previous studies underscores the connection between information processing and sports practice, exploring how these cognitive skills are enhanced through different sports activities.

Nevertheless, these studies have not examined the direct relationship between training age and these skills nor have they implemented predictive equations to ascertain how significantly the independent variable contributes to the dependent variable. This current study builds on the foundation laid by previous research, identifying scientific gaps, shaping the study methodology, selecting appropriate tools, and facilitating the discussion of results.

METHOD AND PROCEDURES

Study Methodology

The research adopted a descriptive correlational methodology, which is well-suited for fulfilling the objectives of this study.

Study Population

The study's target population comprises students from the Physical Activities and Sports Sciences program at Setif University 02 who are actively engaged in competitive sports. This population totals 251 students.

Study Sample

The sample size was determined based on Jaeger Richard's formula, resulting in 152 students, which represents 60.55% of the study population. The selection process involved stratified random sampling, categorizing students based on their university level, ensuring a representative and balanced sample that reflects the diverse levels of training and experience within the student body. The stratification was conducted as outlined in the following table:

Table (01): Sample Size and Selection Method

University Level	Population Size	Percentage	Sample Size
Common Core	109	60.55%	66
Bachelor	72		44
Master	70		42
Total	251		152

Study Tools

Preliminary Scale Form

The study utilized the Schmeck Information Processing Scale, which consists of 4 dimensions and 62 items. Responses to these items are marked as "Applicable" or "Not Applicable." The dimensions of the scale include:

Deep Processing	Systematic Study	Factual Retention	Detailed and Deep Processing
18 items	23 items	7 items	14 Tems

Psychometric Properties of the Scale:

Validity of the Scale:

Extreme Groups Comparison Validity:

The validity was assessed by comparing the scores of the upper third to the lower third after arranging the total scores of the Information Processing Scale in ascending order, as shown in the following table:

Table (02): Results of Extreme Groups Comparison Validity

	Mean	Standard Deviation	T Value	Sig Value	Statistical Significance
Lower Third	24.60	4.94	10.58	0.000	Significant
Upper Third	40.14	4.45			

The table indicates that the Sig value is less than 0.05, thus confirming a significant statistical difference between the mean scores of the lower-performing individuals and the higher-performing individuals, validating the Information Processing Scale.

Internal Consistency Validity:

This was verified by calculating correlation coefficients between the items of the scale and the overall scale score, as detailed in the following table:

Table (03): Results of Internal Consistency Validity

Deep Processing		17	0.554**	33	0.488**	**Detailed Processing**	
01	0.259*	18	0462**	34	0.404**	49	0.529**
02	0.283*	**Systematic Study**		35	0.480**	50	0.453**

03	0.298*	19	0.104	36	0.310*	51	0.483**
04	0.324*	20	0.087	37	0.433**	52	0.433**
05	0.322*	21	-0.132	38	0.460**	53	0.371**
06	0.126	22	0.455**	39	0.370**	54	0.488**
07	0.198	23	0.475**	40	0.311**	55	0.433**
08	0.452**	24	0.344**	41	0.416**	56	0.390**
09	0.245	25	0.350**	**Factual Retention**		57	0.428**
10	0.129	26	0.290*	42	0.491**	58	0.422**
11	0.196	27	0.200	43	0.458**	59	0.517**
12	-0.116	28	0.368**	44	0.550**	60	0.485**
13	0.275*	29	0.442**	45	0.545**	61	0.496**
14	0.438**	30	0.474**	46	0.587**	62	0.585**
15	0.562**	31	0.406**	47	0.447**		
16	0405**	32	0.337**	48	0.217		

Based on the above, the following statements were excluded:

- For the dimension of deep processing: 06, 07, 09, 10, 11, 12.
- For the dimension of systematic study: 19, 20, 21, 27.
- For the dimension of retaining scientific facts: 48.
- For the dimension of detailed and extensive processing: No statements were excluded.

Construct Validity:

Construct validity was verified by calculating the correlation coefficients between the scores of each dimension and the total scale score, after excluding items that did not meet validity standards, as shown in the next table:

Table (04): Results of Construct Validity

Total Scale Score	Deep Processing	Systematic Study	Factual Retention	Detailed Processing
	0.680**	0.806**	0.489**	0.745**

Reliability of the Scale

Split-half reliability:

The scale was divided into two halves after excluding certain items, and the correlation coefficient between these two halves was calculated. The researcher then applied Spearman-Brown formula to adjust for the length of the test, yielding a value of 0.744, indicating good reliability. Cronbach's alpha for the first half of the items was 0.708, and for the second half, it was 0.714.

Cronbach's alpha for composite reliability:

The reliability of the Information Processing Scale, which is multi-dimensional, was verified using the following formula:

$$\alpha = 1 - \frac{\sum V_i \ (1 - a_i)}{V_c}$$

Where α is Cronbach's alpha for composite reliability, V_i is the variance of the dimension, a_i Is the reliability of the dimension, and V_c Is the total variance.

The table below shows the means, standard deviations, variances, and reliability of the dimensions:

Table (05): Data for Cronbach's Alpha for Composite Reliability

Dimensions	**Mean**	**SD**	**Variance**	**Reliability**
Deep Processing	7.33	2.44	5.99	0.595
Systematic Study	8.70	3.74	14.01	0.727
Retention of Factual Information	3.35	1.60	2.53	0.508
Detailed and Extensive Processing	8.58	3.14	9.90	0.719
Total	27.96	7.80	60.88	0.830

After applying the results in the previous formula, we obtained a Cronbach's alpha for composite reliability of 0.83, indicating very good reliability of the Information Processing Scale.

The Final Form of the Scale:

The revised scale contains 51 items distributed across four dimensions as follows:

Table (06): Final Form of the Scale

Dimensions and Scale	**Deep Processing**	**Systematic Study**	**Retention of Facts**	**Detailed Processing**	**Total**
Number of Items	12	19	6	14	51
Positive Items	6	19	4	14	43
Negative Items	6	0	2	0	8

Statistical Processing:

Conducted using a simple linear regression model.

RESULTS AND DISCUSSION:

Verifying the Relationship

Table (07): Results Showing the Relationship between Information Processing Skill and Training Age

Variables		**Information Processing**	**Training Age**
Information Processing	R	1	0.282
	Sig	0.000	0.000

The table indicates that the correlation coefficient between information processing and training age is 0.282 with a significance level of 0.000, demonstrating a statistically significant relationship between information processing skill and training age at a significance level of 0.001.

Predictive Capability Using Multiple Regression Model

Table (08): Results from the Simple Linear Regression Model between Information Processing and Training Age

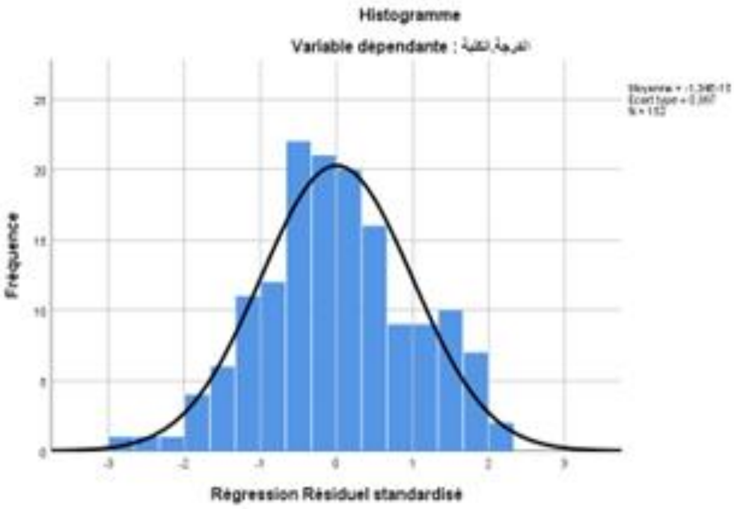
Information Processing	Training Age	R	R^2	F	Sig F	B	T	Sig T
		0.282	0.08	12.97	0.000	0.36	3.602	0.000

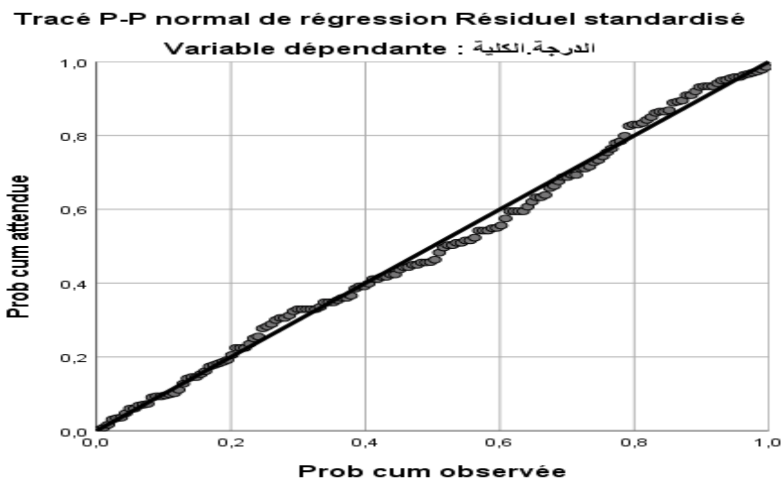
To establish the causal relationship between information processing skills (dependent variable) and training age (independent variable), the study utilized a simple linear regression model as depicted in Table (8). The findings from this model are significant, with an F-value of 12.97 and a p-value of 0.000, which falls well below the significance threshold of 0.01.

These results suggest that training age accounts for 8% of the variance in information processing skills, as reflected by the coefficient of determination (R^2).

The beta value (β), which illustrates the relationship between training age and information processing, showed significant statistical significance. This can be deduced from the T value (3.60) and its associated significance (0.000), which is smaller than the significance level (0.01).

This means that for every unit increase in training age, the information processing skill improves by 0.36 units, as indicated by the beta value (β). The following figures demonstrate the normality of the residuals distribution:

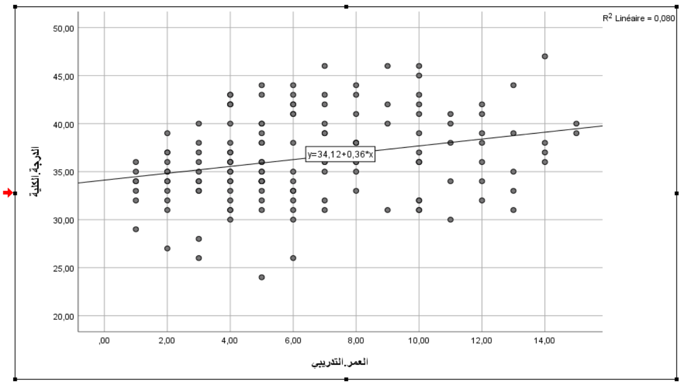




Thus, the regression equation can be written as follows: (**Y = 34.12 + 0.36 X),** which means:

Information Processing Skill = 34.12 + 0.36 Training Age

Therefore, the information processing skill can be predicted based on training age using the aforementioned equation. The following scatter plot illustrates this relationship:



DISCUSSION

The findings from the study elucidate the predictability of information processing skills based on the training age among competitive athletes. This correlation stems from the observation that as training duration extends, athletes enhance their overall preparedness to assimilate extensive knowledge and training exercises that foster diverse aspects of their capabilities.

Significantly, when mental training constitutes a core component of the annual training regimen, it complements both general and specialized physical training, along with pre-competition training.

Although these training forms primarily focus on physical exercises, skills, and strategic planning, they are crucial in bolstering an athlete's mental skills. Furthermore, real-time scenarios encountered during competitions, coupled with the athletes' efforts to recall and apply information pertinent to the immediate context, greatly influence the cultivation of mental skills broadly, and information processing acuity specifically.

Increased training age not only multiplies competitive encounters but also broadens the array of scenarios an athlete navigates, thereby enriching their experiential learning. Following the principles of trial and error, the mastery of these skills is progressively honed with additional training years.

Information processing is acknowledged as a mental skill influenced by the diversity and frequency of exercises, which naturally escalate with prolonged training periods. The principle of continuity in training is pivotal, impacting not just athletic performance but also extending to psychological resilience and cognitive abilities.

Any skill, be it physical, mental, or psychological, deteriorates if training is interrupted. Therefore, sustained training is essential for the acute perception of all stimuli the athlete encounters on the field, facilitating rapid and appropriate responses. [17]

The influential study by Amer Rachid Sabaa (2008) [4] substantiates that athletes' ability to process information significantly exceeds that of non-athletes, irrespective of academic achievements. This disparity underscores the integral role of both cognitive elements and physical training in the development of information processing skills. Regular involvement in competitive sports is demonstrated to substantially enhance and cultivate these skills.

From a cognitive standpoint, participation in competitive sports activities provides athletes with a plethora of knowledge. This includes the reception of sport-specific information and the introduction to motor skills, which precedes their application in practice. Furthermore, athletes engage in the assimilation and implementation of tactical combinations during both training sessions and competitions.

The voluminous information received through various stages of training and years of competitive participation serves to enrich the athlete's information processing capabilities, improving as more information is continuously received and effectively applied in practice.

Cognitive processes are fundamentally based on the integration of basic cognitive operations. The strategic approach to information processing is aimed at fostering an understanding of cognitive elements and facilitating the retrieval of previously acquired information for appropriate application.

Thus, the cognitive structure forms a pivotal basis for cognitive learning as it relates to information processing and preparation. This concept holds substantial importance across various cognitive learning theories, including those proposed by Gestalt psychologists, Kurt Lewin's Field Theory, Jean Piaget's theory of cognitive development which focuses on meaning, and Jerome Bruner's Discovery Learning Theory, as highlighted by Al-Mubarak (2009). [3]

This comprehensive discussion illustrates the profound impact of cognitive and physical training aspects on enhancing information processing skills within the context of competitive sports.

A study conducted by Norwood, J. (1989) [2] investigated how quickly individuals respond to educational stimuli and directions that necessitate guiding behavioral activity toward achieving specific goals. These response speeds, described within the study as cognitive motivations, are positively correlated with enhanced information processing capabilities. This insight establishes a fundamental connection between quick responsiveness to educational directives and efficient cognitive processing.

Supporting this notion, the research by Al-Mubarak (2009) [3] also identified a positive correlational relationship between cognitive motivation and information processing among students. This study corroborates the idea that high cognitive motivation is a significant enhancer of effective information processing.

Mental training, as part of psychological preparation, involves structured mental operations training within a standardized scientific program, as outlined by Al-Dhamad (2014). [18]

This program includes systematic exercises specifically designed to foster a detailed analysis of the application of mental processes in sports skills and tactics. Such training is crucial for the psychological development of an athlete, equipping them with the necessary skills to analyze and utilize cognitive strategies effectively in competitive settings.

Coaches play a pivotal role in this developmental process by implementing mental exercises that simulate critical situations. These exercises compel the athlete to make rapid and accurate decisions to navigate themselves and their teammates out of tactical dilemmas or complex movement sequences that require a special mindset capable of processing multifaceted data and terms.

As noted by Ali Youssef Al-Bayati and Zaman Saleh Al-Kinani [7], such exercises increasingly become complex and intricate as training progresses, which is instrumental in enhancing the athlete's cognitive processing speed. This is further validated by Al-Bayati and Al-Kinani's study, which highlighted that specialized mental exercises significantly accelerate the information processing speed.

Moreover, physical exercises contribute not only to improving the athlete's physical fitness and developing all bodily systems, including the nervous system but also to enhancing cognitive functions. Regular physical training increases blood flow to the brain, stimulates the growth of brain cells and neuronal connections, and improves the brain's functional connectivity.

These physiological enhancements are crucial for strengthening memory, attention, concentration, and overall brain health, thereby playing a vital role in the development of mental skills in general, and information processing skills in particular.

Skill training through skill exercises improves working memory, which is crucial for processing and organizing temporary information, and enhances the ability to store and retrieve information from long-term memory. This enhancement supports learning and comprehension substantially. As skill exercises typically involve explaining the exercise to the athlete and then progressively applying it, from partial to complete and from easy to difficult, this method effectively aids in the reception, encoding, and retrieval of information at the appropriate times during skill execution.

These findings align with the research by Mawahib Hamid and Tamara Ahmed (2018) [18], which established a significant relationship between information processing and the performance of passing skills among female students.

Additionally, Amer Rashid Sabaa (2008) [4] observed that the time allocated for information processing is relatively short for individuals with prior sporting experience, depending on the type and complexity of the skill, compared to those without prior sports experience, where the time required is considerably longer. This difference underscores the impact of sports experience on cognitive efficiency and processing speed in athletes.

Tactical preparation plays a crucial role in an athlete's development, particularly through exercises that involve training across various scenarios. These tactical exercises are designed to enhance an athlete's ability to concentrate, pay attention, and handle complex situations with intelligence. They significantly improve decision-making abilities and the capacity to adapt swiftly to new and evolving scenarios. Each of these factors is integral to boosting and cultivating an athlete's information processing abilities.

Continuous engagement in these tactical exercises and the iterative learning from mistakes during competitions contribute significantly to the development of an athlete's ability to rapidly assess their environment. This capability facilitates efficient and swift processing of information, essential for optimal performance in competitive sports.

In their research, Abdel Wahed and Hamoud (2023) [6] analyzed how different performance variables interact with various information processing styles. Their findings indicated that these interactions are significant and directly impact tactical performance, further emphasizing the importance of tailored tactical training.

CONCLUSION

- There is a demonstrable relationship between information processing skills and training age among students engaged in competitive sports.
- The level of information processing skills can be predicted based on the training age of these students.
- The predictive equation formulated is: ($Y = 34.12 + 0.36 X$) , where Y represents information processing skills and X denotes training age.

Recommendations

- Utilize sports practice as a medium to develop cognitive skills, particularly information processing skills.
- Encourage students to participate actively in sports teams and clubs at local, national, regional, and international levels to enhance their competitive experiences and cognitive skills.
- Implement comprehensive training programs that focus on developing the mental skills of players and trainees, ensuring they are equipped to handle the demands of competitive sports.

- Employ the predictive equation (Y = 34.12 + 0.36 X) to forecast information processing skills based on an athlete is training age, aiding in the customization and optimization of training programs.

COMPETING INTERESTS:

The authors declare that they have no competing interests.

REFERENCES

1) Witkin HA, Goodenough DR. *Cognitive Styles: Essence and Origins of Field Dependence and Independence*. New York, NY: International Universities Press; 1981.
2) Norwood NJ. Speed of information processing and intelligence. In: Kail R, ed. *Ablex Review of Cognitive Development*. Norwood, NJ: Ablex Publishing; 1987.
3) Al-Mubarak SS. Information processing and its relation to cognitive motivation among students of the Faculty of Basic Education at Mosul University. *J Res Fac Basic Educ*. 2009;9(1):54-87.
4) Sebaa AR. Information processing in sports between academic excellence and sports practice and its impact on performance and learning of single movements. *Contemp Sports J*. 2008;7(9).
5) Tamarah H. Measuring the level of mental skills among high-level athletes in Algeria: A comparative study based on the variables of training age and competition level. *J Sci Pract Phys Sports Act*. 2018;7(1):139-148.
6) Abdel Wahed AA, Hamoud SJ. The interactive effect of information processing methods on the tactical performance of football players. *Iraqi J Humanit Soc Sci Res*. 2023;A9.
7) Al-Bayati AY, Al-Kinani ZS. The impact of field mental training on the development of information processing speed according to the VTS system among some elite football league players. *J Fac Phys Educ*. 1437H;28(3).
8) Schmeck RR. Learning styles of college students. In: Dillon RF, Schmeck RR, eds. *Individual Differences in Cognition*. Vol 1. London: Academic Press; 1983:233-279.
9) Shapman S, Shipman NC. Cognitive styles: Some conceptual, methodological, and applied issues. *Rev Res Educ*. 1985;12:229-251.
10) Al-Zaghloul RN, Al-Zaghloul IRA. *Cognitive Psychology*. 1st ed. Ramallah: Dar Al-Shorouk Publishing; 2003.
11) Al-Ali AA. Training age of Kuwaiti female players aged 14-16 and its relation to performance level in volleyball. *Sci J Arts Sports Sci*. 2020;35(35):11-26.
12) Al-Khouli A, et al. *Encyclopedia of Sports Science and Physical Education*. 1st ed. Cairo, Egypt: Dar Al-Fikr Al-Arabi; 2001.
13) Allawi MH. *Psychology of Training and Competitive Sports*. Cairo, Egypt; 2013.
14) Matviev. *Aspects Fondamentaux de l'Entraînement*. Paris: Editions Vigot; 1983.
15) Alderman. *Manuel de la Psychologie du Sport*. Paris: Editions Vigot; 1990.
16) Hamid M, Ahmed T. Information processing and its relationship to the performance of passing skills of both types, top and bottom, in volleyball for female students. *J Intell Res*. 2018;26:185-198.
17) Hussein SA, Natiq G. *Scientific Concepts of Visual Perception*. Baghdad: Al Jazeera Printing and Publishing; 2015.
18) Al-Dhamad ASJ. *Psychology in Sports*. 1st ed. Cairo, Egypt: Dar Al-Fikr Al-Arabi; 2014.