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Editorial

How to write and publish a research paper in physical education: a step-by-step guide for the first time

Cómo escribir y publicar un artículo científico en educación física: guía paso a paso para la primera vez

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Abstract

You want to write and publish your first research paper in physical education, but you don't quite know where to start? We will try to help you from here! Our goal is to help you reach your goal. Without losing academic rigor, but under a prioritized didactic approach, we accompany you in this challenge that begins when facing a blank page for the first time. To this end, we share in this brief but intense essay, three sets of information for you to launch yourself directly into the challenge. First, we show a selected collection of general recommendations for scientific writing. Second, based on the anatomy of an article, we present a step-by-step guide that sequentially addresses the content of the different sections, exemplifying the information in each of them. Third, we describe the publication procedure and aspects to be taken into account, from the initial submission to the final acceptance, including the communication process with the journal.

Keywords: Research report, scientific writing, scientific publication.

Resumen

¿Quieres escribir y publicar tu primer artículo científico en el ámbito de la educación física, pero no sabes muy bien por dónde empezar? ¡Intentaremos ayudarte desde aquí! Nuestro objetivo es que alcances tu meta. Sin perder rigor académico, pero bajo un enfoque prioritariamente didáctico, te acompañamos en este desafío que comienza al enfrentarse a una página en blanco por primera vez. Para ello, compartimos en este breve pero intenso ensayo, tres conjuntos de información para que te lances desde ¡ya! directamente a por el reto. Primero, mostramos una recopilación seleccionada de recomendaciones generales para la redacción científica. Segundo, a partir de la anatomía de un artículo, presentamos una guía paso a paso donde se aborda secuencialmente el contenido de las diferentes secciones, ejemplificando la información de cada una de ellas. Tercero, describimos el procedimiento de publicación y aspectos a tener en cuenta, desde el envío inicial hasta la aceptación definitiva, pasando por el proceso de comunicación con la revista.

Palabras clave: Informe de investigación, redacción científica, publicación científica.

Introduction

There is a wealth of information (books, articles, blog entries, posts) on how to write and publish a research paper. In this essay, the authors present a selected compilation of those general recommendations and specific suggestions that exist in the literature, while at the same time exemplifying specific questions as a step-by-step guide to facilitate the consecutive processes of (1) scientific writing and (2) publication.

Facing, for the first time, a blank page to write a scientific article can represent, in many cases, a truly challenging situation. Not having the necessary tools and skills may even mean giving up or not even trying. Although scientific writing presents a fairly well-defined generic pattern in terms of general structure and specific content of each of the sections that compose it, it is not an easy task. Writing is an activity that needs dedication, time and effort. It also requires an initial motivation that can overcome the barriers and obstacles you will encounter. Although this feat is not without difficulty, if the title of the article and the summary caught your attention, and you surpassed the threshold of interest necessary to get this far, that means it is time to start with this achievable challenge. We invite you to this brief but intense journey through the 'life' of an article from birth to publication.

What is a Scientific Article (Research Paper)?

It is a written and published report that explains the results and new contributions of a research study, discussing the findings in relation to previous existing knowledge (Day, 2005).

What are They for?

The UNESCO Guide for the writing of scientific articles for publication (1983) states that 'the essential purpose of a scientific article is to communicate the results of research, ideas and discussions in a clear, concise and direct manner' (p. 2). Therefore, the publication of a scientific article represents the final stage of the research process (Villagrán & Harris, 2009), i.e., it is when the new findings are made known in an objective way (Salamanca, 2020).

Research and publication are two activities that are directly related. Publishing is the means by which advancements can be incorporated into scientific knowledge (Lam, 2016). It is the means by which new findings can be communicated, results reported and made available to the community. It is also worth highlighting the formative function (García, 2011) with which they comply, improving the teaching practice of physical education (PE) teachers through innovative proposals and stimulating professional growth (Piedrahita-Mejía & Valencia-Gómez, 2019). Therefore, the information from a scientific article is not only intended for other researchers, but acquires its true meaning and significance when it serves for teaching practice. In fact, this should be the main goal because, otherwise, it would be of little use.

General Recommendations for Scientific Writing

One of the most important basic premises before starting to write is 'to have something (important-interesting) to tell'. Although this may seem obvious, it is worth starting from this initial reflection. In this sense, we consider very accurate the eloquent statement of Murillo et al. (2017) when trying to write a good article: 'there are no shortcuts' (p. 6). Without solid research, a good article cannot be produced.

Another aspect of interest to consider is that articles are written 'for other people', i.e., returning to the conceptualization of what a scientific article is, the true meaning lies in communicating with others through a piece of writing. Therefore, from the very beginning, it is crucial to stop and think about how I am going to transmit and share my 'story' so that it can be understood by the recipients.

Based on these preliminary ideas, we present below a selected compilation of 14 general recommendations, mostly from other scientific fields, which we consider highly transferable and applicable to our area of knowledge:

1. Accuracy, clarity and brevity (Santesteban-Echarri & Núñez-Morales, 2017).
2. Thoroughly review previous existing literature to ensure the novelty/originality of the research (Ecarnot et al., 2015).
3. Have a structured planning for writing (Arias-Carrión, 2024).
4. Begin with the end in mind (Hoogenboom & Manske, 2012).
5. Choose the message well and put yourself in the place of who is going to read it (Villagrán & Harris, 2009).
6. Formulate solid messages and arguments avoiding the unnecessary (Gallardo, 2020).
7. Maintain a consistent narrative (Arias-Carrión, 2024).

8. Define very specifically the purpose of the research (Atzen & Bluemke, 2022).

9. Disclose new data and results in a straightforward and logical manner (Arias-Carrión, 2024).

10. Present a clear, relevant, and engaging story within a structured framework (Arias-Carrión, 2024).

11. Demonstrate utility on how your research contributes and helps to better understand some aspect (Iskander et al., 2018).

12. When you consider your article ready, share it with colleagues and receive feedback (Busse & August, 2021).

13. Be patient and persistent (Goh & Bourne, 2020).

14. Practice, practice, practice (Peterson et al., 2018).

The prestigious journal *Nature* offered some advice on how to write a 'first-class' article ('How to produce a first-class paper that will get published, stand out from the crowd and pull in plenty of readers') through interviews with a panel of experts. Two of the most salient core ideas were as follows (Gewin, 2018):

(1) ***Keep your message clear***. *'Think about the message you want to give readers. If that is not clear, misinterpretations may arise later. And a clear message is even more important when there is a multidisciplinary group of authors, which is increasingly common. I encourage groups to sit down together in person and seek consensus, not only on the main message, but on the selection of data, visual presentation and information needed to convey a strong message. The most important information should be in the main text. To avoid distraction, authors should put additional data in supplementary material. Countless manuscripts are rejected because the discussion section is so weak that it is obvious the writer does not clearly understand the existing literature. Writers should put their results in a global context to demonstrate what makes those results significant or original. There is a narrow line between speculation and evidence-based conclusions. An author can speculate in the discussion - but not too much. When the discussion is all speculation, it is not good because it is not rooted in the author's experience. In the conclusion, include a one or two sentence statement about what research you plan to do in the future and what else needs to be explored'* (Angel Borja).

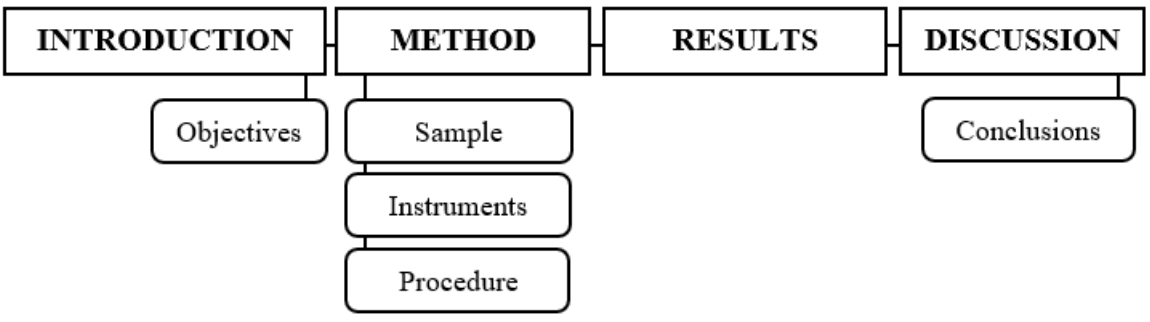
(2) ***Create a logical framework***. *'Structure is paramount. If you don't get the structure right, you have no hope. It's crucial to focus your paper on a single key message, which you communicate in the title. Everything in the paper should logically and structurally support that idea. You have to guide the naive reader to the point at which they are ready to absorb what you did. As a writer, you need to detail the problem. I won't know why I should care about your experiment until you tell me why I should'* (Brett Mensh).

Structure and Organization of a Scientific Article

Although the anatomy of a scientific article is quite rigid in terms of the sections that compose it, there is room to give meaning to the content that is expected to be found in each of these parts. The writing of a scientific article is not as open as a press release in terms of creative possibilities, but the common thread from the introduction to the conclusion must always be present, so it also has the characteristics of a 'story to tell'; be careful! always without losing rigor.

It could be said that the basic structure of a generic research article has already been invented and it will be very rare to deviate from this arrangement. Figure 1 shows this basic structure. We invite you to search for a scientific article in PE on a topic of your interest in Google Scholar® in order to identify these sections.

Figure 1
Basic general structure of a scientific article



This IMRyD model (Introduction, Method, Results and Discussion) constitutes a standard format in the academic field. Originating mainly in Physics and Medicine journals, it is currently applied in the scientific fields of Humanities and Social

Sciences (Codina, 2022), including some variants that allow a better adjustment to both the object of study and the methodology used (quantitative, qualitative or mixed). In any case, and although the essential components do not vary, we recommend reviewing the specific rules of each journal to adapt our article as required in each case.

As a practical recommendation, although the order of presentation of the information in an article follows these sections, this does not necessarily imply that we should prepare them chronologically in this way. In fact, it is more common to choose a writing order where the method and results are addressed first, followed by the introduction and discussion (Santesteban-Echarri & Núñez-Morales, 2017). Similarly, in more advanced stages of the manuscript, it is also common to 'jump' and 'touch up' small details in different sections to find the maximum level of coherence and agreement in the general thread.

Step-by-step Guide to Scientific Writing

However, prior to the central structure, there are other important elements that are also used to index the articles in the databases: Title, Abstract and Keywords.

Title

Will any title do, or should it be carefully thought out? The title is the first thing you see and read. It is the illuminated sign at the front door. It is the business card with the welcome message, and it must make a good impression. Notice if its level of importance is so high, that after this first impact, people will decide whether to continue reading or not. Therefore, finding a good title for the article is undoubtedly something that deserves (a lot) of time.

Precisely on this question of how to give an attractive title to an article to attract attention, and making a play on words, Morales-Castillo et al. (2014) found a good 'hook' for it by titling their article 'How to make the title of an article a hook for readers?' It goes without saying that other possible alternatives of the type 'The title of an article', would provoke a more 'indifferent' effect. Along the same lines, Hernández and Moreno-Martínez (2020) also managed to provide the necessary 'spark' with the article entitled 'Science is also needed to write a title'. Indeed, the title of an article should above all be clear, but, as far as possible, it would be convenient if it could incorporate some small dose of 'hook' that could enhance interest in its reading. As Day (2005) points out, a good title will be a prelude to a good article.

In addition to being brief, concise, concrete, precise and 'straight to the point', it should anticipate, as far as possible, information regarding the main results and conclusions. For example, for studies of a cross-sectional nature: 'Positive relationships between cooperation and academic performance in PE' versus 'Cooperation and academic performance in PE'. In the first case, the title already 'discovers' from the outset what the findings are, informing about the directionality of the relationships. However, the second option presents an exclusively descriptive character of the variables analyzed, without 'advancing' the connections found in the data. For example, for studies of a quasi-experimental nature: 'Cooperative learning increases intrinsic motivation after a three-month intervention' versus 'Effect of cooperative learning on motivation...', or 'Influence, incidence, impact... of cooperative learning on...'. In the first case, the effect observed after the implementation of the model is reported, while in the other cases it is only indicated that the objective was to analyze the impact, but it is not known whether it was positive or negative.

On the other hand, however, titles that respond to a more descriptive and general idea are a good fit for research projects that have not yet been started or are intended to be developed, since for this particular casuistry the results obtained are not yet known.

Whether it is an article, project or presentation to an audience, in any case, you should keep in mind that it will be the first thing they will read and hear, so it is worth thinking about what title could best represent your study and make it more attractive. Capturing the attention of the reading public is also part of the process. Precisely for this reason, it is advisable to share possible titles not only with professional colleagues, but also with friends and family (even if they are not familiar with the research) in order to get feedback on their impressions.

Likewise, and prior to publication, it will also be the first thing that the magazine's editorial team will see and read, so once again the title becomes especially (or doubly) relevant. It is highly recommended to 'think over' the final composition of those 15 words (approximately) placed at the beginning of our article. For these reasons, it is common for authors to evaluate different alternatives and not close their final proposal until the end. In fact, it could be said that although the title is the first thing that appears, perhaps (very probably) it is the last thing that is written.

According to Bavdekar (2016) there are different types of titles that can be used in scientific publications (see Table 1). In any case, it is recommended that it does not include abbreviations or very technical expressions that make it difficult to pay attention to them.

Table 1
Types of titles that can be used in a scientific article

Taxonomy	Definition	Example
Descriptive	Description of the article without alluding to the main findings	*Use of Polar to analyze class intensity in physical education students*
Declarative	Statement of the most relevant findings of the investigation	*The use of Polar for the optimization of effort and cognitive resources in physical education*
Interrogative	Relationship and integration of the research question to be answered in the study	*Is Polar a good teaching resource for matching effort intensities in physical education classes?*

Abstract

If we said earlier that the title is the presentation card, the summary is the welcome letter, and forms an inseparable tandem with the title as an 'initial meeting'. After the title, it will probably be the second thing that the reading public sees, and also, prior to possible publication, the editorial team. From this impact, people will decide whether to read more of the article, some sections, or even the entire article. Similarly, the editorial team will assess the quality level of the manuscript to decide whether to initiate (or not) an improvement process which, in this case, will also include reading it in its entirety.

It should also meet the same qualifying adjectives as the title, in terms of brevity and 'straightforwardness'. We find in the literature, fundamentally two types of summaries: structured (sections Figure 1) and unstructured (free format). However, in both cases the quality of the information responds to the same essence, i.e., to present the fundamental elements of our study. Through very specific sentences, you should try to refer to the central points of your research. The abstract is a 'small version' of the article, where the main information appears in a compact and condensed form (López-Leyva, 2013).

Key-words

The terms already used in the title should not be reiterated here, thus expanding and facilitating correct indexing in databases. Recovering some previous examples, for an article that includes in the title 'cooperative learning in physical education', it would not be advisable to include as keywords 'cooperative learning' or 'physical education', but other more generic ones such as: 'teaching', 'learning', 'methodology', 'school'. As a general suggestion, if the title accurately reflects the essential terms of the study, the key words try to represent what are, in a more global sense, the fundamental pillars in which our research is inserted. Although this may seem a minor issue, it is certainly relevant to the extent that in the search processes in databases (e.g., Web of Science®, Scopus® or Dialnet®), they play a determining role, together with those of the title, to make our publication more easily identifiable and 'salvageable' for the rest of the scientific community and professionals in the field of PE.

Introduction

Two key aspects could characterize a quality introduction. First, it emphasizes the concrete presentation of the results found in the previous literature, i.e., a very clear (and usually brief) presentation of the previous background. This idea is also referred to as the 'state of the art'. For example, if in our article an investigation was carried out on how the teacher's interpersonal style influences the student's more self-determined motivation during PE classes, it would be convenient to start by briefly exposing the theories that support the mentioned constructs (e.g., Self-Determination Theory). In the introduction, the important thing is not so much to elaborate a complete theoretical framework (i.e., to explain very carefully the postulates of Self-Determination Theory, to continue with the example), but rather to make a precise and concrete review of previous and similar research that has been carried out.

Secondly, and integrated with the previous idea, the gap or lacuna to be addressed in the literature should be identified, explicitly including the aspect to be studied, making it very clear what the purpose of the research is. In this sense, systematic reviews of the literature can be of great help because they synthesize what is known about a specific aspect of our subject, while identifying which aspects still need to be addressed. For example, if your article is about pedagogical models in PE, turning to existing literature reviews (Fernandez-Rio & Iglesias, 2024), can be helpful for this.

In other words, the first part of the introduction begins in a general way by identifying the frameworks on which the research is going to be based, going into the gaps that will be deepened in the second part of this section and that you will try to overcome with the research to be presented.

Finally, it is customary to place the research question, objective(s) or hypothesis (as appropriate) in the final part of the introduction, sometimes even located as a subsection.

Method

The method is one of the most important and sensitive parts of the article. Important because it helps to understand what has been done to arrive at the findings that will follow. Sensitive because it is here that if there is a procedural error, the rest of the article will be incorrect. Precisely, the best general guidance that can be given in this section is to think about writing it in a way that allows other researchers (or even ourselves in the future) to reiterate the experiment or intervention described (Foong-May, 2014). The (easily) 'replicable' character is an indicator of quality.

It is usually structured in four subsections: Sample or Participants, Instrument(s), Procedure, and Data Analysis. Let's look at the thrust of each below.

The subsection on the sample (participants) describes the characteristics of the sample participating in our research. For example, information on size, age, experience... should also refer to specific aspects that could be of interest for a more 'accurate' interpretation of the data. For example, if I propose a study to try to improve intrinsic motivation through an intervention based on Cooperative Learning, it would be relevant to know both the previous experience of the teacher with this pedagogical model and the previous experience of the students with this methodological approach. Therefore, an adequate description of the sample will depend on what we need to know, so that the data obtained do not later 'distort' what we intend to find out. Other aspects related to informed consent and approval of the study by the ethics committee are usually also part of this section.

The subsection on instruments includes information on how the data were obtained. All instruments used and the target variables on which data collection took place are mentioned. For example, if a research study analyses integrated regulation during a learning situation related to basketball initiation, this section will briefly describe the scale used, which, continuing with the example, could be the Perceived Locus of Causality Scale 2 (PLOC-2; Ferriz et al., 2015). For qualitative studies, all the techniques used to collect data should be included. For example, a recent article by Brock et al. (2023) specifies that personal reflective notebooks, focus groups and individual interviews were carried out, including some example questions, number of groups and intervention time, among other relevant issues.

In the subsection on the procedure, descriptive information about the process carried out is usually included in a chronological manner. If it is a research that includes a real intervention (for example, the application of a Pedagogical Model in PE classes), the most notable points should be presented, such as, for example, the basic structure of the classes, when the pre-test and post-test were carried out, or how fidelity in implementation was ensured (Iglesias and Fernandez-Rio, 2024).

Finally, it is also common to include a subsection on data analysis. It should refer to all the statistical procedures used, in the case of quantitative research or discourse coding, in the case of qualitative studies, that were carried out to break down the results. Here it would also be interesting to add the software used (if any).

Results

They should be presented in a 'cold' manner and without interpretations. They are usually accompanied by tables and/or figures, graphs, diagrams, etc., which offer valuable information about the data obtained and facilitate a clear visualization in the 'vast sea of data, instead of immersing the reading public in an ocean of figures and texts' (Arias-Carrión, 2024, p. 5). Comments on the tables should not include assessments regarding the reason for the data. They are simply shown in a neutral manner, without making value judgments. Some possible examples could be: 'descriptive statistics show average values between four and five' (we do not indicate here what this could be due to), 'girls present significantly higher values compared to boys' (we do not explain here possible reasons for this difference).

Sometimes a serious error can be made if the appropriate terminology is not used to present the results. This will depend on the type of research design used. If it is a quasi-experimental study, it would be correct to use statements that include terms such as, for example, 'impact', 'effect', 'cause' or synonyms. In the case of association studies between variables, expressions containing terms such as, for example, 'relationship between', 'connection', 'correlation' or synonyms will be used. Sometimes this same error can also be made when interpreting the data in the section relating to the discussion, or even when trying to draw final conclusions and practical implications.

Discussion

In this section, the data obtained are compared with findings from existing literature. Now is the time to check whether the results obtained are in line (or not) with what is known so far. This is perhaps the most difficult part of writing, where interpretations must be guided by data and evidence. The discussion 'acts as a bridge that connects raw data with reasoned conclusions, framing those results within the global landscape of the field of study' (Arias-Carrión, 2024, p. 4).

It is common to start this section by recalling what the purpose of the study was, in order to subsequently establish a dialogue between the findings found and previous evidence. For this section, phrases and statements such as: 'The

data suggest that PE should be approached from a more democratic and reflective perspective…', 'Perhaps these findings could be explaining the key aspects of a more inclusive PE…', 'In line with previous studies, the benefits found after the intervention…', 'Unlike previous research, these data seem to reflect…' are considered quite pertinent.

It is also common to end this section by referring to the strengths, limitations and future research that could be derived towards a future agenda. The strengths should highlight the importance of having carried out the study, that is, they should indicate the relevance of the research carried out, as well as the interest in advancing knowledge. Another important point for reflection is to identify and recognise what the limitations of the study were (for example, the size of the sample used, the context, the methodology used…). Based on this analysis of possible 'weaknesses', it would be appropriate to state some challenges for future research, outlining some options and paths to continue advancing in the understanding of the aspects linked to PE quality.

Conclusions

Sometimes they are included as the final part of the discussion. Other times they are presented in a separate section (this will depend on the specific rules of each journal). It is the main message of the study. It is the essence. It is the contribution. It is what we communicate as 'new'. An important general recommendation is that the conclusions of a research study 'cannot go beyond the data', but neither can they reiterate the results or return to the discussion. For example, in a descriptive study with PE teachers it could be stated: 'Teacher training in new technologies should be promoted given that the majority of the teachers surveyed declare that they are useful but lack knowledge of their use in the classroom…' Sometimes they are also accompanied by some practical implications that are derived from the study. For example: 'teacher intervention in PE should contemplate active participation…'

References

In most cases, the use of APA 7.0 standards will be the most common in PE articles. However, this will depend on the journal you choose to publish your study in. It is recommended to carefully review the standards, both for correct citations throughout the text and for the final list of bibliographical references used. Check and ensure that all citations correspond to the final list of references. Likewise, verify that all references are reflected at some point in the text in the form of a citation. This lack of (double) concordance is a common error.

Acknowledgements

Show your gratitude to those people and/or institutions that made it possible to turn your research idea into a rigorous study. If you have obtained funding, please indicate this as well.

The Process of Submission and Communication With the Scientific Journal

Once the article is considered ready for submission, the phase of adapting the manuscript to the specific (formal) requirements of the journal begins. Although each journal has specific rules and, therefore, it is difficult to offer general recommendations, it is possible to point out frequent differences in the maximum number of words allowed, the format and number of words allowed in the abstract, the citation format or where to place the tables and/or figures. Even so, we again insist on the need to review these rules each time a new submission is to be made.

Once the manuscript is ready to be sent, it will be necessary to register on the journal's computer platform. After completing this process, the submission of the article will begin. All journals present a more or less similar pattern. It will be necessary to attach, at least, the original anonymized document (depending on the journal's rules, the original document with cover and complete author data, figures in separate files, supplementary tables, etc.) must also be uploaded, as well as entering the complete data of the signatories (name and surname, affiliation, ORCID and email). Once the submission has been made, it is time to wait.

The first phase of review will be carried out by the journal's administration, who will check that the manuscript follows the established standards. Next, it will be sent to the editorial team for a first scientific review, that is, to check the novelty, relevance and possible impact of the article if it is accepted. They will then make the decision to reject the article or send it for anonymous review. In the first case, we will receive an email confirming the rejection and, in the second, we will not receive anything (usually). Typically, the journal's platform will provide information about the status of the article and, again in most cases, you will be able to see the change from 'under review by the editorial team' to 'under review'.

The reviewers will make specific comments on the work and will recommend to the editorial team: (1) reject the article, (2) request major changes, (3) request minor changes or (4) accept it for publication. The editorial team will then communicate its decision to the authors via email. If modifications are required, the authors will have a deadline set by the journal to make them and/or respond to the requested comments. To do so, the authors will copy these comments into a new document and make the relevant changes to the original submission. In the new document, they will respond to each of the

comments, indicating, in each case, the modifications made as a result. It is recommended that the tone of the conversation and debate during the process of improving the quality of the manuscript always be respectful and grateful for the review work. Once the review is finished, the documents will be sent to the journal. This process will be repeated as many times as necessary, until the article is considered ready to be published. After receiving the long-awaited email informing about the acceptance of the article, the publication process will begin. The authors will receive the formatted article to check that everything is correct. Once the journal has obtained the approval, it will be published. We present a summary of this entire process in Figure 2.

Figure 2
Submission process and communication with the scientific journal

In addition to this general process, some specific PE journals have presented some concrete recommendations and suggestions. For example, for the journal *Physical Education and Sport Pedagogy*, the editorial team (Kirk et al., 2014) shared guidelines in line with what was presented here. Similarly, also for the *Journal of Teaching in Physical Education* (Richards et al., 2021, 2023).

Final C omment

While reading about how to write and publish a scientific article is useful, perhaps the most important thing is to practice. For an initial contact, some prior guidance can be of great help in taking the first step and, together with reading previously published articles, these can be two important precursor activities before facing a blank page for the first time. However, while recognizing the value and usefulness of this prior preparation, the key is to dive into the challenge, face it, get to work, and practice a lot. It could be said here that 'you learn to cook in the kitchen', making mistakes as in any learning process and gradually improving your skills.

Some experienced people may be more skilled when writing their new article, but each study is a new 'story' to tell, constitutes a new challenge, and requires an effort independent of previous experiences. Therefore, on all occasions, although more so at the beginning, it is advisable to re-position all the keys related to how to write and publish an article in order to face the process with the greatest guarantees of success.

Finally, we believe it is important not to hide the fact that writing and publishing an article is a tough task with a certain level of complexity. Although it involves time, dedication, and effort, it is achievable for anyone who sets their mind to it and brings great personal and group satisfaction, as it is a way to share with others... Are you ready to give it a try...?

Ethics Committee Statement

Not applicable as the article is a theoretical essay.

Conflict of Interest Statement

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Authors' Contribution

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Data Availability Statement

Not applicable. The article does not present empirical data.

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Editorial

Cómo escribir y publicar un artículo científico en educación física: guía paso a paso para la primera vez

How to write and publish a research paper in physical education: a step-by-step guide for the first time

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Resumen

¿Quieres escribir y publicar tu primer artículo científico en el ámbito de la educación física, pero no sabes muy bien por dónde empezar? ¡Intentaremos ayudarte desde aquí! Nuestro objetivo es que alcances tu meta. Sin perder rigor académico, pero bajo un enfoque prioritariamente didáctico, te acompañamos en este desafío que comienza al enfrentarse a una página en blanco por primera vez. Para ello, compartimos en este breve pero intenso ensayo, tres conjuntos de información para que te lances desde ¡ya! directamente a por el reto. Primero, mostramos una recopilación seleccionada de recomendaciones generales para la redacción científica. Segundo, a partir de la anatomía de un artículo, presentamos una guía paso a paso donde se aborda secuencialmente el contenido de las diferentes secciones, ejemplificando la información de cada una de ellas. Tercero, describimos el procedimiento de publicación y aspectos a tener en cuenta, desde el envío inicial hasta la aceptación definitiva, pasando por el proceso de comunicación con la revista.

Palabras clave: Informe de investigación, redacción científica, publicación científica.

Abstract

You want to write and publish your first research paper in physical education, but you don't quite know where to start? We will try to help you from here! Our goal is to help you reach your goal. Without losing academic rigor, but under a prioritized didactic approach, we accompany you in this challenge that begins when facing a blank page for the first time. To this end, we share in this brief but intense essay, three sets of information for you to launch yourself directly into the challenge. First, we show a selected collection of general recommendations for scientific writing. Second, based on the anatomy of an article, we present a step-by-step guide that sequentially addresses the content of the different sections, exemplifying the information in each of them. Third, we describe the publication procedure and aspects to be taken into account, from the initial submission to the final acceptance, including the communication process with the journal.

Keywords: Research report, scientific writing, scientific publication.

Introducción

Existe abundante información (libros, artículos, entradas de blogs, posts) sobre cómo escribir y publicar un artículo científico. En este ensayo, los autores presentamos una recopilación seleccionada de aquellas recomendaciones generales y sugerencias específicas existentes en la bibliografía, al mismo tiempo que ejemplificamos cuestiones concretas a modo de guía y paso a paso, para facilitar los procesos consecutivos de (1) redacción científica y (2) publicación.

Enfrentarse, por primera vez, a una página en blanco para escribir un artículo científico puede representar, en muchos casos, una situación verdaderamente desafiante. No disponer de las herramientas y las destrezas necesarias podría implicar incluso el abandono o ni siquiera intentarlo. Aunque la redacción científica presenta un patrón genérico bastante definido en cuanto a estructura general y contenido concreto de cada una de las secciones que lo componen, no es una tarea fácil. Escribir es una actividad que necesita dedicación, tiempo y esfuerzo. Requiere también una motivación inicial que pueda superar las barreras y obstáculos con los que te encontrarás. Aunque esta hazaña no está exenta de dificultad, si te llamó la atención el título del artículo y el resumen, y superaste el umbral de interés necesario para llegar hasta aquí, eso significa que es el momento de comenzar con este reto alcanzable. Te invitamos a este breve pero intenso recorrido por la 'vida' de un artículo desde que nace hasta que se publica.

¿Qué es un Artículo Científico?

Es un informe escrito y publicado que explica cuáles son los resultados y nuevas aportaciones de un estudio de investigación, poniendo en debate los hallazgos encontrados en relación al conocimiento previo ya existente (Day, 2005).

¿Para qué Sirven?

La *Guía para la redacción de artículos científicos destinados a la publicación* de la UNESCO (1983) establece que 'la finalidad esencial de un artículo científico es comunicar los resultados de investigaciones, ideas y debates de una manera clara, concisa y fidedigna' (p. 2). Por tanto, la publicación de un artículo científico representa la etapa final del proceso de investigación (Villagrán y Harris, 2009), es decir, es cuando se dan a conocer de forma objetiva los nuevos descubrimientos encontrados (Salamanca, 2020).

Investigar y publicar son dos actividades que están directamente relacionadas. La publicación es la manera en que los avances pueden incorporarse al conocimiento científico (Lam, 2016). Es el medio que permite comunicar nuevos hallazgos, informar sobre resultados y ponerlos al servicio de la comunidad. Cabe destacar también la función formativa (García, 2011) con la que cumplen, mejorando la práctica docente del profesorado de educación física (EF) mediante propuestas innovadoras y estimulando el crecimiento profesional (Piedrahita-Mejía y Valencia-Gómez, 2019). Por tanto, la información contenida en un artículo científico no solo va destinada a otros investigadores, sino que adquiere su verdadero sentido y significado cuando sirve para la práctica docente. De hecho, esta debería ser la pretensión principal porque, de lo contrario, sería poco útil.

Recomendaciones Generales para la Redacción Científica

Una de las premisas básicas más importantes antes de empezar a escribir es 'tener algo (importante-interesante) que contar'. Aunque pudiese parecer algo muy evidente, merece la pena partir de esta reflexión inicial. En este sentido, consideramos muy acertada la elocuente afirmación de Murillo et al. (2017) a la hora de intentar escribir un buen artículo: 'no hay atajos' (p. 6), sin una buena investigación no puede derivarse un buen artículo.

Otro aspecto de interés a considerar previamente es que los artículos se escriben 'para otras personas', es decir, volviendo a la conceptualización de qué es un artículo científico, el verdadero significado reside en la comunicación con los demás a través de un escrito. Por tanto, desde el primer momento, resulta crucial detenerse a pensar sobre cómo voy a transmitir y compartir mi 'historia' para que pueda ser comprendida lo más adecuadamente posible por parte de los destinatarios.

Bajo estas ideas previas, presentamos a continuación una recopilación seleccionada de 14 recomendaciones generales, provenientes en su mayoría de otros campos científicos, que consideramos muy transferibles y aplicables a nuestra área de conocimiento:

1. Precisión, claridad y brevedad (Santesteban-Echarri y Núñez-Morales, 2017).
2. Revisar a fondo la bibliografía previa existente para asegurar la novedad/originalidad de la investigación (Ecarnot et al., 2015).
3. Disponer de una planificación estructurada para escribir (Arias-Carrión, 2024).
4. Comenzar teniendo el final en mente (Hoogenboom y Manske, 2012).
5. Escoger bien el mensaje y ponerse en el lugar de quién va a leerlo (Villagrán y Harris, 2009).

6. Formular mensajes y argumentos sólidos evitando lo innecesario (Gallardo, 2020).

7. Mantener una narrativa consistente (Arias-Carrión, 2024).

8. Definir muy específicamente el propósito de la investigación (Atzen y Bluemke, 2022).

9. Dar a conocer los nuevos datos y resultados de forma directa y lógica (Arias-Carrión, 2024).

10. Presentar una historia clara, relevante y atractiva dentro un marco estructurado (Arias-Carrión, 2024).

11. Demostrar utilidad sobre cómo tu investigación aporta y ayuda a comprender mejor algún aspecto (Iskander et al., 2018).

12. Cuando consideres que tu artículo ya está listo, compártelo con colegas y recibe retroalimentación (Busse y August, 2021).

13. Ser paciente y persistente (Goh y Bourne, 2020).

14. Practicar, practicar, practicar (Peterson et al., 2018).

La prestigiosa revista *Nature* ofreció algunos consejos sobre cómo escribir un artículo de 'primera clase' ('*How to produce a first-class paper that will get published, stand out from the crowd and pull in plenty of readers*') a través de entrevistas con un panel de expertos. Dos de las ideas centrales más destacadas fueron las siguientes (Gewin, 2018):

(1) ***Mantenga su mensaje claro***. '*Piense en el mensaje que desea dar a los lectores. Si eso no está claro, las malas interpretaciones pueden surgir más adelante. Y un mensaje claro es aún más importante cuando hay un grupo multidisciplinar de autores, que es cada vez más común. Animo a los grupos a que se sienten juntos en persona y busquen un consenso, no solamente en el mensaje principal, sino en la selección de datos, la presentación visual y la información necesaria para transmitir un mensaje fuerte. La información más importante debe estar en el texto principal. Para evitar la distracción, los autores deben poner datos adicionales en el material suplementario. Incontables artículos son rechazados porque la sección de la discusión es tan débil que es obvio que los autores no entienden claramente la literatura existente. Los autores deben poner sus resultados en un contexto global para demostrar lo que hace que esos resultados sean significativos u originales. Hay una estrecha línea entre la especulación y las conclusiones basadas en la evidencia. Un autor puede especular en la discusión, pero no mucho. Cuando la discusión es toda especulación, no es bueno porque no está arraigada en la experiencia del autor. En la conclusión, incluya una declaración de una o dos frases sobre la investigación que planea hacer en el futuro y sobre qué más necesita ser explorada*' (Angel Borja).

(2) ***Crear una estructura lógica***. '*La estructura es primordial. Si no consigues la estructura correcta, no tienes esperanzas. Es muy importante enfocar su artículo en un solo mensaje clave, el cual comunica en el título. Todo lo que hay en el documento debe sustentar lógicamente y estructuralmente esta idea. Tiene que guiar al lector ingenuo al punto en el que está dispuesto a absorber lo que hizo. Como autor, necesita detallar el problema. No sabré por qué debo preocuparme por su investigación hasta que me diga por qué debo hacerlo*' (Brett Mensh).

Estructura y Organización de un Artículo Científico

Aunque la anatomía de un artículo científico es bastante rígida en cuanto a las secciones y apartados que lo componen, existe margen para dotar de significado al contenido que se espera encontrar en cada una de estas partes. La redacción de un artículo científico no es tan abierta como una noticia de prensa en cuanto a posibilidades creativas, pero el hilo conductor desde la introducción a la conclusión debe estar siempre presente, por lo que también presenta características propias de una 'historia que contar'; ¡cuidado! siempre sin perder rigor.

Se podría decir que la estructura básica de un artículo genérico de investigación ya está inventada y será muy raro salir de dicha ordenación. La Figura 1 muestra esta estructura base. Te invitamos a realizar la búsqueda de un artículo científico en EF sobre una temática de tu interés en Google Scholar® con el objetivo de identificar estas secciones.

Figura 1
Estructura básica general de un artículo científico

Este modelo IMRyD (Introducción, Método, Resultados y Discusión) constituye un formato estándar en el ámbito académico. Con origen principalmente en revistas de Física y Medicina, en la actualidad se aplica en los campos científicos de Humanidades y Ciencias Sociales (Codina, 2022), incluyendo algunas variantes que permiten un mejor ajuste tanto al objeto de estudio como la metodología empleada (cuantitativa, cualitativa o mixta). En todo caso, y aunque los componentes esenciales no varían, se recomienda revisar las normas específicas de cada revista para adecuar nuestro artículo según requiera cada caso.

Como recomendación práctica, aunque el orden de presentación de la información en un artículo siga estos apartados, esto no implica que necesariamente debamos elaborarlos cronológicamente de esta manera. De hecho, es más frecuente optar por un orden de escritura donde en primer lugar se aborden cuestiones relativas al método y resultados, y posteriormente la introducción y discusión (Santesteban-Echarri y Núñez-Morales, 2017). Del mismo modo, ya en fases más avanzadas del manuscrito, también es habitual la idea de ir 'saltando' y 'retocando' pequeños detalles de unas y otras secciones para encontrar el máximo nivel de coherencia y concordancia en el hilo conductor general.

Guía Paso a Paso en la Redacción Científica

Profundizamos a continuación sobre cada uno de los apartados de la Figura 1. No obstante, previamente a la estructura central existen otros elementos también importantes que se utilizan para indexar los artículos en las bases de datos: Título, Resumen y Palabras Clave.

Título

¿Vale cualquier título o habría que pensarlo detenidamente? El título es lo primero que se ve y se lee. Es el cartel luminoso situado en la puerta de entrada. Es la tarjeta de presentación con el mensaje de bienvenida, y debe causar buena impresión. Fíjate si su nivel de importancia es tan elevado, que tras este primer impacto, las personas decidirán si seguir leyendo o no. Por tanto, encontrar un buen título para el artículo es, sin lugar a dudas, algo a lo que merece (y mucho) dedicar tiempo.

Precisamente sobre esta cuestión de cómo poner un título atractivo a un artículo para llamar la atención, y haciendo un juego de palabras, Morales-Castillo et al. (2014) encontraron un buen 'gancho' para ello titulando su artículo *'¿Cómo hacer del título de un artículo un anzuelo para lectores?'*. Ni que decir tiene que otras posibles alternativas del tipo '*El título de un artículo*', provocaría un efecto más 'indiferente'. En esta misma línea, Hernández y Moreno-Martínez (2020) también consiguieron imprimir esa 'chispa' necesaria con el artículo titulado '*Hace falta ciencia también para escribir un título*'. Efectivamente, el título de un artículo debe ser ante todo claro, pero, en la medida de lo posible, sería conveniente que pudiese incorporar alguna pequeña dosis de 'enganche' que pudiese potenciar el interés hacia su lectura. Como indica Day (2005), un buen título será preludio de un buen artículo.

Además de breve, conciso, concreto, preciso y 'directo al grano', debería anticipar, en la medida de lo posible, información relativa a los principales resultados y conclusiones. Por ejemplo, para estudios de naturaleza transversal: '*Relaciones positivas entre cooperación y rendimiento académico en educación física*' frente a '*Cooperación y rendimiento académico en educación física*'. En el primer caso, el título ya 'descubre' desde un primer momento cuáles son los hallazgos encontrados, informando sobre la direccionalidad de las relaciones. Sin embargo, la segunda opción presenta un carácter exclusivamente descriptivo de las variables analizadas, sin 'adelantar' las conexiones encontradas en los datos. Por ejemplo, para estudios de naturaleza cuasiexperimental: '*El aprendizaje cooperativo incrementa la motivación intrínseca tras una intervención de tres meses*' frente a '*Efecto del aprendizaje cooperativo sobre la motivación…*', o '*Influencia, incidencia, impacto… del aprendizaje cooperativo sobre…*'. En el primer caso se informa sobre cuál es el efecto observado tras la implementación del modelo, mientras que en los otros casos solo se indica que el objetivo consistió en analizar el impacto, pero no se sabe si fue positivo o negativo.

Por otra parte, sin embargo, los títulos que responden a una idea más descriptiva y general, presentan un buen ajuste para proyectos de investigación que aún no se han iniciado o se pretenden desarrollar, dado que para esta casuística particular todavía no se conocen los resultados obtenidos.

Tanto si se trata de un artículo, proyecto o presentación ante un público, en todo caso, debes tener en cuenta que será lo primero que lean y oigan, por lo que merece la pena pensar qué título podría representar mejor tu estudio y hacer que fuese más atractivo. Captar la atención del público lector también forma parte del proceso. Precisamente por este motivo, es recomendable compartir posibles títulos no solo con colegas de profesión, sino también con amistades y familiares (aunque no estén familiarizados con la investigación) con el fin de obtener retroalimentación sobre sus impresiones.

De igual modo, y previamente a la publicación, también será lo primero que vean y lean desde el equipo editorial de la revista, por lo que nuevamente el título se convierte en algo especialmente (o doblemente) relevante. Es muy recomendable 'darle vueltas' a la composición final de esas 15 palabras (aproximadamente) colocadas al inicio de nuestro artículo. Por estas razones, es habitual que los autores vayan valorando diferentes alternativas y no cierren su propuesta definitiva

hasta el final. En efecto, podría decirse que aunque el título es lo primero que aparece, quizás (muy seguramente) es lo último que se escribe.

De acuerdo con Bavdekar (2016) existen diferentes tipos de títulos que se pueden usar en las publicaciones científicas (véase Tabla 1). En todo caso, se recomienda que no incluya abreviaturas o expresiones muy técnicas que dificulten su atención.

Tabla 1
Tipos de títulos que se pueden emplear en un artículo científico

Taxonomía	Definición	Ejemplo
Descriptivo	Descripción del artículo sin hacer alusión a los hallazgos principales	*Uso de Polar para analizar la intensidad de las clases en estudiantes de educación física*
Declarativo	Declaración de los hallazgos más relevantes de la investigación	*El empleo de Polar para la optimización del esfuerzo y los recursos cognitivos en educación física*
Interrogativo	Relación e integración de la pregunta de investigación que se pretende responder en el estudio	*¿Es Polar un buen recurso docente para adecuar las intensidades del esfuerzo en las clases de educación física?*

Resumen

Si decíamos anteriormente que el título es la tarjeta de presentación, el resumen es la carta de bienvenida, y forma un tándem inseparable junto al título a modo de 'encuentro inicial'. Después del título, seguramente sea lo segundo que vea el público lector, y también, previamente a la posible publicación, el equipo editorial. A partir de este impacto, las personas decidirán si leer más sobre el artículo, algunos apartados, o incluso de manera completa. De igual modo, el equipo editorial valorará el nivel de calidad del manuscrito para decidir iniciar (o no) un proceso de mejora que, en este caso, incluirá además la lectura completa.

Debería cumplir también con los mismos adjetivos calificativos que el título, en cuanto a la brevedad y 'sin rodeos'. Encontramos en la literatura, fundamentalmente dos tipos de resúmenes: estructurados (secciones Figura 1) y no estructurados (formato libre). No obstante, en ambos casos la calidad de la información responde a una misma esencia, esto es, presentar los elementos fundamentales de nuestro estudio. A través de frases muy concretas, debes tratar de hacer referencia a los puntos centrales de tu investigación. El resumen es una 'versión pequeña' del artículo, donde aparece la información principal de manera compacta y condensada (López-Leyva, 2013).

Palabras Clave

No deberían reiterarse aquí los términos ya utilizados en el título, ampliando y facilitando así una correcta indexación posterior en las bases de datos. Recuperando algunos ejemplos anteriores, para un artículo que incluya en el título 'aprendizaje cooperativo en educación física', no sería recomendable incluir como palabras clave 'aprendizaje cooperativo' o 'educación física', sino otros más genéricos como por ejemplo: 'enseñanza', 'aprendizaje', 'metodología', 'colegio'. Como sugerencia general, si el título recoge de manera precisa los términos esenciales del estudio, las palabras clave tratan de representar cuales son, en un sentido más global, los pilares fundamentales en los que se inserta nuestra investigación. Aunque pudiese parecer éste un asunto de menor importancia, es ciertamente relevante en la medida en que en los procesos de búsqueda en las bases de datos (por ejemplo, *Web of Science*®, *Scopus*® o *Dialnet*®), juegan un papel determinante, junto a los del título, para que nuestra publicación sea más fácilmente identificable y 'rescatable' para el resto de la comunidad científica y profesionales de la EF.

Introducción

Dos aspectos clave podrían caracterizar a una introducción de calidad. En primer lugar, se destaca la exposición concreta de los resultados encontrados en la literatura previa, es decir, una presentación muy clara (y normalmente breve) sobre los antecedentes previos. Esta idea también es denominada como 'estado de la cuestión'. Por ejemplo, si en nuestro artículo se llevó a cabo una investigación sobre cómo influye el estilo interpersonal del docente en la motivación más autodeterminada del estudiante durante las clases de EF, sería conveniente comenzar a exponer brevemente las teorías que sustentan los constructos mencionados (por ejemplo, la Teoría de la Autodeterminación). En la introducción, lo importante no es tanto elaborar un completo marco teórico (es decir, explicar muy detenidamente los postulados de la Teoría de la Autodeterminación, por seguir con el ejemplo), sino más bien realizar un repaso preciso y concreto de las investigaciones previas y similares que se han llevado a cabo.

En segundo lugar, e integrado con la idea anterior, se debe identificar el vacío o laguna por atender en la bibliografía, incluyendo de forma explícita cuál sería el aspecto a estudiar, dejando muy claro cuál es el propósito de la investigación. En

este sentido, las revisiones sistemáticas de la literatura pueden ser de gran ayuda porque sintetizan lo que se conoce sobre algún aspecto específico de nuestra materia, a la vez que identifican qué aspectos aún quedan por abordar. Por ejemplo, si tu artículo es sobre los modelos pedagógicos en EF, acudir a las revisiones bibliográficas ya existentes (Fernandez-Rio e Iglesias, 2024), puede resultar de utilidad para esto.

En otras palabras, la primera parte de la introducción comienza de manera general identificando los marcos en los que se va a basar la investigación, adentrándose en las lagunas que se profundizará en la segunda parte de este apartado y que tratarán de superar con la investigación que se presente.

Por último, es habitual colocar la pregunta investigación, objetivo(s) o hipótesis (según corresponda) en la parte final de la introducción, a veces ubicado incluso como subsección.

Método

El método es una de las partes más importantes y sensibles del artículo. Importante porque ayuda a entender lo que se ha realizado para llegar a los hallazgos que se expondrán a continuación. Sensible porque es aquí donde si hay un error procedimental, el resto del artículo será incorrecto. Precisamente, la mejor orientación general que se puede dar en este apartado es la de pensar en redactarlo de manera que permita a otros investigadores (o incluso a nosotros mismos en un futuro) reiterar el experimento o la intervención descrita (Foong-May, 2014). El carácter (fácilmente) 'replicable' es un indicador de calidad.

Normalmente, se suele estructurar en cuatro subsecciones: Muestra o Participantes, Instrumento(s), Procedimiento, y Análisis de Datos. Veamos a continuación la idea central de cada una.

En el subapartado relativo a la *muestra* (participantes) se describen las características de la muestra participante en nuestra investigación. Por ejemplo, se ofrece información sobre el tamaño, edad, experiencia... Debería hacer referencia también a aspectos específicos que pudieran ser de interés para una interpretación posterior lo más 'acertada' de los datos. Por ejemplo, si planteo un estudio para intentar mejorar la motivación intrínseca a través de una intervención basada en el Aprendizaje Cooperativo, sería relevante conocer tanto la experiencia previa del docente con este modelo pedagógico, como la experiencia previa de los estudiantes con este enfoque metodológico. Por tanto, una adecuada descripción de la muestra va a depender de qué necesitamos saber, para que los datos obtenidos no 'distorsionen' posteriormente lo que se pretende averiguar. Otros aspectos relacionados con el consentimiento informado y la aprobación del estudio por parte del comité ético, suelen formar parte también de esta sección.

En el subapartado relativo a los *instrumentos* se incluye información relativa a cómo se obtuvieron los datos. Se mencionan todos los instrumentos empleados y las variables diana sobre las que tuvo lugar la recogida de datos. Por ejemplo, si una investigación analiza la regulación integrada durante una situación de aprendizaje relacionada con la iniciación al baloncesto, en este apartado se describirá brevemente la escala utilizada, que continuando con el ejemplo podría ser la *Escala del Locus Percibido de Causalidad 2* (PLOC-2; Ferriz et al., 2015). Para estudios de naturaleza cualitativa se deberían incluir todas las técnicas que se emplearon para la recogida de datos. Por ejemplo, un artículo reciente de Brock et al. (2023) especifica que se realizaron cuadernos reflexivos personales, grupos focales y entrevistas individuales, incluyendo algunas preguntas de ejemplo, número de grupos y tiempo de intervención, entre otras cuestiones relevantes.

En el subapartado relativo al *procedimiento*, se suele incluir información descriptiva sobre el proceso llevado a cabo de manera cronológica. Si se trata de una investigación que incluye una intervención real (por ejemplo, la aplicación de un Modelo Pedagógico en las clases de EF), deberían presentarse los puntos más destacables tales como, por ejemplo, la estructura básica de las clases, cuándo se realizó el pre-test y el post-test, o cómo se aseguró la fidelidad en la implementación (Iglesias y Fernandez-Rio, 2024).

Por último, también es habitual incluir un subapartado relativo al *análisis de datos*. Debería hacer referencia a todos los procedimientos estadísticos empleados, en el caso de una investigación cuantitativa o de codificación del discurso, para el caso de estudios cualitativos, que se llevaron a cabo para desglosar los resultados. Aquí también sería interesante añadir el software usado (si lo hubiese).

Resultados

Deben presentarse de manera 'fría' y sin interpretaciones. Es habitual que vayan acompañados de tablas y/o figuras, gráficos, diagramas..., que ofrezcan información valiosa sobre los datos obtenidos y faciliten una visualización clara en el 'vasto mar de datos, en lugar de sumergir al público lector en un océano de cifras y textos' (Arias-Carrión, 2024, p. 5). Los comentarios sobre las tablas no deben incluir apreciaciones relativas al porqué de los datos. Simplemente, se muestran de manera neutral, sin hacer juicios valorativos. Algunos posibles ejemplos podrían ser: 'los estadísticos descriptivos muestran valores medios entre cuatro y cinco' (no indicamos aquí a qué podría deberse), 'las chicas presentan valores significativamente superiores en comparación con los chicos' (no explicamos aquí posibles razones sobre esta diferencia).

A veces puede incurrirse en un error grave si no se emplea la terminología adecuada para presentar los resultados. Esto dependerá del tipo de diseño de investigación empleado. Si se trata de un estudio cuasiexperimental lo correcto sería emplear afirmaciones que incluyan términos como, por ejemplo, 'impacto', 'efecto', 'causa' o sinónimos. En el caso de estudios de asociación entre variables se utilizarán expresiones que contengan términos como, por ejemplo, 'relación entre', 'conexión', 'correlación' o sinóminos. En ocasiones también puede cometerse este mismo error a la hora de interpretar los datos en la sección relativa a la discusión, en incluso al intentar extraer las conclusiones finales y las implicaciones prácticas.

Discusión

En este apartado se contrastan los datos obtenidos con los resultados que existen en la literatura previa. Ahora sí es el momento de comprobar si los resultados obtenidos van en línea (o no) con lo que se sabe hasta ahora. Quizás sea la parte más difícil de escribir, donde las interpretaciones han de estar guiadas por los datos y las evidencias. La discusión 'actúa como puente que conecta los datos crudos con las conclusiones fundamentadas, enmarcando esos resultados dentro del paisaje global del campo de estudio' (Arias-Carrión, 2024, p. 4).

Es habitual iniciar esta sección recordando cuál era el propósito del estudio para, posteriormente establecer un diálogo entre los hallazgos encontrados y las evidencias previas. Para este apartado se consideran bastante pertinentes frases y afirmaciones del tipo: 'Los datos sugieren que la EF debería plantearse bajo un enfoque más democrático y reflexivo…', 'Quizás estos hallazgos podrían estar explicando los aspectos clave de una EF más inclusiva…', 'En línea con estudios previos, los beneficios encontrados tras la intervención…, 'A diferencia de investigaciones anteriores, estos datos parecen reflejar…'.

También es bastante común finalizar este apartado haciendo referencia a las fortalezas, limitaciones y futuras investigaciones que se podrían derivar hacia una futura agenda. Las fortalezas deberían destacar la importancia de haber ejecutado el estudio, es decir, deberían indicar la relevancia de la investigación llevada a cabo, así como el interés para el avance en el conocimiento. Otro punto de reflexión importante está en identificar y reconocer cuáles fueron las limitaciones del estudio (por ejemplo, la amplitud de la muestra empleada, el contexto, la metodología utilizada…). Derivado de este análisis de posibles 'debilidades', sería conveniente enunciar algunos retos de la investigación futura, dibujando algunas opciones y caminos de cara a cómo continuar avanzado en la comprensión de los aspectos vinculados a una EF de calidad.

Conclusiones

En algunas ocasiones, se incluyen como parte final de la discusión. En otras, se presentan con una sección separada (esto dependerá de las normas específicas de cada revista). Es el mensaje principal del estudio. Es la esencia. Es la aportación. Es lo que comunicamos como 'nuevo'. Una recomendación general importante es que las conclusiones de un estudio de investigación 'no pueden ir más allá de los datos', pero tampoco reiterar los resultados ni volver a la discusión. Por ejemplo, en un estudio descriptivo con docentes de EF podría indicarse: 'Debería potenciarse la formación docente en nuevas tecnologías dado que la mayoría del profesorado encuestado declara utilidad pero desconocimiento para su uso en el aula…' En ocasiones, también suelen acompañarse de algunas implicaciones prácticas que se derivan del estudio. Por ejemplo: 'la intervención docente en EF debería contemplar la participación activa…'

Referencias Bibliográficas

En la mayoría de las ocasiones, el empleo de las normas APA 7.0 será lo más habitual en artículos de EF. No obstante, esto dependerá de la vía por la que optes para publicar tu estudio. Se recomienda revisar bien la normativa, tanto para citar correctamente durante el texto como para el listado final de referencias bibliográficas empleadas. Comprueba y asegúrate de que todas las citas mantienen su correspondencia con el listado final de referencias. Del mismo modo, haz un chequeo para contrastar que todas las referencias tienen su reflejo en algún momento del texto en forma de cita. Es un error habitual esta falta de (doble) concordancia.

Agradecimientos

Muestra tu agradecimiento a aquellas personas y/o instituciones que hicieron posible convertir tu idea de investigación en la realidad de un estudio riguroso. En el caso de haber obtenido financiación, indícalo también.

El Proceso de Envío y Comunicación con la Revista Científica

Una vez que se considera que el artículo está listo para su envío, comienza la fase de adecuación del manuscrito a los requisitos (formales) específicos de la revista. A pesar de que cada revista dispone de unas normas concretas y, por tanto, resulta difícil ofrecer recomendaciones generales, sí que es posible advertir de diferencias frecuentes en el número máximo de palabras permitidas, el formato y número de palabras autorizadas en el resumen, el formato de citación o dónde colocar las tablas y/o figuras. Aun así, de nuevo insistimos en la necesidad de revisar estas normas cada vez que se vaya a realizar un nuevo envío.

Una vez que el manuscrito está listo para ser enviado, será necesario registrarse en la plataforma informática de la revista. Tas completar este proceso, comenzará el envío del artículo. Todas las revistas presentan un patrón más o menos similar. Será necesario adjuntar, al menos, el documento original anonimizado (en función de las normas de la revista, deberá subirse también el documento original con portada y los datos completos de autoría, las figuras en archivos separados, tablas suplementarias, etc.), así como introducir los datos completos de las personas firmantes (nombre y apellidos, afiliación, ORCID y correo electrónico). Una vez efectuado el envío, toca esperar.

La primera fase de revisión será realizada por la administración de la revista, quien comprobará que el manuscrito sigue las normas establecidas. A continuación, será enviado al equipo editorial para una primera revisión científica, es decir, comprobar la novedad, relevancia y posible impacto del artículo si es aceptado. Tomarán entonces la decisión de rechazar el artículo o enviarlo a revisión anónima. En el primer caso recibiremos un e-mail confirmando el rechazo y, en el segundo, no recibiremos nada (habitualmente). Generalmente, la plataforma de la revista ofrecerá información acerca del estado del artículo y, de nuevo en la mayoría de los casos, podrá observarse el cambio de 'en revisión por el equipo editorial' a 'en revisión'.

Las personas que actúen como revisores realizarán comentarios concretos del trabajo y recomendarán al equipo editorial: (1) rechazar el artículo, (2) solicitar cambios mayores, (3) solicitar cambios menores o (4) aceptarlo para su publicación. Será entonces cuando el equipo editorial comunique su decisión a las autorías a través de un correo electrónico. Si se requieren modificaciones, las autorías tendrán un plazo establecido por la revista para efectuarlas y/o responder a los comentarios solicitados. Para ello, las autorías copiarán dichos comentarios en un nuevo documento y realizarán los cambios pertinentes en el envío original. En el nuevo documento, responderán a cada uno de los comentarios indicando, en cada caso, las modificaciones realizadas como consecuencia. Se recomienda que el tono de la conversación y el debate durante el proceso de mejora de calidad del manuscrito, sea siempre respetuoso y de agradecimiento a la labor de revisión. Una vez finalizada la revisión, enviarán los documentos a la revista. Este proceso se repetirá tantas veces como sea necesario, hasta que se considere que el artículo está listo para ser publicado.

Tras recibir el anhelado correo electrónico informando sobre la aceptación del artículo, comenzará el proceso de publicación. Los autores recibirán el artículo maquetado para comprobar que todo está correcto. Una vez que la revista haya obtenido el visto bueno, será publicado. Presentamos en la Figura 2 un resumen de todo este proceso.

Figura 2
Proceso de envío y comunicación con la revista científica

Adicionalmente a este proceso general, algunas revistas específicas de EF han presentado algunas recomendaciones y sugerencias concretas. Por ejemplo, para la revista *Physical Education and Sport Pedagogy*, el equipo editorial (Kirk et al., 2014) compartió indicaciones en línea con lo presentado aquí. De forma similar, también para la revista *Journal of Teaching in Physical Education* (Richards et al., 2021, 2023).

Comentario Final

Aunque leer sobre cómo escribir y publicar un artículo científico es útil, quizás lo más importante es practicar. Para una toma de contacto inicial, sin duda, unas orientaciones previas pueden ser de gran ayuda para dar el primer paso y, junto con la lectura de artículos ya publicados, pueden ser dos actividades precursoras importantes antes de enfrentarse por

primera vez a una página en blanco. Pero, aunque reconociendo el valor y la utilidad de esta preparación previa, la clave está en lanzarse al desafío, afrontar el reto, ponerse manos a la obra, y practicar mucho. Podría decirse aquí aquello de que 'a cocinar se aprende en la cocina', cometiendo errores como en cualquier proceso de aprendizaje y mejorando, poco a poco, las destrezas.

Algunas personas con experiencia pueden presentar más habilidad a la hora de escribir su nuevo artículo, pero cada estudio es un nueva 'historia' que contar, constituye un nuevo desafío, y requiere un esfuerzo independiente de las experiencias previas. Por tanto, en todas las ocasiones, aunque en mayor medida al principio, es recomendable re-situar de nuevo todas las claves relacionadas con cómo escribir y publicar un artículo, para afrontar el proceso con las mayores garantías de éxito posible.

Finalmente, consideramos que no es conveniente ocultar que escribir y publicar un artículo es una tarea dura y con cierta dosis de complejidad. Aunque implica tiempo, dedicación y esfuerzo, es alcanzable para cualquiera que se lo proponga y reporta mucha satisfacción grupal y personal, porque es una forma de compartir con los demás... ¿Te animas a intentarlo...?

Declaración del Comité de Ética

No aplica, debido a que el artículo es un ensayo teórico.

Conflicto de Intereses

Los autores declaran que no existe conflicto de intereses.

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No aplica. El artículo no presenta datos empíricos.

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DELPHI-based expert validation of an instrument for reviewing sports safety in the university curriculum of sports sciences in Colombia

Validación por expertos a través del método DELPHI de un instrumento para la revisión de la seguridad deportiva en el currículo universitario de las ciencias del deporte en Colombia

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Abstract

Ensuring safety in physical and sports practices is a challenge for professionals who are in charge of these activities. However, in Colombia, the level of preparation of these professionals and how sports safety has been developed in the curriculum of university academic programs in sports science is unknown. Therefore, the objective of this research was to validate an instrument for the curricular analysis of degree programs in sports, physical education, or related areas through the expert validation methodology. The selection of experts was carried out using the DELPHI method, and the content validity was evaluated using Aiken's V index. The study resulted in the validation of the instrument with optimal levels of relevance, significance, usefulness, and clarity (average of 0.9 out of 1) through the analysis of 10 national and international thematic experts. Finally, the relevance of the methodology implemented in this type of research is highlighted, and it is expected that the design of this instrument will allow for a clear diagnosis of the inclusion of sports safety in the curricula of degree programs in Colombia.

Keywords: Sports safety, DELPHI method, curriculum, university education, Aiken's V.

Resumen

Garantizar la seguridad en las prácticas físico-deportivas es un reto para los profesionales que están a cargo de dichas actividades. No obstante, en Colombia, se desconoce el nivel de preparación de dichos profesionales y cómo se ha desarrollado la seguridad deportiva en el currículo de la formación académica universitaria en ciencias del deporte. Por tanto, el objetivo de esta investigación fue validar un instrumento para el análisis curricular de los programas de grado en deporte, educación física o áreas afines a través de la metodología de validación por experto. La selección de expertos se realizó a través del método DELPHI y en la validez de contenido se implementó el índice V de Aiken. El estudio resultó en la validación del instrumento con niveles óptimos de pertinencia, relevancia, utilidad y claridad (promedio de 0.9 sobre 1) gracias al análisis de 10 expertos temáticos nacionales e internacionales. Finalmente, se resalta la pertinencia de la metodología implementada en estudios de estas características y se espera que el diseño de este instrumento permita un diagnóstico claro de la inclusión de la seguridad deportiva en los currículos de los programas de grado en Colombia.

Palabras clave: Seguridad deportiva, método DELPHI, currículo, formación universitaria, V de Aiken.

Introduction

In recent decades, the practice of physical and sporting activities has increased worldwide due to the growing recognition of their benefits for individuals and communities in terms of physical, emotional, social, and political well-being (Aragón-Espinel, 2022; Barbosa-Granados & Urrea-Cuéllar, 2018; Fuentes, 2022; López & García, 2022; Roldán-Aguilar & Vergara-Ramos, 2022). For example, in Colombia, the National Survey of Nutritional Status conducted in 2010 revealed that 54% of the population met the global physical activity criteria, with a higher prevalence among men compared to women (ENSIN, 2010).

Due to its significance, prominent international institutions such as the World Health Organization (WHO) have established recommendations for physical exercise in their health promotion and disease prevention efforts, focusing primarily on the duration and intensity of exercise to ensure its effective impact on health (WHO, 2010). In fact, following the COVID-19 pandemic, the WHO has lowered the minimum suggested levels of physical activity, acknowledging that every movement counts for health benefits (WHO, 2020).

However, the dissemination of these benefits has overshadowed the potential dangers associated with physical activity (Colef, 2020; Latorre et al., 2023; López et al., 2019). The practice itself implies risks due to the interaction of objects and people moving at different speeds and directions, in addition to other factors such as weather conditions and the age of participants (Herrador & Latorre, 2005). These circumstances can lead to injuries or more severe consequences for participants and even spectators (Latorre & Pérez, 2012; Magaz & García, 2021).

Despite this, recommendations for safe sports practices are not as widely disseminated, focusing more on promoting sports activities to reduce morbidity rates rather than on the associated risks and how to manage them (Flores-Allende et al., 2020). Therefore, recommendations for sports practice should consider comprehensive safety conditions, managing risks and minimizing the likelihood of accidents. This recognizes safety as the primary objective in the execution and provision of any sports service or product (Magaz & García, 2021).

These risks have resulted in countless accidents during sports activities (Bedoya-Marrugo & Manrique-Julio, 2020; Fuentes, 2022; López et al., 2019; Martínez-de-Quel-Pérez et al., 2019), which have been identified as obstacles to continued sports participation and adherence to physical activity. This is due to repeated injuries, constant accidents, and the difficulty of recovering from these episodes (Donoso et al., 2022; Isorna et al., 2019). Unfortunately, the extent of the problem is unknown, since the consequences of the lack of sports safety have been overlooked. Accidents are often only reported by the media under two specific conditions: the severity of the accident or the significance of the event/location where it occurred (López, 2023; Montenegro, 2023; Redacción Bogotá, 2015; Redacción Nación, 2022). As a result, most accidents remain anonymous and are not systematically recorded, which is evident from the absence of official sports accident statistics in many countries.

In contrast, other types of accidents, such as road or workplace accidents, are meticulously tracked with data, statistics, causes, and consequences. In Colombia, for example, these accidents have dedicated observatories, such as the National Road Safety Agency (referred to as ANSV hereafter) and the Colombian Safety Council (referred to as CCS hereafter) (ANSV, 2023; CCS, 2024). This lack of systematic tracking for sports accidents hinders the recognition of the actual safety conditions in sports practice, limiting its study and importance and making it difficult to accurately diagnose the problem (Valle-Soto & Manolles-Marqueta, 2018).

In Colombia, the field of sports safety (referred to as SS hereafter) has been poorly explored, leaving significant gaps in three areas: legislative, control, and academic. Firstly, there is minimal existing legislation on the subject, with the most notable being Law 1356 of 2009, through which the Law on Safety at Sporting Events is issued. Secondly, as was previously mentioned, there is no official systematization of sports-related accidents unless they are reported as sports injuries in a workplace context (Montañez & Hernández, 2018). Thirdly, the topic is inadequately addressed in the training and research processes of future sports professionals.

Given this reality, there is a clear need in the country to focus efforts on developing sports safety (SS) from both passive and active perspectives (Latorre & Pérez, 2012). Passive safety measures include raising awareness of the importance of SS among administrative entities, enacting laws and regulations to protect users (athletes, coaches, referees, spectators, workers, support staff, etc.), acquiring and maintaining optimal facilities and equipment for sports practice, implementing safety plans, managing risks, and systematizing accident data, among other actions.

On the other hand, active safety involves raising awareness of the importance of comprehensive safety in the sports sector among various stakeholders. This is where educational and training processes play a crucial role in bringing about the desired changes (Herrador & Latorre, 2005; Latorre & Pérez, 2012).

Numerous studies have focused on identifying the role of teachers or coaches in SS, their perceptions, and their level of preparedness regarding this topic (Herrador & García-Tascón, 2016; Latorre, 2006; López, 2014). For example, Latorre (2008) highlights the need for sports professionals to have competencies in evaluating sports spaces and equipment.

The European Higher Education Area (EHEA), established by the Bologna Declaration of 1999 (Garay-Sánchez, 2008), facilitated the adaptation of educational content to market demands, improving the quality of university education and the acquisition of competencies in sports management. Within this framework, Spain has become an international academic and research leader.

Specifically, it is recognized that training sports professionals and encouraging research on sports safety (SS) are essential to achieve specific advancements and real implementation. However, the first step must be taken by academia through educational institutions responsible for training professionals in the sector.

Therefore, several international studies have analyzed the curricula of different universities and academic programs in sports sciences or related fields to identify the inclusion and level of development of SS in their study plans (Conesa-Ros & Angosto, 2017; Espada et al., 2010; Magaz et al., 2022; Morales et al., 2017; Moreno et al., 2006; Tortosa-Martínez et al., 2010). Nevertheless, no studies have been found in Colombia that associate curriculum analysis with SS, making this a pioneering investigation in the area and the country, representing both an opportunity and a limitation for its study.

Given this situation, a first step is to diagnose the current state of SS training in Colombia within undergraduate programs in sports, physical education, and related fields. The regulatory body for higher education in the country is the Ministry of National Education, which sets general conditions that universities and degree programs must meet to operate (Ministry of National Education, 2019). To date, no specific guidelines have been issued by the Ministry regarding competencies, profiles, or curricula, leaving these elements to the autonomy of each institution.

To achieve this diagnosis, it is necessary to have an instrument that can evaluate the different curricula of Colombian universities in a relevant, valid, and coherent manner. Therefore, the study conducted by Gallardo et al. (2021) was analyzed, which examined the teaching guides for Sports Equipment and Facilities courses offered in Spanish higher education. The study found that the instrument used could not be implemented in the same way in Colombia, due to the particularities of its educational system, highlighting the need to validate an instrument for an objective analysis.

Therefore, the objective of the present work was to validate an instrument for the curricular analysis of undergraduate programs in sports, physical education, or related fields through expert validation methodology.

Materials and Methods

This is a descriptive, cross-sectional, and qualitative study that utilized the steps of the DELPHI Method.

Participants

Twelve candidates were proposed, including six men and six women, all professionals with over ten years of experience in the field of sports safety from three different countries, for the selection of the expert sample participating in the instrument validation process. Ultimately, despite the experimental loss of two participants, the instrument validation process was conducted with a sample of ten experts.

Instruments

The design of an evaluation instrument must demonstrate certain elements that ensure the fulfillment of its purpose, such as reliability, simplicity, and clarity. Therefore, it is essential to employ validated methodologies that allow for an objective and consistent design aligned with the proposed objectives (Thomas et al., 2022). Consequently, for the validation of the instrument in this research, experts were first selected through the DELPHI method (López, 2018; Mariño, 2011; Moreno & Hervàs, 2009). Subsequently, Aiken's V index was applied, estimating the content validity coefficient of the instrument (Aiken, 1980).

The DELPHI method has been widely used for remote consensus decision-making, avoiding direct confrontation among experts (Hung et al., 2008; Okoli & Pawlowski, 2004). Some of the most notable characteristics of this method include: 1) appointing a principal investigator to lead the process; 2) carefully selecting a sample of subject matter experts; 3) maintaining the anonymity of the experts as a fundamental principle to prevent mutual influence when forming opinions; 4) facilitating interaction between the principal investigator and the experts based on the judgments provided; and 5) ensuring that the outcome reflects the suggestions and consensus of the experts.

Procedure

The procedure followed in this research consisted of three stages, described as follows:

Stage 1. Selection of Subject Matter Experts and Initial Contact

In this stage, 12 experts were selected (six men and six women), all professionals with the following profiles: six faculty-researchers in sports safety from three different countries (Colombia, Spain, and Mexico), two sports safety

advisors, two faculty members from Spain and Mexico, and two curriculum experts from Colombian universities. This selection aimed to include experts addressing the main categories related to the research object, ensuring a comprehensive view by involving professionals from various fields to reach a consensus on their criteria. In the initial contact, the experts were clearly informed about the research object, the validation method, and a self-assessment process of their knowledge level on the topic on a scale of 1 to 10, with 10 being the highest level of expertise in sports safety within the curriculum.

Stage 2. Understanding of the Topic

In this stage, each expert was contacted via email with three open-ended topic-specific questions to determine their area of greatest expertise. The questions, which were ad-hoc for this study, were as follows: 1) What competencies, skills, and knowledge do you believe a student of sports science (or related fields) should develop regarding safety topics that could later aid their professional development in the sports sector, whether they choose a career in management, coaching, health, education, or other possible paths? 2) What is your opinion on the approach to safety-oriented topics in the curricula of sports science (or related fields)? 3) From your experience, are you aware of the incorporation of sports safety topics in the curricula of sports science (or related fields), and do you consider them sufficient to develop the competencies and skills required by a future professional in the field?

The responses provided allowed for an assessment of their knowledge and level of experience in the central topics of the research. Additionally, the responses allowed performing a qualitative analysis of the results of this study. Each response was rated on a scale of 1 to 10 according to the criteria of the central research group, based on the level of knowledge and information supplied. Based on this evaluation, only those experts who scored above 8.0 in the arithmetic mean (George & Mallery, 1995) were retained in the expert group.

Table 1 shows the evaluation of each of the responses provided by the consulted experts. It is evident that out of the 12 experts consulted, only Expert 10 was excluded, as they did not respond to the proposed questions. Therefore, the research continued with 11 experts.

Table 1
Results obtained by each participating expert

Expert	Question 1	Question 2	Question 3	*M*	*Kc*	*Ka*	*K*
1	10	8	8	8.6	.8	.8	.81
2	8	8	8	8.0	.9	1.0	.95
3	9	8	9	8.6	.8	.9	.89
4	10	10	10	10	1.0	1.0	1.00
5	9	8	7	8.0	.8	.0	.42
6	8	7	9	8.0	.9	1.0	.95
7	10	9	10	9.6	.9	.9	.94
8	10	9	10	9.6	.9	1.0	.99
9	10	10	10	10	1.0	.8	.90
10	NA	NA	NA	NA	NA	NA	NA
11	9	10	10	9.6	.9	.8	.86
12	8	10	10	9.3	.8	.8	.83

Note: *M* = Mean, *Kc* = Knowledge Coefficient, *Ka* = Argumentation Coefficient, *K* = *Competence Coefficient,* NA = Not Answer

Based on the responses to the questions posed and the analysis of each expert's academic, research, and professional profile, and following the guidelines of Robles-Pastor (2018), the Knowledge Coefficient (*Kc*) was calculated using the following formula: *Kc* = *n* (0.1). The results are presented in Table 1.

Considering these values, results of .5 or lower were deemed weak, values between .6 and .8 were considered good, and values above this range were referred to as very good (George & Mallery, 1995). According to this parameter, the 11 experts included met the minimum criteria established to continue participating in the study.

Subsequently, the Argumentation Coefficient (*Ka*) was calculated by evaluating the categories with the greatest influence on the argumentation of the topic. To this end, Table 2 was used as a reference for point allocation.

Table 2
Point allocation based on the sources of reasoning for the Argumentation Coefficient

Point allocation	High	Medium	Low
Own theoretical analysis	.3	.2	.1
Personal experience	.5	.4	.2
National authors' literature	.05	.05	.05
International authors' literature	.05	.05	.05
Knowledge of the international state of the art	.05	.05	.05
Intuition	.05	.05	.05

Using this reference, table 1 presents the Argumentation Coefficient obtained by the experts.

With this information, the Competence Coefficient (*K*) was calculated, which was the determining value for considering the experts in the process. This value was calculated using the following formula: $K = 0.5 (Kc + Ka)$. The results are presented in Table 1.

According to these results and following the criteria established by George & Mallery (1995), a high Competence Coefficient ranges between .8 and 1.0; a medium coefficient ranges between .5 and .79; and a low coefficient is below .5. Therefore, this study only considered experts with a high Competence Coefficient, excluding Expert five, due to loss of communication and the inability to obtain the information needed to establish the Argumentation Coefficient.

In summary, after the expert selection process, out of the initial sample of twelve experts, two experts (experts five and ten) were excluded. The instrument validation was ultimately conducted with ten experts.

Stage 3. Practical Development and Exploration of Results

Finally, in the last stage, each expert received the evaluation instrument, which consisted of three parts: basic data (3 items), university and faculty data (9 items), and course/subject data (8 items). These three parts comprised 20 items, with an evaluation sheet designed ad-hoc using a Likert scale of 1 to 4 for each evaluation item (1 = totally disagree, 2 = partially disagree, 3 = partially agree, and 4 = totally agree). The quality criteria evaluated were "relevance," "importance," "usefulness," and "clarity." For each item, the experts evaluated and provided observations to improve the instrument.

Subsequently, the content validity process was implemented using Aiken's V, which is a coefficient that quantifies the content validity of an instrument through a logical methodology based on the evaluations of judges (Robles-Pastor, 2018).

All items with a rating lower than .85 in Aiken's V were revised or eliminated based on the experts' suggestions. Finally, each expert received the final instrument for their review and final evaluation.

Statistical Analysis

For data analysis, the Office 365 suite was used in the Delphi Method procedure, and Aiken's V was implemented with the statistical package SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.

Results

The designed instrument was validated through the expert validation methodology and quantified using Aiken's V coefficient, which ranges from 0 to 1, with 1 being the ideal value of agreement among the experts. This study considered four validation criteria: relevance, importance, usefulness, and clarity. The coefficient obtained for each item based on the experts' evaluations is presented below.

As was previously mentioned, all items with a rating lower than .85 in Aiken's V were revised or eliminated based on the experts' suggestions. Additionally, some items, despite having a score above the established threshold, were adjusted to improve their development according to the experts' suggestions. Therefore, the details of the main modifications made to the instrument are presented below:

- Part 1. Basic information: The study title, objective, and investigator's name were included. Finally, items 2 and 3 were moved to Part 2.
- Part 2. University and Faculty information: Items 8, 10, and 12 were found to have little relevance and usefulness and were thus eliminated.
- Part 3. Course/subject information: Item 14 was removed due to the lack of relevance and usefulness of the course/subject

code in the study. Additionally, there was semantic confusion between the terms "course" and "subject," as, in Colombia, they can be used synonymously to refer to a subject, whereas, in Spain, "course" can refer to an academic year and "subject" to a specific subject. Therefore, it was clarified that "course/subject" would be used synonymously, considering that the instrument was created from a Colombian academic perspective. In item 16, a brief explanation was included to clarify the typology, differentiating between completely theoretical courses and those with a practical component. Similarly, in item 17, a brief explanation was added to the methodology to differentiate between courses offered face-to-face, virtually, or in a hybrid format. Finally, an additional classification category called "Others" was included in item 19 to allow for the coding of elements that were not covered by the instrument, and which may appear in the curricula.

The details of these results are presented in Table 3.

Table 3
Results obtained from the expert's evaluation for each item of the instrument

Part	N° item	Item name	*R*	*I*	*U*	*C*	$\bar{X}$
1	1	Evaluation date	.96	.92	.96	.92	.94
	2	Department/Province of the University location	1.00	1.00	1.00	1.00	1.00
	3	City	1.00	.96	.96	1.00	.98
2	4	Name of the University.	1.00	1.00	1.00	1.00	1.00
	5	Type of University.	1.00	1.00	1.00	1.00	1.00
	6	Name of the Faculty.	1.00	.96	.96	1.00	.98
	7	Name of undergraduate program.	1.00	.96	.96	1.00	.98
	8	Date of obtaining the Qualified Registration.	.83	.75	.79	.96	.83
	9	Mode of the undergraduate program.	.92	.92	.92	.92	.92
	10	Total number of credits for the undergraduate program.	.79	.71	.71	.92	.78
	11	Duration of the undergraduate program in semesters.	.88	.79	.79	1.00	.86
	12	Semester cost (Colombian pesos).	.46	.46	.46	.79	.54
3	13	Name of the course/subject	1.00	1.00	1.00	1.00	1.00
	14	Course/subject code.	.71	.58	.58	.88	.69
	15	Number of credits for the course/ subject.	.88	.88	.83	1.00	.90
	16	Course/subject typology.	.88	.79	.83	.83	.83
	17	Course/subject methodology.	.92	.88	.88	.92	.90
	18	Inclusion of sports safety topics.	1.00	1.00	1.00	.96	.99
	19	Classification category.	.83	.83	.83	.75	.81
	20	Observations.	.88	.88	.88	.92	.89

Note: *R* = Relevance; *I* = Importance; *U* = Usefulness; *C* = Clarity, $\bar{X}$ = Mean

Based on the evaluations and comments made by the experts, modifications were done to the proposed instrument. As a result, a validated and relevant instrument was attained for analyzing the inclusion of sports safety as a study topic in the curricula of undergraduate programs in Colombia.

Discussion

The objective of this work was to design and validate an instrument for analyzing sports safety in the curricula of undergraduate programs related to sports at Colombian universities. Based on the obtained results, it is possible to conclude that the final instrument has optimal levels of relevance, importance, usefulness, and clarity. This allows analyzing the inclusion of sports safety as a study topic for future professionals in sports sciences, as well as multiple spatial variables, program focus, orientation, and other factors that may influence this inclusion.

Similarly, the results show significant differences with respect to the instrument used in the study of Gallardo et al. (2021). This is due to several aspects. Firstly, this study included elements of the geospatial location of the institution, as

there is a significant disparity between rural and urban education in Colombia, with the latter showing better indices in quality, access, and retention (UNESCO., 2010). Secondly, elements regarding the naming of the Faculty and academic program were included, as was previously mentioned, since university autonomy in Colombia allows for a great variety of names for academic programs and the faculties that host them, impacting the training expectations and graduate profiles. Thirdly, some semantic differences reflect the specificities of Colombian terminology. Finally, the fourth element is that the instrument resulting from this research is designed to analyze multiple subjects/courses, as there is no common subject for all programs, requiring its application throughout the entire curriculum.

On the other hand, as this study is a pioneering effort in the country regarding the analysis of SS in the curriculum of sports science programs, it presents certain limitations due to the lack of scientific foundations for discussing these results at the national level. However, some studies, such as the one conducted by Conde et al. (2017) on the digital competencies of Sports and Physical Activity Science students in Colombia, the study by Sandoval et al. (2022) on the continuous academic training and experience of performance and high-performance coaches in Colombia, and the research titled "Overview of postgraduate training in physical education, sports, physical activity, recreation, and related fields in Colombia" by González-Hernández et al. (2022), provide important insights for the continuous improvement of the training offered by universities to future professionals in sports sciences, making them competitive and relevant to current social and cultural demands.

Additionally, the relevance of the DELPHI method for research development is highlighted, as it is one of the most used methods for validating evaluation instruments through expert consensus (Aponte et al., 2012; López & Calvo, 2019). Similarly, it is noted that Aiken's V coefficient is appropriate for content validation by judge criteria due to its ease of application and the quality of its results (Robles-Pastor, 2018).

Finally, the main limitation of the study is the scarcity of research on this topic in Colombia, which affected the selection of experts and necessitated the inclusion of international experts. These experts had several concerns due to their unfamiliarity with the country's educational regulations. Additionally, response times and communication between the research team and the experts were identified as limitations, as they slowed down the process and extended the duration of the research. Despite these challenges, the study highlights the great interest and dedication demonstrated by the participants. Furthermore, the interdisciplinary nature of the experts, along with their research qualities and expertise, was fundamental in improving the instrument.

Conclusions

In summary, it is expected that the design of this instrument will allow for a clear diagnosis of the inclusion of sports safety in the curricula of undergraduate programs in Colombia, thereby highlighting the educational challenges and opportunities from this perspective. Therefore, this work opens a future line of research for implementing this instrument in the analysis of the curricula of sports science and related programs in Colombia.

Ethics Committee Statement

Not applicable for this study, the participants (expert group) have been informed about the study and have participated voluntarily in the research.

Conflict of Interest Statement

The authors and participating entity declare that they have no potential conflict of interest regarding the research, authorship, and/or publication of this article.

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Authors' Contribution

Conceptualization K.A.P.R. & M.G.T.; Methodology K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Software K.A.P.R.; Validation K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Formal Analysis K.A.P.R.; Investigation K.A.P.R.; Resources K.A.P.R. & M.G.T.; Data Curation K.A.P.R.; Writing – Original Draft K.A.P.R.; Writing – Review & Editing K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Visualization K.A.P.R. & M.G.T.; Supervision M.G.T.; Project Administration K.A.P.R. & M.G.T.; Funding Acquisition M.G.T. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data are available in the results section of the research paper. If more detailed information is needed, you can contact the corresponding author at andreaporrasr93@gmail.com

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Validación por expertos a través del método DELPHI de un instrumento para la revisión de la seguridad deportiva en el currículo universitario de las ciencias del deporte en Colombia

DELPHI-based expert validation of an instrument for reviewing sports safety in the university curriculum of sports sciences in Colombia

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Resumen

Garantizar la seguridad en las prácticas físico-deportivas es un reto para los profesionales que están a cargo de dichas actividades. No obstante, en Colombia, se desconoce el nivel de preparación de dichos profesionales y cómo se ha desarrollado la seguridad deportiva en el currículo de la formación académica universitaria en ciencias del deporte. Por tanto, el objetivo de esta investigación fue validar un instrumento para el análisis curricular de los programas de grado en deporte, educación física o áreas afines a través de la metodología de validación por experto. La selección de expertos se realizó a través del método DELPHI y en la validez de contenido se implementó el índice V de Aiken. El estudio resultó en la validación del instrumento con niveles óptimos de pertinencia, relevancia, utilidad y claridad (promedio de 0.9 sobre 1) gracias al análisis de 10 expertos temáticos nacionales e internacionales. Finalmente, se resalta la pertinencia de la metodología implementada en estudios de estas características y se espera que el diseño de este instrumento permita un diagnóstico claro de la inclusión de la seguridad deportiva en los currículos de los programas de grado en Colombia.

Palabras clave: Seguridad deportiva, método DELPHI, currículo, formación universitaria, V de Aiken.

Abstract

Ensuring safety in physical and sports practices is a challenge for professionals who are in charge of these activities. However, in Colombia, the level of preparation of these professionals and how sports safety has been developed in the curriculum of university academic programs in sports science is unknown. Therefore, the objective of this research was to validate an instrument for the curricular analysis of degree programs in sports, physical education, or related areas through the expert validation methodology. The selection of experts was carried out using the DELPHI method, and the content validity was implemented using Aiken's V index. The study resulted in the validation of the instrument with optimal levels of relevance, significance, usefulness, and clarity an (average of 0.9 out of 1) thanks to the analysis of 10 national and international thematic experts. Finally, the relevance of the methodology implemented in studies of this nature is highlighted, and it is expected that the design of this instrument will allow for a clear diagnosis of the inclusion of sports safety in the curricula of degree programs in Colombia.

Keywords: Sports safety, DELPHI method, curriculum, university education, Aiken's V.

Introducción

En las últimas décadas, la práctica de actividades físicas y deportivas ha aumentado a nivel mundial por el auge y reconocimiento social de los beneficios que puede brindar su práctica a personas y comunidades a nivel físico, emocional, social y político (Aragón-Espinel, 2022; Barbosa-Granados & Urrea-Cuéllar, 2018; Fuentes, 2022; López & García, 2022; Roldán-Aguilar & Vergara-Ramos, 2022). Por ejemplo, en Colombia, la Encuesta Nacional de la Situación Nutricional realizada en el 2010 arrojó que el 54% de la población cumplió los criterios de actividad física global con prevalencia en hombres frente a mujeres (ENSIN, 2010).

Por su relevancia, instituciones de gran importancia a nivel internacional como la Organización Mundial de la Salud, en sus procesos de promoción de la salud y prevención de la enfermedad, ha determinado recomendaciones para la práctica del ejercicio físico, principalmente en duración e intensidad, para garantizar el impacto efectivo en la salud (World Health Organization -WHO-, 2010). De hecho, a raíz de la pandemia causada por el COVID-19, dicha organización ha flexibilizado los mínimos sugeridos en actividad física, reconociendo que, para efectos de salud, cada movimiento cuenta (WHO, 2020).

No obstante, la difusión de dichos beneficios ha eclipsado los peligros que puede implicar su práctica (Colef, 2020; Latorre et al., 2023; López et al., 2019), que en sí misma conlleva un riesgo por la interacción de objetos y personas en un espacio a velocidades y direcciones diferentes adicionado a otras condiciones como las climáticas o la edad de los participantes (Herrador & Latorre, 2005), estas circunstancias pueden derivar en lesiones o consecuencias más severas para los participantes, e inclusive para los asistentes (Latorre & Pérez, 2012; Magaz & García, 2021).

Sin embargo, las recomendaciones asociadas a la práctica deportiva segura no son difundidas en la misma proporción, centrándose en la promoción de las actividades deportivas para la disminución de tasas de morbilidad y no en los riesgos que conlleva su práctica y cómo gestionarlos (Flores-Allende et al., 2020). Por tanto, las recomendaciones para la práctica deportiva deben considerar las condiciones de seguridad integral en su desarrollo, gestionando los riesgos y limitando las posibilidades de accidentalidad de los usuarios, reconociendo así, la seguridad como el principal objetivo que se debe tener en la ejecución y prestación de un servicio o producto deportivo (Magaz & García, 2021).

Estos riesgos se han materializado en incontables accidentes ocurridos en la práctica deportiva (Bedoya-Marrugo & Manrique-Julio, 2020; Fuentes, 2022; López et al., 2019; Martínez-de-Quel-Pérez et al., 2019), los cuales han descrito como un obstáculo para la continuidad en la práctica deportiva y la adherencia en la actividad física por la reiteración en las lesiones, accidentalidad constante y la dificultad para recuperarse de dichos episodios (Donoso et al., 2022; Isorna et al., 2019). Infortunadamente, se desconoce la magnitud de la problemática ya que han sido invisibilizadas las consecuencias de la falta de seguridad deportiva, siendo la accidentalidad un hecho aislado difundido por la prensa en dos condiciones específicas: la gravedad del accidente o la importancia del evento/escenario donde ocurrió (López, 2023; Montenegro, 2023; Redacción Bogotá, 2015; Redacción Nación, 2022). Es así como la mayoría de los accidentes quedan en el anonimato y no son sistematizados, lo cual se evidencia en la ausencia de cifras oficiales de accidentalidad deportiva en muchos países. No obstante, otro tipo de accidentalidad cuentan con un riguroso seguimiento a cifras, estadísticas, causas y consecuencias de estos, ejemplo claro de ello, es la accidentalidad vial o laboral que, en Colombia, por ejemplo, cuentan con sus propios observatorios como la Agencia Nacional de Seguridad Vial, en adelante ANSV y el Consejo Colombiano de Seguridad, en adelante CCS (ANSV, 2023; CCS, 2024). Esta situación no permite el reconocimiento real de las condiciones de seguridad en la práctica deportiva limitando su estudio e importancia y dificultando el diagnóstico real de la problemática (Valle-Soto & Manolles-Marqueta, 2018).

En Colombia, el área de la seguridad deportiva (SD en adelante) ha sido poco explorada dejando importantes vacíos desde tres niveles: legislativo, control y académico. El primero, desde la poca normatividad existente en la materia, siendo la más relevante la Ley 1356 de 2009 por medio de la cual se expide la Ley de Seguridad en Eventos Deportivos; el segundo, como se mencionó anteriormente, toda vez que no existe una sistematización oficial de la accidentalidad producida en entornos deportivos, a menos que se presente como una lesión deportiva en entorno laboral (Montañez & Hernández, 2018); y en el tercero, con un abordaje precario de la temática en los procesos de formación e investigación de futuros profesionales en el área del deporte.

Bajo esta realidad, es manifiesta la necesidad en el país de concentrar esfuerzos en el desarrollo de la SD desde el enfoque pasivo y activo (Latorre & Pérez, 2012). En la seguridad pasiva puede contemplar la concientización de la importancia de la SD por parte de los entes administradores, promulgación de leyes y normas que protejan a los usuarios (deportistas, cuerpo técnico, jueces, árbitros, espectadores, trabajadores, personal de apoyo y mantenimiento etc.), adquisición y mantenimiento de instalaciones y equipamientos óptimos para la práctica deportiva, planes de seguridad, gestión de riesgos, sistematización de accidentalidad entre otras acciones. Por otro lado, desde la seguridad activa, radica en la concientización frente a la importancia de la seguridad integral en el ámbito deportivo de los diferentes actores que conforman el sector deportivo y es allí, donde los procesos formativos y educativos cobran un rol fundamental para los cambios que se esperan en la materia (Herrador & Latorre, 2005; Latorre & Pérez, 2012)

Múltiples investigaciones han centrado sus propósitos en la identificación del rol del profesor o entrenador en la SD, sus percepciones y nivel de preparación ante esta temática (Herrador & García-Tascón, 2016; Latorre, 2006; López, 2014). Por ejemplo, Latorre (2008) destaca la necesidad que el profesional en deporte tenga competencias para la evaluación de espacios y equipamientos deportivos. Es así como el Espacio Europeo de Educación Superior (EEES en adelante), creado en la Declaración de Bolonia de 1999 (Garay-Sánchez, 2008), favoreció la adaptación de contenidos a las demandas del mercado, mejorando la calidad en la formación universitaria y la adquisición de competencias en gestión deportiva. Bajo este marco, España se convierte en un referente investigativo y académico a nivel internacional.

En concreto, se reconoce que es indispensable capacitar a los profesionales del área deportiva e incentivar procesos de investigación alrededor de la SD para lograr avances específicos y su implementación real, sin embargo, para llegar a ello, el primer paso debe darse desde la academia a través de las instituciones educativas a cargo de la formación de profesionales del sector.

Por tanto, varios estudios internacionales han analizado los contenidos curriculares de diferentes universidades y programas académicos en ciencias del deporte o áreas afines buscando identificar la inclusión y nivel de desarrollo de la SD en sus planes de estudio (Conesa-Ros & Angosto, 2017; Espada et al., 2010; Magaz et al., 2022; Morales et al., 2017; Moreno et al., 2006; Tortosa-Martínez et al., 2010). Sin embargo, en Colombia no se encontraron estudios que vinculen el currículo y su análisis con la SD, haciendo de este, una investigación pionera en el área y en el país, representando una oportunidad y a la vez, una limitante para su estudio.

Entendiendo esta situación, un primer paso es diagnosticar el estado actual de formación en SD en Colombia en los programas de grado en deporte, educación física y áreas afines del país, toda vez que el ente regulador de la educación superior del país es el Ministerio de Educación Nacional, quien determina condiciones generales que deben cumplir las universidades y programas de grado para su funcionamiento (Ministerio de Educación Nacional, 2019). A la fecha en Colombia, no se dictan disposiciones desde el Ministerio frente a las competencias, perfil o currículo dejando estos elementos a la autonomía universitaria de cada institución.

Para lograr dicho diagnóstico, es necesario contar con un instrumento que, de forma pertinente, válida y coherente logre evaluar los diferentes currículos de las universidades colombianas. Por ello, se analizó el estudio realizado por Gallardo et al. (2021) donde se analizaron las guías docentes de Equipamiento e instalaciones deportivas impartidas en la educación superior española, encontrando que el instrumento utilizado, no podía implementarse de la misma forma en Colombia atendiendo a las particularidades de su sistema educativo, evidenciando la necesidad de validar un instrumento para un análisis objetivo.

Por tanto, el objetivo de la presente investigación es validar un instrumento para el análisis curricular de los programas de grado en deporte, educación física o áreas afines a través de la metodología de validación por expertos.

Material y Métodos

Se trata de una investigación descriptiva, transversal y cualitativa donde se aplicaron los pasos del Método DELPHI.

Participantes

Se propusieron 12 candidatos, seis hombres y seis mujeres, todos profesionales y con más de 10 años de experiencia en el área de la seguridad deportiva de tres países diferentes para la selección de la muestra de expertos participantes en el proceso de validación del instrumento. Finalmente, a pesar de la muerte experimental de dos de ellos, se realiza el proceso de validación del instrumento con una muestra de 10 expertos.

Diseño de la Herramienta

El diseño de un instrumento de evaluación debe evidenciar ciertos elementos que garanticen la ejecución de su propósito como fiabilidad, simpleza y claridad; por tanto, es fundamental emplear metodologías validadas que permitan un diseño objetivo y consistente con los objetivos propuestos (Thomas et al., 2022). En consecuencia, para la validación del instrumento de la presente investigación, se llevó a cabo, en primer lugar, la selección de expertos a través del método DELPHI (López, 2018; Mariño, 2011; Moreno & Hervàs, 2009) y posteriormente, se aplicó el índice de la V de Aiken, estimando el coeficiente de validez de contenido del instrumento (Aiken, 1980).

El método DELPHI ha sido ampliamente empleado para la toma de decisiones consensuadas de forma remota evitando la confrontación directa de expertos (Hung et al., 2008; Okoli & Pawlowski 2004). Dentro de las características más destacables de este método se encuentran: primero, determinar un investigador principal que lidera el proceso; segundo, seleccionar minuciosamente una muestra conformada por expertos temáticos; tercero, conservar el anonimato de los expertos como principio base para evitar influencias entre ellos a lo hora de emitir conceptos; cuarto, generar una interacción entre el investigador principal y los expertos a partir de los juicios emitidos y quinto, el resultado obtenido es el reflejo de las sugerencias y consenso de los expertos.

Procedimiento

El procedimiento seguido en la presente investigación consistió en tres etapas que se describen a continuación:

Etapa 1. Selección de Expertos Temáticos y Primer Contacto

En esta etapa fueron elegidos 12 expertos (seis hombres y seis mujeres) todos profesionales con los siguientes perfiles: seis docentes-investigadores universitarios en seguridad deportiva de tres países diferentes (Colombia, España y México), dos asesores de seguridad deportiva, dos docentes de universidades de España y México y, dos expertos en currículo de universidades colombianas. Con esta selección, se pretendió incluir expertos que abordarán las principales categorías alrededor del objeto de investigación procurando una visión integral entre profesionales de diversas áreas para llegar a un consenso en sus criterios. En el primer contacto, se informó claramente a los expertos el objeto de investigación, el método de validación y se realizó un proceso de autopercepción de su nivel de conocimiento de la temática en una escala de 1 a 10, siendo 10 el nivel más alto frente a la seguridad deportiva en el currículo.

Etapa 2. Conocimiento de la Temática

En esta etapa, cada experto fue contactado a través de correo electrónico con tres preguntas abiertas propias de la temática para determinar el área de conocimiento de mayor experiencia. Las preguntas realizadas fueron ad-hoc para este estudio: 1) ¿Qué competencias, habilidades y conocimientos considera que un estudiante de ciencias del deporte (o carreras afines), debe desarrollar en cuanto a temáticas de seguridad que posteriormente puedan ayudar a su desarrollo profesional en el sector deportivo, ya sea su elección el ámbito de la dirección, entrenamiento, de salud o de educación, entre otras posibles salidas?, 2) ¿Cuál es su opinión frente al abordaje de temática orientadas a la seguridad deportiva en los currículos de ciencias del deporte (o carreras afines)?, y 3) Desde su experiencia, ¿sabe de la incorporación de temáticas de seguridad deportiva en currículos de ciencias del deporte (o carreras afines) y considera que son suficientes para desarrollar las competencias y habilidades que requiere un futuro profesional en el área?

Las respuestas brindadas permitieron realizar una valoración de sus conocimientos y nivel de experiencia en las temáticas centrales de la investigación. Igualmente, las respuestas obtenidas permitieron un análisis cualitativo para los resultados de la presente investigación. Cada respuesta fue valorada en una escala de 1 a 10 según el criterio del grupo central de investigación, atendiendo al nivel de conocimiento e información suministrado. En función de esta asignación, se mantuvo únicamente en el grupo de expertos a quienes obtuvieron una nota superior a 8.0 en la media aritmética (George & Mallerly, 1995).

La Tabla 1 muestra la valoración de cada una de las respuestas brindadas por los expertos consultados donde se evidencia que, de los 12 expertos consultados, únicamente se descarta el número 10 toda vez que no respondió las preguntas propuestas, por tanto, la investigación continúa con 11 expertos.

Tabla 1
Resultados obtenidos por cada uno de los expertos participantes

Experto	Pregunta 1	Pregunta 2	Pregunta 3	*M*	*Kc*	*Ka*	*K*
1	10	8	8	8.6	.8	.8	.81
2	8	8	8	8.0	.9	1.0	.95
3	9	8	9	8.6	.8	.9	.89
4	10	10	10	10	1.0	1.0	1.00
5	9	8	7	8.0	.8	.0	.42
6	8	7	9	8.0	.9	1.0	.95
7	10	9	10	9.6	.9	.9	.94
8	10	9	10	9.6	.9	1.0	.99
9	10	10	10	10	1.0	.8	.90
10	NR	NR	NR	NR	NR	NR	NR
11	9	10	10	9.6	.9	.8	.86
12	8	10	10	9.3	.8	.8	.83

Nota: *M = Media, Kc = Coeficiente de Conocimiento, Ka = Coeficiente de Argumentación, K = Coeficiente de Competencia, NR = No respondió.*

A partir de las respuestas a las preguntas planteadas y del análisis del perfil académico, investigativo y profesional de cada experto, y siguiendo las directrices de Robles-Pastor (2018), se calculó el Coeficiente de Conocimiento (*Kc*) a partir de la siguiente fórmula: *Kc* = *n* (0.1). Los resultados se presentan en la Tabla 1.

Teniendo en cuenta estos valores, aquellos resultados de 0.5 o inferiores son considerados como débiles, entre 0.6 y 0.8 son determinados con buenos y superior a esto, son referidos como muy buenos (George & Mallery, 1995). Bajo este parámetro, los once expertos contemplados cumplen los parámetros mínimos establecidos para continuar haciendo parte del estudio.

Posteriormente, se procede a calcular el Coeficiente de Argumentación (*Ka*) valorando las categorías de mayor influencia en la argumentación de la temática, para ello, se tomó como referencia para la asignación de puntos la Tabla 2 realizada por Robles-Pastor, 2018.

Tabla 2
Asignación de puntos según las fuentes de argumentación del Coeficiente de Argumentación

Fuente de argumentación	Alto	Medio	Bajo
Análisis teóricos propios	.3	.2	.1
Experiencia propia	.5	.4	.2
Literatura de autores nacionales	.05	.05	.05
Literatura de autores internacionales	.05	.05	.05
Conocimiento del estado del arte internacional	.05	.05	.05
Intuición	.05	.05	.05

Atendiendo a esta referencia, se presenta en la tabla 1, el Coeficiente de Argumentación obtenido por los expertos.

Con esta información, se procede a calcular el Coeficiente de Competencia (*K*), que sería el valor determinante para considerar a los expertos en el proceso. Este valor se calcula a partir de la siguiente fórmula: $K = .5 (Kc + Ka)$. Los resultados se presentan en la Tabla 1.

Con estos resultados y siguiendo lo postulado por George & Mallerly (1995), se determinó que un Coeficiente de Competencia alto está entre .8 y 1.0; medio entre .5 y .79; y bajo, inferior a .5. Por tanto, este estudio sólo tuvo en cuenta los expertos con coeficiente de competencia alto, eliminando al Experto número cinco toda vez que se perdió comunicación y no fue posible obtener la información para establecer el Coeficiente de argumentación.

En resumen, posterior al proceso de selección de expertos, de los 12 expertos que iniciaron el proceso, se eliminaron dos expertos, número cinco y diez, realizando la validación finalmente del instrumento con diez expertos.

Etapa 3. Desarrollo Práctico y Exploración de Resultados

Finalmente, en la última etapa, cada experto recibió el instrumento de evaluación compuesto por tres partes: datos básicos (3 ítems), datos de la universidad y facultad (9 ítems) y datos del curso/asignatura (8 ítems). Estas tres partes completaron 20 ítems con una hoja de evaluación diseñada ad-hoc a partir de una escala tipo Likert de 1 a 4 para cada ítem de evaluación, siendo: 1 = totalmente en desacuerdo, 2 = parcialmente en desacuerdo, 3 = parcialmente de acuerdo y 4 = totalmente de acuerdo. Los criterios de calidad valorados fueron “pertinencia”, “relevancia”, “utilidad” y “claridad”. Por cada ítem, los expertos evaluaron y dieron las observaciones para mejorar el instrumento.

Posteriormente, se implementó el proceso de validez de contenido a través de la V de Aiken, coeficiente que, a través de una metodología lógica, cuantifica la validez del contenido de un instrumento a partir de la valoración de jueces (Robles-Pastor, 2018).

Todos los ítems con valoración inferior a .85 en la V de Aiken han sido reformulados o eliminados atendiendo a las sugerencias de los expertos. Por último, cada experto recibió el instrumento final para su conocimiento y evaluación final.

Análisis Estadístico

Para el análisis de datos se utilizó el paquete Office 365 en el procedimiento Método DELPHI y se implementó la V de Aiken con el paquete estadístico SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.

Resultados

El instrumento diseñado fue validado a través de la metodología de validación por expertos, la cual se cuantificó por medio de la utilización del coeficiente de la V de Aiken; este coeficiente oscila entre 0 y 1, siendo 1 el valor ideal de concordancia entre los expertos. Para este estudio se tuvo en cuenta cuatro criterios de validación: pertinencia, relevancia, utilidad y claridad. A continuación, se presenta el coeficiente obtenido por cada ítem según la valoración de los expertos.

Como se mencionó anteriormente, todos los ítems con valoración inferior a .85 en la V de Aiken han sido reformulados o eliminados atendiendo a las sugerencias de los expertos. Así mismo, se ajustaron algunos ítems que, a pesar de tener un puntaje superior a lo establecido, se evidenció mejoras en su desarrollo gracias a las sugerencias de los expertos consultados. Por tanto, se presentan a continuación, el detalle de las principales modificaciones realizadas al instrumento:

- Parte 1. Datos básicos: Se incluyó el nombre de la investigación, objetivo y nombre del investigador. Finalmente, los ítems 2 y 3 fueron trasladados a la parte 2.
- Parte 2. Datos de la Universidad y la Facultad: Se evidenció que los ítems 8, 10 y 12 contaban con poca relevancia y utilidad y fueron eliminados.
- Parte 3. Datos del curso/asignatura: Se eliminó el ítem 14 aduciendo a falta de relevancia y utilidad del código del curso/asignatura en el estudio. Por otro lado, se presentó una confusión semántica de las palabras curso y asignatura, esto debido a que en Colombia pueden ser utilizadas como sinónimos para referirse a una materia; pero en España el curso puede aducirse a un año académico y la asignatura a una materia en específico. Por tanto, se generó la aclaración del uso de curso/asignatura como sinónimos atendiendo a que es un instrumento creado desde la academia colombiana. En el ítem 16, se incluyó una breve explicación de lo que refiere la Tipología discriminando la diferencia entre cursos completamente teóricos frente a aquellos que incluyen componente práctico en su ejecución. Igualmente, en el ítem 17, se añadió una breve explicación en la Metodología para poder diferenciar cursos que se dictan de forma presencial, virtual o mixta. Finalmente, en el ítem 19, se incluyó una categoría adicional de clasificación denominada "Otras" permitiendo codificar elementos no contemplados en el instrumento que puedan evidenciarse en los currículos.

Los detalles de estos resultados se presentan en la tabla 3.

Tabla 3
Resultados obtenidos de la evaluación de los expertos por cada ítem del instrumento

Parte	N° ítem	Nombre ítem	*P*	*R*	*U*	*C*	$\bar{X}$
1	1	Fecha de evaluación	.96	.92	.96	.92	.94
	2	Departamento / provincia de ubicación de la Universidad.	1.00	1.00	1.00	1.00	1.00
	3	Ciudad	1.00	.96	.96	1.00	.98
2	4	Nombre de la Universidad.	1.00	1.00	1.00	1.00	1.00
	5	Naturaleza de la Universidad.	1.00	1.00	1.00	1.00	1.00
	6	Nombre de la Facultad.	1.00	.96	.96	1.00	.98
	7	Nombre del programa de grado.	1.00	.96	.96	1.00	.98
	8	Fecha de obtención del Registro Calificado.	.83	.75	.79	.96	.83
	9	Modalidad del programa de grado.	.92	.92	.92	.92	.92
	10	Número de créditos totales del programa de grado.	.79	.71	.71	.92	.78
	11	Duración en semestres del programa de grado.	.88	.79	.79	1.00	.86
	12	Valor del semestre (pesos colombianos).	.46	.46	.46	.79	.54
3	13	Nombre del curso/asignatura.	1.00	1.00	1.00	1.00	1.00
	14	Código del curso/asignatura.	.71	.58	.58	.88	.69
	15	Número de créditos del curso/asignatura.	.88	.88	.83	1.00	.90
	16	Tipología del curso/asignatura.	.88	.79	.83	.83	.83
	17	Metodología del curso/asignatura.	.92	.88	.88	.92	.90
	18	Inclusión de temática de seguridad deportiva.	1.00	1.00	1.00	.96	.99
	19	Categoría de clasificación.	.83	.83	.83	.75	.81
	20	Observaciones.	.88	.88	.88	.92	.89

Nota: *P* = Pertinencia; *R* = Relevancia; *U* = Utilidad; *C* = Claridad, $\bar{X}$ = Promedio

Atendiendo a las valoraciones y comentarios realizados por los expertos, se realizaron las modificaciones al instrumento planteado, logrando así, un instrumento validado y pertinente para el análisis de la inclusión de la seguridad deportiva como temática de estudio en los currículos de los programas de grado en Colombia.

Discusión

El objetivo de este trabajo era diseñar y validar un instrumento para el análisis de la seguridad deportiva en los currículos de los programas de grado afines a deporte en Universidades colombianas. A partir de los resultados obtenidos, es posible concluir que el instrumento final cuenta con niveles óptimos de pertinencia, relevancia, utilidad y claridad permitiendo analizar la existencia de la seguridad deportiva como temática de estudio para futuros profesionales de las ciencias del deporte, así como múltiples variables espaciales, de enfoque, orientación del programa de grado etc. que pueden influir en dicha inclusión.

Así mismo, los resultados obtenidos evidencian diferencias significativas con el instrumento implementado en el estudio de Gallardo et al. (2021). Esto debido a varios aspectos: primero, en este estudio se incluyeron elementos de ubicación geoespacial de la institución debido a que en Colombia se evidencia una importante desigualdad entre la educación rural y urbana, presentando esta última mejores índices en calidad, acceso y permanencia (UNESCO, 2010). Segundo, se incluyen elementos de denominación de la Facultad y programa académico atendiendo, como se mencionó anteriormente, ya que la autonomía universitaria en Colombia permite encontrar gran variedad en denominaciones de los programas académicos así, como en las facultades que los acogen y esto, tiene un impacto en las expectativas de formación y perfiles de egreso. Tercero, algunas diferencias semánticas respondiendo a las especificidades de la terminología colombiana. Finalmente, como cuarto elemento, el instrumento resultado de esta investigación está diseñado para el análisis de múltiples asignaturas/cursos ya que no existe una asignatura común para todos los programas y se requerirá su aplicación en todo el plan de estudio.

Por otro lado, al ser este estudio pionero en el país en el análisis de la SD en el currículo de los programas de ciencias del deporte, supone ciertas limitantes ya que no se encuentran bases científicas que permitan la discusión de estos resultados a nivel nacional. No obstante, algunos estudios como el realizado por Conde et al. (2017) sobre las competencias digitales de estudiantes de Ciencias del Deporte y la Actividad Física realizado en Colombia, el desarrollado por Sandoval et al. (2022) acerca de la Formación académica permanente y experiencia de los entrenadores de rendimiento y alto rendimiento en Colombia o la investigación titulada Panorama de la formación de posgrado para el área educación física, deporte, actividad física, recreación y afines en Colombia desarrollada por González-Hernández et al. (2022), permiten vislumbrar rutas importantes para la mejora continua en la formación que se ofrece por parte de las universidades a los futuros profesionales en el área de las ciencias del deporte, haciéndolos competitivos y pertinentes frente a las demandas sociales y culturales actuales.

Adicionalmente, se resalta la pertinencia del método DELPHI para el desarrollo de la investigación, siendo uno de los más empleados en el marco de la validación de instrumentos de evaluación a través del consenso de expertos (Aponte et al., 2012; López & Calvo, 2019). De la misma manera, se evidencia que el coeficiente V de Aiken es apropiado para la validación de contenido por criterio de jueces por la facilidad de su aplicación y la calidad de sus resultados (Robles-Pastor, 2018).

Finalmente, la principal limitación del estudio es la precariedad de esta temática en Colombia, que influyó en la selección de expertos, haciendo necesaria la inclusión de expertos internacionales, quienes tuvieron varias inquietudes por el desconocimiento de la normativa educativa en el país. Así mismo, se reconoce los tiempos de respuesta y comunicación entre el equipo investigador y los expertos como una limitante, toda vez, que ralentiza el proceso y prolonga el tiempo de la investigación. A pesar de ello, se destaca el gran interés y dedicación demostrado por quienes participaron del estudio; así mismo, se resalta la interdisciplinariedad de los expertos y su cualidades y experticia investigativa que fueron fundamentales para mejorar el instrumento.

Conclusiones

En resumen, se espera que el diseño de este instrumento permita un diagnóstico claro de la inclusión de la seguridad deportiva en los currículos de los programas de grado en Colombia, permitiendo evidenciar los retos y desafíos que se tienen en materia educativa desde esta óptica. Por tanto, este trabajo abre como futura línea de trabajo la implementación de este instrumento en el análisis de los currículos de los programas de ciencias del deporte y afines en Colombia.

Declaración del Comité de Ética

No aplica para este estudio, los participantes (grupo de expertos) han sido informados del estudio y han participado de forma consentida en la investigación.

Conflicto de Intereses

Los autores y entidad participantes declaran no tener ningún potencial conflicto de interés con respecto a la investigación, autoría y/o publicación de este artículo.

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Contribución de los Autores

Conceptualización K.A.P.R. & M.G.T.; Metodología K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Software K.A.P.R.; Validación K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Análisis formal K.A.P.R.; Investigación K.A.P.R.; Recursos K.A.P.R. & M.G.T.; Procesamiento de datos K.A.P.R.; Escritura – versión original K.A.P.R.; Escritura – revisión y edición K.A.P.R., G.F.A., A.M.G.M. & M.G.T.; Visualización K.A.P.R. & M.G.T.; Supervisión M.G.T.; Administración del proyecto K.A.P.R. & M.G.T.; Adquisición de financiación M.G.T. Todos los autores han leído y están de acuerdo con la versión publicada del manuscrito.

Declaración de Disponibilidad de Datos

Los datos se encuentran disponibles en el apartado de resultados del trabajo de investigación. Si se necesita más información en detalle se puede contactar con el autor de correspondencia andreaporrasr93@gmail.com

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Ankle injury prevention in soccer using machine learning: bibliometric analysis

Prevención de lesiones de tobillo en fútbol mediante aprendizaje automático: análisis bibliométrico

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Bibliometry in ankle injury prevention

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Abstract

Bibliometric analysis seeks to evaluate through statistical methods the scientific activity on the lines and trends of research, the evolution of studies, the relationships between publications, journals and collaboration between researchers. The use of these studies can guide researchers on the evolution of research processes related to injury prevention in soccer, using machine learning. The aim of this study is to analyze the scientific activity related to machine learning in the prevention of ankle injuries in soccer. The present study presents three moments: Data capture, Analysis of the information based on software (Scimat, VosViewer, Use of Text mining with R), discussion and conclusions. As for the results, the evolution of the words and networks generated shows an increase in studies relating the words "sport", "ankle", "risk factors" and "technology" (mobile applications, computational methods, wireless communication). An evolution of research in terms of the use of machine learning in injury prevention, visualization of knowledge networks and support among researchers in recent years is evident, as well as the growth of publications and the increase of networks and interaction between words.

Keywords: Injury sports, bibliometrics, soccer, artificial intelligence, ankle.

Resumen

El análisis bibliométrico busca evaluar a través de métodos estadísticos la actividad científica sobre las líneas y tendencias de investigación, la evolución de los estudios, las relaciones entre publicaciones, revistas y la colaboración entre investigadores. El uso de estos estudios puede orientar a los investigadores sobre la evolución de los procesos de investigación relacionados la prevención de lesiones en el fútbol, utilizando el aprendizaje automático. El objetivo de este estudio es analizar la actividad científica relacionada con el aprendizaje automático en la prevención de lesiones de tobillo en el fútbol. El presente estudio presenta tres momentos: Captura de datos, Análisis de la información basado en software (Scimat, VosViewer, Uso de Text mining con R), discusión y conclusiones. En cuanto a los resultados, la evolución de las palabras y las redes generadas muestra un aumento de los estudios que relacionan las palabras "deporte", "tobillo", "factores de riesgo" y "tecnología" (aplicaciones móviles, métodos computacionales, comunicación inalámbrica). Se evidencia una evolución de la investigación en cuanto al uso del aprendizaje automático en prevención de lesiones, visualización de redes de conocimiento y apoyo entre investigadores en los últimos años, así como el crecimiento de publicaciones y el aumento de redes e interacción entre palabras.

Palabras clave: Lesiones deportivas, bibliometría, fútbol, inteligencia artificial, tobillo.

Introduction

The importance of recognizing and differentiating epidemiologically the most common injury in soccer is one of the steps to develop future prevention and treatment approaches by health professionals (Guldbrandsen et al., 2019; Olmedilla-Zafra, Andreu-Álvarez, Ortín-Montero, et al., 2013). Among the injuries with the highest frequency in this sport (Olmedilla-Zafra, Andreu-Álvarez, Abenza-Cano, et al., 2013), are those affecting the ankle (Kolokotsios et al., 2021), being 80% ligament sprains, and between 16 and 40% acute trauma (Halabchi & Hassabi, 2020), in addition, it is estimated that ankle and foot injuries in competition range between three to nine injuries per 1000 hours of play, producing high costs to the health system and sports clubs (Feria-Arias et al., 2018).

The public health burden of ankle injuries and long-term effects such as osteoarthritis and chronic instability has generated that primary prevention through prophylactic interventions by detecting risk factors is one of the most used tools by coaches and health professionals (Kaminski et al., 2019). Although, both intrinsic and extrinsic risk factors have been established, so far there is no clear consensus on the matter and the existing evidence is limited (Delahunt & Remus, 2019). The above may be due to the use of explanatory causality models used and the limitation of linear analyses between variables, ignoring multifactorial interrelationships (Jauhiainen et al., 2021).

Given the above, the use of artificial intelligence (AI) has shown promising results in injury risk prediction (Ramkumar et al., 2022), with machine learning (ML) being one of the computational methods used in information processing by analyzing real-world datasets to establish relationships, recognize patterns, classify, predict, exchange data, and improve interconnectivity through incremental learning as data is input (Jauhiainen et al., 2021). Despite, finding current evidence of the use of AI, the strengths, limitations, and true applications are yet to be determined (Román-Belmonte et al., 2021).

One of the bases for the initiation of new research processes is the analysis of productivity, recognition of research activity, lines, and central trends (Adán et al., 2020). Among the strategies developed by researchers are bibliometric studies, which allow establishing an overview of maturity, growth, types of research, researchers related to the area, the most prominent journals, and the mapping of publications (Müller et al., 2018).

To demonstrate interconnections and research networks, the VOSviewer software is a program that allows for the analysis and establishment of relationships of large amounts of data (Shah et al., 2020), with extensive text mining functionality through the creation, visualization, and exploration of bibliometric maps (Arruda et al., 2022).

Although there is general information on the use of machine learning in the prevention of sports injuries and the use of bibliometric analysis in sports science, so far there is no research that evidences the monitoring of scientific publications, the evolution of studies, the relationships between publications, journals, collaboration between researchers and co-occurrence specifically in relation to ankle injuries in soccer. Therefore, the aim of this article is to provide a bibliometric approach that identifies and analyzes the scientific activity related to machine learning in the prevention of ankle injuries in soccer.

Materials and Methods

This study attempted to answer the following research questions:

What are the most critical and influential channels (authors, journals, and articles) in machine learning for ankle injury prevention in soccer?

What are the most emerging research streams in machine learning studies for ankle injury prevention in soccer?

What directions will open new avenues for future research using machine learning for ankle injury prevention in soccer?

The present bibliometric study, meso level, presents three moments: Data capture, Software-based information analysis, Discussion and Conclusions.

Data Capture

For data capture, a search was carried out in English in the Scopus and Web of Science (WoS) databases, Pubmed, Science Direct and SportDiscus. To perform the Boolean chain, four groups of search words were selected that correspond to the topics addressed in this article. Theme one corresponds to words associated with predictive technologies through algorithms, selecting the following search words: “artificial intelligence”, “Machine Intelligence”, “Machine learning”, “Neural network” and “learning algorithms”. Topic two deals with injuries in a part of the human body to be studied, the following words are then selected: “ankle sprain”, “ankle”, “ankle injury”, “ankle fracture” and “ankle injuries”. Theme three associates the search in terms of prevention, so the following words are used in the search: “prevention and control”, “preventive therapy”, “preventive measures”, “prevention” and “Injury prevention”. Finally, a sport is contextualized through the following words, “Soccer”, “Futsal”, “indoor soccer”, “five-a-side soccer”, “street soccer”, “street football”.

For the creation of the search string, you considered that each topic contains complementary information, therefore, the Boolean operator used is "OR" to indicate the union in the associated words. To associate the different topics, matching information is used, so the "AND" operator is used for this purpose.

Use of Scientometric Software

Use of Scimat: since different databases were used to find the information, it was necessary to use a tool that would allow grouping the information to pre-process the data and visualize the data clearly. Scimat allows to read different types of files, so that it is possible to consolidate a bank of information from the databases. From this, it is possible to find the documents published for each year and the most cited articles by time (Lopez-Robles et al., 2021).

Use of VosViewer (VOSviewer - Visualizing Scientific Landscapes, n. d.): To find the topics that make up the scientific literature addressed, the bibliographic information visualization software VOSviewer was used, which, based on the density of the keywords of the documents found, makes a mapping that is translated into heat charts, which represent the frequency of repetition of the documents and the proximity to others, and graph charts, which represent the relationships between different topics as well as the creation of groupings based on the relationships and proximity of the keywords.

Use of text mining with R (R: The R Project for Statistical Computing, n. d.): Text mining was used, where a word cloud graph (RPubs, n. d.) was constructed from the abstracts downloaded with the different articles, which represents, according to size, the words with the highest frequency of use, and according to centrality, represents how close they are in relation to the other words. A hierarchical clustering graph of the H-Clust words was also constructed (Murtagh & Legendre, 2014).

Once the results obtained from the data capture and analysis with scientometric software are considered, we proceed to examine the findings, assessing trends and emphasizing the literature in greater detail, performing a systematic mapping, to find from articles of interest, trends in the field of machine learning for the prevention of ankle injuries in soccer.

Results

Based on the results, 144 articles were found, of which three presented duplicities, so the Scopus and Web Of Science databases were considered to continue with the analysis.

Results With Scimat

A quick establishment of groups of words was made by joining those in singular and plural, and after a manual review, it was not found to be necessary to join other groups of terms.

From the documents and using Scimat software, the information summarizing the publications per year, the most cited articles, and the number of publications per journal was constructed. For this purpose, a total of five periods were established for analysis. Period one corresponds to publications up to the year 2010; period two, corresponds from the year 2011 to the year 2015; period three contains the publications from the year 2016 to the year 2020; period four has the publications for the year 2021 and period five covers the publications for the year 2022, the results can be seen in Figure 1.

Figure 1
Publications found by year and period

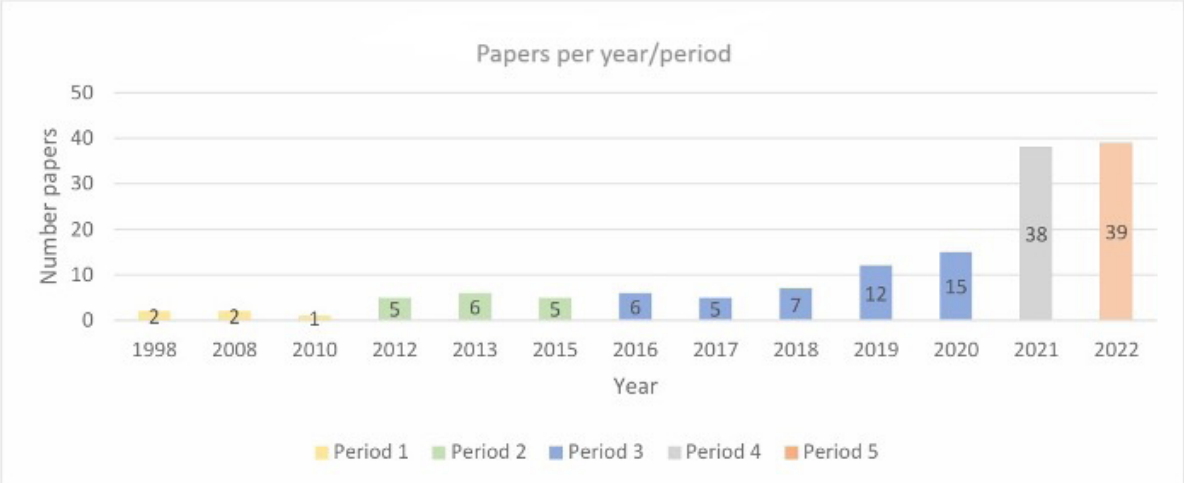


Table 1 shows the most cited articles, disaggregated by year of publication.

Table 1
Most cited articles from 1998 to 2022

Year Title	Citations
2012 Foot plantar pressure measurement system: A review	492
2008 Head and neck position sense	125
2008 Haptic rendering: Foundations, algorithms, and	117
2015 Associations Between Measures of Balance and Lower-	103
2015 MEMS sensor technologies for human centred	99
2018 Photobiomodulation therapy for the improvement of	95
2013 Correlation of clinical and magnetic resonance imaging	78
2012 Virtual reality in medicine	71
2016 A comparative review of footwear-based wearable	69
2015 A systematic review to determine reliability and	64
2019 Principles of Motor Learning to Support Neuroplasticity	59
2018 Wearable monitoring devices for biomechanical risk	56
2020 Measuring biomechanical loads in team sportsâ€“from	45
1998 Factors contributing to function of the knee joint after	43
2013 Postural sway in volleyball players	38
2017 Identifying poses of safe and productive masons using	34
2021 Multidimensional Ground Reaction Forces and	32
2017 Effect of bike-fit in the perception of comfort, fatigue	29
2013 Human Motion Simulation: Predictive Dynamics	26
2012 Motor imagery and 'placebo-racket effects' in tennis	26
2018 A systematic review of game technologies for pediatric	25
2020 Gait analysis â€“ Available platforms for outcome	24
2018 Allopurinol partially prevents disuse muscle atrophy in	22
2013 Design of human surrogates for the study of	21
2019 Wearables, biomechanical feedback, and human motor-	20
2021 Rehabilitation and return to sport assessment after	18
2012 Functional Movement Development Across the Life	18
2019 Sleep deprivation exacerbates concussive head injury	15
2016 Improved determination of dynamic balance using the	15
2020 Multifactorial individualised programme for hamstring	14
2019 Training rugby athletes with an external attentional	14
2019 Use of machine learning and wearable sensors to	13
2021 A machine-learning approach to measure the anterior	12
2021 New Machine Learning Approach for Detection of	12
2019 Rehabilitation Engineering: A perspective on the past	12
2019 Is a low Functional Movement Screen score	12
2019 Using Machine Learning to Predict Lower-Extremity	11
2021 Eccentric Strength Assessment of Hamstring Muscles	9
2021 Applications of pose estimation in human health and	9
2021 Biomechanical Response of the Lower Extremity to	9
2017 Automatic measurement of anthropometric dimensions	9
2021 A Data Science approach analysing the Impact of	8
2021 The future of in-field sports biomechanics: wearables	8
2021 Injury risk prediction of aerobics athletes based on big	8

Table 2 shows the journals with the number of published papers.

Table 2
Journals with the most published articles

Journal	Documents	
Sensors	8	||||||||
Sports Medicine	5	|||||
Applied Sciences (Switzerland)	5	|||||
Frontiers in Physiology	4	||||
Sports Biomechanics	4	||||
Sensors (Switzerland)	4	||||
Sports Medicine - Open	3	|||
Orthopaedic Journal of Sports Medicine	3	|||
Scientific Reports	3	|||
International Journal of Environmental	3	|||
Thermology International	3	|||
Bioengineering	2	||
International Journal of Sports Medicine	2	||
Frontiers in Sports and Active Living	2	||
Revista Brasileira de Medicina do Esporte	2	||
Science and Medicine in Football	2	||
Journal of Physical Education and Sport	2	||
Arthroscopy - Journal of Arthroscopic and	2	||
Frontiers in Psychology	2	||
BMJ Open Sport and Exercise Medicine	2	||
Critical Reviews in Biomedical Engineering	2	||
Journal of Sports Sciences	2	||
Journal of NeuroEngineering and	1	|
Diagnostics	1	|
Frontiers in Bioengineering and Biotechnology	1	|
Life	1	|
Clinical Journal of Sport Medicine	1	|
Yiyong Shengwu Lixue/Journal of Medical	1	|
Frontiers of Information Technology and	1	|
IEEE Journal of Biomedical and Health	1	|
Current Physical Medicine and Rehabilitation	1	|
Biology of Sport	1	|
Journal of Sensors	1	|
Journal of Intelligent and Fuzzy Systems	1	|
Contrast Media and Molecular Imaging	1	|
Russian Journal of Biomechanics	1	|
European Journal of Sport Science	1	|
Mobile Information Systems	1	|
2022 IEEE/CVF Winter Conference on	1	|
Methods in Molecular Biology	1	|
Journal of Clinical Orthopaedics and Trauma	1	|
International Journal of Computer Science in	1	|
International Journal of Sports Science and	1	|
Frontiers in Bioscience - Landmark	1	|
Journal of Orthopaedic Research	1	|
Revista Pesquisa em Fisioterapia	1	|
Physiological Measurement	1	|
Information Systems	1	|
2021 International Conference on Artificial	1	|
Sports Orthopaedics and Traumatology	1	|
Journal of Sport and Health Science	1	|

Journal	Documents	
Sport Mont	1	|
Journal of Military Medicine	1	|
Journal of Strength and Conditioning Research	1	|
Scientific Programming	1	|
Footwear Science	1	|
IEEE Transactions on Biomedical Engineering	1	|
Complementary Therapies in Clinical Practice	1	|
15th IEEE International Symposium on Medical	1	|
Gait and Posture	1	|
Journal of Science and Medicine in Sport	1	|
Injury	1	|
2020 IEEE International Conference on	1	|
Team Sports Training: The Complexity Model	1	|
International Journal of Sports Physiology and	1	|
JMIR mHealth and uHealth	1	|
Biocybernetics and Biomedical Engineering	1	|
Journal of Experimental Orthopaedics	1	|
Medical Engineering and Physics	1	|
Journal of Coastal Research	1	|
Medicine and Science in Sports and Exercise	1	|
Progress in Brain Research	1	|
Computers in Biology and Medicine	1	|
Motor Control, Learning and Development:	1	|
9th International Conference on Digital	1	|
Lasers in Medical Science	1	|
Automation in Construction	1	|
PLoS ONE	1	|
IET Computer Vision	1	|
The Science of Gymnastics: Advanced	1	|
Electronics (Switzerland)	1	|
Journal of Biomechanical Engineering	1	|
SpringerBriefs in Applied Sciences and	1	|
10th International Conference on Ubiquitous	1	|
Medicina dello Sport	1	|
International Journal of Occupational	1	|
Journal of Mobile Multimedia	1	|
Kinesiology	1	|
Human Movement Science	1	|
Routledge Handbook of Motor Control and	1	|
Human Motion Simulation: Predictive	1	|
Psychology of Sport and Exercise	1	|
Virtual Reality in Medicine	1	|
The Science of Footwear	1	|
Functional Movement Development Across	1	|
Haptic Rendering: Foundations, Algorithms,	1	|
Deutsche Zeitschrift fur Sportmedizin	1	|
Journal of Bone and Joint Surgery	1	|

In the analysis of the five periods established from 1998 to 2022, the study yielded the following results. Analysis Configuration:

Unit of analysis: Words (authorRole = true, sourceRole = true, addedRole = true)

Kind of network: Co-occurrence

Normalization measure: Equivalence index

Cluster algorithm: centers simples

Max cluster size: 6

Min cluster size: 1

Evolution measure: Jaccard index

Overlapping measure: Inclusion index

The overlapping map generated with Scimat shows that for period one there were three relevant words, but in the transition to period two, two words leave the map and only one continues, i.e. 33% of the words remain on the map. In period two, there are 17 relevant words, of which 16 are new, in the transition between period two and period three, four words leave the map and 13 remain in the map, while 76% of the words move to period three (Figure 2).

Meanwhile, in period three, there are 47 relevant words, of which 34 new words entered the map, and in the transition between period three and period four, 21 words are lost and 26, i.e. 79%, pass. In period four, 33 relevant words are observed, of which 7 new words enter, nine words leave in the transition to period five, while between period four and period five, 24 words are lost, i.e. 73%. Finally, in period five, there are 43 relevant words, 19 of which are new. Figure 1 shows the evolution of the words over the five periods, corroborating what was shown in the overlapping map.

Figure 2
Map of overlapping and evolution of words generated with Scimat

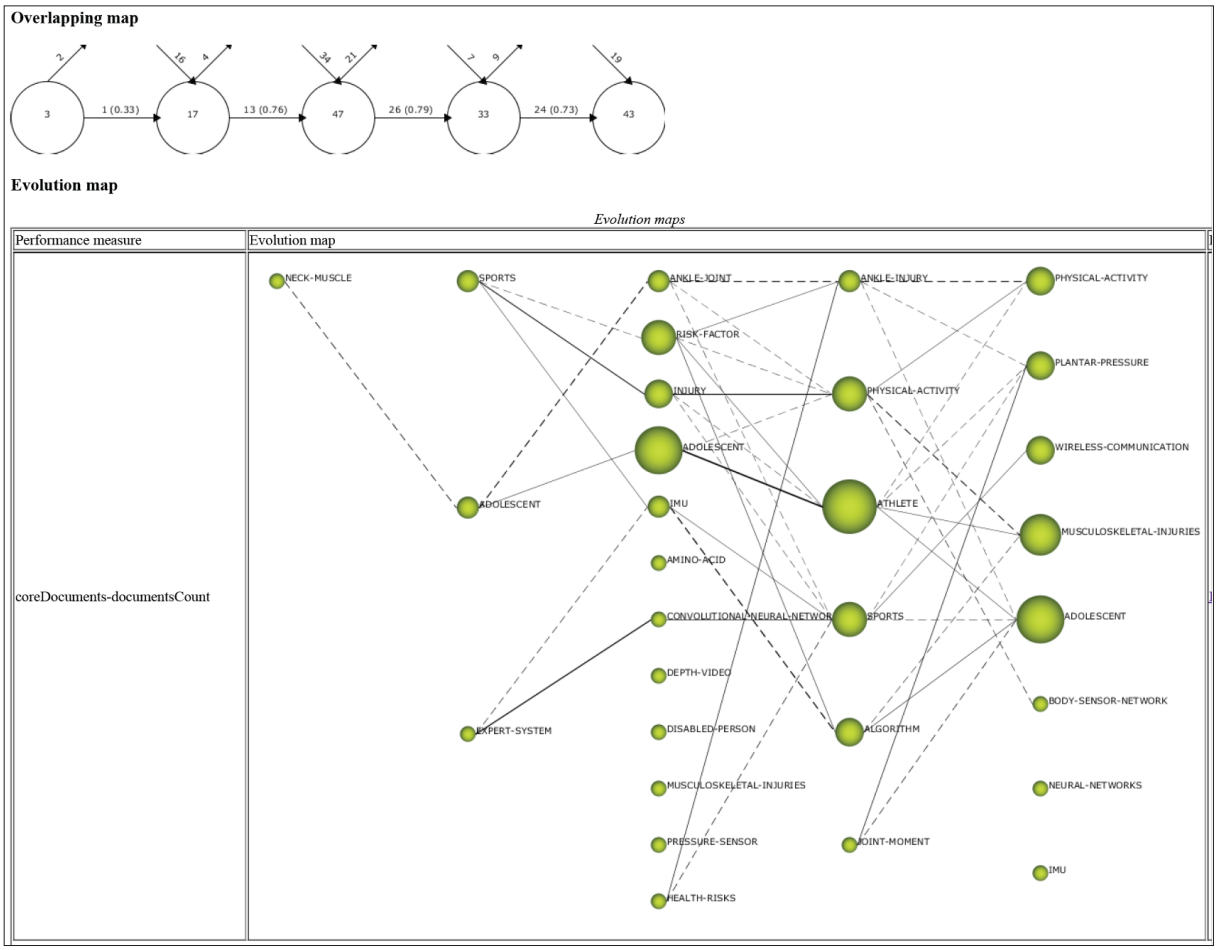


Figure 3 shows the strategic diagram (upper left figure) and the clustering networks associating the words (upper right figure and lower right and left figures) for period three (2016-2020), in this case only the clustering networks with more than two associated words are observed.

Figure 3
Strategic diagram (upper left figure) and clustering networks for the period 2016-2022

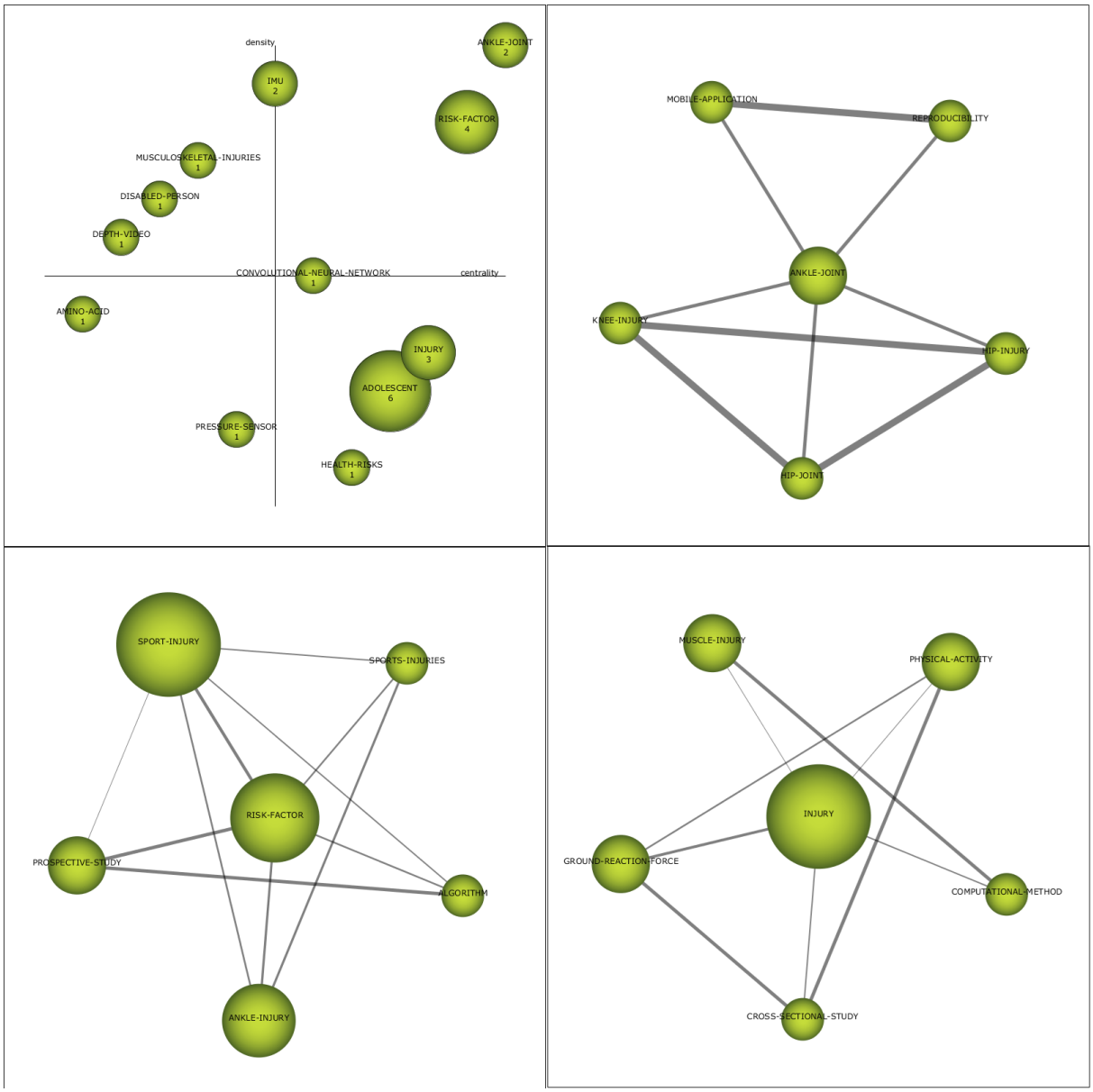
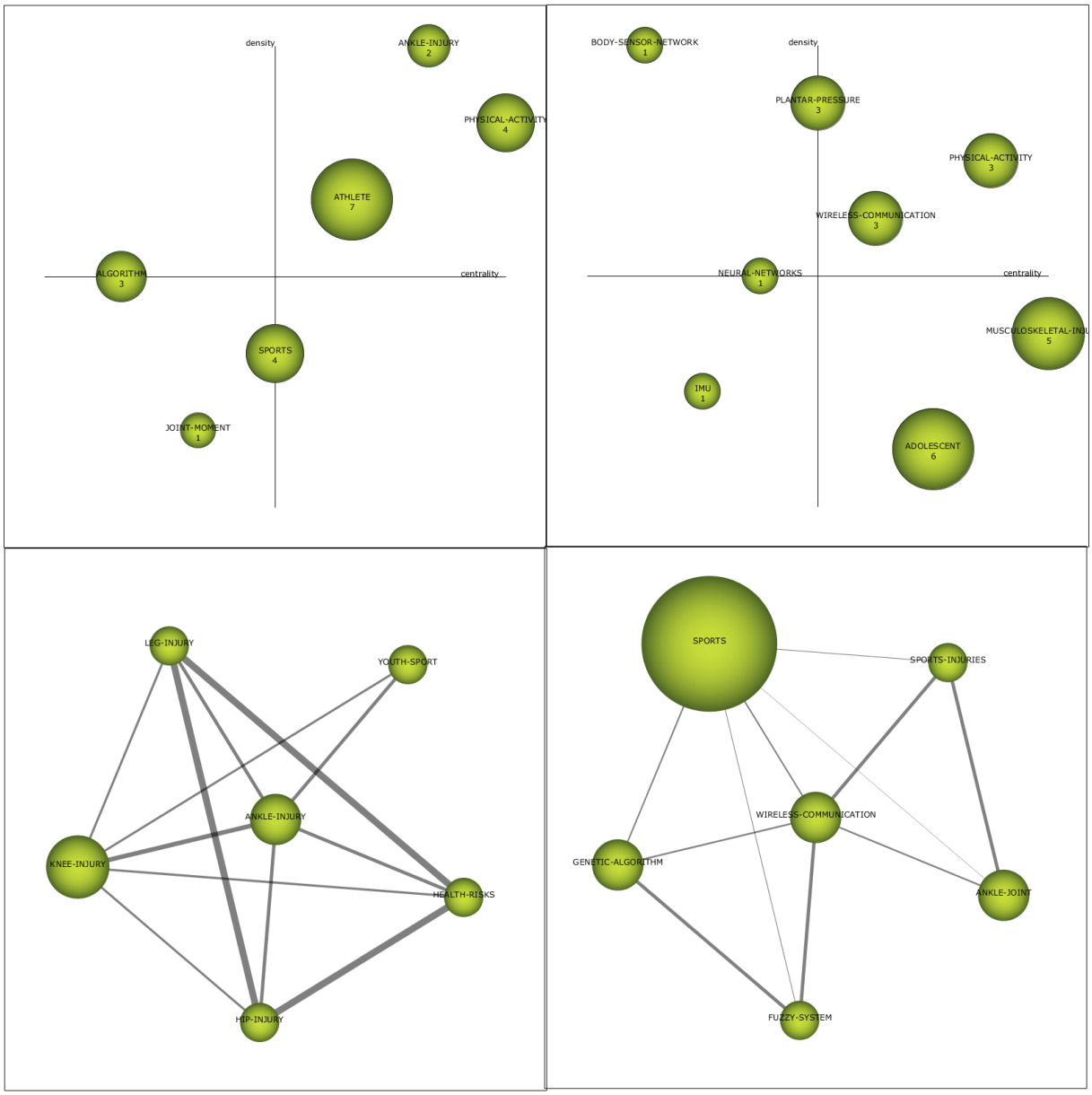


Figure 4 shows the strategic diagram (upper left figure) and the clustering networks that associate the words (upper right figure and lower right and left figures) for period four and five (2021- 2022), in this case only the clustering networks with more than two associated words are shown.

Figure 4
Strategic diagram (upper left figure) and clustering networks for the period 2021-2022

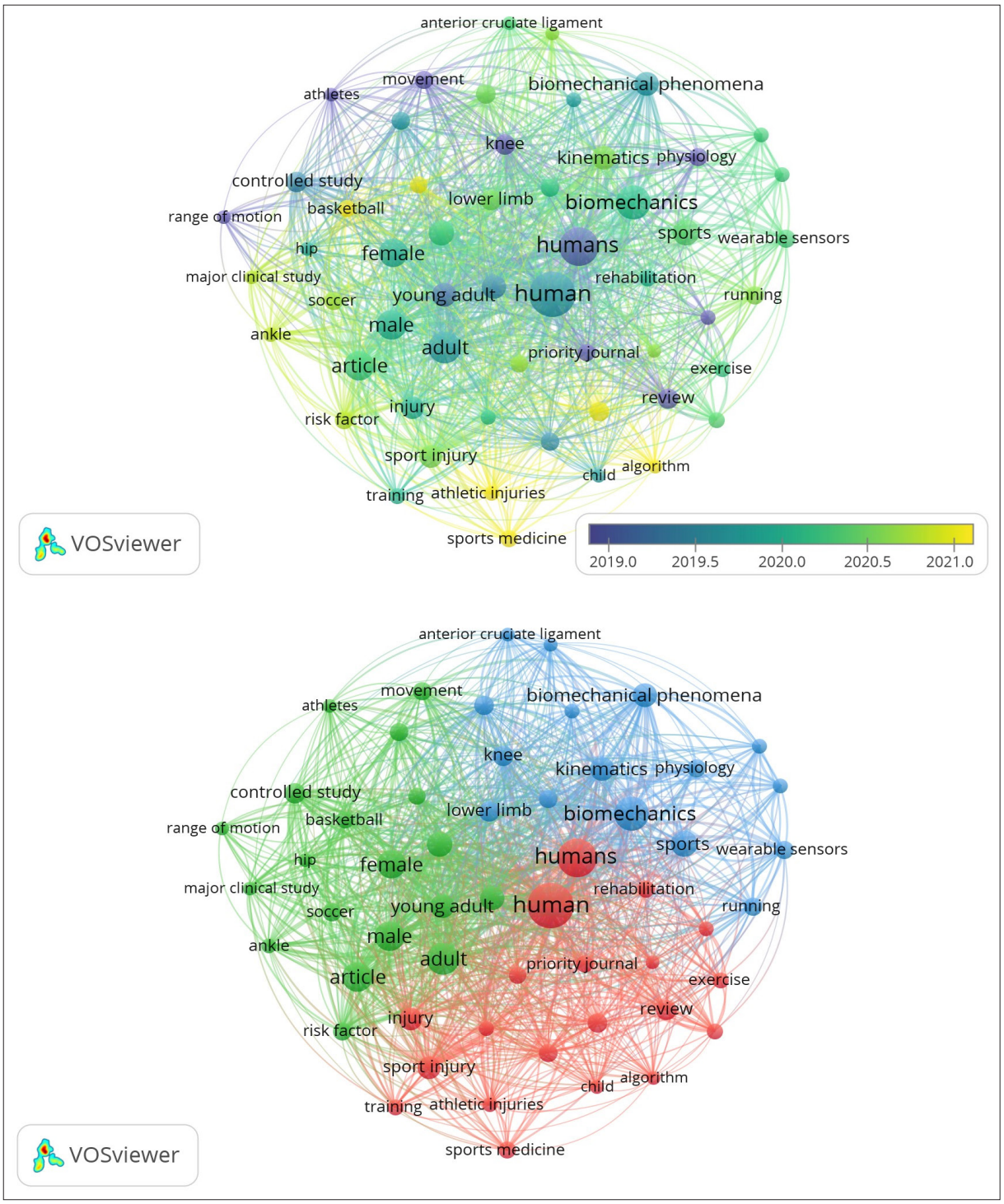


Results With VosViewer

Results With VosViewer Based on the Keywords

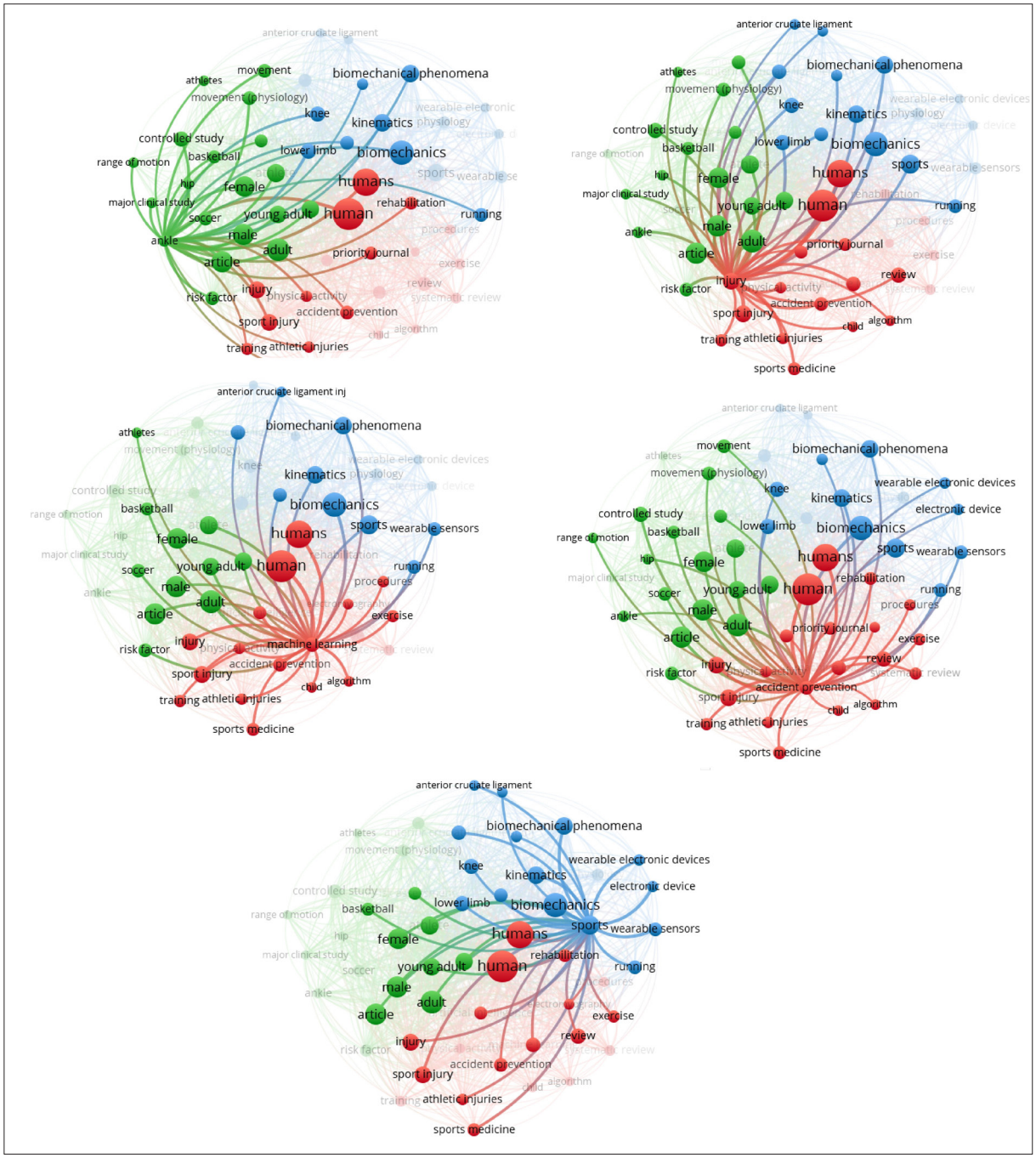
Figure 5 shows the associated words and their different relationships based on the publication date. Additionally, 3-word clusters (green, blue and red) can be observed. The green cluster revolves around gender and age of people, while the blue cluster revolves around biomechanics and the red cluster revolves around the word's human and humans.

Figure 5
Words associated with date of publication, and Cluster of words generated



From the Boolean chains, the words "Ankle", "Injury", "Machine Learning", "Prevention" and "Sport" are selected. The mentioned words are focused to visualize the relationship with other keywords (Figure 6).

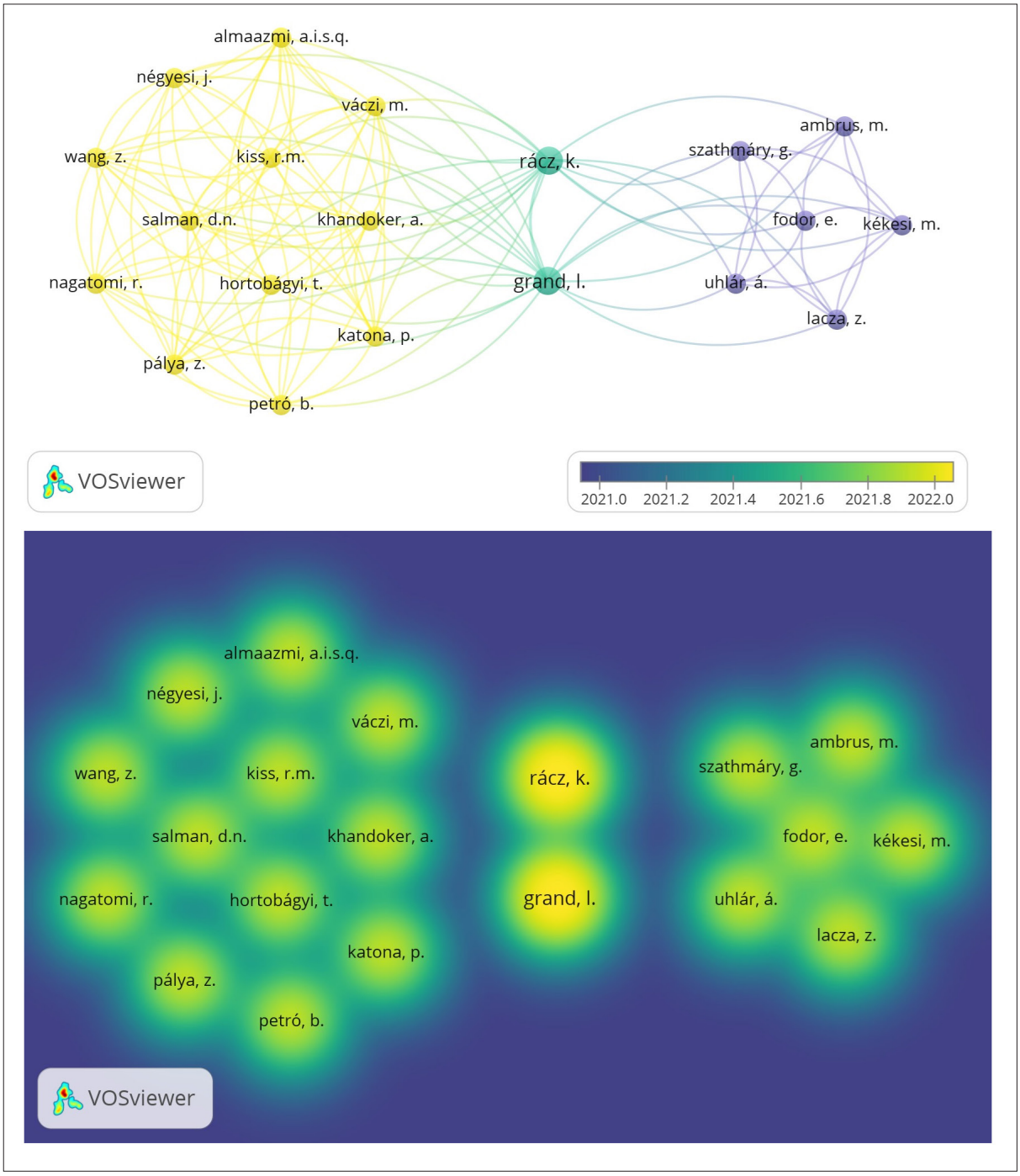
Figure 6
Focus on the words "Ankle", "Injury", "Machine Learning", "Prevention" and "Sport"



Results with VosViewer based on the authors

Figure 7 shows the results obtained based on the authors with the highest number of publications for the analyzed articles. In the upper part, the relationship of the authors is shown based on the publication dates, and the heat diagram based on the frequency of citations.

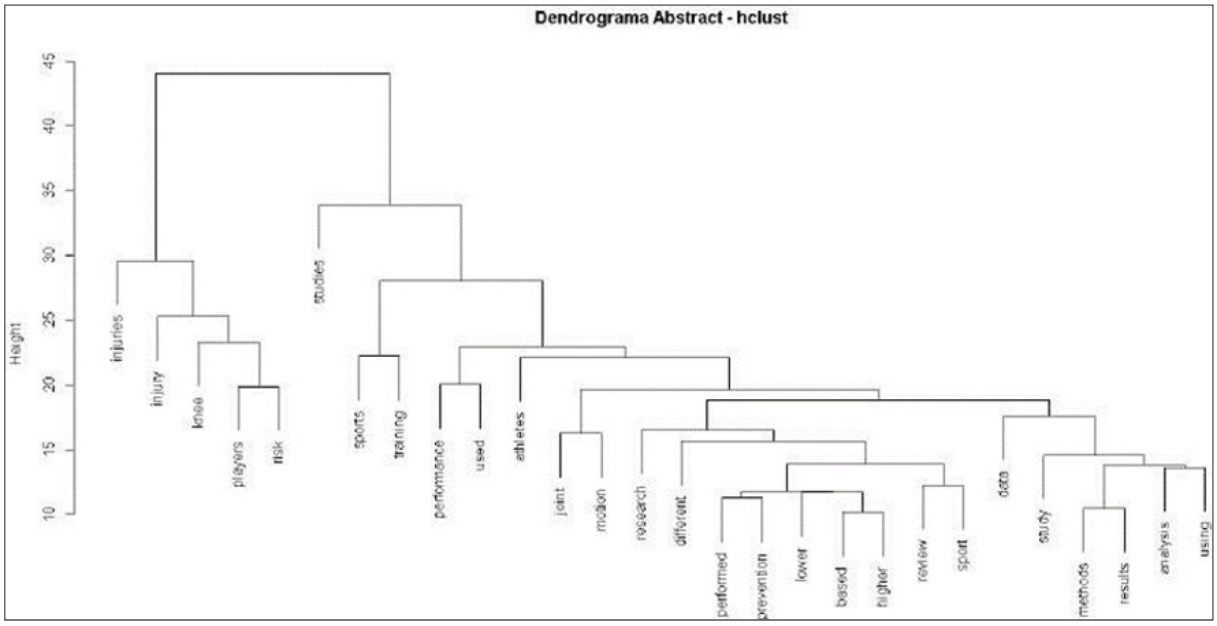
Figure 7
Clusters generated by Authors (top), authors in relation to publication dates (middle), authors' citation frequency (bottom)



Results with text analysis using R language

Using the R programming language, text mining is performed on the abstracts of the articles. A word cloud diagram is generated from the frequency and centrality in the use of the words, where its size indicates the frequency of repetition of the word, and the centrality indicates the closest relationship with the surrounding words. This is shown in Figure 8.

Figure 8
Word dendrogram generated from the abstracts



As can be seen in Figure 8, there is a relationship between the words "studies" and "injuries", as well as a close interaction with the word "injuries" and "sports".

Discussion

Regarding the number of articles published on this topic, a growth in the number of publications from 2016 can be evidenced. In this regard, Llamas (2021) states that the use of technological tools in sport is increasing for the training and control of athletes, in terms of injury prediction, the use of mathematical models can provide relevant information on prevention strategies, however, it is necessary to continue creating and implementing specific computer applications for each sport. This may explain the increase in the research carried out, given that a greater number of studies are required to consolidate these tools as injury prediction instruments.

In reference to the most cited articles, the study "Foot Plantar Pressure Measurement System: A Review" by the authors Abdul Razak et al. (2012) is the article with the highest number of citations, which reviews the features of the sensors and systems for measuring the plantar pressure of the foot and the proposal of a wireless system to measure high pressure distributions under the foot. Wilzman et al. (2022) mention that the measurement of plantar pressure in runners can help predict overuse injuries with the assistance of machine learning, although further research should be done on the characteristics and relationships between healthy and injured subjects to make the model more interpretable.

Additionally, the study by Razak et al. (2021) presented as keywords: "plantar foot pressure", "pressure sensor", "wireless system", such terms have been used in studies looking for predictive results using plantar pressure distributions for risk estimation and prevention strategies in overuse bone injuries (Wilzman et al., 2022), on the other hand, pressure sensors play an important role in the modeling of sports shoes to decrease the complex biomechanical and footwear interactions (Song et al., 2022). Plantar pressure systems have been used in different studies related to diagnosis, injury prevention and rehabilitation of the foot (Zhao et al., 2020), which may explain the references of this research.

The journal "Sensors" presents the highest number of published articles, followed by the journal "Sports Medicine"; the former specializes in presenting contributions of authors related experimental and theoretical results on sensor technology and its applications, while "Sports Medicine" publishes on topics related to injury prevention, exercise for health, training, nutrition, and drugs in sport. Advances in sensor technology and greater ease of availability and acquisition have led to an increase in research related to the evaluation and monitoring of athletes' performance to help control the risk of injury (De Fazio et al., 2023), a situation that may be related to the increase in publications on sensors and sport.

Regarding the evolution of words and networks generated, this study shows an increase in studies that relate words such as: sport, ankle joint, risk factors and technology (mobile applications, computational methods, wireless communication). This trend may be due, as mentioned by Li and Kang (2022) that foot joints generate 10- 30% of all sports injuries,

furthermore, Kobayashi et al. (2016) stated that, although, there are different intrinsic risk factors related to ankle ligament injuries, no consensus has been reached so far on the predictive value that each of these has on the incidence of injury. Despite recognizing the importance of incorporating technology into ankle rehabilitation processes, and although advances in the use of AI in ankle and foot surgery are promising, new predictive models that present greater external validation and clinical benefit should continue to be explored through research (Gupta et al., 2023).

Regarding the evolution of words, the relationship between risk factors and prospective studies should be highlighted, as well as the relationship between ankle injury, knee injury and hip injury. Regarding the former, prospective studies have the advantage that the registration of data is more efficient, since at the beginning of the study the exposure factor may or may not have been present (Moreno & Gutiérrez, 2020), but the research effect has not yet been presented, requiring a follow-up period forward (Salazar et al., 2019), which may be easier for the control of measurements and the analysis of the different relationships between variables understanding their complexity (Pizarro & Masson, 2020). The above, may represent an advantage in the use of this type of methodologies for the researcher who seeks to predict ankle injuries from the analysis of the interaction between the different risk factors.

Regarding the relationships between ankle injury and the other joints of the lower limbs, research has focused its efforts on understanding the involvement and relationship that each of the joints has in different biomechanical actions that allow better decisions to be made in the training and rehabilitation of athletes through a more efficient and integrative clinical reasoning (Kotsifaki et al., 2021).

For their part, the word foci allow us to establish a trend in recent years of networking and interaction between “Ankle”, “Injury”, “Machine Learning”, “Prevention” and “Sport”. This may be mainly due to individual differences, multiple variables and factors and non-linear relationships between them (de Leeuw et al., 2022), have allowed research progress to focus its efforts on machine learning as a tool to identify patterns and create predictive models from the analysis of large data sets, however, research is currently required to incorporate this technology in the prediction of sports injuries (Luu et al., 2020), which makes it an attractive topic for researchers and professionals in sports science.

On the other hand, the scientific collaboration networks show the relationship between authors, publication dates and citation frequency, being the centrality of the network marked by two authors: “Rácz” and “Grand”, who present the highest number of links, identifying leadership and being “star” nodes within the established links. It is important to mention that the greater the number of nodes and relationships, the greater the density of scientific collaboration, generating greater access to information, favoring the availability of resources and scientific productivity (Achury-Saldaña et al., 2022).

Additionally, this analysis shows the dendrogram from the abstracts, it is important to remember that this type of diagram creates clusters in the form of a tree that allows organizing the data, relating the sets, and hierarchizing them (Backhaus et al., 2023). From the graph it can be interpreted that injuries and studies have a more relevant relationship, just as studies on this subject are developed in sport, where there is a relationship with performance and training. This may be due to the increase in studies that seek to predict not only injuries but also the level of performance presented by the athlete, an example of this is the study by Hoog et al. (2021) where they used machine learning to determine the age-related decline in performance.

Conclusions

The present bibliometric analysis allows establishing that there is an increase in research trends towards the prevention of ankle injuries, using neural networks, algorithms and computational methods that facilitate the prediction of sports injuries.

The increase of studies in this area relates words such as: sport, ankle joint, risk factors and technology (mobile applications, computational methods, wireless communication), showing the importance and progress in the use of technological resources, such as machine learning. However, there is still much to be developed and researched in this field, being an opportunity for sports science professionals to explore, innovate and research on the management, control, evaluation, and training of athletes through AI.

The analysis of scientific evidence establishes the importance of prospective studies, which may occur due to the interaction between the words “Ankle”, “Injury”, “Machine Learning”, “Prevention” and “Sport”, non-linear and differential variables within a context, allowing a more efficient data recording, a forward tracking that allows a better understanding of the complex interaction between different risk factors.

Ethics Committee Statement

Not applicable because this is a bibliometric analysis study.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest.

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Authors' Contribution

Conceptualization: Marlon Felipe Burbano, Andres Felipe Villaquiran Hurtado, Nancy Janneth Molano; Data Curation: Marlon Felipe Burbano, Andres Felipe Villaquiran Hurtado; Formal analysis: Marlon Felipe Burbano, Andres Felipe Villaquiran Hurtado; Research: Viviana Marcela Celis and Jeffry Alexander Hoyos, Nancy Janneth Molano; Methodology: Marlon Felipe Burbano, Andrés Felipe Villaquiran Hurtado, Viviana Marcela Celis and Jeffry Alexander Hoyos, Nancy Janneth Molano; Software: Marlon Felipe Burbano; Supervision: Andres Felipe Villaquiran Hurtado; Validation: Marlon Felipe Burbano, Andrés Felipe Villaquiran Hurtado, Viviana Marcela Celis and Jeffry Alexander Hoyos; Visualization: Marlon Felipe Burbano, Andrés Felipe Villaquiran Hurtado, Viviana Marcela Celis and Jeffry Alexander Hoyos; Writing - Marlon Felipe Burbano, Andrés Felipe Villaquiran Hurtado, Viviana Marcela Celis and Jeffry Alexander Hoyos, Nancy Janneth Molano; Writing - proofreading and editing: Marlon Felipe Burbano, Andrés Felipe Villaquiran Hurtado, Viviana Marcela Celis and Jeffry Alexander Hoyos, Nancy Janneth Molano.

Data Availability Statement

The data that support the findings of this study are available in the following repository: https://github.com/mfburbano/BibliometricAnkleInjury2024

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Assessment from reciprocity: a space for co-construction in training of the physical education teachers

La evaluación desde la reciprocidad: un espacio de co-construcción en la formación del profesorado de educación física

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Abstract

In recent years, the assessment in the field of physical education has sparked dialogue, discussion and concern among various educational entities. This is primarily because it seems to struggle to transcend the technical rationality inherent in this didactic process. In light of this context, the present manuscript employed documentary analysis and draws from an educational experience in higher education. Its objective is to propose a perspective on the development of evaluation as a phenomenon and a proposal for reciprocal action, enabling physical education students to play an important role in shaping their learning and teaching processes. This is achieved through democratic, authentic, and reciprocal relationships that enable a discussion of the criteria, form, application, and results of a systematic educational process. We hope that this contribution serves to add to the reflections and foundations of an assessment based on authentic learning, always from a place of respect, trust, responsibility, and the democratization of knowledge.

Keywords: Assessment, reciprocity, physical education.

Resumen

La evaluación en educación física ha sido motivo de diálogo, discusión y preocupación durante los últimos años por las diferentes entidades educativas, principalmente porque no se logra superar la racionalidad técnica de este proceso didáctico. Desde este contexto, el presente artículo se realiza a través de un análisis documental y se nutre de una experiencia educativa en la educación superior, cuyo objetivo es proponer una perspectiva de la evaluación como fenómeno y propuesta de acción recíproca, permitiendo a los estudiantes ser parte importante en la configuración de sus procesos de aprendizaje y enseñanza, a través de relaciones democráticas y auténticas, que permitan discutir los criterios, formatos, estrategias y los resultados del proceso evaluativo desde una relación horizontal entre el profesorado y los estudiantes. Esperamos contribuir a la reflexión y debate de los fundamentos que posibiliten una evaluación basada en el aprendizaje auténtico, el respeto, la confianza, la responsabilidad y democratización del conocer.

Palabras clave: Evaluación, reciprocidad, educación física.

Introduction

Assessment as a subject and an integral part of formal education stands out as one of the most significant and fundamental pillars of both curricular development and the didactic processes of any pedagogical education program (Santos-Guerra, 2016). Assessment processes vary in scope, levels, and intensities. Educators are constantly assessing their students. Each teacher assesses their subject, teachers are also subject to assessed, students assess both their peers and teachers, they engage self-assess, and in some instances, the processes themselves are assessed (Lopez-Estevez, 2014). Evidently, all participants within the education system are deeply engaged in ongoing assessment processes (Peña & Toro, 2022). Nonetheless, the consistent lack of dialogue in the didactic process has led to a reductionist perspective of assessment (Hernández & Velázquez, 2004). This perspective portrays assessment as a unidirectional process (Prieto, 2015), where the teacher is the one who proposes models, develops assessment procedures, forms and instruments, omitting or relegating dialogue to the background, even though dialogue is the fundamental pillar of learning.

Within the realm of didactics, educational assessment constitutes a fundamental component of the intricate and evident connection linked to the acquisition of specific tasks, understanding, and attitudes and dispositions (Toro et al., 2015; Toro et al., 2020), thus laying the foundation for various scenarios, events, incidents, elements and moments between the educators and learners (Quintar, 2009). Even so, the term "educational assessment" remains a complex concept in its interpretation, primarily because assessment is considered a polysemic term that has different epistemic aspects. On the one hand, we have technical rationality, understanding assessment essentially as a control mechanism (Mendez, 2005; Scriven, 1967). The problem with this model is that students become passive learners (Moreno-Olivos, 2016) and do not engage with their learning and teaching processes, once again perpetuating processes fundamentally because of a neoliberal ideology, where the main actors in education refuse an open, participative democracy (Maclaren, 2012: Maclaren et al., 2010). On the other hand, we have practical rationality, which is centered on dialogic value placement and construction processes, characterizing and emphasizing the participation of the actors involved as a radical occurrence in learning, but above all in the definition, at least in its formal sense, which settles or falls outside the process generated from the assessment (Ahumada, 2005; García, 2016; Santos-Guerra, 2016). In this sense, the assessment is understood as the value placed on an observed event, based on data obtained by any defined means, a process where dialogue and the value placed on the subjectivities of all the actors involved is fundamental (Castejón, 2007).

Addressing the concept of "value placement" is significant as assessment inherently involves articulating an opinion, and this subjectivity leans toward being "objective" or "subjective" depending on the nature of the assessment undertaken. It originates from actions driven by beliefs, which may hold varying degrees of consistency (Maturana, 2018), grounded in shared and well-informed criteria coherence and transparency. Therefore, assessment in education is in fact not objective, neutral or impartial. It is more appropriate to define it as a subjective and intersubjective value placement process, product of the same didactic relationship that has been generated, sustained in the coherence, clarity and transparency of processes lived. In other words, the acceptance of subjectivity and intersubjectivity as part of any assessment process is essential, although logically this assessment should not be whimsical or improvised and it certainly shouldn't be ill-intentioned.

Viewed through these lenses, assessment becomes a process focused on collecting, processing, and delivering accurate, dependable, and timely insights into the worth, authenticity, and significance of a student's learning. This culminates in value judgment that paves the guide decision across multiple tiers (Ahumada, 2005). Typically, educators, concerned with assessment's precision and structure, make these decisions. Nonetheless, these particular educational practices within physical education classes persist in upholding the one-sided nature of a didactic and thus evaluative process, which contradicts the very essence and encounter of learning. This often necessitates bidirectional processes, where dialogue facilitates the interaction among all participants in the process, accommodating their subjectivities. As a result, assessment transforms into an arena where intersubjective value placement emerges. In short, it is evident that traditional assessment practices considerably limit the freedom or autonomy of those who learn, placing greater importance on elements of a technical nature, to the detriment of dialogue and the social construction of pedagogical processes.

Embracing learning conception unique to the Biology of Knowing (Maturana, 2018; Maturana & Varela, 1994), and the "Enactive approach" (Brinkmann et al., 2019), the learning process invariably unfolds withing the organism or agent engaged in this progression. In other words, living beings in general, and humans in particular, are not "instructable," even though they are always learning. This phenomenon occurs because of the evolution and display of each person's actions, in a structural connection with their environment. This shapes the objects, the self and above all, the coordination of actions with other living beings of the same species and of others, in a situated emotional flow. Although there may be disruptions in the environment that trigger structural changes and consequently behavioral changes, not everything that changes depend on the shape and size of the disruption, but rather on the determinations and properties of what we are as living beings. Because of this, no two learnings are alike, although an observer (educator) may want to record and measure them the same way.

In this context, as mentioned earlier, a being is not fundamentally "instructable", but rather adaptable. Through their interaction with the environment, they acquire the essential abilities to situate themselves and express their traits within the given circumstance (Maturana & Varela, 1994). Consequently, individuals draw from the relationships they encounter, extracting what is necessary to sustain and advance themselves within these connections or others where they hold emotional investment or interest. Thus, the most fitting form for the learning environment is that of dialogue (Maturana & Davila, 2015). This perspective is ingrained in Latin American indigenous cultures, such as The Mapuche exemplified by phrase "Kishu kimkelay ta che", signifying 'no person knows or learns alone, by themselves" but rather in collaboration with others, drawing upon their historical legacy (Ferrada et al., 2014, p. 35). Hence, for assessment to truly become a facet of learning, it should emerge from reciprocity, independent of it explicit purposes, as each individual learns based on their potentials and involvements within the relationship; a mutual exchange between teachers and students (Freire & Faúndez, 2013).

From this perspective, it becomes evident and paramount to recognize the profound formative significance that reciprocal assessment holds within learning processes, particularly within preservice teacher education (Trigueros et al., 2020). During this phase, prospective educators should encounter and manifest their learning via assessment, shaping their future teaching approaches:

> "Tell me how you assess, and I will tell you what society you are building. The way we assess inexorably marks our students, at school and throughout their lives, and thereby contributes to creating one society or another" (Murillo & Hidalgo, 2015, p. 5).

This underscores the importance of instilling the pressing need for physical education teacher training to guide its assessment processes towards a space of co-construction, establishing ongoing consensus based on the learning process of students, teachers and the learning and teaching process itself. From this point of view, the aim of the manuscript is to propose a perspective of evaluation as a phenomenon and a proposal for reciprocal action, allowing students to be an important part in the configuration of their learning and teaching processes, through democratic and authentic relationships, which allow the discussion of criteria, formats and strategies through a horizontal relationship between teachers and students.

Reciprocal Assessment as a Didactic Process

Building upon the aforementioned, and as witnessed in recent years, assessment has garnered attention within diverse curricular models (López, 2006). This is largely due to an endeavor to shift away from a reductionist, transactional and technically oriented perspective solely focused on instructional procedures. Instead, there's and aspiration to embrace a spectrum of variables that acknowledge education as a multidimensional process. This encompassing view not only includes learning but also incorporates formative, expressive, and therapeutic facets, alongside fostering relation autonomy. In fact, this progression should rest upon dialogue, comprehension, and continual refinement (Santos-Guerra, 2016). It should further embrace an explicit political, ethical and cultural commitment on the horizon, which is generated not from the ethics of discourse, but from the ethics of the relational experience (Dussel, 2020).

In this context, there has been an increase in the use of formative assessment (focusing on feedback for learning), self-assessment or shared assessment learning processes and authentic assessment based on competencies or performance (Ruiz & Serra, 2017). However, it seems that this falls short in moving past the technical rationality of assessment. Rather, there is a kind of tranquility or illusion of participation or "democratization" of the assessment process (Peña & Toro, 2023), but deep down it does not produce a substantive change in either the explicitation of authentic learning or in specific decision-making regarding the qualification of the class as a whole.

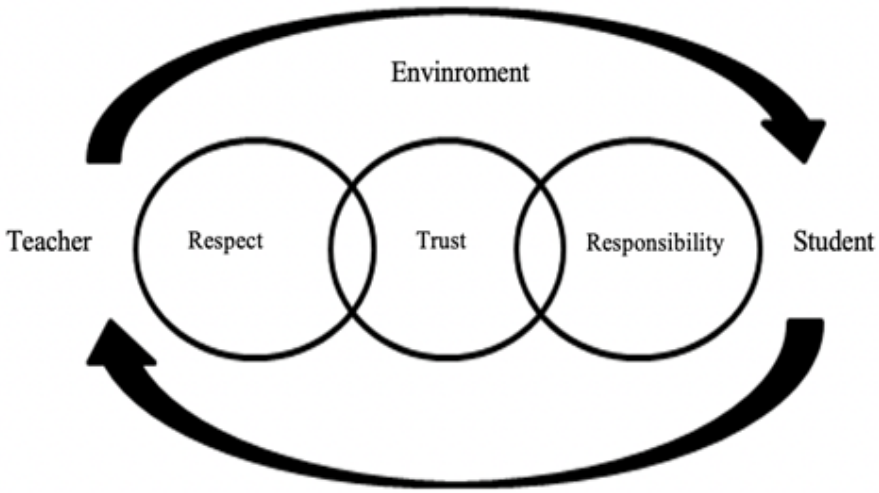
Deep down, there are no substantial changes in terms of the redistribution of power when carrying out assessment processes, nor are there changes towards the promotion and participation of a truly egalitarian dialogue between all parties involved. Contrarily, what comes into view are improvements in a parametric assessment system, based on the capacity and visualization of expert knowledge represented by the role of teaching, rather than a shared, consensual and co-constructed process, both of the learning and teaching process in particular and of the class and the curriculum in general.

It is common knowledge that one learns what one wants to or is interested in, based on one's context, regardless of what is deliberately instructable. However, in this process, the way in which assessment is understood and implemented usually ends up modeling and conditioning the genuine learning interests of each person. Eventually, students end up adapting and submitting to the priorities imposed by whoever holds the power at the time of the assessment, who is generally the teacher. This situation is recurrent and usually translates into demotivation and lack of meaning in the exercise of knowing for students, who must also experience forms of relationship that are not based on reciprocity. In other words, relationships are explicitly generated around learning and grading, without considering that what is learned itself is the context instead of the stimuli (Freeman, 2007). Therefore, there are many aspects to consider in this process, but

our critical issue points to the need to create spaces that enable teachers in training to make decisions regarding their assessment process, course development, and also regarding the relational dynamics that enable dialogue between peers and with the teacher.

This doesn't mean handing over total responsibility to the students, but rather clarifying the responsibility of their own learning and teaching process, reciprocally sharing the different dimensions of assessment, performance and implementation of a course, especially as teachers who take on such tasks as part of their own training. This may involve generating their own categories, appreciation scales and, above all, explicitly and collectively self-assessing their training process and that of the teacher. This approach to reciprocal assessment can be considered a process that generates changes, with the potential to promote social transformation, focused on generating spaces of reciprocal recognition between the subjects that participate in the learning and teaching process, giving each individual confidence and a voice, in an environment of respect throughout the entire didactic process, which is understood as a continuous process, beyond the three traditional moments of evaluation (beginning, process and end). In other words, we refer to assessment as a space for the recognition and development of a democratic praxis, where power is no longer centered on a single individual, thus turning assessment practices into an issue related to the redefinition of relationships (of power) and social justice (Mcarthur, 2019). At this juncture, it seems critical to us that the reciprocal assessment process must be subject to the establishment of relationships of respect, trust and responsibility (Figure 1).

Figure 1
Reciprocal assessment



This form of assessment is based on the culture of sharing ways of constituting knowledge, where ways of knowing are shared. Reciprocity is the value of taking responsibility, where we take responsibility as parts of a situated context, not as radically disconnected or isolated beings. It is quite the opposite, because the relationship is the starting point for the connection and the exchange generated by the particularities and differences that constitute both personal and social identity. In specific education terms, teaching only emerges out of learning (Freire & Faúndez, 2013), i.e., good teachers continually learn in each class that they teach or are responsible for, but rarely is that learning visibly explicit or considered as the meaning or objective of the class. Also, from the point of view of students or trainees, what they show or teach both their peers and the teacher is not a common element within class planning or management (a very relevant aspect within teacher training). Furthermore, their assessment of the class and the teacher, which is usually anonymous and not informed in terms of results, is based on control and mistrust.

A human being's learning cannot be a phenomenon of adaptation to the environment, but rather the consequence of the epigenesis of the organism with conservation of its organization in a particular environment in which conservation and adaptation have been the operational references for the pathway followed by the same learning (Maturana, 2018). The organism is where it is because it maintained its organization and adaptation in a changing or static environment, and we say that it learned because, comparatively, we see that its current behavior is different from its previous behavior, in a way this is contingent on its history of interactions. Without a historical base of comparison, we cannot say anything. We can only see an organism in behavioral congruence with its current environment (Maturana, 2018, p.49).

In this sense, as expressed by Freire (2006), in an educational or pedagogical environment all those who participate learn. The issue is how we are explicit, in our operation as living beings in a certain environment, regarding the recognition and distinction of differences in the evolution that we display, both as learners and teachers (Maturana, 2018).

Consequently, the constructivist orientation of reciprocal assessment should not break from the conceptualization and configuration schemes of power in micropolitics that is displayed in the classroom, session or didactic encounter. This involves transiting from a traditional scheme, where the teacher proposes and decides based on the attainment of objectives or learning skills, to a dynamic of construction and reciprocal development on all didactic levels, namely planning, display, assessment and analysis (Toro et al., 2020).

If we take this option, we will not only have different results in learning the necessary and functional aspects of the teaching professionalism, but also, and above all, we will enter into a type of relational coexistence based on trust, respect and responsibility for the discipline and teaching condition. This understands it as a collective process, which does not sidestep the personal process, but concretizes and enhances the collective and community aspects.

This can be seen in the empirical evidence that is developed in and from indigenous communities in Chile, through communicative assessment in vulnerable contexts with students and their families (Pino-Sepúlveda & Montanares-Vargas, 2019). Although these educational experiences are very enriching as learnings, the Chilean curriculum is characterized by a marked monocultural rationality, which does not provide a space for epistemic pluralism, thus denying the knowledge and ways of knowing of indigenous peoples, as well as the forms that these groups consider valid for learning and assessing this learning. This is why it is essential for the teacher training curriculum to include the cultural and family ways of knowing of the Mapuche people, so that the teachers who work in these contexts can generate a dialogue between school and Mapuche knowledge (Quilaqueo et al., 2015).

The Reciprocal Assessment Experience in Health and Physical Education Teacher Training

The public policies supported by Pre-service Teacher Education in Chile (PTE or FID for its acronym in Chile) through Law 20,903 from 2016 on teacher professional development and Decree 67 from 2018 (Mineduc, 2018), on assessment, qualification and promotion in school, have led to structural changes in the country's public policies. These give it a formative intentionality and focus on learning (setting aside the classic concept of certification) through tools that allow the student to participate in the assessment, even allowing the teacher to adjust their plans as a result of these assessment opportunities.

Despite all these changes in public policies, it is common for physical education classes to have assessment that are more about certification than training processes. This encourages the construction of a passive, conformist and dependent student body, very contrary to the real value of assessment as key in the learning and teaching process. Authors (López-Pastor & Pérez- Pueyo, 2017) indicate that "in the classrooms, faculties and corridors of educational centers, usually when teachers use the term "assessment" they are referring to the "grading" process. This happens essentially because it is what they have experienced for more than 15 years as primary, secondary and university students ... And it is what they continue to experience throughout their professional career as teachers. But insofar as we are unable to understand assessment and grading as two clearly different processes, it will be impossible to change our professional practice" (López-Pastor & Pérez-Pueyo, 2017, p. 34-35). This repeats despite studies that show the futility of this grade in the learning and teaching processes (Ibarra-Sáiz et al., 2012).

Another discrepancy in the assessment is shown in different studies (Gutiérrez-García et al., 2013; Mínguez & Aguilar, 2014), where often the teaching staff claims to carry out a formative assessment and the students state that they have experienced grading processes as part of tests and final exams (Muñoz et al., 2012).

Reciprocal assessment can lead to a concrete change in the paradigm and display of teachers in training, by allowing them to co-construct their learning and teaching processes through assessment and having the direct responsibility of contributing to the improvement of educational processes managed by their teacher educators. As a diagnostic experience with physical education students in training at a university in southern Chile, students have been able to conduct their training processes through assessment, generating ongoing dialogues and discussions with their peers and teachers, elaborating their own assessment procedures, developing instruments that not only make it possible for them to assess each student's process, but also that of classmates, the teacher and the learning and teaching process itself, through the use of strategies and didactic resources for a given context (Beltrán et al., 2018).

This dynamic was operationalized from ongoing dialogue, using non-parametric strategies, such as the use of thematic films on real events, climate change problems with a direct effect on current daily life, the direct experience and evolution of teachers in training, in relation to nature, education and culture. Their opinions and considerations by virtue of the coherence of what was taught with the attitude and direct testimony of the teacher trainers through the meanings and performances of the course were transmitted in logbooks that delved deeper, providing a reflection or criticism of the different topics raised in each class.

Another important decision in this didactic process is the free choice of presentation formats for the learning developed on the central themes, which in turn were also chosen according to group interest. Finally, the assessment of the dynamics and types of relationships developed by the teachers of the subject in particular and as a group (ways of being and engagement between teacher trainers) was consensual, allowing a reciprocal process between teacher and students.

The challenge of this evaluative educational experience is to be able, on the one hand, to engage students with democratic practices in teaching environments that favor responsibility and autonomy (Vera & Moreno, 2016), since schools and universities do not currently facilitate student learning and participation (Calvo, 2014), but rather they are concerned about content and a possible grade. This is what leads to the need to transform a mechanical (Tobár et al., 2019) and technocratic (Moreno & Medina, 2012) process into a participatory one with much more dialogue, through three fundamental elements (respect, trust and responsibility) of learning in a relationship, where the emphasis is not on the position of each person, but in relation to others, i.e., in reciprocity, as is the case with education (Biesta, 2014).

The involvement of students in assessment is key to improving their learning (Brown, 2015), and an adequate assessment system in physical education classes can enable the discipline to overcome the physical test or exam culture, paving the way for an assessment culture with a shared and formative nature (Pérez-Pueyo et al., 2021; Santos-Pastor et al., 2019). These didactic processes will be essential in the transferability of the future teaching practices of graduates (González et al., 2021; Molina-Soria et al., 2019), improving assessment processes not only in the field of PTE, but also in the school context.

Conclusions

Reciprocal assessment represents a proposition seeking to transcend the unilateral perspective of education assessment, particularly in the training of physical education teachers. This approach enabling students to wield play a significant influence in shaping their own learning and teaching processes. This empowerment is achieved through democratic interactions and within a political, ethical and societal framework centered on reciprocity. Undoubtedly, this educational phenomenon stands as a essential element for enhancing classroom methodologies, refining teacher training, optimizing study programs, and, most importantly, improving student learning.

Reciprocal assessment, functioning as a didactic act is a relationship of trust, through a sincere dialogue that makes it possible to discuss criteria, the form, application and results of a systematic educational process. This trust extends not solely to the individuals involved but also encompasses broader to educational processes. In essence, an education built on trust implies focusing on the learning itself, rather than on the control of other aspects that are confused or disrupted with learning, and with this we refer to attendance, group control and power-based authority. Undoubtedly, this proposition heralds a significant opportunity to transition toward markedly more democratic educational methodologies. This is particularly pertinent in an era where both society and educational settings are fervently advocating for equality and equity. While the transformations of this didactic process are slow (Biggs, 1999; Brown & Glasner, 1999; Knight, 2005) and complex (Algozzine et al., 2004; Emery et al., 2003). That is why, we must generate these spaces with teachers in training, mainly because teacher training is an optimal context to transform evaluation practices, regardless of the country in which it is carried out. Initiating this transformation should entail reevaluating the prior notions that's aspiring educators hold regarding assessment (Perez-Pueyo et al., 2016).

Finally, future physical education teachers expressed that the class was more than a traditional class. Rather, it became a transformative experience, centered on the relationship between human beings, people with life experience, in search of a professional development that is connected to and coupled with their environment and culture from an ethical, epistemic and political point of view. From this perspective, we believe that this transformative experience is a great strength for the future practices of preservice teachers.

Ethics Committee Statement

Not applicable.

Conflict of Interest Statement

The authors declare no conflict of interest.

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Authors' Contribution

All authors have contributed to the development and revision of the manuscript and agree to the publication.

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Coaching efficacy in the esports environment: analysis by education level,classification, competitive videogame and physical status

La eficacia de los entrenadores en el entorno de los esports: análisis en base a su nivel educativo, clasificación, videojuego competitivo y estado físico

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Abstract

The figure of the esports coach is reaching a fundamental relevance nowadays. Therefore, the objective of this study was to analyse the effectiveness of professional and amateur esports coaches considering their educational level, their coach classification, their competitive video game and their physical status. Sixty-two coaches (25.81 ± 3.37 years) completed the Coaching Efficacy Scale. Esports coaches have average values close to seven in all four dimensions of this scale (Motivation 6.89 ± 1.14; Strategy 7.09 ± 1.17; Technique 6.72 ± 1.22; Character 7.02 ± 1.20), which are closely related to players' performance and health. Moreover, the educational level (p < .01) or lifestyle (p < .01) are highlighted as elements that influence coaches' performance. The type of video game is important as well, since higher general values were found for Valorant coaches compared to other videogames (p < .05), placing great importance on the experience dimension in amateur coaches. This is the first reference values on self-efficacy in esports coaches, information of great utility for clubs and players to understand potential strengths or weaknesses of their coaches and to identify future talents.

Keywords: Esports coaches, performance, health, talent development.

Resumen

Actualmente la figura del entrenador de esports alcanza una relevancia fundamental. Por ello, el objetivo de este estudio era analizar la eficacia de los entrenadores profesionales y aficionados de esports según su nivel educativo, su clasificación como entrenadores, su videojuego competitivo y su estado físico. Sesenta y dos entrenadores (25.81 ± 3.37 años), completaron la Escala de Eficacia del Entrenador. Los entrenadores de deportes electrónicos tienen valores medios cercanos a siete en las cuatro dimensiones de esta escala (Motivación 6.89 ± 1.14; Estrategia 7.09 ± 1.17; Técnica 6.72 ± 1.22; Carácter 7.02 ± 1.20), que están estrechamente relacionadas con el rendimiento y la salud de los jugadores. Además, el nivel educativo (p < .01) o el estilo de vida (p < .01) destacan como elementos que influyen en el rendimiento de los entrenadores. El tipo de videojuego también es importante, ya que se encontraron valores generales más altos en los entrenadores de Valorant en comparación con otros videojuegos (p < .05), lo que otorga una gran importancia a la dimensión experiencia en los entrenadores amateur. Se trata de los primeros valores de referencia sobre autoeficacia en entrenadores de esports, información de gran utilidad para que clubes y jugadores conozcan las posibles fortalezas y debilidades de sus entrenadores e identifiquen posibles futuros talentos.

Palabras clave: Entrenadores de esports, rendimiento, salud, desarrollo de talento.

Introduction

Esports are currently a rapidly growing economic and social phenomenon, reaching quotes comparable to traditional sports (Cranmer et al., 2021; de Las Heras et al., 2020). This accelerated growth has led to a progressive professionalization of esports clubs in all their sections (Pluss et al., 2019). The profiles of esports players are increasingly similar to those of traditional athletes, with university scholarships, their own leagues, and lucrative economic contracts (Cranmer et al., 2021; Popov, 2021). This evolution of players has also led to the development of various professional roles within the clubs, ranging from specialists in marketing or law to professionals focused on player training and health (Difrancisco-Donoghue et al., 2019; Giakoni-Ramírez et al., 2022). More specifically, regarding the profiles associated with player performance, esports clubs now have large professional structures, including fitness coaches, psychologists, doctors, analysts, all of whom are coordinated under the guidance of the key figure in the staff, the coaches (Difrancisco-Donoghue et al., 2019; Jenny et al., 2017; Sanz-Matesanz et al., 2023).

These professional coaches in the esports environment have grown in number and quality as the industry has evolved, leading to experts in the field who command significant sums of money associated with multimillion-dollar clubs (Cranmer et al., 2021; de Las Heras et al., 2020). This professionalization not only benefits the coaches but also carries the responsibility of training high-level players in pursuit of victory. Just like in traditional sports, the continuity of a coach in their position will depend on these victories. Therefore, the increasing professionalization of coaches goes hand in hand with the demands of their role and the need to have in-depth knowledge of both their video-game and their players (Poulus et al., 2022; Reitman et al., 2020).

This increase in the relevance of the coach's role stems not only from the pursuit of victories but rather from being responsible for the majority of the players' daily routine (Rajič & Grubić, 2018). Furthermore, the coach will be in charge of setting training hours, as well as, along with the rest of the staff, determining the hours for physical exercise, psychological counselling or support, rest, meals, among others, making them the main driver of the team's evolution (Difrancisco-Donoghue et al., 2019; Oberg & Frank, 2011). As a consequence, their importance in clubs has grown, generating an interest from organizations in the professional development of their coaches as a means to enhance the overall team performance.

Despite this, and the current significance that professional clubs attribute to their coaches as the main responsible figures for their players (Difrancisco-Donoghue et al., 2019), in-depth knowledge about their characteristics and particularities has been overlooked by current research.

Knowledge about coaches in traditional sports is very common, delving into the most important characteristics they must possess to achieve their players' success (Teques et al., 2019). However, in research focused on esports, the role of the coach is completely neglected, with all the attention directed towards the players (Gray et al., 2018; Rudolf et al., 2020; Sanz-Matesanz et al., 2023; Trotter et al., 2021), despite the fact that coaches are responsible for the majority of the players' behaviours (Difrancisco-Donoghue et al., 2019; Oberg & Frank, 2011).

All that knowledge found in research focused on coaches in traditional sports bears certain similarities to the reality of esports coaches. For instance, the vast majority of esports coaches base their coaching abilities on being former players, which grants them extensive experience and knowledge about the game (Richards, 2012). However, in order to achieve excellence as a coach, skills such as leadership and the ability to transmit knowledge are necessary to make a real impact on their players (Richards, 2012; Teques et al., 2019). Delving into these skills, these authors relate a favourable emotional climate created by coaches to a greater ability to acquire knowledge and improve the performance of their players, basing their training on trust and calmness (Judge et al., 2021; Teques et al., 2019). Considering the foregoing, it is evident that experience and game knowledge are crucial, but they are not the sole factors that determine a coach's ability to carry out their profession. It will be necessary to consider other parameters that influence their efficacy as coaches (Teques et al., 2019). This efficacy will ultimately define a coach's potential to influence their players and achieve performance based on the application of their knowledge.

This self-efficacy, as a concept, has been thoroughly studied in traditional sports, primarily through the use of the Coaching Efficacy Scale (CES) (Myers et al., 2017).

The CES is a scale focused on understanding the efficacy of coaches in any discipline, which provides data regarding the coach's capability in four distinct qualities or subscales (Feltz et al., 1999). By using this scale, information can be obtained about 1) the coach's strategic development capabilities, 2) their qualities as a motivator, 3) their skill in developing players' techniques, and 4) their ability to foster character and attitude within their team (Vargas-Tonsing et al., 2003).

This information regarding the four categories is related to the levels of emotional intelligence and the climate created by coaches, something considered crucial in being a good coach (Teques et al., 2019). Similarly, higher levels on the CES are correlated with better overall coaching behavior, greater team satisfaction, and improved competitive performance (Feltz et al., 1999; Tsorbatzoudis et al., 2003). Finally, this scale has been validated not only in relation to the created climate but

also in its connection to the coach's ability to transmit knowledge and gain player acceptance, demonstrating that a high perception of the coach's own ability is linked to their actual capacity to carry out the coaching task (Judge et al., 2021; Richards, 2012).

The importance of the CES has not only been demonstrated from the coaches' perspective, but various studies have also shown that players' perception of their coach's quality coincides in 95% with the coaches' self-perception (Keatlholetswe & Malete, 2019; Short & Short, 2004). In addition, these findings are related to an increase in levels of democracy in training and the relationship with their players, resulting in a sense of greater significance for the players, thereby enhancing their mood and performance (Judge et al., 2021).

Given the significance of the data provided by this scale and its widespread use in traditional sports, the data obtained from its application in esports could mark the beginning of an in-depth understanding of the characteristics of esports coaches. Based on this knowledge, the first profile of these coaches can be generated, identifying their strengths and weaknesses, in order to continue the evolution that esports are experiencing and provide valuable insights for clubs.

Consequently, the aim of this research was to analyse the effectiveness of professional and amateur esports coaches taking into consideration the education level, coach classification, competitive videogame and physical status. This study was created in order to generate the first representative data of this population for this critical study variable.

Materials and Methods

Design and Participants

A descriptive and cross-sectional study was conducted using a non-probabilistic convenience sampling method (Cubo-Delgado et al., 2011). The sample was selected based on convenience. The following inclusion criteria were established for coaches: a) have competitive experience exceeding 2 years or 3 competitive splits; b) actively belong to a competitive esports organization or have been a member during the minimum period set in the first criterion; c) be a coach of a video game considered an esport, belonging to a competitive league, excluding those related to recreational video games. In this study, sixty-two esports coaches participated. The mean age of the participants was 25.81 years (*SD* = 3.37).

Sample Size

Sample size calculations were performed with the software G*Power 3.1.9.4. For this purpose, a protocol of the t-test family identified with the test of difference between independent means (two groups) was used (Faul et al., 2007). The significance level was set at α = .09. As a consequence, the sample size (power analysis) revealed that 58 participants were sufficient to obtain a power of 90%. To avoid potential dropouts or data loss due to the detection of abnormal responses or non-completion, we decided to recruit a larger number of participants. The study sample consisted of a total of 62 coaches. The study was conducted in accordance with the ethical principles of the Helsinki declaration for research involving human subjects (World Medical Association, 2013) and was approved by the institutional review board of the corresponding author´s University.

Instruments

For measuring the coaches' efficacy, the scale known as the Coaching Efficacy Scale (CES) was employed (Feltz et al., 1999).

This scale consists of a total of 24 items belonging to four different subscales or dimensions: Motivation (ítems 1, 3, 6, 10, 12, 15 y 23), Strategy (ítems 2, 4, 8, 9, 11, 17 y 21), Technique (ítems 7, 14, 16, 18, 20 y 22); and Character Building (ítems 5, 13, 19 y 24). The items or questions refer to "How confident are you in your ability to..." with a 10-point response level on a Likert scale from 0 "not at all confident" to 9 "extremely confident".

The instrument has shown in various studies Cronbach's Alpha levels above .8 overall when applied to both professional and amateur coaches (Myers et al., 2005, 2008, 2017; Tsorbatzoudis et al., 2003). Specifically referring to the values for each subscale, a Chronbach's Alpha level of .94 was observed for motivational efficacy, .89 for game strategy efficacy, .87 for technical development efficacy, and .88 for character development efficacy (Feltz et al., 1999; Myers et al., 2017).

Procedure

The data collection took place through online administration of the scale. Firstly, participants were provided with an informed consent letter along with instructions for completing the questionnaire. Following the information about the response procedure of the scale, basic demographic data was collected, which included questions about age, gender, nationality, educational level, professional level, and the main esport they dedicated themselves to. Likewise, questions about their coaching experience, best competitive results, and, if they were former players, their best results during that time were also administered. This information was gathered with the aim of categorising the sample into different groups that facilitate its subsequent in-depth analysis. Completing the entire questionnaire took approximately 15 minutes.

Statistical Analysis

Descriptive data for the different variables under study are presented with their mean (M) and standard deviation (SD) values. The Kolmogorov-Smirnov test and Levene's test were used to check for data normality and variance homogeneity, respectively. Subsequently, independent t-tests were performed for the variables of educational level, type of coach, main esport, and physical activity; whereas the country was analysed using a one-factor ANOVA. For this second analysis, to explore significant differences between each of these conditions, the Bonferroni post hoc test was applied. Furthermore, ROC (Receiver Operating Characteristic) curve analysis was conducted to determine the cutoff point in the different dimensions of the Coaching Efficacy Scale questionnaire and classify the coaches based on several variables: their grouping as professionals or amateurs, the type of specific competition or videogame, and finally, their classification according to whether they engage in sports physical activity or not. The classification accuracy for each set of cutoff points was evaluated by calculating weighted statistics, sensitivity, specificity, and the area under the receiver operating characteristic curve (AUC). An AUC value of > .90 is considered excellent, .80 - .89 good, .70 - .79 fair, and < .70 poor (Metz, 1978). The level of statistical significance was set at $p < .05$ for all statistical comparisons. Data analysis was performed using SPSS software (IBM Corp., Armonk, NY, USA) for Windows, version 24.0, as well as MedCalc 14.12.0 (Mariakerke, Belgium).

Results

The descriptive data of the sample based on the characteristics presented by the participating coaches in the study can be observed in Table 1.

Table 1

Descriptive data of the sample based on the characteristics presented by the participating coaches in the study. Descriptive data concerning age, expertise, as well as their classification by nationality, education and coach levels, the competitive video game, and physical status

	Age	Years spent in competition	Nº tournaments played as coach
	M ± SD	M ± SD	M ± SD
Country			
Spain (*n* = 39)	26.15 ± 3.73	6.72 ± 3.46	8.97 ± 6.39
Portugal (*n* = 15)	25.27 ± 2.94	6.27 ± 2.66	10.00 ± 5.92
Brazil (*n* = 3)	26.00 ± 1.73	7.33 ± 0.58	8.00 ± 2.00
Germany (*n* = 2)	27.00 ± 0.00	8.50 ± 2.12	16.00 ± 0.00
Italy (*n* = 1)	22.00	4.00	4.00
Denmark (*n* = 1)	24.00	3.00	8.00
Uruguay (*n* = 1)	23.00	3.00	6.00
Total (*n* = 62)	25.81 ± 3.37	6.53 ± 3.15	9.26 ± 6.00
Educational level			
High school (*n* = 30)	25.97 ± 3.16	7.37 ± 3.02	8.03 ± 5.95
University (*n* = 32)	25.66 ± 3.61	5.75 ± 3.10	10.41 ± 5.90
Total (*n* = 62)	25.81 ± 3.37	6.53 ± 3.15	9.26 ± 6.00
Coach_Classification			
Amateur (*n* = 18)	23.50 ± 3.70	5.00 ± 3.25	9.44 ± 6.01
Professional (*n* = 44)	26.75 ± 2.75	7.16 ± 3.00	9.18 ± 6.06
Total (*n* = 62)	25.81 ± 3.37	6.53 ± 3.15	9.26 ± 6.00
Main Esport			
LOL (*n* = 38)	26.16 ± 2.98	6.14 ± 2.54	11.19 ± 6.20
Valorant (*n* = 24)	25.61 ± 3.86	7.35 ± 3.87	6.26 ± 4.58
Total (*n* = 62)	25.81 ± 3.37	6.53 ± 3.14	9.26 ± 6.00
Physicaly Active			
Yes (*n* = 40)	25.78 ± 3.72	6.90 ± 3.41	9.35 ± 6.41
No (*n* = 22)	25.86 ± 2.70	5.86 ± 2.53	9.09 ± 5.30
Total (*n* = 62)	25.81 ± 3.37	6.53 ± 3.14	9.26 ± 6.00

Note: LOL = League of Legends; *M* = mean; *SD* = standard deviation.

The results showed significant differences in the mean scores for the motivation dimension, both concerning the classification of the sample based on the type of coach and the type of competitive videogame they are involved in (p < .05) (Table 2). Specifically, for amateur coaches, the mean score for the motivation dimension was higher (*Ma* = 7.26 ± 1.12) compared to professional coaches (*Mp* = 6.74 ± 1.12). On the other hand, for the same motivation dimension, the mean scores were higher in the case of Valorant (*Ma* = 7.26 ± 1.13) compared to League of Legends (LOL) (*Ma* = 6.62 ± 1.06).

Table 2
Mean values obtained for dimensions of the Coaching Efficacy Scale based on different variables related to the characterization of esports coaches

	Motivation	*p*	Strategy	*p*	Technique	*p*	Character	*p*
	M ± SD		M ± SD		M ± SD		*M ± SD*	
Country								
Spain (*n* = 39)	6.99 ± 1.16		6.93 ± 1.15		6.68 ± 1.30		6.99 ± 10.5	
Portugal (*n* = 15)	6.64 ± 1.17		7.09 ± 1.27		6.44 ± 1.14		6.72 ± 1.56	
Brazil (*n* = 3)	6.76 ± 0.95		7.57 ± 0.65		7.39 ± 0.42		7.58 ± 0.63	
Germany (*n* = 2)	6.50 ± 1.31	.44	7.29 ± 0.61	.42	6.79 ± 0.77	.6	7.17 ± 1.18	.32
Italy (*n* = 1)	8.71		8.86		8.50		9.00	
Denmark (*n* = 1)	6.86		8.00		7.80		9.00	
Uruguay (*n* = 1)	6.29		8.71		7.00		6.75	
Total (*n* = 62)	6.89 ± 1.14		7.09 ± 1.17		6.72 ± 1.22		7.02 ± 1.20	
Educational level								
High school (*n* = 30)	6.91 ± 1.24	.95	7.04 ± 1.25	.77	6.78 ± 1.25	.69	6.72 ± 1.35	.06
University (*n* = 32)	6.88 ± 1.06		7.13 ± 1.10		6.66 ± 1.20		7.30 ± 0.98	
Total (*n* = 62)	6.89 ± 1.14		7.09 ± 1.17		6.72 ± 1.22		7.02 ± 1.20	
Coach_Classification								
Amateur (*n* = 18)	7.26 ± 1.12	.035*	7.22 ± 1.06	.57	6.94 ± 1.15	.37	7.46 ± 0.83	.06
Professional (*n* = 44)	6.74 ± 1.12		7.03 ± 1.22		6.62 ± 1.24		6.84 ± 1.29	
Total (*n* = 62)	6.89 ± 1.14		7.09 ± 1.17		6.72 ± 1.22		7.02 ± 1.20	
Main Esport								
LOL (*n* = 38)	6.62 ± 1.06		7.04 ± 1.26		6.51 ± 1.26		6.82 ± 1.33	
Valorant (*n* = 24)	7.26 ± 1.13	.008**	7.21 ± 1.05	.60	7.06 ± 1.13	.09	7.36 ± 0.95	.09
Total (*n* = 62)	6.86 ± 1.17		7.11 ± 1.17		6.73 ± 1.23		7.03 ± 1.22	
Physicaly Active								
Yes (*n* = 40)	7.03 ± 1.09	.23	7.20 ± 1.08	.33	6.77 ± 1.16		7.2 ± 1.09	.11
No (*n* = 22)	6.66 ± 1.20		6.89 ± 1.31		6.61 ± 1.34	.63	6.69 ± 1.34	
Total (n = 62)	6.89 ± 1.14		7.09 ± 1.17		6.72 ± 1.22		7.02 ± 1.20	

Note: LOL= League of Legends; *M* = mean; *SD* = standard deviation; p = significance level; * = p < .05; ** = p < .01.

Finally, through the analysis of ROC curves (Table 3), the cutoff points for the different dimensions of the Coaching Efficacy Scale questionnaire were determined. In this case, taking into consideration both overall scores, and the type of videogame, their classification as coaches, educational level and physical activity (active or sedentary).

Table 3
ROC analysis for the different dimensions of the Coaching Efficacy Scale questionnaire was performed based on various variables related to the characterization of esports coaches

	Motivation			Strategy	Character				
	General	T_Coach	Esport Clasf	Esport Clasf	T_Coach	T_Coach	Studies		Physical Activity
	(*n* = 58)	Prof	LOL	LOL	Prof	Amateur	High School		Active
		(*n* = 41)	(*n* = 37)	(*n* = 37)	(*n* = 43)	(*n* = 18)	(*n* = 29)	(*n* = 29)	(*n* = 22)
	Esport Clasf	Esport Clasf	T_Coach	T_Coach	Studies	Studies	Physical activity	T_Coach	Studies
	LOL	LOL	Amateur	Amateur	High School	High School	Sedentary	Amateur	High School
AUC	0.66	0,78	0.79	0.71	0,68	0,79	0,76	0,87	0,78
SE	0.08	0,09	0.08	0.11	0,08	0,14	0,09	0,1	0,1
95% IC	0.52 a 0.78	0.58 a 0.86	0.62 a 0.91	0.53 a 0.84	0.52 a 0.82	0.53 a 0.94	0.56 a 0.90	0.69 a 0.96	0.56 a 0.93
p	0.04*	0,007**	< 0.000**	< 0.05*	0,03*	0.04*	0,006**	< 0.000**	0,006**
IY	0.27	0,48	0.53	0.48	0,28	0,67	0,37	0,75	0,48
C_P	> 6,57	> 6,57	<6,43	<7,43	>7,25	< 7,75	< 6,75	< 7,75	> 6,00

Note: Only significant results are presented. N = number; *= significance *p* <.05; **=significance *p* <.01; *IC* = Confidence Index; IY= Youden Index; C_P = Cutoff point; SE = Standard Error; AUC = area under the curve; LOL= League of Legends; Esport Clasf= type of esport; T_Coach=coach classification; Prof = professional coach.

The ROC analysis revealed cutoff points in the scores obtained for the motivation dimension, both overall based on the type of esports practice (6.57), and specifically for LOL when discriminating between professional and amateur coaches (6.57). For the motivation dimension, coaches showed cutoff points of 6.43 when considering LOL practice to differentiate between amateur and professional coaches. Moving on to the strategy dimension, cutoff points of 7.43 were observed exclusively for LOL practice when discriminating between types of coaches. Regarding the character dimension, cutoff points of 7.25 and 7.75 were found when distinguishing between professional and amateur coaches based on their level of education. Additionally, for the character dimension, a cutoff point of 6.75 was observed when considering whether coaches engaged in physical activity or not. On the other hand, for discriminating based on the classification of coaches, the cutoff point was 7.75.

Finally, the character dimension revealed a cutoff point of 6.00 when considering the coaches' level of education for differentiation, as well as their involvement in physical or sporting activity.

Discussion

The aim of this study was to analyse the effectiveness of professional and amateur esports coaches in order to generate the first representative data for this population.

When comparing the scores obtained for the dimensions included in the Coaching Efficacy Scale, it can be noted that the results are consistent with those found in other samples of traditional sports coaches (Myers et al., 2017). Specifically, the mean scores found in this study range from 6.72 to 7.02. These data are similar to those reported in studies conducted by Short and Short (2004), where coaches from various disciplines obtained scores between 6.8 and 7.7, or by Feltz et al. (1999), with an average ranging from 7.31 to 8.19 points, and finally, those reported for soccer coaches by Keatlholetswe and Malete (2019), with scores between 7.67 and 8.12.

The similitude in these scores could be ascribed to the significant professionalization and growth that the esports sector has undergone. In this regard, to comprehend the level of professionalization and reach of esports, studies such as that of Cranmer et al. (2021) demonstrate that over the last 7 years, esports have been able to attract more than 60 million annual viewers compared to the NBA's annual 20 million. Similarly, Activate's study (2023) notes that the age group between

18 and 25 has altered its consumption preferences for competitions, dedicating 55% of leisure time to watching esports as opposed to 45% to traditional sports. These data indicate a societal change in the influence of esports, resulting in a continuous rise in the economic figures handled by clubs and organizations, along with an increased ability to invest in their personnel. Consequently, akin to traditional sports, esports clubs have opted to invest substantial amounts of money in enhancing their infrastructures, including coaches being a key component in this framework, given their importance and relevance to the players' performance (Difrancisco-Donoghue et al., 2019; Jenny et al., 2017; Sanz-Matesanz et al., 2023). The degree of professionalization of coaches is becoming comparable to that already established in more traditional sports practices (Cranmer et al., 2021; Giakoni-Ramírez et al., 2022).

In line with this, Myers et al. (2017) state that scores close to seven are synonymous with a high level of knowledge about the specific sports practice. Likewise, these authors suggest that it also reflects experience, enabling coaches to manage game situations with better judgment, based on the trust placed in their players' professional abilities. It is essential to remember that the evolution in this sector also involves players, where their specialization and professionalization have grown significantly, having a comparable pace to that observed in traditional sports (Reitman et al., 2020; Sanz-Matesanz et al., 2023).

Furthermore, it should be noted that scientific evidence has correlated these values from the Coaching Efficacy Scale with improved performance and the ability of coaches to achieve positive outcomes both in competitions and in the personal development of players (González-Ponce et al., 2017; Keatlholetswe & Malete, 2019; Short & Short, 2004; Teques et al., 2019). Therefore, the findings presented in this study could be of great relevance and utility, as no previous research has been conducted in this area within the esports environment. In traditional sports, the coach is considered a highly influential cornerstone in a player's life, capable of influencing their behaviours and emotional state, directly affecting their performance (González-Ponce et al., 2017).

As a consequence, the use of this tool would be highly valuable in detecting potential anomalies or situations that could adversely affect performance or effective coaching capabilities, based on the competencies acquired by the coaches and the players' perception of these abilities (González-Ponce et al., 2017). Moreover, providing a reference value for such an important parameter in player performance and well-being will enable clubs to possess a valuable tool when selecting talent, not only for players but also for recruiting future coaches (Oberg & Frank, 2011).

Additionally, when analysing the data according to the type of coach (professional or amateur), significant differences were found in the mean scores for the dimension of motivational competence. These findings are in line with those of Kavussanu et al. (2008), but not with those reported by Feltz et al. (1999) or Marback et al. (2005). The explanation for these discrepancies might lie in the way each study defines the experience accumulated by a coach. In this research, experience is synonymous with professionalization, and it is crucial to consider that it is not the number of years spent as a coach that makes the difference, but rather how the coach fulfils this role. For professional coaches, this involves significant changes in their personal life and social relationships, as it requires them to spend more time away from their families and become more isolated (Myers et al., 2017). Consequently, this can lead to a reduction in social support and relationships, potentially resulting in a lower perception of motivational competence among professional coaches (Myers et al., 2017). In fact, these authors assert that constant social support is a key factor in increasing perceived efficacy among coaches.

On the other hand, the explanation for the findings related to a higher perception of motivational competence among amateur coaches may be related to their ambition for improvement and progress (Erickson et al., 2008; Mesquita et al., 2011). Amateur coaches may be more motivated to excel and demonstrate their abilities, as they are likely driven by a strong desire to succeed and showcase their coaching capabilities. This might contribute to their higher perceived motivational competence. These findings shed light on the importance of considering the context and esports coach 'experiences when evaluating their coaching efficacy.

In this line, the effectiveness of coaching has been defined as the degree to which coaches believe they have the ability to influence the learning and performance of their athletes (Feltz et al., 1999). In the specific case of perceived effectiveness in the competence to motivate dimension, the same author states that the theoretical concept is comparable to the confidence a coach has in their ability to influence the skills and psychological states of their athletes. Perhaps, the differences found here are also related to the fact that an amateur coach works in a more modest esports club compared to a professional one. This circumstance implies that the amateur coach is solely responsible for motivating their players, whereas in the case of professional coaches, esports clubs have resources and specialised staff who specifically take care of these psychological aspects, resulting in those aforementioned differences, similar to those found in traditional sports (McCalla & Fitzpatrick, 2016).

The presence of additional resources and support staff in professional esports clubs can relieve some of the motivational responsibilities placed on coaches, allowing them to focus on other coaching aspects. On the other hand, amateur coaches may need to take on a more hands-on approach, personally managing and motivating their players. This could lead to

a higher perceived competence in motivation among amateur coaches, as they are directly involved in the day-to-day motivational processes.

When studying the scores obtained for the competence to motivate dimension based on the type of videogame, significant differences were found, showing a higher perception of this competence among coaches working with the videogame identified as Valorant. These results are supported by those obtained in the ROC curves, which allow establishing a discriminatory point based on this classification. These findings contrast with those reported by Feltz et al. (1999), where higher scores are associated with more experienced coaches. In line with this, considering that Valorant is a videogame released in mid-2020, while LOL was released in late 2009, the maximum experience of a Valorant coach cannot exceed 3 years, while LOL coaches can have more than 10 years of experience. The possible explanation for the results found here might be related to several factors. On one hand, even though Valorant is a recent creation, coaches do not emerge out of nowhere; they may have previously served as coaches in another type of videogame, and with the emergence of Valorant, new job opportunities in the sector have appeared, allowing for an easy transition within the esports ecosystem, as seen in other labour sectors (Wanberg et al., 2020). On the other hand, the novelty associated with this type of game could be related to a greater perception of motivation for carrying out their coaching duties, leading to an increase in the perception of competence to motivate as well (Myers et al., 2017). The same author pointed out that novelty is highly correlated with perceiving greater social support, essential for motivation as previously mentioned. The successful emergence of Valorant in the esports scene attracted a large audience, creating a strong sense of support among players and coaches, as well as a higher rate of competitive success (Tsorbatzoudis et al., 2003). In the case of LOL competition, time may have had an impact on these two elements related to novelty and motivation.

Other factors that could explain the differentiation between the values of LOL and Valorant coaches may be based on the characteristics of the games themselves. In this regard, a distinguishing element between both esports can be highlighted, such as their level of activity during competitions. In the case of Valorant, each match is divided into short-duration, high-intensity rounds that allow no place for relaxation for both players and coaches, maintaining a constant level of attention and motivation. On the other hand, in LOL, matches are linear, of indefinite duration, with moments of high tension and transitional periods that can negatively impact coaches' motivational competition due to the absence of a consistently high level of tension.

In addition, we could mention the coach's perception of intervening during the competition. In Valorant, timeouts during the competition are allowed, enabling coaches to have a discussion with the players that could contributes to their motivation and concentration. However, in LOL, coach interventions during the competition are prohibited. These statements align with the findings of Shahzad (2022), where a significant relationship between the motivation of team members and their leaders is observed in environments with high demands of constant attention, similar to the differences between LOL and Valorant. Moreover, this study demonstrates an improvement in leaders' perception of competence when given the ability to intervene in their teams' performance, resembling the prohibition or allowance of timeouts in esports competitions.

The analysis of the ROC curves allowed evaluating the motivational capacity of coaches across different types of competition, amateur or professional. As shown in the previous results, the type of competition could be used to discriminate between professional and amateur coaches in their ability to motivate, with a cutoff point of 6.57, with higher values for amateurs. Similarly, these ROC curves allow the same discrimination for amateur coaches in the LOL competition (cutoff point = 6.43). These findings are related to those reported by Mesquita et al. (2010), where they state that professional coaches have well-established and complex systems that lead to a sense of caution when considering them effective, due to their constant pursuit of perfection, thus decreasing their perceived efficacy. Conversely, the same study highlights that amateur coaches are more open to taking risks, showing higher levels of self-confidence in less polished methods and increasing their levels of perceived efficacy. As far as we know, this is the first study that defines these cutoff points. Even if further research is needed, this could be considered an important finding in order to differentiate coaches based on their level of professionalization and the type of videogame they work with. This will help determine the levels of efficacy in this competence to motivate dimension, being a fundamental characteristic that allows coaches to influence the players´ skills and psychological state, which is closely related to player performance (Feltz, 1999).

Referring to the results obtained for the variable of educational level, it was observed that, even though no significant differences were recorded, the ROC curves showed cutoff points that allowed discrimination among coaches based on their educational background. Specifically, it was evident that for the dimension of player character, coaches with higher education who are professionals achieve a distinctive and higher score in their perception of their ability to develop this character in the player, compared to amateurs. These findings align with research in traditional sports, such as Gould et al. (2016) or Santos et al. (2010), where the coaches with higher education levels enhance their perceived efficacy values. According to research, the reason for this correlation lies in the greater capacity of higher-educated coaches to provide relevant information, comprehension, and access to it compared to those with lower educational levels (Feltz et al., 1999; Gould et al., 2016; Santos et al., 2010). This increased access capacity is further accentuated when dealing with professional

coaches, who, due to their greater resource levels, possess more tools to obtain high-quality information compared to amateur coaches (Poulus et al., 2022).

However, in contrast to the results found for professional coaches, when focusing on amateur coaches in the character dimension, the ROC curves revealed cutoff points indicating that coaches with lower levels of education display higher scores. These findings align previous research applied to coaches in traditional sports. These studies emphasize that in competitive coaching, the primary source of coaches' knowledge comes from other coaches and mentors, drastically reducing the importance of holding university studies (Irwin et al., 2004; Mesquita et al., 2010). This assertion implies a significant modification when selecting coaches based on the degree of club professionalization.

In this context, Gould et al. (2016) stated that the complexity of most scientific studies and their limited applicability to the coaching reality, leads to reduced usage among coaches. They also argue that this difference is even more pronounced in environments with fewer resources, linking the statement to the amateur scene, where more accessible sources of knowledge such as meetings between coaches or consultations with experts are favoured.

In a similar manner, referencing the meta-analysis by Myers et al. (2017), it is demonstrated that one of the primary factors influencing increased perceived efficacy in coaches of any level lies in their experience. This assertion could justify the data concerning higher scores among amateur coaches without formal education. These coaches, not having invested time in university studies and having engaged in coaching roles earlier, accumulate more experience compared to coaches who delayed their entry into competition due to pursuing higher education.

This proposition aligns with the argument by Mesquita et al. (2011), where they correlate increased coaching efficacy with greater experience associated with early entry into the competitive environment. The study suggests that this entry is influenced by access to higher education and its requirements, since in non-professional environments where compatibility is not feasible, coaches must delay their entry into the competition in order to fulfil academic obligations.

Continuing with the character dimension, concerning coaches with a lower level of education, it is evident that sedentary coaches obtain higher scores compared to active coaches. The rationale for this finding, as in the previous case, is related to the study by Mesquita et al. (2011), which associates higher coaching efficacy with those coaches dedicating more time to their role, thus accumulating greater experience than their counterparts who invest time in other activities.

However, when considering the overall data and continuing with the character dimension, active coaches exhibit better overall scores compared to sedentary ones. This discrepancy from the earlier findings is attributed to the differentiation based on the level of education. By examining the cutoff points, differences emerge among coaches with higher education, revealing that active coaches achieve higher scores than sedentary ones. This differentiation has been associated, in the context of traditional sports, with a better understanding of the significance of physical exercise as an enhancer of cognitive abilities (Mandolesi et al., 2018; Wilke et al., 2019), leading to its increased implementation in the team's routine.

Lastly, referring to the strategy dimension, no significant differences were found. However, the ROC curves allowed for discrimination between amateur and professional coaches in terms of their ability to develop strategies for their players, where amateur coaches scored higher than professional ones. Similar findings have been observed in studies conducted on coaches in other sports (Feltz et al., 1999; Myers et al., 2017). These studies suggest that the perception of coaches' strategic development capabilities is linked to achieving victories, which significantly influences their perceived efficacy as well (Feltz et al., 1999; Myers et al., 2017). Regarding this matter, it is asserted that achieving victories is easier in the amateur environment compared to the professional setting, where team demands increase drastically, and the number of tournaments decreases, making it more challenging to secure wins (George & Sherrick, 2019). higher scores in the amateur setting may stem from the increased frequency of tournaments with lower stakes, leading to a more achievable and likely attainment of victories. Consequently, this could influence the coach's perceived effectiveness in strategy development compared to their professional counterparts (Tsorbatzoudis et al., 2003).

Conclusions

This study is the first one applied to esports coaches, who despite being the most influential figures in player performance and well-being, have not received much attention from the scientific community. Additionally, this study is the first to use cutoff points to differentiate profiles based on the scores obtained in the different dimensions of the efficacy scale. This information could be highly valuable and cost-effective in evaluating coaches, enabling the implementation of intervention strategies to improve their competencies and identify any shortcomings that could negatively impact esports players' performance.

Furthermore, the results indicate that perceived efficacy scores can be considered high (~7), comparable to those of traditional sports coaches, consolidating the professionalization of the esports industry. Alongside this, the scores obtained for each dimension of the efficacy perception scale are the first reference points available and can be applied by esports clubs to understand their coaches' profiles, facilitating talent acquisition and professional development.

Finally, this study reveals several determinants of perceived efficacy that should be considered in future analyses of efficacy in esports coach samples. These include the significance of possessing specific university studies for professional coaches and the importance of engaging in physical activity at any level of professionalization to enhance coaching capabilities. Likewise, when selecting coaches for amateur teams, experience is of vital importance, surpassing the relevance of possessing higher education. The data obtained in this study suggest that an increase in the experience of amateur coaches, with more dedication and years of experience in their role, outweighs the significance of having higher education when it comes to achieving success. Lastly, our study highlights that amateur and Valorant coaches have higher reference scores than those in LOL for all the dimensions analysed, a crucial point to consider in the coach' selection process. This implies that, the requirements for coaching positions within a professional or amateur club, differ based on the specialized game and the level of professionalization, leading to variations in the scores on an efficacy scale.

An important fact to keep in mind is that, depending on the club's profile, the elements to be considered when selecting a coach are different. If the club manages both categories (amateur or academy and professional), or if they are focused on one type of game or another, the selection processes should be approached in a different way. For the professional section, the education level and physical status will be key points, while for the amateur section, the experience level will be decisive. In the same way, being a specialist in Valorant or LOL is key to the success of the club, regardless of whether the coach meets other quality criteria in the selection process.

In this particular esports environment, clubs can undergo changes in terms of downgrading, and this affects both the players they will be able to retain, the new additions to be made, as well as the new coach profile that meets the level requirements of the club. Amateur coaches who move on to pro-coach requirements are ruled by different selection criteria, and vice versa. Hence the importance of having some normative reference data for the dimensions studied in this research.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Catholic University of Murcia (code: CE052209; approval date 27 May 2022).

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Authors' Contribution

Conceptualization, M.S.-M., L.M.M.-A. and G.M.G.-G.; Methodology, M.S.-M., L.M.M.-A. and G.M.G.-G.; Software, M.S.-M. and G.M.G.-G.; Validation, M.S.-M., L.M.M.-A. and G.M.G.-G.; Formal Analysis, G.M.G.-G.; Investigation, M.S.-M., L.M.M.-A. and G.M.G.-G.; Resources, M.S.-M., L.M.M.-A. and G.M.G.-G.; Data Curation, G.M.G.-G.; Writing—Original Draft, M.S.-M.; Writing—Review and Editing, M.S.-M., L.M.M.-A. and G.M.G.-G.; Visualization, M.S.-M., L.M.M.-A. and G.M.G.-G.; Supervision, L.M.M.-A. and G.M.G.-G.; Project Administration, M.S.-M., L.M.M.-A. and G.M.G.-G. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the corresponding or last authors of the manuscript on request.

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Body shadow theatre in physical education to promote the emotional wellbeing of schoolchildren: a gender perspective

Teatro de sombras corporales en educación física para favorecer el bienestar emocional de escolares: perspectiva de género

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Abstract

The present study was based on the possibilities offered by body shadow theatre as a resource and content to promote the emotional well-being of girls and boys from an early age. A total of 118 primary school students (60 boys and 58 girls) from a school in south-eastern Spain participated. They assessed the emotional intensity they experienced through the Games and Emotions Scale for Children (GES-C) instrument and explained which emotion they had felt more intensely and why, through drawings and/or comments. The data obtained were analyzed using Statistical Package for Social Sciences version 27.0 for Windows and an inductive categorization using NVivo software. The results showed that the expressive motor situations presented through body shadow theatre favored the intense experience of positive emotions (M = 5.02, SD = 1.40) significantly (p = .000) in relation to negative emotions (M = 1.17, SD = 0.47). Boys and girls justified emotional well-being with personal and body shadow theatre aspects. Girls, unlike boys, emphasized social relationships during expressive motor practice. The conclusions showed that the free and creative expressive motor situations presented in body shadow theatre favored emotional well-being in both girls and boys.

Keywords: Expressive motor situations, emotion, didactic resources, socio-cultural constructions, physical education.

Resumen

El presente estudio se basó en conocer las posibilidades que ofrece el teatro de sombras corporales como recurso y contenido para favorecer el bienestar emocional de chicas y chicos desde edades tempranas. Participaron un total 118 estudiantes de educación primaria (60 chicos y 58 chicas) de un centro educativo situado en el sureste de España. Valoraron la intensidad emocional que experimentaron a través del instrumento Games and Emotions Scale for Children (GES-C) y explicaron qué emoción habían sentido con mayor intensidad y por qué, a través de dibujos y/o comentarios. Los datos obtenidos se analizaron mediante el Statistical Package for Social Sciences versión 27.0 para Windows y una categorización inductiva utilizando el software NVivo. Los resultados mostraron que las situaciones motrices expresivas planteadas a través del teatro de sombras corporal favorecieron la vivencia intensa de emociones positivas (M = 5.02, DT = 1.40) de forma significativa (p = .000) con relación a las emociones negativas (M = 1.17, DT = 0.47). Los chicos y las chicas justificaron el bienestar emocional con aspectos personales y propios del teatro de sombras corporales. Las chicas, a diferencia de los chicos, destacaron las relaciones sociales durante la práctica motriz expresiva. Las conclusiones mostraron que las situaciones motrices expresivas libres y creativas planteadas en el teatro de sombras corporal favorece el bienestar emocional tanto en chicas como chicos.

Palabras clave: Situaciones motrices expresivas, emoción, recursos didácticos, construcciones socio-culturales, educación física.

Introduction

Body Shadow Theatre as a Didactic Resource

Body shadow theatre is understood as the representation of stories, scenes, situations, etc., mainly with body shadows (accompanied by objects) that are projected onto a cloth or similar thanks to a spotlight. It is considered a didactic resource that favours the work of expression and communication in body language (Cifo & Ureña, 2022), as well as spontaneity and improvisation (Pérez et al., 2012). On the one hand, it awakens curiosity in students, motivating their involvement in the teaching-learning process (Pérez-Pueyo et al., 2010). And, on the other hand, it allows the work on interculturality and the development of the contents of corporal expression from spontaneity and creativity (Cifo & Ureña, 2022).

In turn, this didactic resource can enable different expressive motor situations (EMS) characterised by an internal and external logic, loaded with symbolic and referential meaning (Mateu & Torrents, 2012; Parlebas, 2003). In this sense, we should not only contemplate those EMS focused on the expression itself or on the reproduction of models without the intention of communicating or representing something in particular (such as dancing for the sake of dancing), but also those that inherently communicate a message, idea, emotion, etc., to an audience through body language (Troya, 2018). Body shadow theatre allows both EMS proposals based on the reproduction of previously established models (such as representing animal flashcards through body posture) through the execution and expression itself without the presence of spectators, and EMS proposals based on improvisation (such as improvising animal postures through body posture) through creative expression on the fly and its communication to spectators.

In line with the above, Ribas and Mateu (2020) consider four creative processes classified into three degrees of creativity that can occur during the practice of EMS. Firstly, minimal creativity in imitative EMS. Secondly, intermediate creativity in EMS suggesting variation and composition. And third and lastly, maximum creativity in improvisational EMS. This differentiation relates the degree of codification (regulation) of the EMS (Mateu & Coelho, 2011) and the degree of uncertainty of the participants during the performance of the EMS (Ribas, 2018). Thus, when performing EMS of: a) imitation, creativity is determined (with regulation and without uncertainty); b) variation and composition, creativity is semi-determined (with regulation and uncertainty); and c) improvisation, creativity is not determined (without regulation and with uncertainty) (Ribas & Mateu, 2020).

Through body shadow theatre, a variety of EMS could be proposed according to the creative processes and degrees of creativity, with the aim of originating motor behaviours that encompass the whole person and are oriented towards personal well-being. There are differences in the emotional experience of students when participating in EMS depending on their internal logic (Gómez-Carmona et al., 2019).

Body Shadow Theatre and Emotional Well-Being

For years, the possibilities and importance of corporal expression for health have been highlighted, not only in relation to physical, cognitive or social aspects, but also to emotional ones (Álvarez & Quintana, 2010). Pérez-Pueyo and Casado (2011) state that in body shadow theatre students face the difficulties of expressing and creating, which can originate and intensify the feeling of ridicule and the emotion of shame. It is still evident that a high percentage of Primary Education students do not receive training on the content of corporal expression (Bonet & Menescardi, 2022), so some expressive resources may be novel for them. When introducing EMS through body shadow theatre, pupils could experience the same level of expressive and communicative competence (Pallarés et al., 2014). Therefore, students end up participating and integrating in the development of the experience (Cifo & Ureña, 2022).

Moreover, emotional well-being may also be conditioned by the motor objective of each EMS (Torrents et al., 2011; Troya, 2018). Well-being is favoured if the motor objective of the EMS does not require a technique in its execution or the reproduction of models (López-Villar & Canales-Lacruz, 2007), that is, if the motor objective of the EMS offers a creative and spontaneous experience, where greater importance is given to enjoyment and personal bodily expression (Cifo & Ureña, 2022).

In line with the above, it should be noted that different studies affirm that EMS promote well-being (Alonso et al., 2019; Ruiz-Vico & Cifo, 2020; Torrents et al., 2011). However, the emotion of shame is intensified in the initiation phases of body expression (Torrents et al., 2011). Through body shadow theatre, it is possible to integrate the participation of the most shy and shameful students (Cifo & Ureña, 2022; Pallarés et al., 2014). Although they face the difficulties of expressing and creating, body shadow theatre presents a clear difference with respect to other didactic resources, the presence of a cloth or sheet between actors and spectators. This allows that during the process of corporal communication there is no direct exposure to the spectators, but an indirect exposure that provides security and favours well-being (López-Villar & Canales-Lacruz, 2007). This characteristic should be highlighted when considering the existence of a relationship between the comfort and discomfort experienced by the students and the internal logic of the EMS, since the presence or absence of spectators conditions the emotional experience in the EMS (Canales-Lacruz & Corral-Abós, 2021). These authors associate

the role of spectator with comfort and the role of actor with discomfort and point out that, in the absence of observers, students show greater comfort in improvisations than in the presence of observers. Ruiz-Vico and Cifo (2020) indicate that one of the reasons why students experience the emotion of embarrassment in EMS is because they feel observed. When students are observed during EMS they experience discomfort, unease and ridicule (Canales-Lacruz, 2009).

Body Shadow Theatre, Emotional Wellbeing and Gender

According to the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), approved by the United Nations General Assembly in 2015 (United Nations, 2015), one of the main challenges and goals is: "5. Taking into account that "gender is understood as the socio-cultural constructs that differentiate and shape the roles, perceptions and status of women and men in a society" (UNESCO, 2014, p.104), when a person participates in a motor situation they are entering a social system (Alonso et al., 2019) that is usually associated with the male or female gender (Alcaraz et al., 2023). In this sense, EMS could be a good scenario to generate socialisation processes between both genders oriented towards equality.

Several studies show that there are stereotypes associated with the female gender when participating in EMS (Alonso et al., 2019; Papí-Monzó et al., 2021). In contrast, Bonet and Menescardi (2022), after carrying out a study with students in the first year of Compulsory Secondary Education, state that most of them do not have a stereotypical opinion towards the content of corporal expression. However, the teachers involved in the experience point out that there is a minority who make stereotypical statements.

There are still differences in the feeling of motor competence between girls and boys when participating in EMS (Papí-Monzó et al., 2021). Although this is still a reality, it is also true that the majority of students reject the reproduction of traditional gender stereotypes in EMS (Bonet & Menescardi, 2022). These differences in the level of motor competence when performing EMS may be determined by the contents worked on (Papí-Monzó et al., 2021). For example, girls generally prefer EMS in physical education sessions compared to boys (Arias et al., 2021). This difference is noticeable when performing dance EMS. This is why the content to be worked on in EMS should be varied, since, as Sevil et al. (2016) point out, the feeling of expressive motor competence in boys increases when the content of EMS is varied.

This gives an important role to the teaching role. Teachers must guarantee positive emotional experiences for students (Gea et al., 2017; Gil-Madrona et al., 2021; Muñoz-Oliver et al., 2022; Sáez de Ocáriz et al., 2014), improving attitudes and socio-cultural constructions towards PE in general and EMS in particular (Arias et al., 2021). Teachers of PE through EMS from an early age should educate in gender equality in order to eliminate stereotypical constructions (Arias et al., 2021; Bonet & Menescardi, 2022; Torrents et al., 2011).

For all these reasons, it is interesting to know the possibilities offered by body shadow theatre as a resource and content to promote emotional well-being from an early age, considering the gender of the learners.

After reviewing the literature and analysing previous studies, the following objectives were set:

1. To analyse the emotional intensity experienced when participating in expressive motor situations through body shadow theatre.

   The following hypothesis was derived from this first objective: Body shadow theatre increases the emotional intensity of the participants.

2. To analyse the emotional intensity experienced by girls and boys when intervening in expressive motor situations through body shadow theatre.

   For this objective, the following hypothesis was elaborated: Girls experience positive emotions more intensely than boys when performing body shadow theatre.

3. To examine the comments made by girls and boys about the type of positive emotion experienced with greater intensity when participating in expressive motor situations through body shadow theatre.

The hypothesis that was raised from this last objective was: Both girls and boys mention the same aspects of body shadow theatre as determinants in the experience of positive emotions.

Materials and Methods

Design and Participants

A descriptive, cross-sectional study design with non-probabilistic sampling was used. A total of 118 primary school students (60 boys and 58 girls; age range = 6-11 years, M = 8.30, SD = 0.95) from a Spanish public school participated. The data were collected in a cross-sectional experience organised by the school during regular school hours. This study was conducted with the approval of the University Research Ethics Committee (ID: 1684/2017).

Instruments

The first version of the Games and Emotions Scale for Children (GES-C) validated by Alcaraz-Muñoz et al. (2022) was used to assess emotional intensity. This first version of the scale included three basic and universal negative emotions (Ekman, 1993) such as anger, sadness and fear, and three positive emotions such as joy, affection (Goleman, 2013) and surprise, which according to Lazarus (1991) can be considered more positive than ambiguous, as it is mostly associated with favourable situations. This selection of emotions was made based on the classification proposed by Bisquerra (2009) for educational purposes. Each item was rated on a Likert scale from 1 (I felt nothing) to 7 (I felt a lot). In addition, symbolic representations of each of the emotions and their intensity were included along with the numerical scale, following the recommendations of DeKlerk et al. (2014) in a study with children. A qualitative data collection section was also considered, focused on the emotional experience associated with the physical artistic-expressive content worked on. The schoolchildren were asked to explain which emotion they had felt most intensely and why, together with a free choice between drawing and/or commenting. For each emotion identified (positive or negative), an average value of the emotional intensity experienced was obtained.

In terms of reliability, Cronbach's alpha value indicated that the internal consistency was good both for positive (α = .85) and negative emotions (α = .79). Confirmatory factor analysis adequately reproduced the scale structure and showed good fit indices [minimum $\chi 2/df$ = 1.35; Tucker-Lewis index (*TLI*) = .98; comparative fit index (*CFI*) = .98; root mean squared error of approximation (*RMSEA*) = .048 (LO90 = .000 - HI90 = .086)].

Procedure

The students participated in a 60-minute session. First, the functioning of the scale and the six emotions included in it were explained to them in order to facilitate their recognition. Subsequently, the study intervention was developed (see Table 1), which consisted of five physical artistic-expressive activities structured in four blocks and taught by an expert. The materials used were two canvases and two spotlights (a projector and a spotlight). At the end of the session, the students filled in the first version of the GES-C in which they recorded the level of intensity, from 1 to 7, that they had experienced in each of the six emotions considered in the scale. Immediately afterwards, they described and/or briefly drew an explanation of why they had felt the most intense emotion associated with the content they had worked on.

Table 1
Description of the physical artistic-expressive activities used in the study

ACTIVITIES TO GET IN TOUCH WITH MATERIALS AND SHADOWS
Say my name: the pupils are divided into two large groups, one on each side of the sheet. The sheet is placed as a screen between the two groups so that neither side can be seen. From each group, one person from each group approaches the sheet, in total and absolute silence. When they are ready, the sheet will be lowered and they will have to say the name of the partner in front of them. The winner is the group of the person who manages to say the name of the opponent first.
In the light and in the shade: the whole group, according to the teacher's instructions, must position themselves inside the spotlight or outside the spotlight. The teacher will project a light on the floor and move it around the space, making short stops. Firstly, the students must follow the light, without stepping on it, always staying outside it, in the shadow. Secondly, the pupils must follow the spotlight and place them inside the light when the stop is made.
INTRODUCTORY ACTIVITIES IN SHADOW PROJECTION
Parade of models: in two large groups, one group will play the role of actor and the other group will play the role of spectator. The actor group will be positioned between light and shadow. The members of this group will go out one by one, walking as in their daily life and the spectators will have to recognise the shadow of each partner as they walk from the spotlight to the canvas. If the role-playing partners do not recognise the shadow of the parading partner in the way they walk, the pupil in the role of actor will have to parade again. When they have all left, the roles change. The actors become spectators and vice versa.
RECREATIONAL AND RESEARCH ACTIVITIES
Who is who: in two large groups, one group will play the role of actor and the other group the role of spectator. The actor group will be positioned between the light and the shadow. The members of this group will come out one by one. In this case, they will have to move from the spotlight to the canvas, experimenting with different body shapes (crawling, crawling, ball-shaped, etc.). The pupils in the role of actors will try to confuse the spectators through their body language, so that they do not guess who they are. The pupil in the role of actor will continue to create different forms of body movement until the spectators guess who it is. When they have all come out, the roles will change. The actors become spectators and vice versa.
PERFORMANCE AND IMPROVISATION ACTIVITIES
My favourite sport: in two large groups, one group will play the role of actor and the other group the role of spectator. The actor group is positioned between the light and the shadow. The members of this group will come out one by one. In an expressive motor situation, they will have to enter the stage approaching the canvas individually and they will have to represent the sport they like the most only with movement and body language. The spectators will try to guess it. As long as the spectators do not guess the sport, the actor will continue to perform different improvised movements related to the preferred sport. When everyone has come out, the roles will change. The actors become spectators and vice versa.

Quantitative Statistical Analysis

Means and standard deviations were calculated for each variable. The Kolmogorov-Smirnov test showed a normal distribution of the data, therefore, Student's parametric t-test for related and independent samples and Levene's test for homogeneity of variance were applied. A *p*-value of .05 was used for all statistical tests. Effect size (*ES*) results of interactions between variables were also calculated using partial eta squared ($\eta P2$). All analyses were performed using Statistical Package for Social Sciences version 27.0 for Windows.

Qualitative Statistical Analysis

The proposal of Trigueros et al. (2019) was followed, carrying out a categorical analysis using the descriptive technique of open-ended written questionnaires. Participants responded to the researcher's interests or questions. From the responses, an inductive categorisation was carried out using NVivo software. Four categories emerged (see Figure 1): 1) personal well-being; 2) social well-being; 3) technical well-being or EMS; and 4) acquired role well-being. The analysis started with a total of 156 references provided by the students, categorised into the four identified themes.

Figure 1
Categories of analysis

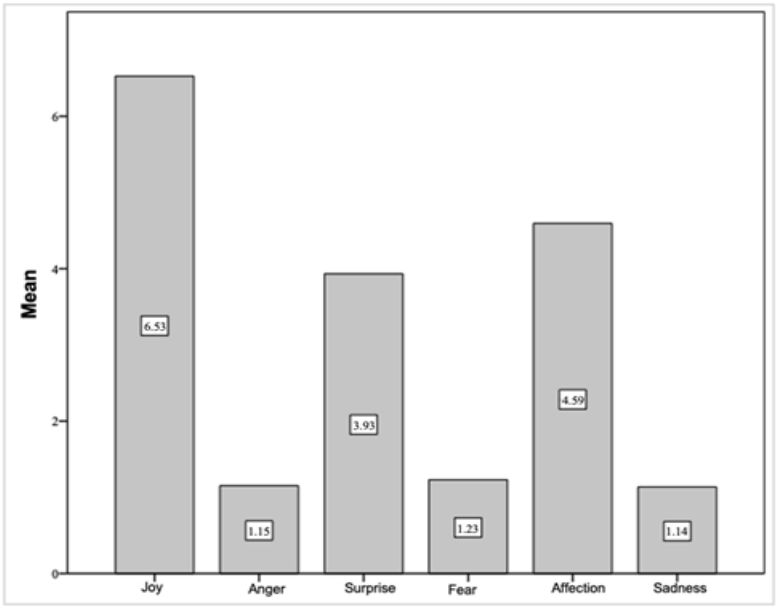
Name	Archives	References
Personal well-being	1	75
Well-being role	1	14
Social well-being	1	21
Well-being body shadow theatre	1	46

Results

Results of Quantitative Statistical Analysis

The Student's t-test for related samples showed that when schoolchildren took part in the body shadow theatre, they experienced positive emotions (M = 5.02, SD = 1.40) significantly (p = .000) more intensely than negative emotions (M = 1.17, SD = 0.47) (see Figure 2).

Figure 2
Intensity of emotions experienced



Regarding the gender of the participants, the interaction with emotional intensity also showed significant differences ($p < .05$) according to the type of emotion experienced. Negative emotions were experienced significantly less intensely by girls ($M = 1.09$, $SD = 0.28$, $p = .049$) than boys ($M = 1.26$, $SD = 0.59$) ($F = 2.797$, $ES = 0.137$). However, with respect to positive emotions no significant gender differences were found ($p > .05$), both boys and girls recorded similar positive emotional intensity (boys: $M = 5.05$, $SD = 1.47$; girls: $M = 4.98$, $SD = 1.34$) ($F = 0.880$, $ES = 0.098$).

Results of Qualitative Statistical Analysis

The analysis was based on the interpretation and visualisation of the weight of the well-being experienced by the students in the four categories identified (personal well-being; social well-being; technical well-being or EMS; and acquired role well-being) according to the gender attribute. Table 2 shows that the intensities varied according to category and gender.

Table 2
Presence of categories by attribute gender

Category	Boys	Girls
Personal well-being		
Role wellbeing		
Social well-being		
Well-being body shadow theatre		

Note: The intensity of the colours shows the frequency of the categories.

The role acquired (spectator or actor) during student participation was not as important for the well-being of girls and boys as other aspects. The boys mainly justified the well-being experienced in personal aspects, such as personal satisfaction or enjoyment, for example "because I had a great time and I liked it", "because I had a lot of fun", etc. Secondarily, they also associated the wellbeing experienced to aspects of the expressive resource used, the body shadow theatre. In this sense, they expressed that "...I danced", "...I didn't know that we were going to perform and they had to guess", "...I played in the competition", etc. The girls also justified their well-being in the personal and body shadow theatre aspects, although with less intensity than the boys. However, unlike the boys, the girls emphasised the social relations during the expressive motor practice as a determinant of well-being. Some of their comments were: "because we have played together", "...when we have all gone out in groups", "because we have been playing with all our classmates".

Subsequently, the analysis continued with the interpretation and visualisation of the weight of the emotional well-being experienced by the students in the four categories identified (personal well-being; social well-being; technical well-being or EMS; and acquired role well-being) according to the attributes gender and most intense emotion (see Table 3).

Table 3
Presence of categories by attribute gender

		Categories			
Sex	More intense emotion	Personal well-being	Role well-being	Social well-being	Well-being body shadow theatre
Boys	Joy				
	Affection				
	Surprise				
	Happiness				
Girls	Joy				
	Affection				
	Surprise				
	Happiness				

Note: The intensity of the colors shows the frequency of the categories.

It could be observed that in both boys and girls the well-being was originated by intensely experiencing the emotion of joy when participating in the body shadow theatre. This confirms once again that this expressive resource favours the emotional well-being of the pupils, regardless of whether they are girls or boys. The joy experienced by the pupils is mainly a consequence of personal aspects (such as personal satisfaction), as well as the characteristics of body shadow theatre (such as expressing and communicating), the social relationships established (cooperating to express and communicate a sport), and the roles adopted during the EMS (actor or spectator).

Discussion

The first objective was based on analysing the emotional intensity experienced when participating in EMS through body shadow theatre. The analysis of the results allows us to affirm that the EMS through body shadow theatre promote the well-being of the participating pupils. When participating in the EMS through body shadow theatre, the pupils valued positive emotions more highly than negative ones. The results were in line with those obtained in the works of Alonso et al. (2019), Ruiz-Vico and Cifo (2020) and Torrents et al. (2011), in considering that EMS promote well-being. In this sense, body shadow theatre can be a good methodological resource for creating emotionally positive EMS.

The second objective was to find out the emotional intensity experienced by girls and boys when intervening in EMS through body shadow theatre. Through the analysis of the results, it was observed that the discomfort is determined in the EMS raised through body shadow theatre by gender. Girls rated negative emotions less highly than boys. However, the emotions experienced with greater intensity in the EMS were the positive ones, with no differences between genders. Although to a lesser extent, this fact confirms that EMS show stereotypes associated with girls in the early ages (Alonso et al., 2019; Bonet & Menescardi, 2022; Papí-Monzó et al., 2021), which is why boys experience negative emotions more intensely than girls. Since, when participating in EMS, the perception of motor competence in girls and boys is different (Papí-Monzó et al., 2021), it was key in this work to vary the contents of the EMS proposed in the body shadow theatre. Thus, both girls and boys worked on dance, mime, rhythm, etc., in the different EMS of body shadow theatre. Therefore, although girls prefer the EMS to boys (Arias et al., 2021), it is necessary to vary the expressive motor work contents in the EMS in order to increase the perception of motor competence in boys (Papí-Monzó et al., 2021; Sevil et al., 2016).

In relation to the third objective, we analysed the comments made by girls and boys about the type of positive emotion experienced more intensely when participating in EMS through body shadow theatre. In this sense, both girls and boys mentioned the same personal and body shadow theatre aspects as determinants in the experience of positive emotions. The boys valued mainly the personal aspects for their well-being, while the girls established a balance between personal, social and body shadow theatre aspects. Both girls and boys faced difficulties in expressing, creating and communicating, however, the experience of the emotion joy was favoured in contrast to the study by Pérez-Pueyo and Casado (2011). This could be due to the motor objectives set, as according to López-Villar and Canales-Lacruz (2007), Torrents et al. (2011) and Troya (2018) these can condition the emotional well-being of the students. Following the authors' line, the EMS proposals in the body shadow theatre of this study moved away from the reproduction of models and approached a freer, creative and spontaneous experience that originated emotional well-being. Furthermore, Cifo and Ureña (2022) add that this type of EMS (free and creative) favours the enjoyment of personal bodily expression, an aspect that was mainly highlighted by boys in their comments. In addition, girls also mainly highlighted their well-being associated with social aspects compared to boys. Therefore, it is also necessary to highlight the value of social relationships during EMS in fostering emotional well-being (Armada et al., 2021; Rivera & Velázquez, 2017).

Different studies establish embarrassment as the most characteristic emotion in these situations, as well as other states such as discomfort, uneasiness, shyness (Canales-Lacruz, 2009; Ruiz-Vico & Cifo, 2020; Torrents et al., 2011), due to the fact of feeling observed. However, the role acquired (spectator or actor) during student participation was not so decisive for the well-being of girls and boys, in relation to other aspects. In body shadow theatre, the students are not so exposed to observation by the rest of their peers, so it can be pointed out that the use of the sheet or cloth is another reason why both girls and boys pointed out joy as the most intensely experienced emotion, regardless of being actors or spectators. In this way, students integrate and participate, their shyness and embarrassment taking a back seat (Cifo & Ureña, 2022; Pallarés et al. 2014). In line with López-Villar and Canales-Lacruz (2007), in body shadow theatre there is an indirect exposure, which guarantees the well-being of the students. Therefore, although the presence or absence of spectators can determine the emotional experience of students in EMS, being positive without spectators and negative with spectators (Canales-Lacruz & Corral-Abós, 2021), according to the results of this study, the presence of a cloth or sheet between spectators and actors favors the well-being of girls and boys.

If the aim is to guide PE and EMS from a gender perspective, positive emotional experiences should be guaranteed in both girls and boys (Gea et al., 2017; Gil-Madrona et al., 2021; Muñoz-Oliver et al., 2022; Sáez de Ocáriz et al., 2014) and improve attitudes and sociocultural constructions, free of sexist stereotypes (Arias et al., 2021; Bonet & Menescardi, 2022; Torrents et al., 2011).

EMS in Physical Education can be a good tool to promote the emotional well-being of schoolchildren, from a gender perspective. In particular, body shadow theatre as an expressive content and didactic resource offers the ideal conditions for this. In summary, it can be said that body shadow theatre in primary school:

a. It promotes well-being in both girls and boys, since it allows personal satisfaction in both genders.

b. It enables free body expression and communication.

c. Improves well-being regardless of the role adopted during the EMS (actor or spectator) as there is a cloth or sheet that limits the total exposure.

Therefore, when working on emotional well-being through body shadow theater, from a gender perspective, with primary school students, the following should be taken into account:

a. Encourage spontaneous and free expression and communication, personal of each student, avoiding the reproduction of models.
b. Vary the expressive motor content when planning a session.
c. To set up cooperative EMS, in which at least two people have to help each other to express and communicate a message, idea, emotion, etc.
d. Establish the roles of actor and spectator, and change them constantly to work on respect for one's own and others' productions and learn to value them.

These are four basic aspects to take into account if we want to promote the emotional well-being of students, considering their gender, through EMS in body shadow theatre. Likewise, EMS in shadow theatre becomes a good scenario to generate socialisation processes between both genders. In future research, it would be necessary to orientate these pedagogical interventions towards equality if the aspects highlighted above are taken into account.

Conclusions

The findings are reflected below in the form of conclusions, based on the discussion and the previous objectives set out:

The first objective was based on analysing the emotional intensity experienced when participating in expressive motor situations through body shadow theatre. The hypothesis formulated is confirmed, and it is concluded that body shadow theatre increases the positive emotional intensity of the participants.

The second objective was focused on knowing the emotional intensity experienced by girls and boys when intervening in expressive motor situations through body shadow theatre. The conclusion drawn does not confirm the hypothesis defined. Girls value positive emotions with a similar intensity to boys.

The third objective consisted of analyzing the comments made by girls and boys about the type of positive emotion experienced with greater intensity when participating in expressive motor situations through body shadow theatre. The conclusion drawn does not confirm the previously defined hypothesis. Both girls and boys mention the same personal and body shadow theatre aspects as determinants in the experience of positive emotions. Boys mainly value personal aspects for their well-being, while girls establish a balance between personal, social and body shadow theatre aspects.

Finally, it should be noted that the main limitation of this experience was that we did not collect information about the reasons why the pupils experienced discomfort or negative emotions when participating in the EMS. Although students were asked to explain which emotion they had felt most intensely and why, the most intense emotion in each case was positive and no comments were made about the negative ones. Therefore, it is necessary to continue researching in this line and collect information on the reasons that caused them to experience discomfort or negative emotions when participating in the EMS, always in the case that they have originated.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee: Universidad de Murcia (ID: 1684/2017).

Conflict of Interest Statement

The authors declare that there are no conflicts of interest. The funding agency had no influence on the development of the study.

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Authors' Contribution

Conceptualization M.C. & V.A-M.; Methodology M.C. & V.A-M.; Validation M.C. & V.A-M.; Formal Analysis M.C. & V.A-M.;

Investigation M.C. & V.A-M.; Resources M.C. & V.A-M.; Data Curation M.C. & V.A-M.; Writing – Original Draft M.C. & V.A-M.; Writing – Review & Editing M.C. & V.A-M.; Supervision M.C. & V.A-M.; Project Administration M.C. & V.A-M. Funding Acquisition V.A.M. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author valcaraz@ucam.edu

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Sports performance in function of self-efficacy: a systematic review

Rendimiento deportivo en función de la autoeficacia: revisión sistemática

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Abstract

The self-efficacy on sport performance has been a widely studied topic, but without reaching a consensus yet. Professionals in sports psychology highlight the importance of understanding the psychological state of the athlete, including their level of confidence and attitude to challenges to perform adequately in their discipline. For this reason, the objective of the study is to analyze the existing studies on the influence of self-efficacy on sport performance. The review was performed under the PRISMA methodology, 304 articles were identified and analyzed under the criteria of eligibility and methodological quality by the AXIS tool; finally, 10 articles were included. The results mostly indicate that self-efficacy is present in different sports, it is an element of impact, which will predict sporting behavior and consequently its success. Performance measures differ in each discipline, according to the particularity of each sport. Self-efficacy can be part of an explicative model of the athlete's personality. The information presented allows for greater clarity in the theories of response to the sports phenomenon and to contribute to the design of intervention tools that strengthen the appropriate psychological processes. Results found shouldn´t be generalized, due to the limitations in the performance measurement, other variables to be considered and the virtues of each discipline.

Keywords: Sport psychology, physical activity, achievement, self-efficacy.

Resumen

La autoeficacia en el rendimiento deportivo ha sido un tópico estudiado ampliamente, pero sin llegar todavía a un consenso. Los profesionales en psicología deportiva resaltan la importancia de conocer el estado psicológico del atleta, incluyendo su nivel de confianza y actitud frente a los retos para desempeñarse adecuadamente en su disciplina. Por lo anterior, el objetivo de la investigación fue analizar los estudios existentes sobre la influencia de la autoeficacia en el rendimiento deportivo. La revisión se realizó bajo la metodología PRISMA, se identificaron 304 artículos que fueron analizados bajo los criterios de elegibilidad y calidad metodológica por la herramienta AXIS, finalmente se incluyen 10 artículos. Los resultados indican mayormente que la autoeficacia está presente en distintos deportes, es un elemento de impacto, que puede influir en el comportamiento deportivo y por ende en su éxito. Las mediciones del rendimiento difieren en cada disciplina, debido a la particularidad de cada deporte. La autoeficacia puede ser parte de un modelo explicativo de la personalidad deportiva. La información presentada permite tener mayor claridad en las teorías de respuesta al fenómeno deportivo y aportar al diseño de herramientas de intervención que fortalezcan los procesos psicológicos adecuados. No se deberán generalizar los resultados, debido a limitaciones en la medición del rendimiento, otras variables involucradas y las virtudes de cada disciplina.

Palabras clave: Psicología deportiva, ciencia deportiva, actividad física, logro, autoeficacia.

Introduction

Sports performance, as defined by Ericsson and Charness (1994), refers to the highest possible performance given the current knowledge and training methods existing in the specific domain of practice. On the other hand, Conejero et al. (2017) define performance as the final result of a motor action, considering the characteristics of each discipline. If each sport has different traits, its evaluation will have different indicators and possibly a concept adapted to its operationalization.

Bloom (1985) investigated different sports activities and disciplines to find patterns and similar characteristics in individuals who had developed their activity to levels of excellence. Through various case studies that included swimmers, tennis players, pianists, sculptors, and scientific specialists in the fields of mathematics and neurology, he found that most had a playful motivation at an early age, presence of motivation generators towards the activity of interest, and a strong parental bond that conveyed the importance of excellence.

In the sports aspect, the development of skills focuses on successfully anticipating future events and skillfully coordinating overlapping movements. It has been mentioned that sports performance is the result of extreme adaptation, achieved through lifetime effort, including adaptive changes at the physiological level and specific motor skills. For psychology, the study of performance was out of reach for many years, as research focused on studying the innate (physiological) conditions of the subject (Ericsson & Charness, 1994). With the arrival of sports psychology, a professional field oriented towards creating and evaluating programs and techniques to develop psychological skills (Cantón, 2010) that will impact sports performance was established.

Sports performance is a central element in sports sciences and "congruently for sports psychology." Optimal performance allows achieving success and desired results. Therefore, it is important to consider: What factors influence sports performance? What sports settings have considered self-efficacy as an object of study? What evidence has sports psychology found in relation to athlete performance and with what type of scope? (Ursino et al., 2018).

We understand self-efficacy as the assessment an individual gives to their capacity to achieve a specific goal (Bandura, 1977). It is likely that an individual with a high degree of self-efficacy will exert greater effort to complete a task despite environmental threats.

Self-efficacy belongs to the construct of success, which etymologically has its origin in the English noun *success* and its verb form *succeed,* which does not come directly from Latin but was incorporated through the French spoken by the conquerors. It is composed of "su/sub" (under) and *cedere* (to go towards), which refers to going under or going behind (Klein, 1966). Success is explained through Nicholls' (1984) achievement goal theory, which states that the main objective of a subject in competitive environments is to demonstrate ability based on two conceptions: task orientation, which refers to mastery of the activity; and ego orientation, which refers to the outcome, where success comes from victory over each rival by demonstrating greater ability. It is important to consider that the dimension of the concept allows us to analyze it from different representations, as it is a concept relative to each individual's interpretation, often related to problem-solving, passing tests, or progressing towards a specific point. Therefore, it can be analyzed as a phenomenon with various research dimensions.

The following of a psychological stimulus can be determinant for reaching maximum performance levels (Bloom, 1985). On the other hand, each sports discipline is considered a subculture with its particular systems and values (Malico et al., 2008), making each sport a relevant object of study concerning the same psychological variable, such as self-efficacy. The review by Ursino et al. (2020) provides clarity on the advances in the study of sports performance as a polysemic term sensitive to each discipline. However, it is of utmost importance to understand the state of knowledge related to psychological aspects to generate appropriate strategies for athletes in training and for new emerging sports.

Objective

The objective of this paper was to conduct a systematic review of existing studies on the influence of the *self-efficacy* variable on *sports performance,* in the main international databases.

Research Question

How does the perception of self-efficacy influence the athletic performance of athletes?

Materials and Methods

Search Strategy

In this systematic review, the PRISMA statement (Page et al., 2020) was used, which consists of 27 items divided into seven sections, ensuring that the information is transparent, reproducible, and systematic.

Studies were identified through electronic databases: Scopus, VHL (Virtual Health Library), EBSCOhost, MEDLINE, and Google Scholar.

Two semantic fields were used, one pertaining to the area of sports performance and the other describing the perception of self-efficacy. Search terms, both in English and Spanish, were: *Sport* performance/rendimiento deportivo, athletic performance/rendimiento atlético, psychomotor performance/desempeño psicomotor, sport* achievement/logro deportivo,* and *sport* result/resultado deportivo,* combined with *success/*éxito*, self-efficacy/autoeficacia, success attribution*/atribuciones de* éxito*, and achievement/logro.* Searches were conducted using the Boolean operators "*AND*" and "*OR*" (Table 1).

Table 1
Search strategies

Database	*Search Strategy*
Google Scholar	allintitle: "Sport* performance"OR"athletic performance"OR"Psychomotor Performance"OR"Sport* achievement"OR"sport* result" "success"OR"self-efficacy"OR"success attribution*"OR"achievement" allintitle: "Rendimiento deportivo"OR"Rendimiento atlético"OR"Desempeño psicomotor"OR"Logro deportivo"OR"Resultado deportivo" "éxito»OR»autoeficacia»OR »atribuciones de éxito»OR»logro"
VHL – Virtual Health Library	(Sport* performance) OR (athletic performance) OR (Psychomotor Performance) OR (Sport* achievement) OR (sport* result) AND (success) OR (self-efficacy) OR (success attribution) OR (achievement) (Rendimiento deportivo) OR (Rendimiento atlético) OR (Desempeño psicomotor) OR (Logro deportivo) OR (Resultado deportivo) AND (Éxito) OR (Autoeficacia) OR (Atribuciones de éxito) OR (Logro)
Scopus	TITLE ("Sport* performance" OR "athletic performance" OR "Psychomotor Performance" OR "Sport* achievement" OR "sport* result" AND "success" OR "self-efficacy" OR "success attribution*" OR "achievement") AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)) TITLE ("rendimiento deportivo" OR "rendimiento atlético" OR "desempeño psicomotor" OR "logro deportio" OR "resultado deportivo" AND "éxito" OR "autoeficacia" OR "atribuciones de éxito" OR "logro") AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))
EBSCO-HOST	(TI "Sport* performance" OR TI "athletic performance" OR TI "Psychomotor Performance" OR TI "Sport* achievement" OR TI "sport* result") AND (TI "success" OR TI "self-efficacy" OR TI "success attribution*" OR TI "achievement") (TI "Rendimiento deportivo" OR TI "Rendimiento atlético" OR TI "Resultado deportivo" OR TI "Desempeño psicomotor" OR TI "Logro deportivo") AND (TI "éxito" OR TI "autoeficacia" OR TI "atribuciones de éxito" OR TI "logro")
MEDLINE	(sport* performance[Title] OR athletic performance[Title] OR psychomotor performance[Title] OR sport* achievement[Title] OR sport* result[Title]) AND (success[Title] OR self-efficacy[Title] OR success attribution*[Title] OR achievement[Title]) Filters: from 2017 – 2023 (rendimiento deportivo[Title] OR rendimiento atlético[Title] OR desempeño psicomotor[Title] OR logro deportivo[Title] OR resultado deportivo[Title]) AND (éxito[Title] OR autoeficacia[Title] OR atribuciones de éxito[Title] OR logro[Title]) Filters: from 2017 – 2023

Inclusion and Exclusion Criteria

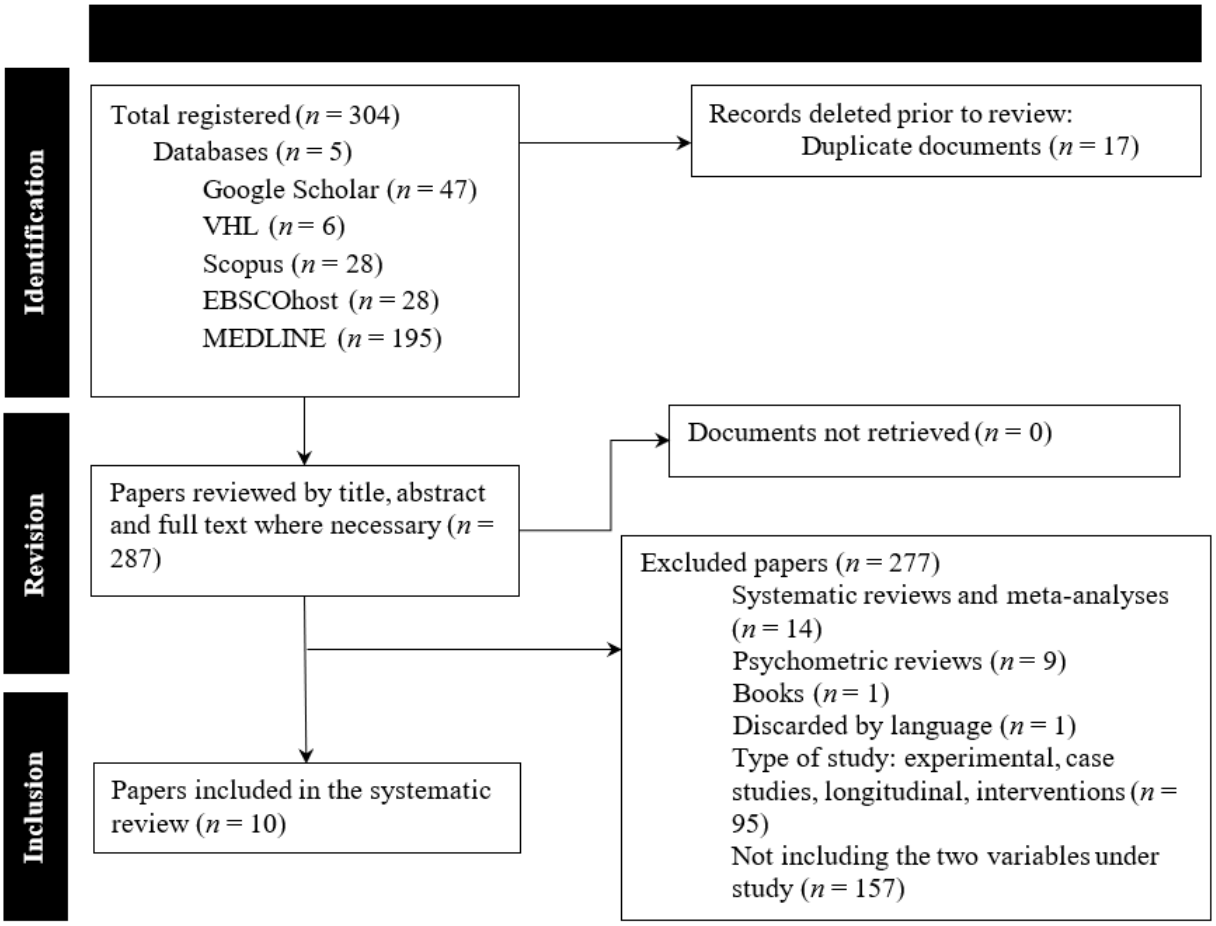
Studies that met the following inclusion criteria were selected: a) type of document source (scientific articles); b) empirical cross-sectional designs with athlete, sportsmen, or player participants; c) documents in English or Spanish; d) studies that included a variable related to self-efficacy or concepts related to the construct (success, attributions, and achievement) and a variable related to the player's sports performance; and e) studies from the year 2017 to 2023 to include the most up-to-date literature, following the review period by Ursino et al. (2020), which considered previous years.

Based on the exclusion criteria, theses, scientific meetings, outreach journals, systematic reviews, meta-analyses, and books were discarded. It was considered that the information from these sources would be included in the highest-prestige sources.

Study Selection Process

The systematic search process (Figure 1) identified a total of 304 articles. Seventeen studies were eliminated as duplicates. Subsequently, title and abstract were examined, and "when necessary" the full text was reviewed. From the analysis, studies were discarded based on inclusion criteria of language (English and Spanish) *n* = 1, article type (*n* = 1) as it was a book, discarded for being systematic reviews and/or meta-analyses (*n* = 14), psychometric reviews (*n* = 9), for not including both study variables (*n* = 157), and for the study type (*n* = 95), which included: experimental research, case studies, longitudinal studies, interventions, and others whose methodology was not cross-sectional. Finally, a result of *n* = 10 was included in this review.

Figure 1
PRISMA diagram



Methodological Quality Assessment

To evaluate the methodological quality of the selected studies, the assessment tool for cross-sectional studies AXIS (Downes et al., 2016) was used, which aims to assist in systematic interpretation by informing about the quality of the research. It contains 20 items divided into five sections that evaluate the introduction, method, results, discussion, and others. Therefore, a total percentage is obtained that describes the quality, validity, accuracy, relevance, and design of the study.

The evaluation criteria are scored with one or zero for each of the 20 items to describe the methodological content that should be considered in each study. Finally, the obtained score is summed and a rule of three is used to determine the percentage of each study. Of the 10 reviewed articles, an index of 75% or more was considered acceptable for inclusion in the study (Table 2), none of which were eliminated as all met the desired minimum scores.

Table 2
Assessment of methodological quality

No.	Introduction	Method											Results					Discussion		Other		%
		Items																				
	Studies	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	Baretta et al. (2017)	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	95%
2	Hepler et al. (2017)	1	1	-	1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	85%
3	Sklett et al. (2018)	1	1	1	1	1	1	-	1	-	1	1	1	1	1	-	1	1	-	1	1	80%
4	van Raalte & Posteher (2019)	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	-	1	85%
5	Ahmed et al. (2020)	1	1	-	1	1	1	1	1	1	-	1	1	1	-	1	1	1	-	1	1	80%
6	Koper et al. (2020)	1	-	1	1	1	-	-	1	1	1	1	1	1	-	1	1	1	1	1	1	80%
7	Li et al. (2020)	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	-	1	85%
8	Çakiroğlu (2021)	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	-	1	1	90%
9	Djurovic (2021)	1	1	-	1	1	-	1	1	-	1	-	1	1	1	1	1	1	-	1	1	75%
10	Peng & Zhang (2021)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%

Note: 1 = Were the study objectives/goals clear?, 2 = Was the study design appropriate to the stated objective(s)?, 3 = Was the sample size justified?, 4 = Was the target population clearly defined?, 5 = Was the sampling frame taken from an appropriate population base to closely represent the target population?, 6 = Was the selection process likely to select participants who were representative of the target population being investigated?, 7 = Were steps taken to address and categorize nonresponders?, 8 = Were the risk factor and outcome variables measured in accordance with the study objective?, 9 = Were the risk factor and outcome variables correctly measured using instruments that had been previously tested, piloted, or published? 10 = Is it clear what was used to determine statistical significance and/or precision estimates (e.g., p values, confidence intervals) ?, 11 = Was the method sufficiently described to allow for replication?, 12 = Were the baseline data adequately described?, 13 = Does the response rate raise concerns about nonresponse bias?, 14 = Was information about nonresponding participants described?, 15 = Were the results internally consistent?, 16 = Were the results presented for the analyses described in the method?, 17 = Were the authors' discussions and conclusions justified by the results?, 18 = Were the limitations of the study discussed?, 19 = Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?, 20 = Was ethical approval or consent obtained from the participants?, 20 = Was ethical approval or consent obtained from the participants?

Data Extraction

For data extraction, the following information was recorded: author, year, country, number of participants (including sex and age range/average), type of sport (including years of experience), instruments used, variable related to self-efficacy, variable related to sports performance, main results, and limitations (Table 3).

Results

The ten studies included in this review were mostly conducted in Europe (*n* = 4) (Baretta et al., 2017; Durovic, 2021; Koper et al., 2020; Sklett et al., 2018), followed by Asia (*n* = 4) (Ahmed et al., 2020; Çakiroğlu, 2021; Li et al., 2020; Peng & Zhang, 2021), and finally, two in America, specifically in the United States (Hepler et al., 2017; van Raalte & Posteher, 2019).

Regarding the population, most of the studies included both men and women in their samples (*n* = 6*)* (Baretta et al., 2017; Durovic, 2021; Hepler et al., 2017; Koper et al., 2020; Li et al., 2020; Peng & Zhang, 2021), followed by studies that only considered men (*n* = 2) (Ahmed et al., 2020; Sklett et al., 2018) and studies that did not specify the gender of their population

(*n* = 2) (Çakiroğlu, 2021; van Raalte & Posteher, 2019). The average age was 26.65 years (*n* = 6), with only one study (Ahmed et al., 2020) indicating that their population was under 20 years old, and three studies not mentioning the age range or average age (Çakiroğlu, 2021; Sklett et al., 2018; van Raalte & Posteher, 2019).

Regarding the sample size, it ranged from 40 to 459 participants, with an average of 154.1. In terms of sports, the studies included various disciplines such as boccia, competitive apnea, handball, soccer, water polo, skiing, basketball, darts, taekwondo, and athletics; the study by Çakiroğlu (2021) did not specify the practiced disciplines. Likewise, the experience in sports ranged from 4.26 to 9.72 years of experience, considering the studies that reported it (*n* = 4) (Baretta et al., 2017; Li et al., 2020; Peng & Zhang, 2021; van Raalte & Posteher, 2019).

Table 3
Articles included in the systematic review

Nº	Reference	Method					Results	
	Author, year and country	Participants	Sport and/or years of experience	Instruments	Variable of self-efficacy evaluated	Variable of sport performance evaluated	Main results	Limitations
1	Baretta et al. (2017) Italy	Athletes (n = 129), 86 males and 43 females, mean age 39.76.	Dynamic freediving (DYN) 4.26 average years of experience and constant weight freediving (CWT) 5.58 average years of experience.	BSSS Vertical self-efficacy scale Horizontal self-efficacy scale	Perceived self-efficacy	DYN and CWT Apnea Performance.	Self-efficacy can partially predict performance in horizontal and vertical apnea.	Not generalizable due to cross-sectional design and non-equivalent samples.
2	Hepler et al. (2017) United States	Student Players (n = 84), 42 females and 42 males, mean age 20.23 years old.	Darts (participants practiced: baseball, softball, soccer, basketball or field hockey).	Self-efficacy scale - throwing Self-efficacy scale - shooting	Self-efficacy	Indoor and outdoor shooting scores, in competitive and target conditions.	Self-efficacy has a significant relationship with shooting performance, but no significant differences if performed outdoors or indoors.	Participants' darts experience was varied; therefore, task objectives may be biased by being more difficult for some participants.
3	Sklett et al. (2018) Germany	Athletes (n = 40), males.	World Cup Ski Jumping.	FSS PANAS PSWQ Self-efficacy scale - jump	Self-efficacy	Ski jumping performance.	Self-efficacy is predictive of ski jumping performance.	Consider environmental effects such as weather and athlete environment as a factor.
4	van Raalte y Posteher (2019) United States	Athletes (n = 459).	18 different sports, 9.72 average years of experience.	SLSI SSS NGSE PPAA	Perceived self-efficacy	Self-reported sport performance.	There is a positive effect between self-efficacy and performance. In addition, Self-efficacy can partially mediate stress and performance.	Measurement of performance was self-reported.
5	Ahmed et al. (2020) Iraq	Athletes (n = 45), males under 20 years of age.	Track and field (n = 10 discus throw, n = 11 shot put, n = 10 hammer throw, n = 14 javelin throw).	MSAM TSCI.	Sports self-confidence	Achievement in throwing events.	Self-confidence can predict achievement outcomes in athletes.	Pay attention to other psychological components such as motivation and stress. Need to construct achievement motivation and self-confidence instruments for other sport disciplines.

6	Koper et al. (2020) Poland	Athletes (n = 109), 24 females and 85 males between 16 and 54 years old.	Boccia	AIMS SES SSA AMS STAI STPQ	Self-efficacy for physical activities	Place in individual competitions.	Athletes with higher levels of self-efficacy and expectations and lower levels of athletic identity and anxiety have better athletic outcomes.	Analysis based on self-reported data and cross-sectional design. Sample size and underrepresentation of women (22%).
7	Li et al. (2020) China	Taekwondo athletes (n = 332), 187 males and 145 females, mean age 18.32.	Taekwondo with 5.81 years of experience.	BIF – 44 AQ CES–D UCLA EQ ASC IC SSEQ	Self-efficacy	Performance in rankings and positions in competitions.	Self-efficacy is part of an athlete profile, which includes: Extraversion, healthy habits, impulse control and ethics; inconsistent results were obtained to explain a significant association with players' success.	Insufficient measures were included to account for an athlete's personalities and emotions. Measurements of variables were self-reported, so may involve bias.
8	Çakiroğlu (2021) Turkey	Athletes (n = 186).	NS	ASEQ APerfectQ APerfoQ	Perceived athletic self-efficacy	Self-reported athletic performance.	Athletic self-efficacy has a significant positive effect on athletic performance.	NS
9	Durovic (2021) Serbia	Athletes (n = 76), 53 males and 23 females, mean age 18.38.	Team sports (handball 71%, soccer 18%, water polo 11%).	CSAI-2R, GSE, Self-assessment of performance.	General self-efficacy	Self-reported athletic performance.	Self-efficacy can mediate sport anxiety and performance, in addition to being a predictor of performance in team sports.	NS
10	Peng y Zhang (2021) China	Players (n = 81), 40 females and 41 males, mean age 20.26 years old.	College basketball with 6.54 average years of sports experience	SCAT TEOSQ GSES CSAI-2R	General self-efficacy	Performance in free throw competition.	Self-efficacy has a positive effect on motor performance in competitive and non-competitive conditions alike.	Results not generalizable to broader athletic population. Sample of Chinese athletes only.

Note: *n* = sample size, NE = not specified, AIMS = Athletic Identity Measurement Scale, SES = Self-Esteem Scale, SSA = Self-Efficacy for Sport Activities Scale, AMS = Achievement Motives Scale, STAI = State Trait Anxiety Inventory, STPQ = Self- and Task-Perception Questionnaire, ASEQ = Athletic Self-Efficacy Questionnaire, APerfectQ = Athletic Perfectionism Questionnaire, APerfoQ = Athletic Performance Questionnaire, SLSI = Student-Life Stress Inventory, SSS = Social Support Scale, PPAA = Perceptions of Performance Academic and Athletic, NGSE = new general self-efficacy scale, BSSS = Brief Sensation Seeking Scale, CSAI-2R = The Revised Competitive State Anxiety Inventory, GSE = General Self-Efficacy, FSS = Flow State Scale, PANAS = Positive- and Negative Affect Schedule, PSWQ = Penn State Worry Questionnaire, SCAT = Sport

Competitive Anxiety Test, TEOSQ = Task and Ego Orientation in Sports Questionnaire, GSES = General Self-Efficacy Scale, BIF-44 = Big Five Inventory – 44, AQ = Aggression Questionnaire, CES-D = Center for Epidemiologic Studies Depression Scale, UCLA = Loneliness Scale, EQ = Envy Questionnaire, ASC = Athlete Self-Control, IC = Impulse Control, SSEQ = Sport Self-efficacy Questionnaire, MSAM = Measuring Sport Achievement Motivation, TSCI = Trait Sport Confidence Inventory.

The instruments used to assess perceived self-efficacy in the athlete were GSES or GSE (General Self-Efficacy Scale) in two studies (Durovic, 2021; Peng & Zhang, 2021), which is a general self-efficacy scale designed by Baessler and Schwarzer (1996) and aims to assess the stable feeling of competence to effectively handle stressful situations. Followed by the Ski Jumping, Throwing, and Dart Throwing Self-Efficacy scale (*n* = 2) (Hepler et al., 2017; Sklett et al., 2018), which were created from Bandura's (2001) Self-Efficacy Scale Construction Guide, which describes the construct structure and provides steps to design, write, and validate a scale adapted to the required environment. The study by van Raalte and Posteher (2019) relied on the NGSE (New General Self-Efficacy Scale), which is a new scale developed by Chen et al. (2001), which aims to measure individuals' perception of their ability to perform successfully in a variety of different situations. For the work of Koper et al. (2020) they relied on the SSA (Self-Efficacy for Sport Activities Scale), which is a scale of self-efficacy in sport environments and represents the extent to which a person is convinced of his or her ability to follow an exercise program, even under unfavorable conditions. Subsequently, Ahmed et al. (2020) used the TSCI (Trait Sports Confidence Inventory), which was created by Vealey (1986) to measure confidence traits when performing a sport activity. In the case of the study by Li et al. (2020), the SSEQ (Sport Self-efficacy Questionnaire), a questionnaire developed to measure athlete self-efficacy under training and competition conditions by the athlete, was applied (Wei et al., 2008). In the study by Çakiroğlu et al. (2021), the variable was assessed using the ASEQ (Athletic Self-Efficacy Questionnaire), which is validated to provide information on the perception of self-efficacy in athletes (Sahraian et al., 2016). Finally, in the study by Baretta et al. (2017), two scales created through expert opinion in freediving were used to express perceived self-efficacy in both modalities of the discipline (vertical and horizontal). Regarding validity and reliability, two studies (Djurovic, 2021; Sklett et al., 2018) showed no evidence in this regard, the rest, (*n* = 8) used instruments that had been piloted, tested or used previously.

Regarding the tools used to evaluate sport performance, mostly (*n* = 5) discipline-specific measures were used. For example, in the study by Baretta et al. (2017) it was determined from distance and depth in the two types of apnea evaluated (horizontal and vertical); for the work by Sklett et al. (2018) it was calculated from ski jump scores; Peng and Zhang (2021) evaluated free throw scores in closed and open space, as their population was basketball players; Hepler et al. (2017) used the sum of the scores obtained from the dartboard when throwing darts; and Ahmed et al. (2020) evaluated performance from the throws of track and field competitors as they were all throwers. On the other hand, in the studies of Koper et al. (2020) and Li et al. (2020) used as a measure of performance the place obtained in the competition event, being Boccia and Taekwondo the evaluated disciplines, respectively. In the case of van Raalte and Posteher (2019), the PPAA (Perceptions of Performance Academic and Athletic) scale was used, which measures the perception of athletic and academic performance (Rees & Hardy, 2004). Çakiroğlu (2021) used a scale (Athletic Performance Questionnaire) validated and created by Charbonneau et al. (2001), which from five items assesses perceived athletic performance. Finally, Djurovic (2021) used self-assessments of athletic performance designed for the study.

Regarding the results, most studies (*n* = 7) indicate that self-efficacy can have a significant relationship and influence on performance in a sport discipline and can even be considered a predictor in freediving and ski jumping (Baretta et al., 2017; Sklett et al., 2018). Only the study by Li et al. (2020) showed inconsistent results to relate it to athletes' self-efficacy. The above confirms that the self-efficacy perceived by an athlete when practicing a discipline is a relevant factor in their sport performance. It can also influence an athlete's motor abilities under competitive and non-competitive conditions, which will largely determine his or her outcome (Peng & Zhang 2021). Most studies indicate a relationship between the self-efficacy variable and the athlete's competitive status. Therefore, the level of self-confidence can determine the way of facing challenges; before, during and after the competition.

The main limitations mentioned in the studies are: the research design does not allow generalization to the whole sport context (*n* = 4), being cross-sectional and with purposive or non-equivalent samples due to the availability of the players. There is a risk of bias, due to the fact that performance data were obtained from subjective measures (*n* = 3) (Koper et al., 2020; Li et al., 2020; van Raalte & Posteher, 2019) which, is confirmed in the review by Ursino et al. (2020), as performance assessment continues to show shortcomings, by employing unreliable analysis methodologies, resorting to self-reported and contextual measures, for example the outcome of a single competition, it would be valuable to include more consistent measures such as aerobic capacity and athlete mobility. Other articles indicate that it is important to consider more variables to explain the phenomenon of sport performance, such as environmental influences (Sklett et al., 2018), internal motivation (Ahmed et al., 2020) and personality (Li et al., 2020). In addition to analyzing the sport contexts (coach, family and professionals) that could, or could not, have an impact on the athlete (García-Naveira, 2018).

Also, it is recommended to control for years of sport experience and to solve the need for more standardized instruments to assess self-efficacy.

Conclusions

The present work aimed to perform a systematic review of existing studies on self-efficacy and sport performance, considering the period from 2017 to 2023. For several decades, studies have aimed to find the factors involved in athletes' sports performance. Sport psychology proposes to examine factors unrelated to physical ability, which have a great impact on the state before, during and after sports practice. Therefore, the self-efficacy perceived by the athlete will have a relevance in the outcome of the sport practice. Programs focused on improving the athlete's confidence can greatly complement the achievement of expected goals in high performance.

Studies allow us to observe that the athlete's perceptions about what he/she can achieve, regardless of whether or not he/she has the physical conditions, will make him/her face challenges, difficulties and competitions in a different way. In this way, the beliefs about one's own capabilities have a great power of action.

The synthesis of the information reviewed allows us to conclude that the variable of self-efficacy is present in different sports, as it is an element of impact, which will predict sporting behavior and therefore "its result". On the other hand, there are few inconsistencies in the relationship between the variables, which are due to limitations or particular considerations of each study. It is evident that sport psychology has an area of opportunity to strengthen the operationalization and evaluation of those psychological constructs that can influence sport performance, because it is one of the main conditions that limit the generalization of results.

Finally, despite the evidence found, the relevance of replicating the studies in different populations and sports should be considered. Exploring in depth each variable and its combination, as part of explanatory models of behavior. This will allow us to have greater clarity in the theories of response to the sports phenomenon, and thus be able to design intervention tools that strengthen the appropriate psychological processes that help the optimal sports development; achieving an impact on the permanence, motivation and satisfaction in the execution of physical activity, which will contribute positively to overall health.

Ethics Committee Statement

Not applicable because the study is a systematic review.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest; the funding institutions had no influence on the design of the study, the analysis of the data or the interpretation of the results.

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Authors' Contribution

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Data Availability Statement

Data are not available because the paper is a systematic review.

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Rendimiento deportivo en función de la autoeficacia: revisión sistemática

Sports performance in function of self-efficacy: a systematic review

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Resumen

La autoeficacia en el rendimiento deportivo ha sido un tópico estudiado ampliamente, pero sin llegar todavía a un consenso. Los profesionales en psicología deportiva resaltan la importancia de conocer el estado psicológico del atleta, incluyendo su nivel de confianza y actitud frente a los retos para desempeñarse adecuadamente en su disciplina. Por lo anterior, el objetivo de la investigación fue analizar los estudios existentes sobre la influencia de la autoeficacia en el rendimiento deportivo. La revisión se realizó bajo la metodología PRISMA, se identificaron 304 artículos que fueron analizados bajo los criterios de elegibilidad y calidad metodológica por la herramienta AXIS, finalmente se incluyen 10 artículos. Los resultados indican mayormente que la autoeficacia está presente en distintos deportes, es un elemento de impacto, que puede influir en el comportamiento deportivo y por ende en su éxito. Las mediciones del rendimiento difieren en cada disciplina, debido a la particularidad de cada deporte. La autoeficacia puede ser parte de un modelo explicativo de la personalidad deportiva. La información presentada permite tener mayor claridad en las teorías de respuesta al fenómeno deportivo y aportar al diseño de herramientas de intervención que fortalezcan los procesos psicológicos adecuados. No se deberán generalizar los resultados, debido a limitaciones en la medición del rendimiento, otras variables involucradas y las virtudes de cada disciplina.

Palabras clave: Psicología deportiva, ciencia deportiva, actividad física, logro, autoeficacia.

Abstract

The self-efficacy on sport performance has been a widely studied topic, but without reaching a consensus yet. Professionals in sports psychology highlight the importance of understanding the psychological state of the athlete, including their level of confidence and attitude to challenges to perform adequately in their discipline. For this reason, the objective of the study is to analyze the existing studies on the influence of self-efficacy on sport performance. The review was performed under the PRISMA methodology, 304 articles were identified and analyzed under the criteria of eligibility and methodological quality by the AXIS tool; finally, 10 articles were included. The results mostly indicate that self-efficacy is present in different sports, it is an element of impact, which will predict sporting behavior and consequently its success. Performance measures differ in each discipline, according to the particularity of each sport. Self-efficacy can be part of an explicative model of the athlete's personality. The information presented allows for greater clarity in the theories of response to the sports phenomenon and to contribute to the design of intervention tools that strengthen the appropriate psychological processes. Results found shouldn´t be generalized, due to the limitations in the performance measurement, other variables to be considered and the virtues of each discipline.

Keywords: Sport psychology, physical activity, achievement, self-efficacy.

Introducción

El rendimiento deportivo, como lo definen Ericsson y Charness (1994), se refiere a desempeño más alto posible, dado el conocimiento actual y los métodos de capacitación que existen en el dominio de esa práctica en específico. Por otro lado, Conejero et al. (2017) definen al rendimiento como el resultado final de una acción motriz, considerando las características de cada disciplina. Si cada deporte tiene rasgos distintos, su evaluación tendrá indicadores distintos y posiblemente un concepto adaptado a su operacionalización.

Bloom (1985) investigó diferentes actividades deportivas y disciplinas con el objetivo de encontrar patrones y características similares en personajes que habían desarrollado su actividad en niveles de excelencia. Por medio de diversos estudios de caso que incluyeron a nadadores, tenistas, pianistas, escultores y especialistas científicos en las áreas de matemática y neurología. Se encontró en la mayoría una motivación lúdica en edades tempranas, presencia de generadores de motivación hacia la actividad de interés y un vínculo paterno fuerte que transmitía la importancia de la excelencia.

En el aspecto deportivo, el desarrollo de habilidades se centra en anticipar con éxito eventos futuros y coordinar hábilmente los movimientos superpuestos. Se ha mencionado que el rendimiento deportivo es resultado de una adaptación extrema, lograda a través del esfuerzo de toda la vida, que incluye cambios adaptativos a nivel fisiológico y habilidades motrices específicas. Para la psicología, el estudio del desempeño estuvo fuera de alcance durante muchos años, ya que la investigación centraba sus esfuerzos en estudiar las condiciones innatas (fisiológicas) del sujeto (Ericsson & Charness, 1994). Con la llegada de la psicología deportiva, se constituye un campo profesional orientado a crear y evaluar programas y técnicas para desarrollar habilidades psicológicas (Cantón, 2010) que tendrán impacto en el rendimiento deportivo.

El rendimiento deportivo es un elemento central en las ciencias deportivas y "congruentemente para la psicología del deporte". Un rendimiento óptimo permite alcanzar el éxito y resultados deseados. Por ello, es importante considerar: ¿Cuáles son los factores que influyen en el rendimiento deportivo? ¿Qué contextos deportivos han considerado a la autoeficacia como objeto de estudio? ¿Qué evidencia ha encontrado la psicología del deporte con relación al rendimiento del atleta y con qué tipo de alcance? (Ursino et al., 2018).

Entendemos por autoeficacia como la valoración que una persona otorga a su capacidad para obtener un determinado objetivo (Bandura, 1977). Es probable que un individuo con alto grado de autoeficacia ejerza mayor esfuerzo para cumplir una tarea, a pesar de las amenazas del ambiente.

La autoeficacia pertenece al constructo de éxito, el cual etimológicamente tiene su origen en el sustantivo en inglés *success* y su forma verbal *succeed*, la cual no llega directamente del latín, sino que se incorporó a través del francés hablado por los conquistadores. Está compuesto de *su/sub (bajo)* y *cedere (ir hacia)* lo cual refiere a *ir debajo de* o *ir detrás de* (Klein, 1966). El éxito es explicado mediante la teoría de metas de logro de Nicholls (1984), la cual expone que el principal objetivo de un sujeto en ambientes competitivos es demostrar habilidad partiendo de dos concepciones; la orientación a la tarea, que refiere a la maestría en la actividad; y la orientación al ego, que se refiere al resultado, donde el éxito viene de la victoria frente a cada rival, al demostrar mayor capacidad. Es importante considerar que la dimensión del concepto nos permite analizarlo desde diferentes representaciones, debido a que es un concepto relativo a la interpretación de cada individuo, que suele estar relacionado a la resolución de problemas, superación de pruebas o al avance hacia un punto concreto. Por lo que se puede analizar como un fenómeno con diversas vertientes de investigación.

El seguimiento de un estímulo psicológico puede ser determinante para el alcance de niveles máximos de desempeño (Bloom, 1985). Por otro lado, cada disciplina deportiva se considera una subcultura, con sistemas y valores particulares (Malico et al., 2008), que colocan a cada deporte como objeto de estudio relevante frente a la misma variable psicológica, como la autoeficacia. La revisión de Ursino et al. (2020) nos brinda claridad en los avances del estudio del rendimiento deportivo, como un término polisémico y sensible a cada disciplina. Sin embargo, es de suma importancia conocer el estado del conocimiento relacionado con aspectos psicológicos para generar estrategias adecuadas hacia los atletas en formación y para nuevos deportes en crecimiento.

Objetivo

El objetivo del presente trabajo fue realizar una revisión sistemática de los estudios existentes sobre la influencia de la variable autoeficacia en el rendimiento deportivo, en las principales bases de datos internacionales.

Pregunta de Investigación

¿Cómo influye la percepción de autoeficacia en el rendimiento deportivo de los atletas?

Material y Métodos

Estrategia de Búsqueda

En la presente revisión sistemática se usó la declaración PRISMA (Page et al., 2020), que consta de 27 ítems divididos en siete secciones, que garantizan que la información sea transparente, reproducible y sistemática.

Los estudios se identificaron a través de bases de datos electrónicas: Scopus, BVS (Biblioteca Virtual de la Salud), EBSCO-host, MEDLINE y Google Académico.

Se utilizaron dos campos semánticos, uno perteneciente al área de rendimiento deportivo y otro que describe la percepción de autoeficacia. Los términos de búsqueda, tanto en inglés como en español, fueron: *Sport* performance/rendimiento deportivo*, *athletic performance/rendimiento atlético, psychomotor performance/desempeño psicomotor, sport* achievement/ logro deportivo* y *sport* result/resultado deportivo,* combinadas con *success/ éxito, self-efficacy/autoeficacia, success attribution*/atribuciones de éxito* y *achievement/logro*. Las búsquedas fueron realizadas utilizando los operadores booleanos "*AND*" y "*OR*" (Tabla 1).

Tabla 1
Estrategias de búsqueda

Base de datos	Estrategia de búsqueda
Google Académico	allintitle: "Sport* performance"OR"athletic performance"OR"Psychomotor Performance"OR"Sport* achievement"OR"sport* result" "success"OR"self-efficacy"OR"success attribution*"OR"achievement" allintitle: "Rendimiento deportivo"OR"Rendimiento atlético"OR"Desempeño psicomotor"OR"Logro deportivo"OR"Resultado deportivo" "éxito»OR»autoeficacia»OR »atribuciones de éxito»OR»logro"
BVS – Biblioteca Virtual de la Salud	(Sport* performance) OR (athletic performance) OR (Psychomotor Performance) OR (Sport* achievement) OR (sport* result) AND (success) OR (self-efficacy) OR (success attribution) OR (achievement) (Rendimiento deportivo) OR (Rendimiento atlético) OR (Desempeño psicomotor) OR (Logro deportivo) OR (Resultado deportivo) AND (Éxito) OR (Autoeficacia) OR (Atribuciones de éxito) OR (Logro)
Scopus	TITLE ("Sport* performance" OR "athletic performance" OR "Psychomotor Performance" OR "Sport* achievement" OR "sport* result" AND "success" OR "self-efficacy" OR "success attribution*" OR "achievement") AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017)) TITLE ("rendimiento deportivo" OR "rendimiento atlético" OR "desempeño psicomotor" OR "logro deportio" OR "resultado deportivo" AND "éxito" OR "autoeficacia" OR "atribuciones de éxito" OR "logro") AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR , 2022) OR LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017))
EBSCO-HOST	(TI "Sport* performance" OR TI "athletic performance" OR TI "Psychomotor Performance" OR TI "Sport* achievement" OR TI "sport* result") AND (TI "success" OR TI "self-efficacy" OR TI "success attribution*" OR TI "achievement") (TI "Rendimiento deportivo" OR TI "Rendimiento atlético" OR TI "Resultado deportivo" OR TI "Desempeño psicomotor" OR TI "Logro deportivo") AND (TI "éxito" OR TI "autoeficacia" OR TI "atribuciones de éxito" OR TI "logro")
MEDLINE	(sport* performance[Title] OR athletic performance[Title] OR psychomotor performance[Title] OR sport* achievement[Title] OR sport* result[Title]) AND (success[Title] OR self-efficacy[Title] OR success attribution*[Title] OR achievement[Title]) Filters: from 2017 – 2023 (rendimiento deportivo[Title] OR rendimiento atlético[Title] OR desempeño psicomotor[Title] OR logro deportivo[Title] OR resultado deportivo[Title]) AND (éxito[Title] OR autoeficacia[Title] OR atribuciones de éxito[Title] OR logro[Title]) Filters: from 2017 – 2023

Criterios de Inclusión y Exclusión

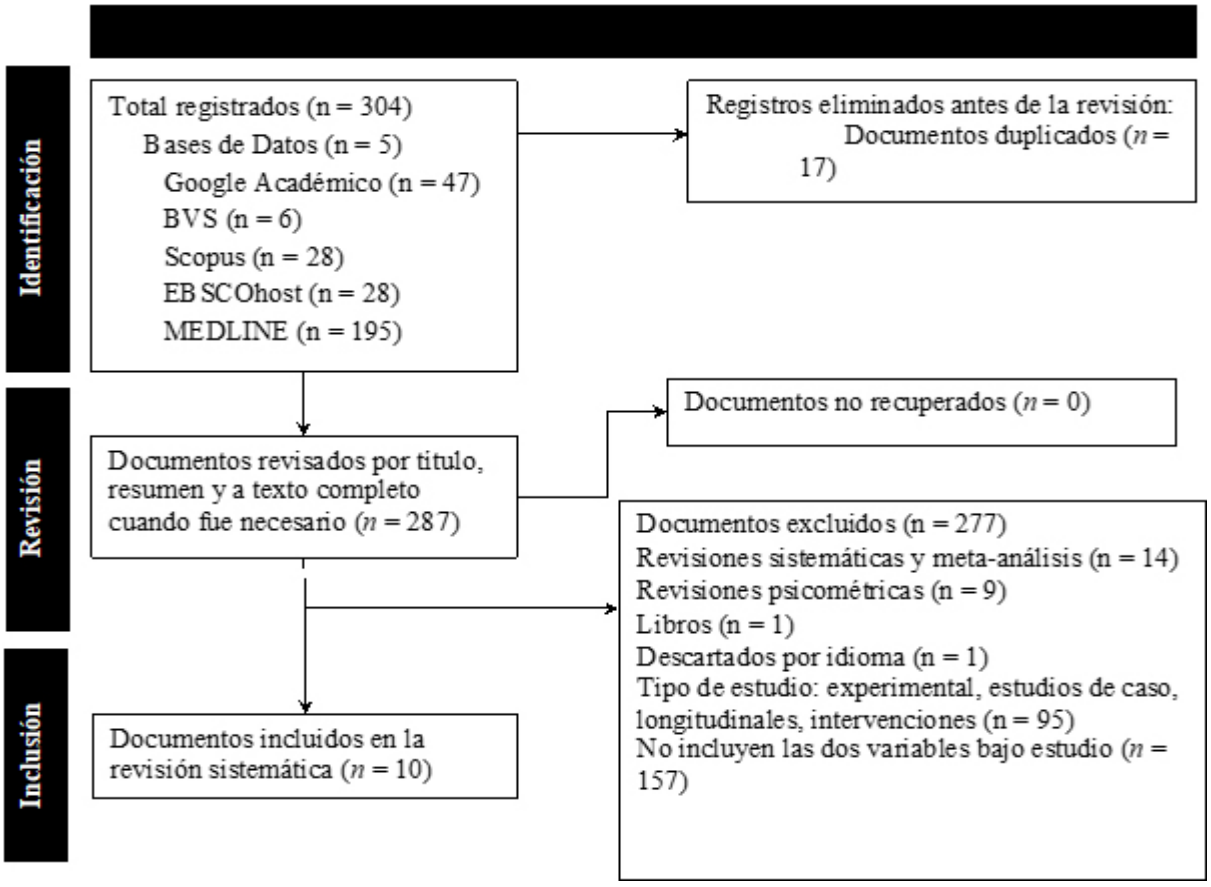
Se seleccionaron los estudios que cumplieran con los criterios de inclusión: a) tipo de fuente documental (artículos científicos); b) diseños empíricos de corte transversal, con participantes atletas, deportistas o jugadores; c) documentos en idioma inglés o español; d) estudios que incluyeran una variable relacionada con la autoeficacia o conceptos relacionados al constructo (éxito, atribuciones y logro) y una variable relacionada con el rendimiento deportivo del jugador; y e) estudios desde el año 2017 al 2023, para incluir la literatura más actualizada, en seguimiento al periodo de la revisión de Ursino et al. (2020), que consideró años anteriores.

Con base a los criterios de exclusión, se descartaron tesis, encuentros científicos, revistas de divulgación, revisiones sistemáticas o metaanálisis y libros. Se consideró que en las fuentes de mayor prestigio estaría incluida la información de estos medios.

Proceso de Selección de Estudios

El proceso de búsqueda sistemática (Figura 1), identificó un total de 304 artículos. Se eliminaron 17 estudios por ser duplicados. Posteriormente, se examinó: título y resumen y "cuando fue necesario" se revisó a texto completo. Del análisis, se descartaron con relación a los criterios de inclusión de idioma (inglés y español) (*n* = 1), por el tipo de texto (*n* = 1) al ser libro, se descartaron por ser revisiones sistemáticas y/o meta análisis (*n* = 14), revisiones psicométricas (*n* = 9), por no incluir ambas variables de estudio (*n* = 157) y por el tipo de estudio (*n* = 95), donde se incluyeron: investigaciones experimentales, estudios de caso, estudios longitudinales, intervenciones y adicionales que su metodología no fuera transversal. Finalmente se obtuvo un resultado de *n* = 10, incluidos en la presente revisión.

Figura 1
Diagrama PRISMA



Evaluación de la Calidad Metodológica

Para la evaluación de la calidad metodológica de los estudios seleccionados, se utilizó la herramienta de evaluación para estudios transversales AXIS (Downes et al., 2016), la cual tiene como objetivo ayudar a la interpretación sistemática, informando acerca de la calidad de una investigación. Contiene 20 ítems, divididos en cinco secciones que evalúan la introducción, el método, los resultados, la discusión y otros. Por lo cual se obtiene un porcentaje total que describe la calidad, la validez, la precisión, la relevancia y el diseño del estudio.

Los criterios de evaluación se evalúan al puntuar, con uno o cero, cada uno de los 20 ítems para describir el contenido metodológico de que se debe contemplar en cada estudio. Finalmente, se suma el puntaje obtenido y se determina, con regla de tres el porcentaje de cada estudio. De los 10 artículos revisados, se consideró un índice del 75% o más, para ser aceptados dentro del estudio (Tabla 2), de los cuales no fue eliminado ninguno, ya que todos cumplieron con los puntajes mínimos deseados.

Extracción de Datos

Para la extracción de datos, fue registrada la siguiente información: autor, año, país, número de participantes (incluyendo sexo y rango/promedio de edades), tipo de deporte (incluyendo años de experiencia), instrumentos utilizados, variable relacionada la con autoeficacia, variable relacionada con el desempeño deportivo, principales resultados y limitaciones (Tabla 3).

Resultados

Los 10 estudios incluidos en esta revisión fueron realizados mayormente en la zona de Europa (*n* = 4) (Baretta et al., 2017; Durovic, 2021; Koper et al., 2020; Sklett et al., 2018), seguido por Asia (*n* = 4) (Ahmed et al., 2020; Çakiroğlu 2021; Li et al., 2020; Peng & Zhang 2021) y, por último, dos en América, específicamente en Estados Unidos (Hepler et al., 2017; van Raalte & Posteher, 2019).

En cuanto a la población, mayormente incluyeron hombres y mujeres en su muestra (*n* = 6) (Baretta et al., 2017; Durovic, 2021; Hepler et al., 2017; Koper et al., 2020; Li et al., 2020; Peng & Zhang, 2021), seguido de estudios que solo consideraron hombres (*n* = 2) (Ahmed et al., 2020; Sklett et al., 2018) y estudios que no especifican el sexo de su población (*n* = 2) (Çakiroğlu, 2021; van Raalte & Posteher, 2019). La edad promedio fue de 26.65 años (*n* = 6), solo un estudio (Ahmed et al., 2020) indica que su población fue menor a 20 años y tres estudios no mencionan rango o promedio de edad (Çakiroğlu, 2021; Sklett et al., 2018; van Raalte & Posteher, 2019).

Tabla 2
Evaluación de la calidad metodológica

No.	Introducción	Método											Resultados				Discusión		Otros		%
		Ítems																			
	Estudios	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	Baretta et al. (2017)	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	95%
2	Hepler et al. (2017)	1	1	-	1	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	85%
3	Sklett et al. (2018)	1	1	1	1	1	1	-	1	-	1	1	1	1	1	-	1	1	-	1	1	80%
4	van Raalte y Posteher (2019)	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1	1	1	1	-	1	85%
5	Ahmed et al. (2020)	1	1	-	1	1	1	1	1	1	-	1	1	1	-	1	1	1	-	1	1	80%
6	Koper et al. (2020)	1	-	1	1	1	-	-	1	1	1	1	1	1	-	1	1	1	1	1	1	80%
7	Li et al. (2020)	1	1	-	1	1	1	-	1	1	1	1	1	1	1	1	1	1	1	-	1	85%
8	Çakiroğlu (2021)	1	1	1	1	1	1	1	1	1	1	-	1	1	1	1	1	1	-	1	1	90%
9	Djurovic (2021)	1	1	-	1	1	-	1	1	-	1	-	1	1	1	1	1	1	-	1	1	75%
10	Peng y Zhang (2021)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100%

Nota: 1 = ¿Fueron claros los objetivos/metas del estudio?, 2 = ¿El diseño del estudio fue apropiado para el objetivo(s) declarado(s)?, 3 = ¿Estaba justificado el tamaño de la muestra?, 4 = ¿La población objetivo estaba claramente definida?, 5

= ¿El marco muestral se tomó de una base de población apropiada para que representara de cerca a la población meta?, 6 = ¿Era probable que el proceso de selección seleccionara participantes que fueran representativos de la población objetivo que se estaba investigando?, 7 = ¿Se tomaron medidas para abordar y categorizar a los que no respondieron?, 8 = ¿El factor de riesgo y las variables de resultado se midieron de acuerdo con el objetivo del estudio?, 9 = ¿Se midieron correctamente el factor de riesgo y las variables de resultado utilizando instrumentos que se habían probado, piloteado o publicado previamente?, 10 = ¿Está claro qué se utilizó para determinar la significancia estadística y/o estimaciones de precisión (por ejemplo, p valores, intervalos de confianza)?, 11 = ¿El método estaba lo suficientemente descrito como para permitir su repetición?, 12 = ¿Los datos básicos fueron adecuadamente descritos?, 13 = ¿La tasa de respuesta genera preocupación sobre el sesgo de falta de respuesta?, 14 = ¿Se describió la información sobre los participantes que no respondieron?, 15 = ¿Los resultados fueron consistentes internamente?, 16 = ¿Se presentaron los resultados para los análisis descritos en el método?, 17 = ¿Las discusiones y conclusiones de los autores se justificaron por los resultados?, 18 = ¿Se discutieron las limitaciones del estudio?, 19 = ¿Hubo alguna fuente de financiación o conflictos de interés que puedan afectar la interpretación de los resultados por parte de los autores?, 20 = ¿Se obtuvo la aprobación ética o el consentimiento de los participantes?

Tabla 3
Artículos incluidos en la revisión sistemática

Nº	Referencia	Método				Resultados		
	Autor, año y país	Participantes	Deporte y/o años de experiencia	Instrumentos	Variable de autoeficacia evaluada	Variable de desempeño deportivo evaluada	Principales resultados	Limitaciones
1	Baretta et al. (2017) Italia	Atletas (n = 129), 86 hombres y 43 mujeres, edad media de 39.76	Apnea dinámica (DYN) 4.26 años promedio de experiencia y apnea con peso constante (CWT) 5.58 años promedio de experiencia	BSSS Escala de autoeficacia vertical Escala de autoeficacia horizontal	Autoeficacia percibida	Rendimiento en Apnea DYN y CWT	La autoeficacia puede predecir parcialmente el rendimiento en la apnea horizontal y vertical.	No generalizar debido al diseño transversal y muestras no equivalentes.
2	Hepler et al. (2017) EE. UU.	Jugadores Estudiantiles (n = 84), 42 mujeres y 42 hombres, edad media de 20.23 años	Dardos (los participantes practicaban: beisbol, softbol, fútbol, basquetbol o hockey)	Escala de autoeficacia -lanzamiento Escala de autoeficacia - tiro	Autoeficacia	Puntaje de tiro en espacio cerrado y al aire libre, en estado competitivo y por objetivos	La autoeficacia tiene una relación significa con el rendimiento de tiro, pero sin diferencias significativas si se realiza en exterior o interior.	La experiencia en dardos de los participantes era muy variada; por lo tanto, los objetivos de la tarea pueden suponer un sesgo, al ser más difíciles para algunos participantes.
3	Sklett et al. (2018) Alemania	Atletas (n = 40), hombres	Copa Mundial de salto de Esquí	FSS PANAS PSWQ Escala de autoeficacia-salto	Autoeficacia	Rendimiento en salto de Esquí	La autoeficacia es predictora del rendimiento en salto de Esquí.	Considerar los efectos ambientales como el clima y el entorno del atleta como factor.

4	van Raalte y Posteher (2019) Estados Unidos	Atletas (n = 459)	18 deportes diferentes, 9.72 años de experiencia promedio	SLSI SSS NGSE PPAA	Autoeficacia percibida	Rendimiento deportivo autoreportado	Existe un efecto positivo entre la autoeficacia y el desempeño. Además, La autoeficacia puede mediar parcialmente el estrés y el rendimiento.	Medida de rendimiento fue auto informada.
5	Ahmed et al. (2020) Irak	Atletas (n = 45), hombres menores de 20 años.	Atletismo (n = 10 lanzamiento de disco, n = 11 lanzamiento de peso, n = 10 lanzamiento de martillo, n = 14 lanzamiento de jabalina)	MSAM TSCI.	Autoconfianza deportiva	Logro en eventos de lanzamiento	La autoconfianza puede predecir los resultados de logro en los atletas.	Prestar atención a otros componentes psicológicos como motivación y estrés. Necesidad de construir instrumentos de motivación de logro y autoconfianza para otras disciplinas deportivas.
6	Koper et al. (2020) Polonia	Atletas (n = 109), 24 mujeres y 85 hombres entre 16 y 54 años.	Boccia	AIMS SES SSA AMS STAI STPQ	Autoeficacia para actividades físicas	Lugar en competencias individuales	Atletas con más alto nivel de autoeficacia y expectativas y niveles más bajos de identidad atléticas y ansiedad tienen mejores resultados deportivos.	Análisis basado en datos auto informados y en un diseño transversal. Tamaño de la muestra y escasa representación de mujeres (22%).
7	Li et al. (2020) China	Atletas de Taekwondo (n = 332), 187 hombres y 145 mujeres, edad media de 18.32	Taekwondo con 5.81 años de experiencia	BIF – 44 AQ CES–D UCLA EQ ASC IC SSEQ	Autoeficacia	Rendimiento en clasificaciones y posiciones en competencias.	La autoeficacia es parte de un perfil del atleta, que incluye: Extraversión, hábitos saludables, control de impulsos y ética; se obtuvieron resultados inconsistentes para explicar una asociación significativa con el éxito de los jugadores.	No se incluyeron suficientes medidas para explicar las personalidades y emociones de un atleta. Las mediciones de las variables fueron auto informadas, por lo que pueden suponer un sesgo.
8	Çakiroğlu (2021) Turquía	Atletas (n = 186)	NE	ASEQ APerfectQ APerfoQ	Autoeficacia atlética percibida	Desempeño atlético autoreportado	La autoeficacia atlética tiene un efecto positivo significativo en el rendimiento deportivo.	NE

9	Durovic (2021) Serbia	Atletas (n = 76), 53 hombres y 23 mujeres, edad media de 18.38	Deportes en equipo (balonmano 71%, fútbol 18%, waterpolo 11%)	CSAI-2R, GSE, Autoevaluación de rendimiento.	Autoeficacia general	Rendimiento deportivo autoreportado	La autoeficacia puede mediar la ansiedad y rendimiento deportivo, además de ser predictora del desempeño en deportes de equipo.	NE
10	Peng y Zhang (2021) China	Jugadores (n = 81), 40 mujeres y 41 hombres, edad media de 20.26 años	Baloncesto universitario con 6.54 promedio de años de experiencia deportiva	SCAT TEOSQ GSES CSAI-2R	Autoeficacia general	Rendimiento en competencia de tiros libres	La autoeficacia tiene un efecto positivo en el rendimiento motriz en condiciones competitivas y no competitivas por igual.	Resultados no generalizables a una población atlética más amplia. Muestra únicamente de atletas chinos.

Nota: n = tamaño de la muestra, NE = no especifica, AIMS = Athletic Identity Measurement Scale, SES = Self-Esteem Scale, SSA = Self-Efficacy for Sport Activities Scale, AMS = Achievement Motives Scale, STAI = State Trait Anxiety Inventory, STPQ = Self- and Task-Perception Questionnaire, ASEQ = Athletic Self-Efficacy Questionnaire, APerfectQ = Athletic Perfectionism Questionnaire, APerfoQ = Athletic Performance Questionnaire, SLSI = Student-Life Stress Inventory, SSS = Social Support Scale, PPAA = Perceptions of Performance Academic and Athletic, NGSE = new general self-efficacy scale, BSSS = Brief Sensation Seeking Scale, CSAI-2R = The Revised Competitive State Anxiety Inventory, GSE = General Self-Efficacy, FSS = Flow State Scale, PANAS = Positive- and Negative Affect Schedule, PSWQ = Penn State Worry Questionnaire, SCAT = Sport Competitive Anxiety Test, TEOSQ = Task and Ego Orientation in Sports Questionnaire, GSES = General Self-Efficacy Scale, BIF-44 = Big Five Inventory – 44, AQ = Aggression Questionnaire, CES-D = Center for Epidemiologic Studies Depression Scale, UCLA = Loneliness Scale, EQ = Envy Questionnaire, ASC = Athlete Self-Control, IC = Impulse Control, SSEQ = Sport Self-efficacy Questionnaire, MSAM = Measuring Sport Achievement Motivation, TSCI = Trait Sport Confidence Inventory.

En cuanto al tamaño de la muestra, se encontró entre 40 y 459 participantes, con una media de 154.1. Con relación a los deportes, los estudios incluyeron: boccia, apnea competitiva, balonmano, fútbol, waterpolo, esquí, baloncesto, dardos, taekwondo y atletismo; el estudio de Çakiroğlu (2021) no indicó las disciplinas practicadas. Así mismo, la experiencia en el deporte iba desde 4.26 hasta 9.72 años de experiencia, considerando los estudios que si lo reportaron (*n* = 4) (Baretta et al., 2017; Li et al., 2020; Peng & Zhang, 2021; van Raalte & Posteher; 2019).

Los instrumentos utilizados para evaluar la percepción de autoeficacia en el deportista fueron: GSES o GSE (General Self-Efficacy Scale) en dos estudios (Durovic, 2021; Peng & Zhang, 2021), la cual es una escala general de autoeficacia diseñada por Baessler y Schwarzer (1996) y que tiene por objetivo evaluar el sentimiento estable de la competencia para manejar de forma eficaz situaciones estresantes. Seguido de la escala de Autoeficacia de salto de esquí, lanzamiento y tiro de dardos (*n* = 2) (Hepler et al., 2017; Sklett et al., 2018), que se crearon a partir de la Guía de Construcción de Escalas de Autoeficacia de Bandura (2001), la cual describe la estructura del constructo y brinda los pasos para diseñar, redactar y validar una escala adaptada al ambiente que se requiera. El estudio de van Raalte y Posteher (2019) se apoyó de la NGSE (New General Self-Efficacy Scale), la cual es una nueva escala elaborada por Chen et al. (2001), que tiene por objetivo medir la percepción de los individuos sobre su capacidad para desempeñarse con éxito en una variedad de situaciones diferentes. Para el trabajo de Koper et al. (2020) se apoyaron de la SSA (Self-Efficacy for Sport Activities Scale), que es una escala de autoeficacia en ambientes deportivos y representa la medida en que una persona está convencida de su capacidad de seguir un programa de ejercicios, incluso en condiciones desfavorables. Posteriormente, Ahmed et al. (2020) utilizaron el TSCI (Trait Sports Confidence Inventory), el cual fue creado por Vealey (1986) para medir los rasgos de confianza al desempeñar una actividad deportiva. En el caso del estudio de Li et al. (2020) se aplicó el SSEQ (Sport Self-efficacy Questionnaire), un cuestionario elaborado para medir la autoeficacia del atleta bajo condiciones de entrenamiento y de competencia por parte del atleta (Wei et al., 2008). En el estudio de Çakiroğlu et al. (2021), se evaluó la variable mediante el ASEQ (Athletic Self-Efficacy Questionnaire), el cual está validado para brindar información de la percepción de autoeficacia en atletas (Sahraian et al., 2016). Por último, en el estudio de Baretta et al. (2017) se utilizaron dos escalas creadas mediante opinión de expertos en apnea para expresar la autoeficacia percibida en ambas modalidades de la disciplina (vertical y horizontal). Con relación a la validez y confiabilidad, dos estudios (Djurovic, 2021; Sklett et al., 2018) no mostraron evidencia al respecto, el resto, (*n* = 8) utilizaron instrumentos que habían sido piloteados, probados o utilizados previamente.

Con relación a las herramientas utilizadas para evaluar el rendimiento deportivo, mayormente (*n* = 5) se utilizaron medidas específicas a cada disciplina. Por ejemplo, en el estudio de Baretta et al. (2017) se determinó a partir de la distancia y profundidad en los dos tipos de apnea evaluadas (horizontal y vertical); para el trabajo de Sklett et al. (2018) se calculó a partir de los puntajes de salto de esquí; Peng y Zhang (2021) evaluaron los puntajes de tiros libres en espacio cerrado y abierto, ya que su población fue de jugadores de baloncesto; Hepler et al. (2017) utilizó la suma de los puntajes que se obtienen de la diana al tirar los dardos; y Ahmed et al. (2020) evaluó el rendimiento a partir de los lanzamientos de competidores de atletismo al ser todos lanzadores. Por otro lado, en los estudios de Koper et al. (2020) y Li et al. (2020) utilizaron como medida de rendimiento el lugar que se obtuvo en el evento de competencia, al ser Boccia y Taekwondo las disciplinas evaluadas, respectivamente. En el caso de van Raalte y Posteher (2019) se utilizó la escala PPAA (Perceptions of Performance Academic and Athletic), que mide la percepción de rendimiento atlético y académico (Rees & Hardy, 2004). Çakiroğlu (2021) utilizó una escala (Athletic Performance Questionnaire) validada y creada por Charbonneau et al. (2001), la cual a partir de cinco ítems evalúa el rendimiento atlético percibido. Por último, Djurovic (2021), se ayudó de autoevaluaciones de rendimiento deportivo diseñados para el estudio ex profeso.

Con relación a los resultados, la mayoría de los estudios (*n* = 7) indican que la autoeficacia puede tener una relación e influencia significativa en el desempeño de una disciplina deportiva, incluso puede llegar a considerarse un predictor en la práctica de apnea y salto de esquí (Baretta et al., 2017; Sklett et al., 2018). Únicamente el estudio de Li et al. (2020) mostró resultados inconsistentes para relacionarlo con la autoeficacia de los deportistas. Lo anterior confirma que la autoeficacia que percibe un deportista al practicar una disciplina es un factor relevante en su desempeño deportivo. También puede influir en las capacidades motoras de un deportista en condiciones competitivas y no competitivas, lo cual determinará en gran medida su resultado (Peng & Zhang 2021). La mayoría de los estudios indican una relación entre la variable de autoeficacia y el estado competitivo del atleta. Por lo tanto, el nivel de autoconfianza puede determinar la forma de enfrentar los retos; antes, durante y después de la competencia.

Las principales limitaciones que se mencionan en los estudios son: el diseño de la investigación no permite generalizar a todo el contexto deportivo (*n* = 4), al ser transversales y con muestras intencionales o sin equivalencia debido a la disponibilidad de los jugadores. Existe un riesgo de sesgo, debido a que los datos de rendimiento se obtuvieron a partir de medidas subjetivas (*n* = 3) (Koper et al., 2020; Li et al., 2020; van Raalte & Posteher, 2019) lo cual, se confirma en la revisión de Ursino et al. (2020), ya que la evaluación de rendimiento sigue mostrando deficiencias, al emplear metodologías de análisis poco confiables, recurriendo a medidas auto informadas y contextuales, por ejemplo el resultado de una sola competencia, sería valioso incluir mediciones más consistentes como capacidad aeróbica y movilidad del atleta. Otros artículos indican que es importante considerar más variables para explicar el fenómeno del rendimiento deportivo, como influencias ambientales (Sklett et al., 2018), la motivación interna (Ahmed et al., 2020) y personalidad (Li et al., 2020). Además de analizar los contextos deportivos (entrenador, familia y profesionales) que podrían, o no, tener impacto en el deportista (García-Naveira, 2018). También, se recomienda controlar los años de experiencia deportiva y solventar la necesidad de contar con más instrumentos estandarizados para evaluar la autoeficacia.

Conclusiones

El presente trabajo tuvo como objetivo realizar una revisión sistemática de los estudios existentes sobre la autoeficacia y el rendimiento deportivo, considerando el periodo de 2017 a 2023. Desde hace varias décadas los estudios han tenido como meta encontrar los factores que se involucran en el desempeño deportivo de los atletas. La psicología deportiva propone examinar factores no relacionados con la capacidad física, que tienen gran impacto en el estado antes, durante y después de la práctica deportiva. Por lo tanto, la autoeficacia que perciba el atleta tendrá una relevancia en el resultado de la práctica deportiva. Programas enfocados en mejorar la confianza del atleta, pueden complementar en gran medida el logro de objetivos esperados en el alto rendimiento.

Los estudios nos permiten observar que las percepciones del atleta acerca de lo que puede lograr, independientemente de tener o no las condiciones físicas, harán que enfrente de forma distinta los retos, dificultades y competencias. De esta forma, las creencias de las propias capacidades tienen un gran poder de acción.

La síntesis de la información revisada nos permite concluir que la variable de autoeficacia está presente en distintos deportes, como es un elemento de impacto, que predecirá el comportamiento deportivo y por ende "su resultado". Por otro lado, son pocas las inconsistencias de la relación entre las variables, las cuales se deben a limitaciones o consideraciones particulares de cada estudio. Queda en evidencia que la psicología deportiva tiene un área de oportunidad para fortalecer la operacionalización y la evaluación de aquellos constructos psicológicos que pueden incidir en el rendimiento deportivo, debido a que es una de las condiciones principales que limita la generalización de resultados.

Finalmente, a pesar de la evidencia encontrada, se debe considerar la relevancia que tendrá replicar los estudios en diferentes poblaciones y deportes. Explorando a fondo cada variable y su combinación, como parte de modelos explicativos

de la conducta. Esto nos permitirá tener mayor claridad en las teorías de respuesta al fenómeno deportivo, y poder así diseñar herramientas de intervención que fortalezcan los procesos psicológicos adecuados que ayuden al óptimo desarrollo deportivo; logrando un impacto en la permanencia, la motivación y la satisfacción en la ejecución de la actividad física lo que contribuirá de manera positiva en la salud en general.

Declaración del Comité de Ética

No aplica debido a que el estudio es una revisión sistemática.

Conflicto de Intereses

Los autores declaran no tener conflicto de intereses, las instituciones financiadoras no tuvieron influencia en el diseño del estudio, en el análisis de los datos o en la interpretación de los resultados.

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Declaración de Disponibilidad de Datos

Los datos no se encuentran disponibles debido a que el escrito es una revisión sistemática.

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Development of an Android-Based Digital Game Instrument for Evaluating Volleyball Serve and Smash Skills

Desarrollo de Habilidades de Voleibol Basadas en Modelos de Instrumentos Digitales

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Abstract

This research aims to develop a digital instrument-based volleyball game skill test tool. Data collection uses observation, questionnaire, interview, and test. The data analysis technique used in this study was quantitative descriptive statistics with the effectiveness test using t-test. The small-scale trials given to 12 subjects had an average value of 78.2% in the category of "good/feasible" to proceed to the large-scale trial phase. The results of the Testing Protocol for Monitoring Spike and Serve Speed in Volleyball are radar sensor-based service and smash tests not based on Android. The renewal of this research is that application software tools have been added to the Android application so that it can be used on an Android smartphone. Therefore, a digital game instrument of volleyball skills is "Eligible" and effective to be used as a tool to measure the technical ability of volleyball players.

Keywords: Sport skill, technical ability, test tool.

Resumen

Esta investigación tiene como objetivo desarrollar una herramienta de prueba de habilidad de juego de voleibol basada en instrumentos digitales. La recopilación de datos utiliza la observación, el cuestionario, la entrevista y la prueba. La técnica de análisis de datos utilizada en este estudio fue la estadística descriptiva cuantitativa con la prueba de efectividad mediante la prueba t. Los ensayos a pequeña escala entregados a 12 sujetos tuvieron un valor promedio de 78,2% en la categoría de "bueno/factible" para pasar a la fase de ensayo a gran escala. Los resultados del Protocolo de prueba para monitorear el remate y la velocidad del servicio en voleibol son pruebas de servicio basadas en sensores de radar y remate que no se basan en Android. La renovación de esta investigación es que se han agregado herramientas de software de aplicación a la aplicación de Android para que pueda usarse en un teléfono inteligente Android. Por lo tanto, un instrumento de juego digital de habilidades de voleibol es "Elegible" y efectivo para ser utilizado como una herramienta para medir la habilidad técnica de los jugadores de voleibol.

Palabras clave: Habilidad deportiva, habilidad técnica, herramienta de prueba.

Introduction

Various sciences must quickly adjust to several demands, one of which is sports science. The speed at which knowledge and technology evolve highlights the importance of good and up-to-date education programs in all professional fields, including sports coaching (Rui et al., 2014). According to Cojocaru and Cojocaru (2018), the volleyball game contains a series of individual technical–tactical actions interacting during the game. Bratovčić et al. (2017) said 12 players participated in the game, six in each team. The game is played in three won sets on the principle of tiebreaks up to 25 points with a difference of 2 points in the first 4 sets, and in the fifth set, a tiebreak is played up to 15 points with a difference of 2 points. According to Luminița and Valentina (2017), volleyball is a loving and exciting sport, but its poor promotion leads to a low number of participants, especially in areas where this sport has no tradition. There are several kinds of basic techniques in volleyball games: service, passing, smash, and block. The basic technique of volleyball, according to the results of the study by Florin and C-Tin (2013), states that volleyball is a complex sport where the results in the game depend on the cooperation of each player who occupies a position following the rules of the game. The performance in volleyball games requires a good psychomotor aspect and is trained on every player. The ability to adapt to a team and physical and psychological abilities influence the outcome of the game. According to Raiola (2014), in the process of learning volleyball, using a tutorial that has a theoretical basis in a cognitive approach that covers the development of strength and skills can be useful. The results of research by García-De-Alcaraz et al. (2017) provide a reference value in guiding the development of athletes and for coaches to be used in evaluating the skills both during matches and volleyball basic technical training. Exercises to improve service below are performed to improve service skill (Destriana et al., 2000).

Research by Luis-del Campo et al. (2022) indicates that probability information from video analysis regarding the opponent's setter passing direction significantly influences the blocking performance of skilled female volleyball players. The study found faster reactions from blocking players when receiving this information but no effect on decision-making and the quality of movement execution. These findings confirm the importance of probability information in enhancing initial responses in volleyball blocking at high skill levels. Similarly, research by Jiménez-Olmedo et al. (2022) on the effects of Deep Dry Needling on latent myofascial trigger points on jumping performance showed moderate increases in jump height after one week of intervention among international beach volleyball players under the age of 21. However, the decrease in performance immediately after the intervention suggests that using this technique just before competition is not recommended. Both studies highlight the importance of using appropriate strategies and interventions to improve volleyball players' performance, considering these interventions' short-term and long-term effects.

According to results of research by Boichuk et al. (2017) and Clemente et al. (2015), modern volleyball is connected with highly intensive loads; stability, distribution, and re-switching of attention; and maximal speed of players' reaction. Moreover, it has also been found that in volleyball matches, better attacks occur at the beginning of the set (first 15 rallies). The spike is the best indicator of success in high-level men's volleyball, but only when considering relative measures. The number of block points per game proved to be a good indicator of success in a match (Přidal & Priklerová, 2018)

Tests are tools or instruments used to obtain information about a person or object (Widiastuti, 2015). To get good measurement results, you should use a test tool or instrument that refers to the purpose of the test itself. Previous research on the development of volleyball service test instruments was conducted by Palao and Valades with the title, Testing Protocol for Monitoring Spike and Serve Speed in Volleyball. The research resulted in the development of two types of test instruments, namely, an instrument to see the strength of a smash and an instrument for service (Palao & Valades, 2009). Furthermore, the results of Hidayat et al. (2019) developed a computer-based volleyball passing test instrument. The research developed a volleyball passing test instrument that uses vibrating sensors and computer-based applications. The result is effective for measuring the volleyball player's skill level. Research Destriana et al. (2020) Development of Overhand Serve Learning Techniques in Volleyball Games.

The development of an Android-based pocketbook application is feasible to use in the learning process (Oktiana, 2015). Satyaputra (2014) stated that Android is an operating system for smartphones and tablets. Furthermore, in the opinion of Huda (2013), Android is a Linux operating system that is made specifically for mobile devices such as smartphones or tablets.

The speed at which knowledge and technology evolve highlights the importance of good and up-to-date education programs in all professional fields, including sports coaching (Rui et al., 2014). Furthermore, according to Vladimir and Marian, "there are connections among digital systems governed by standard devices developed by the International Standards Organization which produce the OSI (Open System Interconnection), model". The physical interconnection model of the OSI reference model shows ways of communicating with data connections, synchronizing communications, correcting errors, network errors, network circuits, display, performance, imaging, and creating digital applications (Vladimir & Marian, 2015).

According to Tangkudung (2016), development research is research that is used to create new products and/or develop existing products, based on an analysis of needs found in the field. According to Ardani (2015) development can be interpreted as a process of translating or describing design specifications into physical features. Science and technology will continue to grow and be utilized in the world of sports because current technological advances are very beneficial for improving sports achievements.

The results of research on the development of the volleyball skill test instrument above and the results of previous studies are in line with the results of the research conducted, namely, by developing a digital-based volleyball skill test instrument. Thus, this study has renewal in terms of components and Android applications that can be used by smartphones and tablets. The product test results are more effective and efficient for measuring volleyball skills.

Materials and Methods

The research approach used in this research is research and development, which are as follows: (1) research and information collecting, (2) planning, (3) developing preliminary product form, (4) preliminary field testing, (5) main product revision, (6) main field testing, (7) operational product revision, (8) operational field testing, (9) final product revision, and (10) dissemination and implementation (Borg & Gall, 2007).

Research Subject

The research subjects were 52 male and female volleyball players aged 14-20 years, 28 male and female volleyball players from the Sriwijaya State Sports School (SONS), and 24 male and female volleyball players from Bina Darma University. The subject's characteristics are volleyball players who actively train and have two years of training experience. A purposive sampling technique was chosen for the research subject.

Data Collection Techniques and Instruments

Data collection techniques in this study were (1) observations of spaciousness where the research subjects were carried out and (2) interviews with trainers. These were followed by data collection instruments using a questionnaire, observation, interview, and volleyball skills test. Test instruments to measure serves and smashes used volleyball serve test instruments and volleyball smash test instruments. The questionnaire can be a closed/open question/statement. According to Sugiyono (2013), the types of questionnaires, according to their shape, are divided into three categories: (1) multiple-choice questionnaire, (2) checklist, and (3) rating scale.

Data Analysis Techniques

Data analysis includes all the activities of clarifying, analyzing, using, and drawing conclusions from all data collected in action, whereas quantitative data were obtained by giving a score qualitatively based on a Likert scale that was converted to a scale value of 4, Table 1.

Table 1
Likert Scale

Scale	Description
1	Very inadequate/good/suitable
2	Not decent/good/suitable
3	Decent/good/suitable
4	Very decent/good/appropriate

A percentage is intended to find out the status of something that is presented as a percentage. The formula for calculating eligibility, according to Sugiyono (2013) is as follows:

Formula: $\frac{SH}{SK}$ *x* 100% (1)

Where, SH: Calculate score; SK: Criteria score or ideal score.

The results of subsequent data calculations are made in the form of a percentage multiplied by 100% and in the four categories of eligibility by using the scale as follows (percentage of eligibility category by Arikunto (2010) (Table 2).

Table 2
Percentage of eligibility

Score as a percentage	Eligibility category
<40%	Not good/not eligible
40–55%	Poor/inadequate
56–75%	Good enough/decent enough
76–100%	Good/decent

Note: (1), strongly disagree/very improper; (2), not appropriate/not feasible; (3), appropriate/feasible; (4), very appropriate/very feasible. After knowing about feasibility data, the data is calculated using nonparametric statistical analysis techniques, namely, data normality test and paired sample t-test. Given an approved value of $p > 0.005$, then H0 is rejected, resulting in a significant difference between the results of manual service tests with digital tests.

Results

A small group trial was conducted on 12 Bina Darma University volleyball players. The test subjects performed all digital-based volleyball skill-testing tests, Table 3.

Table 3
Data on small-scale group trial results

Aspect of rating	Count score	Max score	Percent	Category
Originality	78	96	81.2	Good/ decent
Innovation	114	144	79.2	Good/ decent
Usability	188	240	78.3	Good/ decent
Safety	111	144	76.4	Good/ decent
Use	146	192	76	Good/ decent
Total score	631	816	78.2	Good/ decent

Based on the results of a small-scale trial, as shown in Table 3, in the aspect of originality, the digital-based volleyball skill test instrument scores 81.2% in the "good" category, which means that the digital-based volleyball skill test instrument is "feasible." The excellence aspect of the digital-based volleyball skills tests instrument scores 79.2% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The aspect of the use of digital-based volleyball skills test instrument scores 78.3% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The safety aspect of the digital-based volleyball skills tests instrument scores 76.4% in the "good" category, which means that the digital-based volleyball skill test instrument is "feasible." The excellence aspect of digital-based volleyball skills tests instrument scores 76% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." Thus, the average value of the results of small-scale trials is 78.2% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible."

Large group trials were conducted on 24 male and female volleyball players from Bina Darma University, Table 4. Based on the results of large-scale group trials as shown in Table 4, in the aspect of originality, the digital-based volleyball skills test instrument scores 83.3% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The excellence aspect of the digital-based volleyball skills test instrument scores 84.7% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The aspect of the utilization of digital-based volleyball skills tests instrument scores 87% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The safety aspect of the digital-based volleyball skills tests instrument scores 86.1% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." The excellence aspect of the digital-based volleyball skills tests instrument scores 87.5% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible." Thus, the average value of the results of large-scale group trials is 85.7% in the "good" category, which means that the digital-based volleyball skills test instrument is "feasible."

Table 4
Data from large-scale group trial results

Aspect of rating	Count score	Max score	Percent	Category
Originality	80	96	83.3	Good/ decent
Innovation	122	144	84.7	Good/ decent
Usability	209	240	87	Good/ decent
Safety	124	144	86.1	Good/ decent
Use	146	192	87.5	Good/ decent
Total score	704	816	85.7	Good/ decent

The results of the effectiveness test were carried out using a t-test involving 52 subjects, namely, 24 male and female volleyball players from Bina Darma University and 28 male and female volleyball players from Sriwijaya State Sports School. The following are the results of the t-test for the manual and digital groups (Table 5). Based on the output above, Table 5, the significance value (sig.) for all the data, both Kolmogorov–Smirnov, and Shapiro–Wilk tests > .05, it can be concluded that the study is stated to be normally distributed.

Table 5
Test of Normality Instrument

Test of Normality						
	Kolmogorov–Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Manual	.126	52	.039	.947	52	.022
Digital	.134	52	.020	.948	52	.023

Note: a. Lilliefors Significance Correction.

The following are the results of the t-test for the value of the manual group and the digital group, Table 6.

Table 6
T-Test Results of Experiment Groups and Control Groups

Paired Samples Statistics					
		Mean	*N*	*SD*	*Std. Error Mean*
Pair 1	Manual	21.692	52	5.249	.728
	Digital	22.481	52	5.256	.729

Looking at the data in Table 6, the mean result of the control group was 21.692, and the mean result of the experimental group was 22.481 (in the group statistics table). From these data, it can be seen that the value of the experimental group is higher or greater than the control group, Table 7.

Table 7
Paired simples instrument tests

Paired samples test									
		$\bar{x}$	Paired differences				T	df	Sig. (t
			SD	*σM*	*95% CI*				
					Lower	Upper			
Pair 1	Manual – Digital	−.941	.238	.033	−1.008	−.874	−28.284	50	.000

In the results of the paired samples test output above, the value of t =−11.406 and Sig. (two-tailed) or *p*-value = .000 < .05 or Ho is rejected. There is then a significant difference between the results of manual service tests and digital tests. The difference between the average control group (21.692) and the average of the experimental group (22.481) was revealed. This shows that the increase in the experimental group was higher than the control group, which means that digital-based volleyball skills instrument models are more effective for conducting volleyball smash skills tests.

Discussion

This developmental research aims to provide a new alternative in evaluating the skills of volleyball game techniques, which are more varied and effective. The product developed is a digital-based volleyball skill test kit, where researchers utilize digital technology as the main component to make this test kit. The technology used is the latest development both in software and hardware, to produce a good and appropriate product used to measure volleyball game skills.

Meanwhile, the results of research by Manafifard et al. (2017) stated that the purpose of player tracking technology is to find out the extent of the movements made by players, mark players, and find out how players look. Research results by Thomas et al. (2017) are in line with the results of research that most sports can use sensors or other devices to monitor players while other equipment is not possible.

This development research uses a model of developing preexisting tools such as a test and smash test based on technology. From the instrument model, the researchers then developed it in a form and innovation that was certainly different from previous research, both of the physical aspects/components and software that is made. In terms of physical/component aspects, if in previous studies conducted by Hidayat et al. (2019) the components were made of one type of vibrating sensor and one sensor used in volleyball fitting test, in this study, in one the circumference of the target, there are four sensors installed so that the level of sensitivity will be better than the previous studies. Furthermore, for volleyball smash tests, previous studies conducted by Palao and Valades (2012) only looked at how fast the smash shots were carried out by volleyball players, using camera radar as a detector, in contrast to the development carried out in this study. This research makes smash test kits that apply to volleyball games of the same size where players smash exactly at the time of the game. Therefore, the test equipment is made following the area of half the volleyball court where the test equipment is placed and then given numbers as a target. Based on several different elements both in terms of physical/component and software aspects, of course, the research on the development of a volleyball skills test is an innovation, and the original has not been done by other researchers. Besides, this product will be very helpful in carrying out volleyball skills tests for beginner athletes as well as students and the general public. This product has utilized digital technology so that very new and more objective data are generated. Thus, the data cannot be changed by athletes to minimize data manipulation actions. Obviously, with an objective result, the coach or teacher will know the actual skill level of each athlete or student.

Conclusions

Based on the results of data analysis obtained from several good stages of expert validity test, proceeding with small-scale group trials and large-scale group trials obtained average scores as follows: Stages of expert validation given by five stages I experts following their respective expertise obtained an average rating of 72.4% in the “good enough” category, which means that the digital-based volleyball skills test instrument was “decent enough.” Furthermore, the stage II validation expert test from five experts obtained an average rating of 84.1% in the “good” category, which means that the digital-based volleyball skills test instrument was “eligible” to be continued in the next stage, namely, the product trial phase. Furthermore, the small-scale group trial phase obtained an average score of 78.2% in the “good” category, which means that the digital-based volleyball skills test instrument was “feasible” to proceed to the large-scale trial phase. The average value of the results of large-scale group trials is 85.7% in the “good” category, which means that a digital-based volleyball skills test instrument is “feasible” to measure volleyball skill testing. In the results of the independent samples test output above, the value of t = −11.406 and Sig. (two-tailed) or *p*-value = .000 < .05 or H0 is rejected. There is then a significant difference between the results of manual tests and digital tests. Thus, it can be concluded that the digital-based volleyball skills test instrument is effective and feasible to measure volleyball skills tests.

The results of this study are expected to contribute to sports education, especially in volleyball games. With the presence of digital-based instruments, it is expected to provide examples of instruments that are more specific to sports education. In the future, researchers want to carry out research that has a better effect on sports education.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

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Authors’ Contribution

Conceptualization, M. and D.; Methodology, M. and D.; Validation, A.F.; Formal Analysis, A.F.; Investigation, M., D., and A.F.; Data Curation, A.F.; Writing – Original Draft, M., and D.; Visualization, M., and D.; Supervision, M., and D.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author (muslimin@binadarma.ac.id).

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Transnationalism and professional coaches' migration processes: a systematic mapping review

Transnacionalismo y procesos migratorios de entrenadores y entrenadoras profesionales: una revisión sistemática de mapeo

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Abstract

The aim of this article is to study the existing knowledge on migratory processes in professional coaches. To achieve this, a systematic mapping review of existing literature was conducted. The systematic search extended up to August 31, 2023, with no date or language restrictions established. Twenty-one studies were selected and analyzed, examining their objectives, design, and sample characteristics from three different migratory perspectives (i.e., emigrant, immigrant, and mixed). In the synthesis of the results of the included studies, it was observed that the majority of coaches were positive about migration and recommended it to others due to the personal and professional benefits it entails. However, difficulties were also found at both personal (e.g., loss of social ties) and professional (e.g., training standards and sports culture) levels upon arrival in the new country and adapting to the new sociocultural context. Future research should pay specific attention to female coaches, who have received less attention thus far, explore the impact of cultural transition on the mental health of coaches, and analyze similarities and differences between the migratory processes of athletes and coaches.

Keywords: Acculturation, coaches, cultural transition, transnationalism.

Resumen

El objetivo de este trabajo es estudiar el conocimiento existente sobre los procesos migratorios en entrenadores y entrenadoras profesionales. Para ello, se realizó una revisión sistemática de mapeo de la literatura existente. La búsqueda sistemática se extendió hasta el 31 de agosto de 2023 y no se establecieron limitaciones de fecha de publicación ni de idioma. Se seleccionaron 21 trabajos y se analizaron, desde tres perspectivas migratorias distintas (i.e., emigrante, inmigrante y mixta) sus objetivos, diseño y características de la muestra. En la síntesis realizada de los resultados de los trabajos incluidos se observó que la mayoría de entrenadores y entrenadoras fueron positivos en relación a la migración y la recomiendan a otros por los beneficios a nivel personal y profesional que conlleva. Sin embargo, también se hallaron dificultades a nivel personal (e.g., pérdida de vínculos sociales) y profesional (e.g., estándares de entrenamiento y cultura deportiva) al llegar al nuevo país y al adaptarse al nuevo contexto sociocultural. Conviene que futuras investigaciones atiendan de manera específica a las entrenadoras, que hasta ahora han recibido menos atención, que exploren el impacto de la transición cultural en la salud mental de entrenadores y entrenadoras, y que analicen similitudes y diferencias entre los procesos migratorios de deportistas y entrenadores y entrenadoras.

Palabras clave: Aculturación, entrenadores, transición cultural, transnacionalismo.

Introduction

Globalization is a phenomenon based on the continuous increase in communication and interdependence among different countries worldwide in economic, political, social, technological, and cultural realms. This process of globalization has also reached elite sports, where we find that geographical mobility has increased on a global scale (Ryba et al., 2017) and has become a fundamental aspect today (Prato et al., 2020; Ryba & Stambulova, 2013). Nowadays, there are numerous international competitions taking place in various countries simultaneously (e.g., UEFA/AFC Champions League or Copa Libertadores in football, Euro League or Liga de las Américas in basketball), state competitions held in other countries (e.g., Spanish Football SuperCup in Saudi Arabia, NBA or NFL games in Europe), as well as athletes, referees/judges, coaches, and members of different technical teams pursuing their careers by moving from one country to another (Maguire & Falcous, 2011). Therefore, understanding migration processes in sports is important for developing sports policies and implementing strategies that facilitate successful adaptation for those involved (Borges et al., 2014). Over the last decade, interest in researching the migratory processes of coaches has increased, and several authors have attempted to explore elements such as the motives behind coaches' migration (Borges, 2014; Charbonneau et al., 2020), their migratory experiences (Lenartowicz, 2022; Samuel et al., 2020), or the processes of acculturation (Hall et al., 2021). However, several authors point out that there is still a scarcity of research in this area (Sain et al., 2022; Samuel et al., 2020).

To describe these migratory processes, Koser and Salt (1997) differentiated between the terms "mobility," which refers to short-term or intermittent stays (e.g., training camps in another country in preparation for a competition), and "migration," which carries a connotation of long-term stay or permanence (e.g., signing a multi-season contract). Ryba and Stambulova (2013), on the other hand, introduced the term "transnational" to define those individuals who build their careers abroad and/or who develop both athletically and personally across borders. Later, a distinction was also made between an "immigrant athlete," who moves to a new country with the aim of settling, and a "transnational athlete," who moves back and forth between their country of origin, building their career across borders and undergoing cyclical transition processes (Ryba et al., 2017). Another term used in the study of migratory processes is "acculturation," which describes the process of psychological and cultural changes in practices, values, and identity that occur as a result of continuous direct contact between people from different cultural groups (Berry, 2005). The strategies and attitudes developed when becoming part of this new social and cultural context allow migrants to adapt to a greater or lesser extent to the new reality in which they live, defining to what extent their previous cultural heritage is maintained and/or the new culture is embraced (Schinke et al., 2013). This process can have an impact on performance and psychological well-being (Schinke et al., 2014).

To explain migratory processes and adaptation to a new culture, theoretical models such as the Cultural Transition Model (Ryba et al., 2016) or Berry's Acculturation Model (1997) have been developed. According to Ryba et al. (2016) Cultural Transition Model, the process of sociocultural adaptation involved in transitioning from one context to another consists of three phases: (a) the pre-transition phase, which is when individuals begin to consider the possibility of migration. One of the main objectives at this stage is to gather information about the potential destination (e.g., sports facilities, social and sporting customs, city life), initiate the necessary bureaucracy for the transition, and start preparing psychologically for the challenges they will face (Borges et al., 2014); (b) the acute cultural adaptation phase, characterized by the renegotiation of cultural practices in daily life, social repositioning, and coping with various personal (e.g., language, customs, cultural practices) and professional challenges (e.g., integrating into the new technical team or club, adapting to their work routines, adjusting to different coaching styles); and (c) the sociocultural adaptation phase, which refers to the process of adapting to the social and cultural norms of the new country and developing interpersonal relationships with people in the new environment (Ryba et al., 2016). Depending on the balance between the demands of the transition and the individual's coping strategies, the transition can (a) be favorable, enhancing sports and/or personal development, (b) lead to a crisis that delays favorable transition, or (c) become an unfavorable transition, associated with negative outcomes such as dropout or substance abuse (Stambulova & Samuel, 2019). Berry's Acculturation Model (1997) positions individuals' attitudes toward acculturation along two dimensions: (a) cultural interaction, referring to the extent to which individuals or groups wish to engage with the host culture, and (b) cultural maintenance, referring to the extent to which individuals or groups wish to maintain their own culture when interacting. According to Berry (1997), four acculturation strategies are associated with these two dimensions: (a) assimilation: actively engaging with the new culture, showing little or no desire to maintain one's own culture; (b) separation: maintaining cultural norms without the desire to embrace the new culture; (c) marginalization: neither maintaining the original culture nor embracing the new one; and (d) integration: seeking to maintain cultural behaviors while participating in the host society. It is important to note, as Prato et al. (2020) highlight, that this process is not linear and that migrants may move from one phase to another depending on their circumstances.

Regarding migration transition processes, research has primarily focused its efforts on professional team sports athletes (e.g., Prato et al., 2020; Wicker et al., 2017). Some studies have analyzed the various reasons that lead athletes to migrate (e.g., Magee & Sugden, 2002; Maguire & Falcous, 2011) or their acculturation experiences (e.g., Hirose & Meijen, 2022; Schinke et al., 2013). Prato et al. (2020) identified challenges that migrant and transnational professional athletes must face at both sporting (e.g., different playing style, new training routines) and sociocultural levels (e.g., new language, new cultural customs), and other authors have described how these athletes have experienced stress (Hobson et al., 2023), loneliness, social isolation, and homesickness (Ronkainen et al., 2019), even leading to the development of clinical mental health problems such as anxiety, depression, or burnout (Hassmén et al., 2019; Nixdorf et al., 2023). Regarding coaches, research to date has explored topics related to their stress, burnout, or well-being, as well as their influence on athletes (e.g., Carson et al., 2019; Norris et al., 2017; Oglesby et al., 2020; Ramis et al., 2017). Over the last decade, there have also been, albeit to a lesser extent, publications exploring transnationalism and the migratory processes of coaches (e.g., Hall et al., 2021; Samuel et al., 2020). However, to the best of the authors' knowledge, no systematic review on this topic has been found that provides an overview of the current state of research.

The aim of this study is to explore the existing knowledge regarding the migratory processes of professional coaches, specifically addressing (a) the trend and location of evidence, (b) the characteristics of the studies, considering their objectives and design, the migratory perspective of the studies, and the sample characteristics, and (c) synthesizing the results obtained in the included studies and identifying possible gaps in the literature to be addressed in future research.

Materials and Methods

Design

This study is a systematic mapping review conducted following the criteria proposed by the PRISMA method (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Page et al., 2021) and its three steps: (a) identification, (b) screening, and (c) inclusion. This design was chosen because systematic reviews contribute to advancing knowledge by synthesizing existing evidence, identifying gaps in knowledge, and facilitating evidence-based decision-making (Page et al., 2021). The reviewed and synthesized evidence was analyzed using previously established theoretical frameworks, such as the Cultural Transition Model (Ryba et al., 2016) and Berry's Acculturation Model (1997).

Systematic Search

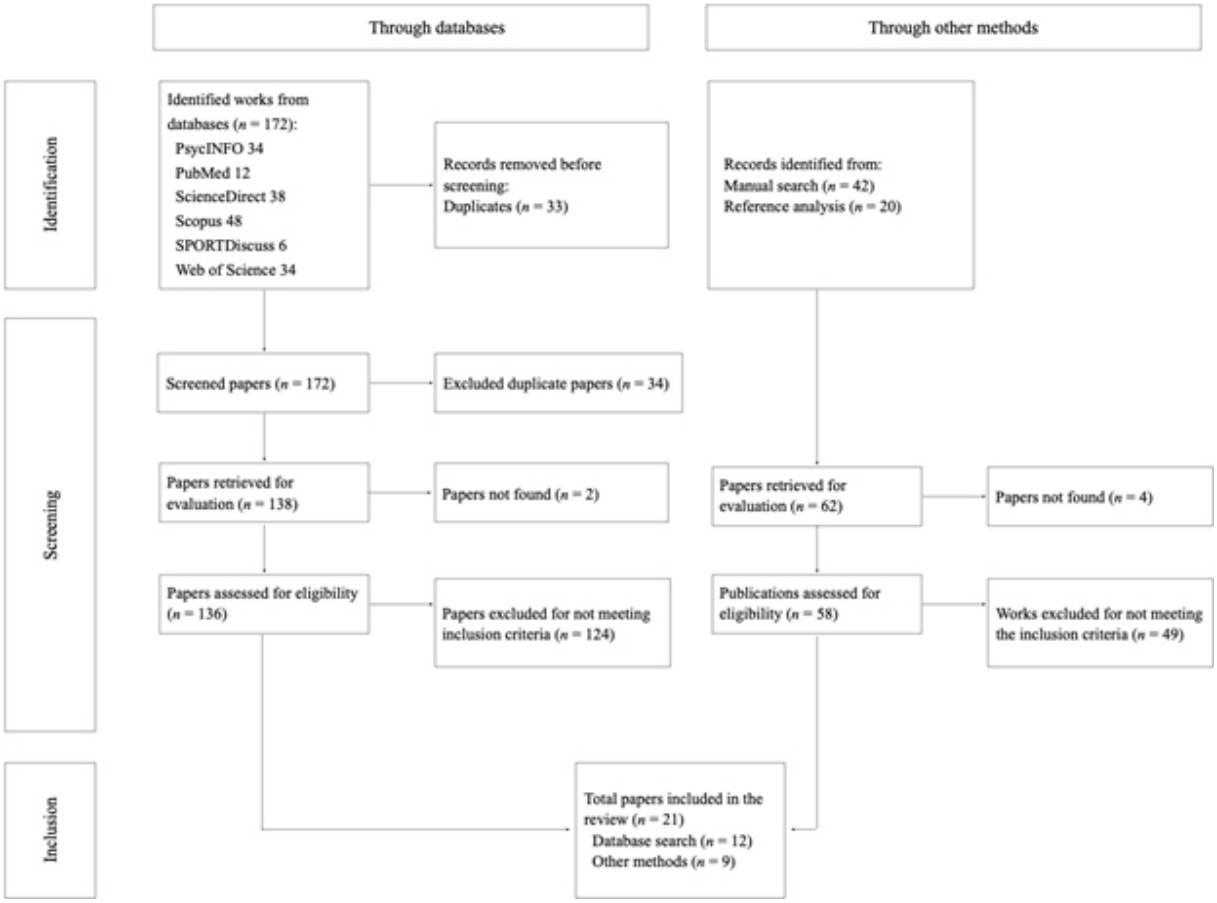
To systematize the process, the CHIP tool (Context, How, Issue, Population; Shaw, 2010) was utilized, facilitating the identification of terms, keywords, and synonyms related to the review's objective (Prato et al., 2020). The CHIP formula was used in English to detect abstracts of articles in any language (document available upon request to the corresponding author). This formula was applied across six databases: PsycINFO, PubMed, ScienceDirect, SCOPUS, SPORTDiscuss, and Web of Science. Additionally, a manual search was conducted by examining the references of all identified evidence. The search was extended until August 31, 2023.

Evidence Selection

The criterion defined for the inclusion of identified evidence was that they explored transnationalism and migratory processes of professional coaches. Professional coaches were understood as those who have a full-time professional contract, regardless of the category or age group they coach. Evidence focused on transnationalism or migratory processes of other social agents (e.g., athletes) were excluded. No restrictions were established regarding language or publication date.

The database search identified a total of 234 studies: 172 were found through searches in scientific databases, 42 through manual searches, and 20 through citation examination (see Figure 1). Once duplicate articles were excluded (34), screening was conducted in two phases. Firstly, six studies that could not be located were excluded, and the titles and abstracts of the remaining studies were analyzed, resulting in the exclusion of 118 studies that did not meet the inclusion criteria. Secondly, eligibility was assessed by reading the full text of each study, and an additional 55 studies were excluded for not meeting the inclusion criteria. After this screening, a total of 21 studies were included in this review.

Figure 1
PRISMA flow diagram



Data Extraction Process

The data extraction process involved conducting a descriptive analysis of the studies, identifying elements such as the format of the study (i.e., article, book chapter, book, doctoral thesis), the journal or publisher that published it, the country where the study was developed, its objectives and design, the perspective from which the migratory process is analyzed, the country from which it is studied, and the characteristics of the sample (e.g., population, average age, country of origin). A content analysis was also conducted using the Cultural Transition Model (Ryba et al., 2016) as a reference to explore the results obtained in the included articles on issues related to motives for migration, mediating factors, or existing barriers and challenges in adaptation, and Berry's Acculturation Model (1997) for the analysis of results on acculturation. All this information was recorded in a Numbers file composed of several tabs for subsequent analysis and relevant selection of information to highlight in the results section (document available upon request to the corresponding author). In order to ensure the rigor and methodological coherence of this research, and as pointed out by Tod (2019) and Tod et al. (2022), the second and third authors encouraged reflection and exploration of alternatives throughout the entire process of design, analysis, data presentation, and writing of this article.

Results

The results have been organized by presenting, firstly, the trend and location of the evidence. Secondly, the characteristics of the included studies are analyzed, focusing on (a) the objectives they pose and their design, (b) the perspective from which they study migratory processes, and (c) the characteristics of the sample. Finally, a synthesis of the results of the included studies is shown, organizing them into three temporal moments: (a) before migrating, (b) upon arrival in the new country, and (c) adapting to the new sociocultural context.

Trend and Location of the Evidence

Out of the total of 21 studies included in this review, 16 are research articles, three are books or book chapters, and two are theses (one doctoral and one master's). Although no limitations were set regarding the publication date or language, all studies were published in English between the years 2010 and 2023.

The 16 articles included in this review were published in 14 different journals (e.g., Sport, Education and Society; Psychology of Sport & Exercise; Physical Education and Sport Pedagogy), and only three of these journals published more than one article: International Sport Coaching Journal (Charbonneau et al., 2020; Hall et al., 2021), Leisure Studies (Borges et al., 2014; Kerr & Obel, 2018), and Sociología del Deporte (Borges et al., 2020; Sain et al., 2022). The three books or book chapters included were also published by three different publishers (i.e., Bennion Kearny Limited; Palgrave Macmillan; Routledge). Cummings's thesis (2014) was defended at Lauterian University (Canada), and Bespomoshchnov's thesis (2023) was defended at Haaga-Helia University of Applied Sciences (Finland).

Characteristics of the Evidence

Table 1 presents, in reverse chronological order, information about the studies included in this review: authors, type of evidence, perspective from which the migratory process is studied, design, objectives, and characteristics of the sample (i.e., population, average age, country of origin, and destination)**.**

Migration Perspective of Coaches

Based on the perspective from which migratory processes were studied, we have classified the included studies into: (a) those that explore from the perspective of the emigrant coach, (b) those that explore from the perspective of the immigrant coach, and (c) those that explore from a mixed perspective.

Table 1
Description of Included Evidence

No.	Authors	Type	Perspective	Design	Objective/s	Sample	Origin - Destination
[1]	Bespomoshchnov (2023)	Master's Thesis	Emigrant	Qualitative study Case study Semi-structured interview Thematic analysis	Enhance understanding of the work of high-performance coaches in a globalized sports context. Provide insights into the work of transnational, developmental, and administrative coaches	*N* = 14 coaches Age: *N/S* (M_{age} = *N/S*; *SD* = *N/S*)	*O*: Finland *D*: Sweden, Slovakia, Austria, England, Switzerland, Poland, Italy, Russia, USA, Germany, and Slovenia
[2]	Guo et al. (2023)	Article	Emigrant	Qualitative study Semi-structured interview Thematic analysis	Analyze the professional development of international football coaches in the context of their transnational migration	*N* = 8 coaches Age: 25-40 (M_{age} = *N/S*; *SD* = *N/S*)	*O*: Brazil, Colombia, Serbia, United Kingdom, Spain *D*: China
[3]	Mckenna (2022)	Book	Emigrant	Non-empirical work	Showcasing the personal and professional experiences of eight migrant coaches	*N* = 8 coaches Age: *N/S* (M_{age} = *N/S*; *SD* = *N/S*)	*N/S*
[4]	Sain et al. (2022)	Article	Inmigrant	Qualitative study Semi-structured interview 38-question questionnaire for immigrant coaches Thematic Analysis (MAXQDA11)	Analyzing (a) immigrant coaches' perceptions of their experiences and (b) native coaches' perceptions regarding the migration of coaches	*N* = 15 coaches *n* = 10 migrant coaches (*M* = 4; *F* = 6) Age: 19 – 44 (M_{age} = 30.7; *SD* = 9.04) *n* = 5 native coaches (*M* = 4; *F* = 1) Age: 20 – 40 (M_{age} = 30.5; *SD* = 9.25)	*O*: Italy, Spain, Croacia, Bulgaria, and Brazil *D*: United Kingdom

[5]	Hall et al. (2021)	Article	Inmigrant	Qualitative study Semi-structured interview Thematic analysis	Increase knowledge about acculturation in elite sports following Berry's theoretical model	*N* = 5 coaches *M* = 5; *F* = 0 Age: 47-56 (M_{age} = 50.8; *SD* = 3.42)	*O*: England, Ireland, Wales, and New Zealand *D*: England, Scotland, Wales, Ireland, and Italy
[6]	Borges et al. (2020)	Article	Emigrant	Quantitative study Online questionnaire Regression analysis	Identify migration patterns and networks of Portuguese football coaches between 2009 and 2013	*N/S*	*O*: Portugal *D*: Multiple countries (e.g., Saudi Arabia, China, Cyprus, Spain, Greece, Iran, Mozambique)
[7]	Charbonneau et al. (2020)	Article	Mixta	Qualitative study Semi-structured interview Interpretative phenomenological analysis	Analyze the motives and experiences of expatriation for ski coaches training in Norway	*N* = 5 coaches *M* = 4; *F* = 1 Age: *N/S* (M_{age} = *N/S*; *SD* = *N/S*)	*O*: North America *D*: Norway
[8]	Koopers & de Haan (2020)	Chapter		Exploratory study	Explore how transnational coaches challenge or reinforce dominant ideologies of race/ethnicity and gender	*N/S*	*N/S*
[9]	Samuel et al. (2020)	Article	Inmigrant	Qualitative study Semi-structured interview Thematic analysis	Analyze the mobility and migration experiences of transnational coaches working in the context of Israeli Handball	*N* = 8 coaches *M* = 8; *F* = 0 Age: 36-59 (M_{age} = 44.50; *SD* = 7.96)	*O*: Balkan countries and other European countries *D*: Israel
[10]	Tao et al. (2019)	Article	Inmigrant	Qualitative study Case study Direct observation for 12 months Thematic analysis (MindNote)	Examine the learning experiences of Chinese coaches immigrating to Australia	*N* = 11 *n* = 3 coaches *M* = 2; *F* = 1 Age: 25-55 (M_{age} = *N/S*; *SD* = *N/S*)	*O*: China *D*: Australia
[11]	Kerr & Obel (2018)	Article	Emigrant	Qualitative study Semi-structured interview Thematic analysis	Study the factors influencing gymnastics coaches from former Soviet Union countries to migrate to New Zealand	*N* = 10 coaches *M* = 4; *F* = 6 Age: *N/S* (M_{age} = *N/S*; *SD* = *N/S*)	*O*: Countries of the former Soviet Union (Russia, Belarus, Uzbekistan, and Kazakhstan) *D*: New Zealand
[12]	Orlowski et al. (2018)	Article	Emigrant	Qualitative study Semi-structured interview Thematic analysis	Analyzing migration factors for coaches in less commercialized sports	*N* = 9 coaches *M* = 8; *F* = 1 Age: *N/S* (M_{age} = *N/S*; *SD* = *N/S*)	*O*: Germany *D*: *N/S*

[13]	Wicker et al. (2017)	Article	Mixed	Quantitative study Online questionnaire Regression analysis	Examining the factors affecting the emigration and immigration of elite coaches	*N* = 210 coaches *M = N/S*; *F = N/S* Age: *N/S* (M_{age} = 41; *SD* = N/S)	*O*: *N/S* *D*: Germany
[14]	Orlowski et al. (2016)	Article	Emigrant	Quantitative study Online questionnaire Regression analysis	Analyzing the factors influencing the migration likelihood of elite coaches in Germany	*N* = 186 coaches *M = N/S*; *F = N/S* Age: *N/S* (M_{age} = 43; *SD = N/S*)	*O*: Germany *D*: *N/S*
[15]	Kerr & Moore (2015)	Article	Emigrant	Qualitative study Semi-structured life interview Thematic analysis	Examining the factors influencing Russian gymnastics coaches when immigrating to New Zealand	*N* = 6 coaches *M* = 3; *F* = 3 Age: 30 – 60 (M_{age} = *N/S*; *SD = N/S*)	*O*: Countries of the former Soviet Union *D*: New Zealand
[16]	Borges et al. (2014)	Article	Mixta	Qualitative study Semi-structured interview Thematic analysis (MAXQDA)	Explore perceptions about the experiences of migrant coaches, their selection processes, motivations for migration, and their migratory experiences	*N* = 5 coaches *M* = 5; *F* = 0 Age: *N/S* (M_{age} = 41; *SD* = 8)	*O*: Portugal, Slovenia, Denmark, Spain *D*: Angola, Israel, Poland, Brazil
[17]	Cummings (2014)	Doctoral Thesis	Inmigrant	Qualitative study Demographic questionnaire Semi-structured interview Thematic analysis	Analyze the experiences and challenges of a group of immigrant coaches relocated in Canada	*N* = 10 coaches *M* = 9; *F* = 1 Age: 36-78 (M_{age} = *N/S*; *SD = N/S*)	*O*: *N/S* *D*: Canadá
[18]	Schinke et al. (2014)	Article	Inmigrant	Qualitative study Semi-structured interview Thematic analysis	Analyze the acculturation process of immigrant coaches in Canada	*N* = 10 coaches *M = N/S*; *F = N/S* Age: *N/S* (M_{age} = N/S; *SD* = N/S)	*O*: Russia, Romania, China, Uzbekistan, United Kingdom, New Zealand, Germany, Jamaica, and Mexico *D*: Canada
[19]	Smith (2014)	Article	N/S	Descriptive study	Explore how mobility can revitalize, enhance, or sustain coaches' careers	*N/S*	Multiple countries
[20]	Harris (2010)	Chapter	N/S	Descriptive study	Explore the migration of Rugby coaches	*N/S*	*N/S*
[21]	Taylor (2010)	Article	Emigrant	Descriptive study	Explore the migration patterns and networks of British football coaches	*N/S*	O: United Kingdom D: Multiple countries (e.g., Germany, Austria, France, Hungary, Netherlands)

Note. N = total sample; *n* = *sample;* M = male; F = female; M_{age} = average age; *SD* = standard deviation; N/S = not specified; O. = origin country; D. = destination country

The studies that addressed the study of migratory processes from the perspective of the emigrant focused on exploring the reasons and factors that lead coaches to migrate from countries such as Finland (Bespomoshchnov, 2023), Portugal (Borges et al., 2020), Germany (Orlowski et al., 2018), the United Kingdom (Taylor, 2010), or Russia, Belarus, Uzbekistan, and Kazakhstan (Keer & More, 2015; Kerr & Obel, 2018). The studies conducted from the perspective of immigrant coaches explored the migratory experiences of coaches in the host country, addressing differences in sports organizational cultures, the challenges they must face, adaptation strategies, and acculturation processes (e.g., Samuel et al., 2020; Schinke et al., 2014) in countries such as the United Kingdom (Sain et al., 2022), Israel (Samuel et al., 2020), Australia (Tao et al., 2019), or Canada (Cummings, 2014; Schinke, 2014). The studies that used a mixed perspective in the study of migratory processes analyzed factors affecting both emigration and immigration (Wicker et al., 2017) and explored the reasons and migratory experiences of coaches in different migratory flows (e.g., from North America to Norway, from Portugal, Slovenia, Denmark, Spain to Angola, Israel, Poland, Brazil) (Charbonneau et al., 2020).

Most of the studies explored migratory processes towards a single destination from various countries of origin (e.g., Charbonneau et al., 2020; Guo et al., 2023; Sain et al., 2022; Samuel et al., 2020; Schinke et al., 2014). Others analyzed these migratory processes from one country of origin to multiple destinations (i.e., Bespomoshchnov, 2023; Borges et al., 2020; Taylor, 2010) or from multiple countries of origin to multiple destinations (i.e., Borges et al., 2014; Hall et al., 2021; Mckenna, 2022). Only the study of Tao et al. (2019) analyzed a specific migratory pattern between two countries (China and Australia).

Objectives and Design of the Studies

Based on the objectives outlined in the studies included in this review, they can be classified into: (a) those aiming to identify and analyze specific migration patterns (e.g., Borges et al., 2020; Tao et al., 2019), (b) those seeking to analyze and understand the motives and reasons for migration and the factors influencing the decision (e.g., Kerr & Moore, 2015; Kerr & Obel, 2018), and (c) those focusing on exploring the migratory experiences of coaches and their acculturation process (e.g., Hall et al., 2021; Samuel et al., 2020). Some of these studies explored multiple objectives (e.g., Borges et al., 2014; Charbonneau et al., 2020). Regarding the design of the studies, 13 used a qualitative design (e.g., Bespomoshchnov, 2023; Guo et al., 2023; Sain et al., 2022), three used a quantitative design (i.e., Borges et al., 2020; Orlowski et al., 2016; Wicker et al., 2017). Three other studies were descriptive (i.e., Harris, 2010; Smith, 2014; Taylor, 2010), one was exploratory (Koopers & de Haan, 2020), and one was non-empirical (Mckenna, 2020). Semi-structured interviews and thematic analysis of these interviews were the most common methodology used by studies with a qualitative design, while the use of questionnaires and descriptive statistical analysis was common for articles with a quantitative design.

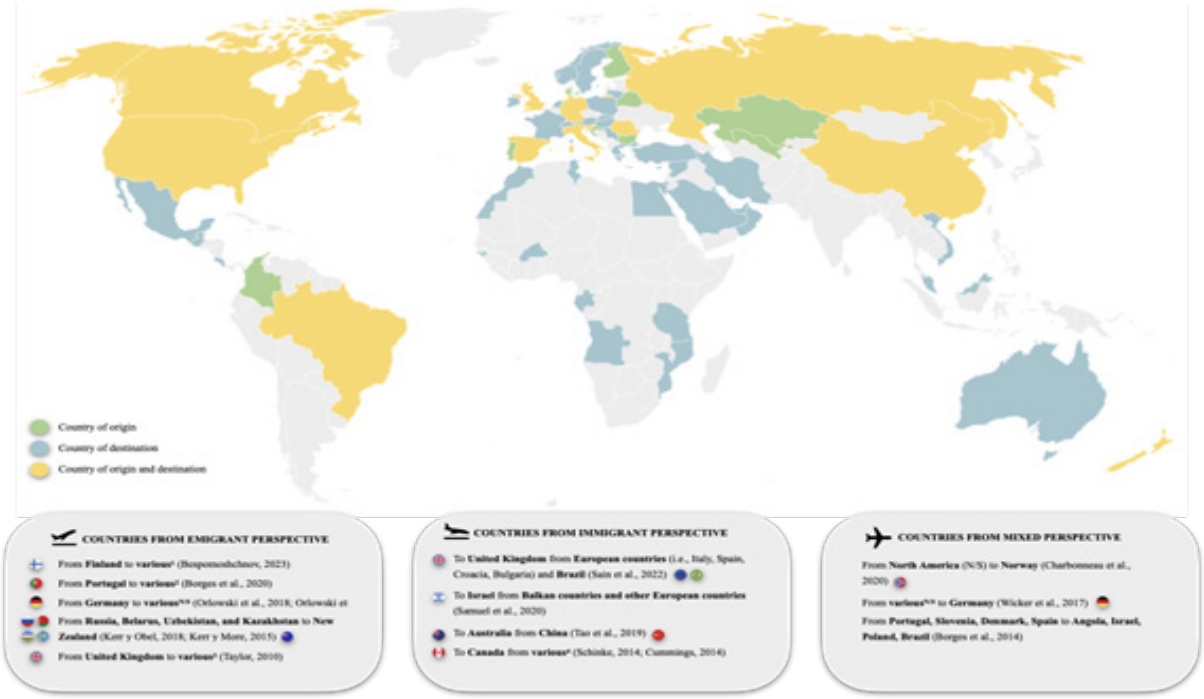
Sample Characteristics

The average number of participants in the included studies follows the expected logic, with larger samples in quantitative studies (M = 198; SD = 16.97) than in qualitative studies (M = 8.92; SD = 3.25). When considering the gender of the participants, it is observed that, in those studies specifying it, there is a tendency for a higher presence of male coaches (M = 5.82; SD = 2.44) than female coaches (M = 1.82; SD = 2.48). The study of Kerr and Obel (2018) had a higher presence of female coaches than male coaches, and other studies showed equal or similar proportions (e.g., Sain et al., 2022; Kerr & Moore, 2015). However, there are more studies that present a higher proportion of male coaches than female coaches (e.g., Charbonneau et al., 2020; Orlowski et al., 2018) or a sample consisting only of males (e.g., Hall et al., 2021; Mckeena, 2022; Samuel et al., 2020). Some studies reported on the total number of participants without specifying their gender (e.g., Bespomoshchnov, 2023; Guo et al., 2023), and others did not report the total number of participants or their gender (e.g., Borges et al., 2020; Smith, 2014). Regarding the age of the participants, no clear trend has been observed, with age ranges of more than 20 years difference in some studies (e.g., Sain et al., 2022; Samuel et al., 2020) and other studies that do not provide any information regarding the age of their participants (e.g., Charbonneau et al., 2020; Kerr & Obel, 2018).

Figure 2 depicts the migratory phenomenon of the coaches participating in the evidence included in this review based on three categories: (a) country of origin, (b) destination country, and (c) country of origin and destination. In this regard, the European continent has been both an origin (e.g., Croatia, Denmark, Portugal) and destination (e.g., Austria, Cyprus, France), and several of its countries were both origin and destination (e.g., Germany, Italy, Serbia). Similarly, although with a smaller number of participants, the same occurs in the American continent, where countries are observed as origin (i.e., Colombia), destination (i.e., Mexico), and origin and destination (i.e., Brazil, USA, Canada). Asia and Oceania follow a similar dynamic to that observed in Europe and America, with the presence of countries as origin (e.g., Kazakhstan, Uzbekistan), destination (e.g., Vietnam, Malaysia, Australia), and origin and destination (e.g., China, New Zealand). In Africa, however, all the countries that appeared in the different studies did so as destinations (e.g., Angola, Morocco, Tunisia), as did the countries in the Middle East (e.g., Saudi Arabia, Oman, Iran). Additionally, Figure 2 includes the classification of the included studies based on the migratory perspective from which they studied the phenomenon and showing the studied migratory flows.

Considering the sport of the coaches, football is the one with the most presence in the evidence (e.g., Guo et al., 2023; Mckenna, 2022). Other sports such as rugby (e.g., Hall et al., 2021), handball (e.g., Samuel et al., 2020), or gymnastics (Kerr & Moore, 2015) also had prominence. Quantitative studies (e.g., Orlowski et al., 2016; Wicker et al., 2017), with larger participant samples, included a greater variety of sports (e.g., archery, canoeing, track cycling). Some studies also provided information on participants' years of experience (e.g., Hall et al., 2021; Sain et al., 2022), previous migrations made (e.g., Samuel et al., 2020), or the level at which coaches work (e.g., Guo et al., 2023).

Figure 2
Country of origin and destination of coaches



Note: Various[1]: Sweden, Slovakia, Austria, England, Switzerland, Poland, Italy, Russia, USA, Germany, and Slovenia; Various[2]: multiple countries (e.g., Saudi Arabia, China, Cyprus, Spain, Greece, Iran, Mozambique); Various[3]: multiple countries (e.g., Germany, Austria, France, Hungary, Netherlands); Various[4]: Russia, Romania, China, Uzbekistan, United Kingdom, New Zealand, Germany, Jamaica, and Mexico; Various[N/S]: Not Specified.

Synthesis of Included Studies

This section synthesizes the main results obtained by the studies included in the review. Based on Ryba et al. (2016) Cultural Transition Model and its three phases, we have organized the results based on three temporal moments in migrants' lives: (a) before migration, (b) upon arrival in the new country, and (c) upon adapting to the new sociocultural context.

Before Migrating

In relation to this moment, research has explored issues such as the job search process and hiring mechanisms for coaches, emphasizing the importance of previous migration experiences (Borges et al., 2020) and networking in the selection processes (e.g., Harris, 2010; Mckenna, 2022; Samuel et al., 2020). Various studies have also investigated the reasons coaches migrate (e.g., Charbonneau et al., 2020; Samuel et al., 2020). Guo et al. (2023) noted that coaches see migration as an opportunity to consolidate their careers by stabilizing or reshaping them according to their desires or needs. This is somewhat similar to what Orlowski et al. (2018) highlighted, categorizing motives into (a) work-related factors (e.g., salary, financial security, pressure, recognition), (b) social factors (e.g., family support, children's education), (c) competitive factors (e.g., greater training resources, competitiveness in the environment), and (d) factors related to seeking new experiences (e.g., living in a new culture, learning a language, experiencing new challenges). Kerr and Obel (2018) found motivation to migrate based on children (e.g., avoiding military service in their home country, providing greater opportunities for their future).

Upon Arrival in the new Country

Upon arrival in a new country, coaches must learn the existing social norms, adapt their training methods to the new context, and adjust their way of communicating with athletes and other club staff (Tao et al., 2019). This moment could be linked to the acute adaptation phase proposed by Ryba et al. (2016).

Research has pointed out facilitative elements for coaches' adaptation upon arriving in a new country, such as receiving assistance from the club upon arrival (Borges et al., 2014), geographical proximity to the home country, or being able to maintain social relationships with family and friends (Sain et al., 2022). Kerr and Obel (2018) also noted the existence of subtle coincidences that can act as facilitators for this adaptation (e.g., the partner finding someone who speaks the same language). Attention has also been paid to the barriers and challenges that coaches face in their cultural transition (e.g., Charbonneau et al., 2020; Kerr & Moore, 2015; Sain et al., 2022; Schinke et al., 2014). Finally, during this arrival phase, challenges related to both the professional realm (e.g., training standards, levels of commitment, sports culture, media impact) and the sociocultural sphere (e.g., language, climate, lifestyle) have been highlighted.

When Adapting to the new Sociocultural Context

This third phase relates to the sociocultural adaptation of the Cultural Transition Model, where it has been observed that individuals who consider themselves psychologically adjusted to the new culture report higher levels of satisfaction in non-sporting aspects of daily life and that feeling congruence between one's own values and lifestyle and local norms could be a key element in this adjustment (Ryba et al., 2016). However, some authors argue that within the sports context, it is not necessary for an immigrant coach to adapt to the culture of all the norms, values, and beliefs of the new staff or the athletes they work with, as some cultural differences may not cause stress and may even create some opportunities (Cummings, 2014; Schinke, 2014).

This process of psychological and cultural changes resulting from contact between different cultural groups, which we term acculturation (Berry, 2005), is influenced by a wide variety of elements, including, as several authors have noted (e.g., Hall et al., 2021; Schinke et al., 2014), personal factors (e.g., language skills, adaptability, personality, previous experiences), group factors (e.g., social support, communication among team members and club personnel, team cohesion), sociocultural factors (e.g., cultural differences in values, norms, and beliefs), situational factors (e.g., duration of stay in the new country, frequency of contact with the culture of origin), and organizational factors (e.g., structure and culture of the sports organization, availability of resources and services). Other factors have also been identified as mediators of the acculturation process for coaches, such as (a) the role of the family, highlighting both its influence on the decision to migrate and its importance in adaptation and job performance (e.g., Hall et al., 2021; Sain et al., 2022; Samuel et al., 2020); (b) social support provided by family, friends, colleagues, and other members of the coaching staff (e.g., Borges et al., 2015; Sain et al., 2022; Schinke et al., 2014); (c) establishing personal relationships and social networks outside the sports environment as a key element in developing a sense of belonging to the new country (Kerr & Moore, 2015); and (d) the role of the club or federation (Borges et al., 2015), facilitating the acculturation process through the institutional support they can offer to migrant coaches (e.g., legal advice, support in finding housing, providing a home; facilitating language learning).

Discussion

The analysis of evidence published in articles, books, and academic studies indicates that the majority of coaches view their migration positively, considering it a valuable experience for personal development and recommending it to others for the personal (e.g., improved quality of life, personal growth) and professional (e.g., economic improvement, opportunity to coach at a higher level, increased status and recognition as coaches) benefits it entails (e.g., Charbonneau et al., 2020; Samuel et al., 2020). However, these same authors also noted the costs that migration can bring, both personally (e.g., adaptation issues, loss of social and family ties, experiences of isolation and loneliness) and professionally (e.g., greater job instability, difficulties adapting to the new sports system). Although the benefits, challenges, and difficulties associated with coaches' migration experiences have been explored, no evidence has been found directly analyzing the impact that cultural transition may have on coaches' mental health, as has been done with athletes (Schinke et al., 2018). It is advisable for future research to explore this phenomenon.

In general, research on sports careers and transitions suggests that some of the findings regarding migration among athletes (Prato et al., 2020) or career assistance programs (Torregrossa et al., 2020) are directly applicable to coaches' experiences. However, since these are migratory processes occurring at different life stages, differences are expected in aspects such as family implications or the type of social relationships established in the destination country. Prato et al. (2020) observed that language can generally affect athletes in their professional careers abroad, influencing them at the sports level (e.g., coach's decision on competition participation), psychological level (e.g., effects on self-confidence, motivation, and emotional state), and social level (e.g., facilitating social segregation or isolation). However, contrary to what seems to occur with athletes, Borges et al. (2020) noted that cultural relationships between countries and language do not seem to be relevant factors in coaches' migration. In another review on migration and psychological aspects of athletes, Souza et al. (2021) found that, among athletes, it is not common practice to seek information about the country or sports context in which they will be inserted. These data are in line with what was pointed out by Bespomoshchnov (2023), who observed that coaches did research about the club, the league, and the destination country. Future research should specifically explore whether seeking prior information aids in the adaptation process or not, and other possible similarities

and differences between the migration processes of athletes and coaches. It is important to consider, furthermore, that the theoretical models currently used to describe the experiences of athletes and coaches are based on athletes, and future research should assess the need to adapt existing theoretical models to coaches' characteristics or to create new theoretical models that fit their specific characteristics.

There is a clear trend towards greater participation of male coaches than female in the studies included in this review. These findings are consistent with those found by Prato et al. (2020) in their review on cultural transition and migration of athletes, and with the findings of Borrueco et al. (2023), who noted that the number of female coaches is lower and they are marginalized. Future research should specifically explore the migratory experiences of female coaches and analyze possible similarities and differences with those of male coaches.

Other characteristics (e.g., nationality, age, previous migratory experiences, whether traveling with family or not) have been described in some studies, although they have not been specifically analyzed for their influence on the migratory process. It is important for future research to specifically address the needs of migrant coaches and the differences among participants. Additionally, exploring the relationship between the sporting cultural tradition and/or the results obtained in the countries of origin and destination of coaches is advisable. As Samuel et al. (2020) pointed out, it is also important to explore the effects of short-term mobility and, as Prato et al. (2020) suggested, to examine the experiences shared by the social networks in the context of origin and analyze their role in the adaptation process of coaches.

Practical Implications

Based on the results obtained in this review and drawing from the proposals of Torregrossa et al. (2016) and Prato et al. (2020) with athletes, we offer a series of practical recommendations at different levels. Firstly, at the level of sports culture, it is important to promote research on the cultural transition of coaches, identifying needs based on certain personal or professional characteristics and specific cultural contexts, raising awareness about the difficulties that a cultural transition may entail, and training club leaders, federations, and organizations on their role in professionals' adaptation to a new sociocultural context. Secondly, at the level of the coach's environment, researching the role it plays in the adaptation of coaches, training them in coping strategies, and offering psychological support and guidance. Thirdly, at the individual level of the coach, providing training during their academic preparation on the challenges of cultural transition so that they can develop coping strategies, and providing psychological support and advice during the different stages of their transition.

Limitations

This study has certain limitations. The only inclusion criterion for this review was that the studies had to focus on transnationalism and the migratory processes of professional coaches. Some of the studies that were excluded for not meeting this inclusion criterion could provide relevant information on the topic. Examples of this include Lenartowicz (2022), which explored cultural differences in sports organizations and the athlete/coach relationship; Carter (2011), which analyzed the routes and strategies of transnational sports migration, the risks and costs of mobility, and migration policies; or Morela (2017), which investigated immigrants' acculturation preferences and the host community's acculturation expectations regarding sports participation and the sports motivation environment. It would be advisable for future research to also explore transnationalism and migratory processes of coaches from these perspectives. Future research should specifically address the sport of coaches. Another limitation of this article is found in Figure 2, which was designed with information obtained from the studies included in the review. Since no color scale was included, Figure 2 assigns the same visual importance to countries with only one participant migrating to or from there as it does to countries with more participants. Additionally, in some of the studies, complete information on the countries of origin and destination of the participants was not found, so Figure 2 may not accurately represent the reality described in the studies. However, we consider it appropriate to include it as a starting point.

Conclusions

This article is, to our knowledge, the first systematic review conducted on transnationalism and the migration processes of professional coaches. The most relevant studies and their main characteristics have been identified, and their results have been synthesized based on three temporal moments of their migration: (a) before migrating, identifying the reasons for migration and how preparation for migration is conducted; (b) upon arrival in the new context, identifying the main barriers, challenges, and facilitators for adaptation; and (c) when adapting to the new sociocultural context, identifying the main mediators of the acculturation process. The need to continue exploring the cultural transition of coaches has been highlighted, addressing some existing gaps such as the influence of migration on the mental health of coaches, the similarities and differences between the migration processes of athletes and coaches, and the scarcity of female coaches participating as shown in the studies conducted to date.

Ethics Committee Statement

Not applicable because the research study does not involve the participation of humans, either directly or through the use of their biological material or medical records.

Conflict of Interest Statement

The authors declare no conflict of interest.

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Authors' Contribution

Conceptualization F.H., A.J. & M.T.; Methodology F.H.; Software F.H.; Validation F.H., A.J. & M.T.; Formal Analysis F.H.; Investigation F.H.; Resources A.J. & M.T.; Data Curation F.H., A.J. & M.T.; Writing – Original Draft F.H.; Writing – Review & Editing A.J., & M.T.; Visualization A.J. & M.T.; Supervision A.J. & M.T.; Project Administration A.J. & M.T. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Data available upon request from the corresponding author (fran.herruzo@autonoma.cat).

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Transnacionalismo y procesos migratorios de entrenadores y entrenadoras profesionales: una revisión sistemática de mapeo

Transnationalism and professional coaches' migration processes: a systematic mapping review

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Resumen

El objetivo de este trabajo es estudiar el conocimiento existente sobre los procesos migratorios en entrenadores y entrenadoras profesionales. Para ello, se realizó una revisión sistemática de mapeo de la literatura existente. La búsqueda sistemática se extendió hasta el 31 de agosto de 2023 y no se establecieron limitaciones de fecha de publicación ni de idioma. Se seleccionaron 21 trabajos y se analizaron, desde tres perspectivas migratorias distintas (i.e., emigrante, inmigrante y mixta) sus objetivos, diseño y características de la muestra. En la síntesis realizada de los resultados de los trabajos incluidos se observó que la mayoría de entrenadores y entrenadoras fueron positivos en relación a la migración y la recomiendan a otros por los beneficios a nivel personal y profesional que conlleva. Sin embargo, también se hallaron dificultades a nivel personal (e.g., pérdida de vínculos sociales) y profesional (e.g., estándares de entrenamiento y cultura deportiva) al llegar al nuevo país y al adaptarse al nuevo contexto sociocultural. Conviene que futuras investigaciones atiendan de manera específica a las entrenadoras, que hasta ahora han recibido menos atención, que exploren el impacto de la transición cultural en la salud mental de entrenadores y entrenadoras, y que analicen similitudes y diferencias entre los procesos migratorios de deportistas y entrenadores y entrenadoras.

Palabras clave: Aculturación, entrenadores, transición cultural, transnacionalismo.

Abstract

The aim of this work is to study the existing knowledge on migratory processes in professional coaches. To achieve this, a systematic mapping review of existing literature was conducted. The systematic search extended up to August 31, 2023, with no date or language restrictions established. Twenty-one studies were selected and analyzed, examining their objectives, design, and sample characteristics from three different migratory perspectives (i.e., emigrant, immigrant, and mixed). In the synthesis of the results of the included studies, it was observed that the majority of coaches were positive about migration and recommended it to others due to the personal and professional benefits it entails. However, difficulties were also found at both personal (e.g., loss of social ties) and professional (e.g., training standards and sports culture) levels upon arrival in the new country and adapting to the new sociocultural context. Future research should pay specific attention to female coaches, who have received less attention thus far, explore the impact of cultural transition on the mental health of coaches, and analyze similarities and differences between the migratory processes of athletes and coaches.

Keywords: Acculturation, coaches, cultural transition, transnationalism.

Introducción

La globalización es un fenómeno basado en el aumento continuo de la comunicación e interdependencia entre los diferentes países del mundo en el plano económico, político, social, tecnológico y cultural. Este proceso de globalización también ha llegado al deporte de élite, donde encontramos que la movilidad geográfica ha aumentado a escala mundial (Ryba et al., 2017) y se ha convertido en un aspecto fundamental en la actualidad (Prato et al., 2020; Ryba & Stambulova, 2013). Hoy en día hay multitud de competiciones internacionales desarrollándose en varios países al mismo tiempo (e.g., UEFA/AFC Champions League o Copa Libertadores en fútbol, Euro League o Liga de las Américas en baloncesto), competiciones estatales que se llevan a cabo en otros países (e.g., Supercopa de España de fútbol en Arabia Saudí, partidos de la NBA o de la NFL en Europa), así como deportistas, árbitros/jueces, directores y miembros de diferentes equipos técnicos que desarrollan sus carreras moviéndose de un país a otro (Maguire & Falcous, 2011). Por consiguiente, entender los procesos de migración en el deporte es importante para desarrollar políticas deportivas e implementar estrategias que faciliten una adaptación exitosa de quienes forman parte (Borges et al., 2014). Durante la última década ha aumentado el interés por la investigación sobre los procesos migratorios de los entrenadores y varios autores han tratado de explorar elementos como los motivos que llevan a los entrenadores a migrar (Borges, 2014; Charbonneau et al., 2020), sus experiencias migratorias (Lenartowicz, 2022; Samuel et al., 2020) o los procesos de aculturación (Hall et al., 2021). Sin embargo, son varios los autores que señalan que todavía existe una escasez de investigación en esta temática (Sain et al., 2022; Samuel et al., 2020).

Para describir estos procesos migratorios, Koser y Salt (1997) diferenciaron entre los términos "movilidad", que hace referencia a una estancia a corto plazo o intermitente (e.g., concentraciones en otro país con el objetivo de preparar una competición) y "migración" que tiene una connotación de estancia a largo plazo o permanencia (e.g., firmar un contrato de varias temporadas). Ryba y Stambulova (2013), por su parte, introdujeron el término "transnacional" para definir a aquellas personas que construyen sus carreras en el extranjero y/o quienes se desarrollan a nivel deportivo y personal entre fronteras. Más tarde, se distinguió también entre "deportista inmigrante", aquel que se mueve a un nuevo país con el objetivo de asentarse, a diferencia del "deportista transnacional", que va y vuelve de su país de origen, construyendo su carrera entre fronteras y pasando por procesos de transición cíclicos (Ryba et al., 2017). Otro de los términos utilizados en el estudio de los procesos migratorios es el de "aculturación", que describe el proceso de cambios psicológicos y culturales en prácticas, valores e identidad que se produce como resultado de un contacto directo continuo entre personas de diferentes grupos culturales (Berry, 2005). Las estrategias y actitudes desarrolladas al formar parte de este nuevo contexto social y cultural permiten a los migrantes adaptarse en mayor o menor medida a la nueva realidad en la que viven, definiendo hasta qué punto se mantiene la herencia cultural previa y/o se abraza la nueva cultura (Schinke et al., 2013). Este proceso puede tener un impacto en el rendimiento y bienestar psicológico (Schinke et al., 2014).

Para explicar los procesos migratorios y la adaptación a una nueva cultura, se han desarrollado modelos teóricos como el Modelo de Transición Cultural (Ryba et al., 2016) o el Modelo de Aculturación de Berry (1997). Según el Modelo de Transición Cultural de Ryba et al. (2016), el proceso de adaptación sociocultural por el que se pasa al transitar de un contexto a otro consta de tres fases: (a) la fase de pre-transición, que es el momento en el que las personas empiezan a plantearse la posibilidad de llevar a cabo una migración y uno de los principales objetivos que se plantean en este momento es obtener información relativa al lugar al que podrían ir (e.g., instalaciones deportivas, costumbres sociales y deportivas, vida en la ciudad), iniciar toda la burocracia necesaria para llevar a cabo la transición y empezar a prepararse psicológicamente para los retos a los que deberán hacer frente (Borges et al., 2014); (b) la fase de adaptación cultural aguda, que se caracteriza por la renegociación de prácticas culturales en la vida diaria, un reposicionamiento social y el afrontamiento de diferentes retos personales (e.g., idioma, costumbres, prácticas culturales) y profesionales (e.g., integrarse en el nuevo cuerpo técnico o club, adaptarse a sus rutinas de trabajo, adaptarse a diferentes estilos de entrenamiento), y (c) la fase de adaptación sociocultural, que se refiere al proceso de adaptación a las normas sociales y culturales del nuevo país y al desarrollo de relaciones interpersonales con personas del nuevo entorno (Ryba et al., 2016). En función del equilibrio entre las demandas de la transición y las estrategias de afrontamiento del individuo, la transición puede (a) resultar favorable, mejorando el desarrollo deportivo y/o personal, (b) provocar una crisis que retrase la transición favorable o (c) convertirse en una transición desfavorable, asociada a consecuencias negativas como abandono o abuso de sustancias (Stambulova & Samuel, 2019). El Modelo de Aculturación de Berry (1997) ubica en dos dimensiones las actitudes de las personas con relación a la aculturación: (a) interacción cultural, que hace referencia al grado en el que las personas o grupos desean interactuar con la cultura anfitriona, y (b) mantenimiento cultural, que se refiere al grado en el que las personas o grupos desean mantener su cultura cuando se produce una interacción. Según Berry (1997), cuatro estrategias de aculturación se asocian a estas dos dimensiones: (a) asimilación: interactúa activamente con la nueva cultura, mostrando poco o ningún deseo de mantener la suya propia; (b) separación: se mantienen las normas culturales sin el deseo de abrazar la nueva cultura; (c) marginación: ni se pretende mantener la cultura de origen ni se pretende abrazar la nueva e (d) integración: se busca mantener los comportamientos culturales al tiempo que se participa en la sociedad de acogida. Conviene destacar, tal y como señalan Prato et al. (2020), que este proceso no es lineal y que los migrantes pueden pasar de una fase a otra en función de sus circunstancias.

En lo que a procesos de transición por migración se refiere, la investigación ha centrado sus esfuerzos, principalmente, en deportistas profesionales que practican deportes de equipo (e.g., Prato et al., 2020; Wicker et al., 2017). Algunos trabajos han analizado los diferentes motivos que llevan a los deportistas a migrar (e.g., Magee & Sugden, 2002; Maguire & Falcous, 2011) o sus experiencias de aculturación (e.g., Hirose & Meijen, 2022; Schinke et al., 2013). Prato et al. (2020), identificaron retos a los que los deportistas profesionales migrantes y transnacionales deben hacer frente a nivel deportivo (e.g., forma diferente de jugar, nuevas rutinas de entrenamiento) y sociocultural (e.g., nuevo idioma, nuevas costumbres culturales) y otros autores han descrito cómo estos deportistas han pasado por experiencias de estrés (Hobson et al., 2023), soledad, aislamiento social y nostalgia del hogar (Ronkainen et al., 2019), llegando incluso a desarrollar problemas clínicos de salud mental como ansiedad, depresión o burnout (Hassmén et al., 2019; Nixdorf et al., 2023). En lo que a entrenadores y entrenadoras se refiere, los trabajos realizados hasta la fecha han explorado temáticas relativas a su estrés, burnout o bienestar o a la influencia que tienen sobre los y las deportistas (e.g., Carson et al., 2019; Norris et al., 2017; Oglesby et al., 2020; Ramis et al., 2017). Durante la última década, también se han publicado, aunque en menor medida, trabajos que exploran el transnacionalismo y los procesos migratorios de los entrenadores y las entrenadoras (e.g., Hall et al., 2021; Samuel et al., 2020). Sin embargo, hasta donde el conocimiento de los autores alcanza, no hemos encontrado ninguna revisión sistemática sobre esta temática que proporcione una visión general del estado actual de la investigación.

El objetivo de este estudio es explorar el conocimiento existente sobre los procesos migratorios de entrenadores y entrenadoras profesionales, atendiendo, de manera específica, a la (a) tendencia y localización de la evidencia, (b) las características de los trabajos, considerando sus objetivos y diseño, la perspectiva migratoria de los trabajos y las características de la muestra, y (c) sintetizando los resultados obtenidos en los trabajos incluidos y las posibles lagunas en la literatura a cubrir en futuras investigaciones.

Método

Diseño

Este estudio es una revisión sistemática de mapeo realizada siguiendo los criterios propuestos por el método PRISMA (por sus siglas en inglés *Preferred Reporting Items for Systamtic Reviews and Meta-Analyses*; Page et al., 2021) y sus tres pasos: (a) identificación, (b) cribado, e (c) inclusión. Este diseño fue seleccionado ya que las revisiones sistemáticas contribuyen al avance del conocimiento sintetizando la evidencia existente, identificando lagunas en el conocimiento y facilitando la toma de decisiones basada en evidencia (Page et al., 2021). La evidencia revisada y sintetizada fue analizada desde marcos teóricos previamente establecidos, como el Modelo de Transición Cultural (Ryba et al., 2016) y el Modelo de Aculturación de Berry (1997).

Búsqueda Sistemática

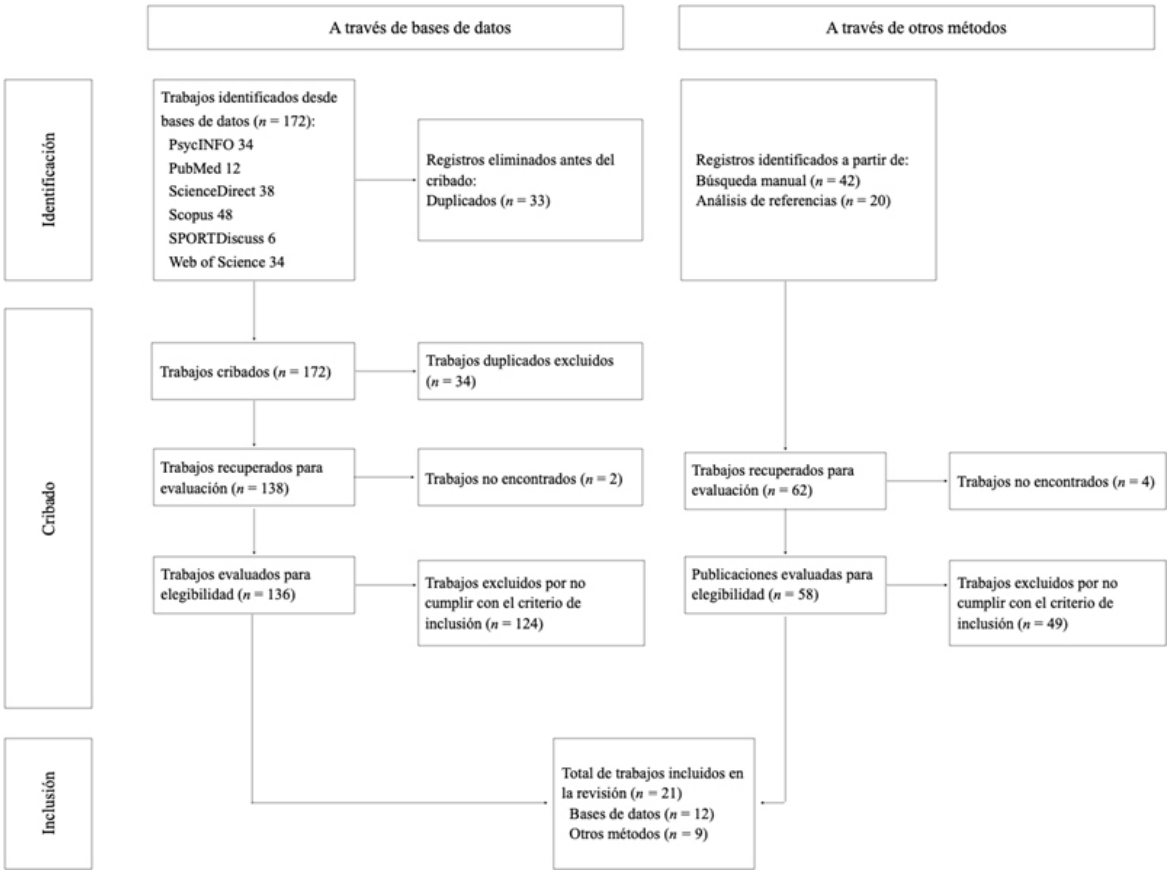
Para sistematizar el proceso, se utilizó la herramienta CHIP (por sus siglas en inglés *Context, How, Issue, Population*; Shaw, 2010), que facilita la identificación de los términos, palabras clave y sinónimos relacionados con el objetivo de la revisión (Prato et al., 2020). La fórmula CHIP se utilizó en inglés para poder detectar resúmenes de artículos en cualquier idioma (documento disponible previa petición al autor de correspondencia). Esta fórmula se aplicó en seis bases de datos: PsycINFO, PubMed, ScienceDirect, SCOPUS, SPORTDiscuss, Web of Science. También se realizó una búsqueda manual examinando las referencias de todos los trabajos encontrados. La búsqueda se extendió hasta el 31 de agosto de 2023.

Selección de los Trabajos

El criterio definido para la inclusión de los trabajos identificados fue que exploraran el transnacionalismo y los procesos migratorios de entrenadores y entrenadoras profesionales. Se entendió como entrenadores y entrenadoras profesionales a aquellos y aquellas que tienen un contrato profesional a jornada completa, independientemente de la categoría o de la edad en la que entrenen. Fueron excluidos aquellos trabajos que estuvieran centrados en el transnacionalismo o en los procesos migratorios de otros agentes sociales (e.g., deportistas). No se estableció ninguna restricción en cuanto al idioma ni a la fecha de publicación.

La búsqueda en bases de datos identificó un total 234 trabajos: 172 fueron hallados mediante búsquedas en bases de datos científicas, 42 mediante búsqueda manual y 20 examinando las citas (ver Figura 1). Una vez excluidos aquellos artículos que estaban duplicados (34), se realizó un cribaje en dos fases. En primer lugar, se excluyeron seis trabajos que no pudieron ser localizados y se analizaron los títulos y resúmenes del resto, excluyendo 118 trabajos más que no cumplían con el criterio de inclusión. En segundo lugar, se valoró la elegibilidad mediante la lectura del texto completo de cada uno de los trabajos y se excluyeron otros 55 trabajos que no cumplían con el criterio de inclusión. Tras este cribado, se incluyeron un total de 21 trabajos en esta revisión.

Figura 1
Diagrama de flujo PRISMA



Proceso de Extracción de los Datos

El proceso de extracción de los datos se llevó a cabo realizando un análisis descriptivo de los trabajos, identificando elementos como el formato del trabajo (i.e., artículo, capítulo de libro, libro, tesis doctoral), la revista o editorial que lo publica, el país de desarrollo del trabajo, sus objetivos y diseño, la perspectiva desde la cual se analiza el proceso migratorio, el país desde el que se estudia y las características de la muestra (e.g., población, edad media, país de origen). También se realizó un análisis de contenido tomando como referencia el Modelo de Transición Cultural (Ryba et al., 2016) para explorar los resultados obtenidos en los artículos incluidos sobre cuestiones relativas a los motivos para migrar, los factores mediadores o las barreras y desafíos existentes en la adaptación y el Modelo de Aculturación (Berry, 1997) para el análisis de los resultados sobre la aculturación. Toda esta información fue registrada en un archivo de Numbers compuesto por varias pestañas para su posterior análisis y selección relevante de la información a destacar en el apartado de resultados (documento disponible previa petición al autor de correspondencia). Con el objetivo de garantizar el rigor y la coherencia metodológica de esta investigación, y del mismo modo que señalan Tod (2019) y Tod et al. (2022), el segundo y tercer autor fomentaron la reflexión y la exploración de alternativas a lo largo de todo el proceso de diseño, análisis, presentación de los datos y escritura de este artículo.

Resultados

Se han organizado los resultados presentando, en primer lugar, la tendencia y la localización de la evidencia. En segundo lugar, se analizan las características de los trabajos incluidos), atendiendo a (a) los objetivos que plantean y su diseño, (b) la perspectiva desde la cual estudian los procesos migratorios y (c) las características de la muestra. Por último, se muestra una síntesis de los resultados de los trabajos incluidos, organizándolos en tres momentos temporales: (a) antes de migrar, (b) al llegar al nuevo país y (c) al adaptarse al nuevo contexto sociocultural.

Tendencia y Localización de la Evidencia

Del total de 21 trabajos incluidos en esta revisión, 16 son artículos de investigación, tres libros o capítulos de libros y dos tesis (una doctoral y una de máster). Pese a que no se estableció ninguna limitación en cuanto a la fecha o el idioma de publicación, todos los trabajos fueron publicados en inglés entre los años 2010 y 2023.

Los 16 artículos incluidos en esta revisión fueron publicados por 14 revistas diferentes (e.g., Sport, Education and Society; Psychology of Sport & Exercise; Physical Education and Sport Pedagogy) y únicamente tres de estas revistas publicaron más de un artículo: International Sport Coaching Journal (Charbonneau et al., 2020; Hall et al., 2021), Leisure Studies (Borges et al., 2014; Kerr & Obel, 2018) y Sociología del Deporte (Borges et al., 2020; Sain et al., 2022). Los tres libros o capítulos de libro incluidos también fueron publicados por tres editoriales diferentes (i.e., Bennion Kearny Limited; Palgrave Macmillan; Routledge). La tesis de Cummings (2014) fue defendida en la Lauterian University (Canadá) y la de Bespomoshchnov (2023) en Haaga-Helia University of Applied Sciences (Finlandia).

Características de los Trabajos

La Tabla 1 muestra, siguiendo un orden cronológico inverso, información sobre los trabajos incluidos en esta revisión: autores, tipo de trabajo, perspectiva desde la cual se estudia el proceso migratorio, diseño, objetivos, y características de la muestra (i.e., población, media de edad, país de origen y de destino).

Perspectiva Migratoria de Entrenadores y Entrenadoras

Atendiendo a la perspectiva desde la cual se estudiaron los procesos migratorios, hemos clasificado los trabajos incluidos en: (a) aquellos que exploran desde la perspectiva del entrenador o entrenadora emigrante, (b) los que exploran desde la perspectiva del entrenador o entrenadora inmigrante y (c) los que exploran desde una perspectiva mixta.

Los trabajos que abordaron el estudio de los procesos migratorios desde la perspectiva del emigrante se centraron en explorar los motivos y factores que llevan a los entrenadores y a las entrenadoras a migrar desde países como Finlandia (Bespomoshchnov, 2023), Portugal (Borges et al., 2020), Alemania (Orlowski et al., 2018), Reino Unido (Taylor, 2010) o Rusia, Bielorrusia, Uzbekistán y Kazajistán (Keer & More, 2015; Kerr & Obel, 2018). Los trabajos realizados desde la perspectiva del entrenador y la entrenadora inmigrante exploraron las experiencias migratorias de los entrenadores en el país de acogida, atendiendo a las diferencias en las culturas organizacionales deportivas, a los retos a los que deben hacer frente, las estrategias para adaptarse y los procesos de aculturación (e.g., Samuel et al., 2020; Schinke et al., 2014) en países como Reino Unido (Sain et al., 2022), Israel (Samuel et al., 2020), Australia (Tao et al., 2019) o Canadá (Cummings, 2014; Schinke, 2014). Los trabajos que utilizaron una perspectiva mixta en el estudio de los procesos migratorios, analizaron los factores que afectan tanto a la emigración como a la inmigración (Wicker et al., 2017) y exploraron los motivos y las experiencias migratorias de los entrenadores y las entrenadoras (Charbonneau et al., 2020) en distintos flujos migratorios (e.g., desde Norteamérica hacia Noruega, desde Portugal, Eslovenia, Dinamarca, España hacia Angola, Israel, Polonia, Brasil).

Tabla 1
Descripción de los trabajos incluidos

Nº	Autores	Tipo	Perspectiva	Diseño	Objetivo/s	Muestra	País Origen - Destino
[1]	Bespomoshchnov (2023)	Tesis máster	Emigrante	Estudio cualitativo Estudio de caso Entrevista semi-estructurada Análisis temático	Ampliar la comprensión del trabajo de los entrenadores de alto rendimiento en un contexto deportivo globalizado. Ofrecer ideas relativas al trabajo de los entrenadores transnacionales, formadores y administrativos	*N* = 14 Ent. Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: Finlandia *P.D*: Suecia, Eslovaquia, Austria, Inglaterra, Suiza, Polonia, Italia, Rusia, EEUU, Alemania y Eslovenia
[2]	Guo et al. (2023)	Artículo	Emigrante	Estudio cualitativo Entrevista semi-estructurada Análisis temático	Analizar el desarrollo profesional de los entrenadores de fútbol internacionales en el contexto de su migración transnacional	*N* = 8 Ent. Edad: 25-40 (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: Brasil, Colombia, Serbia, Reino Unido, España *P.D*: China

[3]	Mckenna (2022)	Libro	Emigrante	Trabajo no empírico	Mostrar las experiencias personales y profesionales de ocho entrenadores migrantes	*N* = 8 Ent. Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*N/E*
[4]	Sain et al. (2022)	Artículo	Inmigrante	Estudio cualitativo Entrevista semi-estructurada Cuestionario de 38 preguntas para entrenadores inmigrantes Análisis Temático (MAXQDA 11)	Analizar (a) las percepciones de los entrenadores inmigrantes sobre sus experiencias y (b) las percepciones de los de los entrenadores nativos con respecto a la migración de entrenadores	*N* = 15 Ent. *n* = 10 Ent. migrantes (*H* = 4; *M* = 6) Edad: 19 – 44 (M_{edad} = 30.7; *SD* = 9.04) *n* = 5 Ent. Nativos (*H* = 4; *M*= 1) Edad: 20 – 40 (M_{edad} = 30.5; *SD* = 9.25)	*P.O*: Italia, España, Croacia, Bulgaria y Brasil *P.D*: Reino Unido
[5]	Hall et al. (2021)	Artículo	Inmigrante	Estudio cualitativo Entrevista semi-estructurada Análisis sistemático	Aumentar el conocimiento sobre la aculturación en el deporte de élite siguiendo el modelo teórico de Berry	*N* = 5 Ent. *H* = 5; *M* = 0 Edad: 47-56 (M_{edad} = 50.8; *SD* = 3.42)	*P.O*: Inglaterra, Irlanda, Gales y Nueva Zelanda *P.D*: Inglaterra, Escocia, Gales, Irlanda e Italia
[6]	Borges et al. (2020)	Artículo	Emigrante	Estudio cuantitativo Cuestionario online Análisis de regresión	Identificar los patrones y redes de migración de entrenadores portugueses de fútbol entre los años 2009 y 2013.	*N/E*	*P.O*: Portugal *P.D*: Diversos países (e.g., Arabia Saudí, China, Chipre, España, Grecia, Irán, Mozambique)
[7]	Charbonneau et al. (2020)	Artículo	Mixta	Estudio cualitativo Entrevista semi-estructurada Análisis interpretativo fenomenológico	Analizar los motivos y las experiencias de expatriación para entrenar en Noruega de entrenadores de esquí	*N* = 5 Ent. *H* = 4; *M* = 1 Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: Norte América *P.D*: Noruega
[8]	Koopers y de Haan (2020)	Capítulo		Estudio exploratorio	Explorar cómo los entrenadores transnacionales desafían o refuerzan ideologías dominantes de raza/etnia y género	*N/E*	*N/E*
[9]	Samuel et al. (2020)	Artículo	Inmigrante	Estudio cualitativo Entrevista semi-estructurada Análisis Temático	Analizar las experiencias de movilidad y migración de entrenadores transnacionales trabajando en el contexto del Balonmano israelí	*N* = 8 Ent. *H* = 8; *M* = 0 Edad: 36-59 (M_{edad} = 44.50; *SD* = 7.96)	*P.O*: países balcánicos y otros países europeos *P.D*: Israel

[10]	Tao et al. (2019)	Artículo	Inmigrante	Estudio cualitativo Estudio de caso Observación directa 12 meses Análisis Temático (MindNote)	Examinar las experiencias de aprendizaje de entrenadores chinos que emigran a Australia	*N* = 11 *n* = 3 Ent. *H* = 2; *M* = 1 Edad: 25-55 (M_{edad} = *N/E*; *SD* = *N/E*) *n* = 4 Dep. *n* = 4 Admin.	*P.O*: China *P.D*: Australia
[11]	Kerr y Obel (2018)	Artículo	Emigrante	Estudio cualitativo Entrevista de vida Análisis temático	Estudiar los factores que influencian a entrenadores de gimnasia de países de la antigua Unión Soviética a emigrar a Nueva Zelanda	*N* = 10 Ent. *H* = 4; *M* = 6 Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: países de la antigua Unión Soviética (Rusia, Bielorusia, Uzbekistán y Kazajistán) *P.D*: Nueva Zelanda
[12]	Orlowski et al. (2018)	Artículo	Emigrante	Estudio cualitativo Entrevista semi-estructurada Análisis temático	Analizar los factores de migración de los entrenadores en deportes menos comercializados	*N* = 9 Ent. *H* = 8; *M* = 1 Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: Alemania *P.D*: *N/E*
[13]	Wicker et al. (2017)	Artículo	Mixta	Estudio cuantitativo Cuestionario online Análisis de regresión	Examinar los factores que afectan la emigración e inmigración de los entrenadores de élite.	*N* = 210 Ent. *H* = *N/E*; *M* = *N/E* Edad: *N/E* (M_{edad} = 41; *SD* = *N/E*)	*P.O*: *N/E* *P.D*: Alemania
[14]	Orlowski et al. (2016)	Artículo	Emigrante	Estudio cuantitativo Cuestionario online Análisis de regresión	Analizar los factores que influyen en las probabilidades de migración de entrenadores de élite en Alemania.	*N* = 186 Ent *H* = *N/E*; *M* = *N/E* Edad: *N/E* (M_{edad} = 43; *SD* = *N/E*)	*P.O*: Alemania *P.D*: *N/E*
[15]	Kerr y Moore (2015)	Artículo	Emigrante	Estudio cualitativo Entrevista de vida semi-estructurada Análisis temático	Examinar los factores que influencian a los entrenadores de gimnasia rusos al emigrar a Nueva Zelanda	*N* = 6 Ent. *H* = 3; *M* = 3 Edad: 30 – 60 (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: países de la antigua Unión Soviética (N) *P.D*: Nueva Zelanda
[16]	Borges et al. (2014)	Artículo	Mixta	Estudio cualitativo Entrevista semi-estructurada Análisis temático (MAXQDA)	Explorar las percepciones sobre las experiencias de los entrenadores migrantes, sus procesos de selección, sus motivaciones para migrar y sus experiencias migratorias.	*N* = 5 Ent. *H* = 5; *M* = 0 Edad: *N/E* (M_{edad} = 41; *SD* = 8)	*P.O*: Portugal, Eslovenia, Dinamarca, España *P.D*: Angola, Israel, Polonia, Brasil
[17]	Cummings (2014)	Tesis doctoral	Inmigrante	Estudio cualitativo Cuestionario demográfico Entrevista semi-estructurada Análisis temático	Analizar las experiencias y los retos de un grupo de entrenadores inmigrantes recolocados en Canadá	*N* = 10 Ent. *H* = 9; *M* = 1 Edad: 36-78 (M_{edad} = *N/E; SD* = *N/E*)	*P.O*: *N/E* *P.D*: Canadá

[18]	Schinke et al. (2014)	Artículo	Inmigrante	Estudio cualitativo Entrevista semi-estructurada Análisis temático	Analizar el proceso de aculturación de entrenadores inmigrantes en Canadá	*N* = 10 Ent. *H* = *N/E*; *M* = *N/E* Edad: *N/E* (M_{edad} = *N/E*; *SD* = *N/E*)	*P.O*: Rusia, Rumanía, China, Uzbekistán, Reino Unido, Nueva Zelanda, Alemania, Jamaica y México *P.D*: Canadá
[19]	Smith (2014)	Artículo	N/E	Estudio descriptivo	Explorar cómo la movilidad puede relanzar, mejorar o sostener las carreras de los entrenadores.	*N/E*	Varios
[20]	Harris (2010)	Capítulo	N/E	Estudio descriptivo	Explorar la migración de los entrenadores de Rugby	*N/E*	*N/E*
[21]	Taylor (2010)	Artículo	Emigrante	Estudio descriptivo	Explorar los patrones de migración y las redes de contactos de los entrenadores británicos de fútbol	*N/E*	P.O: Reino Unido P.D: Diversos países (e.g., Alemania, Austria, Francia, Hungría, Países Bajos)

Nota: N = muestra total; *n* = muestra; Ent = entrenador/a; H = hombre; M = mujer; M_{edad} = media de edad; *SD* = desviación estándar; N/E = no especificado; P.O. = país de origen; P.D. = país de destino

La mayoría de los trabajos exploraron los procesos migratorios hacia un único destino provenientes de distintos países de origen (e.g., Charbonneau et al., 2020; Guo et al., 2023; Sain et al., 2022; Samuel et al., 2020; Schinke et al., 2014). Otros analizaron estos procesos migratorios desde un país de origen hacia múltiples destinos (i.e., Bespomoshchnov, 2023; Borges et al., 2020; Taylor, 2010) o desde varios países de origen hacia varios países de destino (i.e., Borges et al., 2014; Hall et al., 2021; Mckenna, 2022). Tan solo el trabajo de Tao et al. (2019) analizó un patrón migratorio específico entre dos países (China y Australia).

Objetivos y Diseño de los Trabajos

Atendiendo a los objetivos planteados en los trabajos incluidos en esta revisión, pueden clasificarse en: (a) aquellos que pretenden identificar y analizar patrones de migración específicos (e.g., Borges et al., 2020; Tao et al., 2019), (b) aquellos que tratan de analizar y comprender los motivos y las razones para migrar y los factores que influyen en la decisión (e.g., Kerr & Moore, 2015; Kerr & Obel, 2018) y (c) aquellos que se centran en explorar las experiencias migratorias de los entrenadores y las entrenadoras y su proceso de aculturación (e.g., Hall et al., 2021; Samuel et al., 2020). Algunos de estos trabajos exploraron varios de estos objetivos (e.g., Borges et al., 2014; Charbonneau et al., 2020). En relación al diseño de los trabajos, 13 utilizaron un diseño cualitativo (e.g., Bespomoshchnov, 2023; Guo et al., 2023; Sain et al., 2022), tres un diseño cuantitativo (i.e., Borges et al., 2020; Orlowski et al., 2016; Wicker et al., 2017). Otros tres trabajos fueron descriptivos (i.e., Harris, 2010; Smith, 2014; Taylor, 2010), uno exploratorio (Koopers & de Haan, 2020) y otro no empírico (Mckenna, 2020). Las entrevistas semiestructuradas y el análisis temático de estas fue la metodología más utilizada por los trabajos de diseño cualitativo, mientras que el uso de cuestionarios y análisis estadístico descriptivo lo fue para los artículos de diseño cuantitativo.

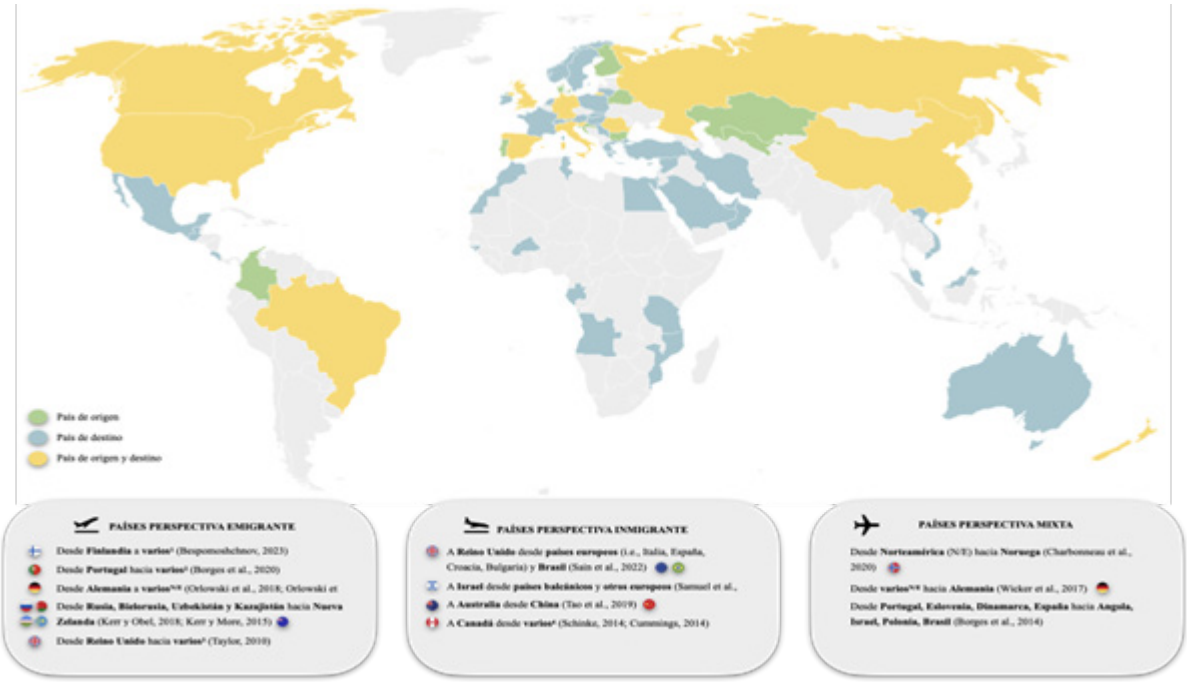
Características de la Muestra

La media de participantes en los trabajos incluidos sigue la lógica esperable, con muestras más grandes en trabajos cuantitativos (*M* = 198; *SD* = 16.97) que en trabajos cualitativos (*M* = 8.92; *SD* = 3.25). Si atendemos al género de los participantes se observa que, en aquellos trabajos que lo especificaron, existe una tendencia a una mayor presencia de entrena-

dores (*M* = 5.82; *SD* = 2.44) que de entrenadoras (*M* = 1.82; *SD* = 2.48). El trabajo de Kerr y Obel (2018) contó con una mayor presencia de entrenadoras que de entrenadores y otros trabajos mostraron proporciones iguales o similares (e.g., Sain et al., 2022; Kerr & Moore, 2015). Sin embargo, son más los trabajos que presentan una mayor proporción de entrenadores que de entrenadoras (e.g., Charbonneau et al., 2020; Orlowski et al., 2018) o una muestra formada únicamente por hombres (e.g., Hall et al., 2021; Mckeena, 2022; Samuel et al., 2020). Algunos trabajos informaron sobre el total de participantes sin especificar su género (e.g., Bespomoshchnov, 2023; Guo et al., 2023) y otros no informaron del total de participantes o de su género (e.g., Borges et al., 2020; Smith, 2014). Con relación a la edad de los y las participantes, no se ha observado una tendencia clara, con rangos de edad de más de 20 años de diferencia en algunos trabajos (e.g., Sain et al., 2022; Samuel et al., 2020) y con otros trabajos que no presentan ninguna información relativa a la edad de sus participantes (e.g., Charbonneau et al., 2020; Kerr & Obel, 2018).

La Figura 2 muestra el fenómeno migratorio de los entrenadores y las entrenadoras participantes en los trabajos incluidos en esta revisión en base a tres categorías: (a) país de origen, (b) país de destino, y (c) país de origen y de destino. En este sentido, el continente europeo ha sido tanto origen (e.g., Croacia, Dinamarca, Portugal) como destino (e.g., Austria, Chipre, Francia) y varios de sus países fueron origen y destino (e.g., Alemania, Italia, Serbia). Algo similar, aunque con un menor número de participantes, ocurre en el continente americano, donde se observan países como origen (i.e., Colombia), destino (i.e., México) y origen y destino (i.e., Brasil, EEUU, Canadá). Asia y Oceanía siguen una dinámica similar a la observada en Europa y América, con presencia de países como origen (e.g., Kazajistán, Uzbekistán), destino (e.g., Vietnam, Malasia, Australia) y origen y destino (e.g., China, Nueva Zelanda). En África, en cambio, todos los países que aparecieron en los diferentes trabajos lo hicieron como destino (e.g., Angola, Marruecos, Túnez), del mismo modo que los países de Oriente Medio (e.g., Arabia Saudí, Omán, Irán). En la Figura 2 se ha incluido, además, la clasificación de los trabajos incluidos en función de la perspectiva migratoria desde la que estudiaron el fenómeno y mostrando los flujos migratorios estudiados.

Figura 2
País de origen y de destino de los entrenadores y las entrenadoras



Nota: Varios[1]: Suecia, Eslovaquia, Austria, Inglaterra, Suiza, Polonia, Italia, Rusia, EEUU, Alemania y Eslovenia; Varios[2]: múltiples países (e.g., Arabia Saudí, China, Chipre, España, Grecia, Iran, Mozambique); Varios[3]: múltiples países (e.g., Alemania, Austria, Francia, Hungría, Países Bajos); Varios[4]: Rusia, Rumanía, China, Uzbekistán, Reino Unido, Nueva Zelanda, Alemania, Jamaica y México (Schinke, 2014); Varios[N/E]: No Especificado.

Atendiendo al deporte de los entrenadores y las entrenadoras, observamos que el fútbol es el que tiene presencia en más trabajos (e.g., Guo et al., 2023; Mckenna, 2022). Otros deportes como el rugby (e.g., Hall et al., 2021), el balonmano (e.g., Samuel et al., 2020) o la gimnasia (Kerr & Moore, 2015) también tuvieron protagonismo. Los estudios cuantitativos (e.g., Orlowski et al., 2016; Wicker et al., 2017), al contar con muestras de participantes más grandes, incluyeron una mayor variedad de deportes (e.g., tiro con arco, piragüismo, ciclismo en pista). Algunos trabajos también aportaron información

sobre los años de experiencia de los participantes (e.g., Hall et al., 2021; Sain et al., 2022), las migraciones previas realizadas (e.g., Samuel et al., 2020) o el nivel en el que trabajan los entrenadores y las entrenadoras (e.g., Guo et al., 2023).

Síntesis de los Trabajos Incluidos

Esta sección sintetiza los principales resultados obtenidos por los trabajos incluidos en la revisión. Basándonos en el Modelo de Transición Cultural de Ryba et al. (2016) y sus tres fases, hemos organizado los resultados en base a tres momentos temporales de la vida de los migrantes: (a) antes de realizar la migración, (b) al llegar al nuevo país, y (c) al adaptarse al nuevo contexto sociocultural.

Antes de Migrar

En relación a este momento, la investigación ha explorado cuestiones como el proceso de búsqueda de empleo y los mecanismos de contratación de los entrenadores y las entrenadoras, destacando la importancia de las experiencias migratorias previas (Borges et al., 2020) y de las redes de contacto en los procesos de selección (e.g., Harris, 2010; Mckenna, 2022; Samuel et al., 2020). Diferentes trabajos también han explorado los motivos que llevan a los entrenadores y las entrenadoras a migrar (e.g., Charbonneau et al., 2020; Samuel et al., 2020). En este sentido, Guo et al. (2023) señalaron que los entrenadores y las entrenadoras ven en la migración la posibilidad de consolidarse profesionalmente estabilizando su carrera o reformulándola en función de sus deseos o necesidades. Esto presenta algunas similitudes con lo destacado por Orlowski et al. (2018), que agruparon los motivos en (a) factores relacionados con el trabajo (e.g., salario, seguridad financiera, presión, reconocimiento), (b) factores sociales (e.g., soporte familiar, educación de los hijos), (c) factores competitivos (e.g., mayores recursos para el entrenamiento, competitividad en el entorno), y (d) factores relacionados con la búsqueda de nuevas experiencias (e.g., vivir en una nueva cultura, aprender un idioma, experimentar nuevos retos). Kerr y Obel (2018) hallaron una motivación para migrar basada en los hijos y las hijas (e.g., evitar que tuvieran que hacer el servicio militar en su país de origen, dar mayores oportunidades para su futuro).

Al Llegar al Nuevo País

Al llegar a un nuevo país, los entrenadores y las entrenadoras deben aprender las normas sociales existentes, adaptar sus métodos de entrenamiento al nuevo contexto y adecuar su manera de comunicarse con los y las deportistas y demás trabajadores del club (Tao et al., 2019). Este momento podría vincularse a la fase de adaptación aguda que propone el modelo de Ryba et al. (2016).

La investigación ha señalado elementos facilitadores para la adaptación de los entrenadores y las entrenadoras al llegar a un nuevo país, tales como el hecho de recibir ayuda por parte del club a su llegada (Borges et al., 2014), la proximidad geográfica al país de origen o el poder mantener relaciones sociales con familia y amigos (Sain et al., 2022). Kerr y Obel (2018) señalaron, además, la existencia de coincidencias sutiles que pueden actuar como facilitadores de esta adaptación (e.g., que la pareja encuentre a alguien con quien comparta idioma). También se ha prestado atención a las barreras y los desafíos que los entrenadores y las entrenadoras deben hacer frente en su transición cultural (e.g., Charbonneau et al., 2020; Kerr & Moore, 2015; Sain et al., 2022; Schinke et al., 2014). Por último, en este momento de llegada se han señalado retos relacionados con el ámbito profesional (e.g., estándares de entrenamiento, niveles de compromiso, cultura deportiva, impacto mediático) y con el ámbito sociocultural (e.g., idioma, climatología, estilo de vida).

Al Adaptarse al Nuevo Contexto Sociocultural

Esta tercera fase se relaciona con la adaptación sociocultural del Modelo de Transición Cultural, en la que ha observado como las personas que se consideran psicológicamente ajustados a la nueva cultura reportan mayores niveles de satisfacción en los aspectos no deportivos de la vida diaria y que sentir congruencia entre los valores propios y el estilo de vida y las normas locales podría ser un elemento clave en este ajuste (Ryba et al., 2016). Sin embargo, algunos autores y autoras consideran que, dentro del contexto deportivo, no es necesario que un entrenador o entrenadora inmigrante se adapte a la cultura de todas las normas, valores y creencias del nuevo personal o de los y las deportistas con los que trabaja, ya que algunas diferencias culturales pueden no causar estrés e incluso pueden generar alguna oportunidad (Cummings, 2014; Schinke, 2014).

Este proceso de cambios psicológicos y culturales que se dan como fruto de un contacto entre diferentes grupos culturales y que denominamos aculturación (Berry, 2005) está influenciado por una gran variedad de elementos entre los que se incluyen, tal y como señalan varios autores (e.g., Hall et al., 2021; Schinke et al., 2014), factores personales (e.g., habilidades lingüísticas, capacidad de adaptación, personalidad, experiencias previas), grupales (e.g., apoyo social, comunicación entre miembros del equipo y personal del club, cohesión del equipo), socioculturales (e.g., diferencias culturales en cuanto valores, normas y creencias), situacionales (e.g., duración de la estancia en el nuevo país, frecuencia de contacto con la cultura de origen) y organizacionales (e.g., estructura y cultura de la organización deportiva, disponibilidad de recursos y servicios). También se han señalado como mediadores del proceso de aculturación de los entrenadores y las entrenadoras otros factores como (a) el papel de la familia, destacando tanto su influencia en la decisión de emigrar como la importancia en la adaptación y en su rendimiento laboral (e.g., Hall et al., 2021; Sain et al., 2022; Samuel et al., 2020); (b) el apoyo social ofrecido por familia-

res, amigos, compañeros de profesión y otros miembros del cuerpo técnico (e.g., Borges et al., 2015; Sain et al., 2022; Schinke et al., 2014); (c) la creación de relaciones personales y redes sociales fuera del entorno deportivo como elemento clave para desarrollar un sentido de pertenencia al nuevo país (Kerr &Moore, 2015) y (d) el papel del club o federación (Borges et al., 2015), facilitando el proceso de aculturación mediante el apoyo institucional que pueden ofrecer al entrenador migrante (e.g., asesoramiento legal, apoyo en la búsqueda de vivienda, facilitando un hogar; facilitando aprender el idioma).

Discusión

El análisis de la evidencia publicada en artículos, libros y trabajos académicos nos indica que la mayoría de entrenadores y entrenadoras son positivos con relación a su migración, considerándola una experiencia valiosa para desarrollarse, recomendándola a otras personas por los beneficios a nivel personal (e.g., mejora de la calidad de vida, crecimiento personal) y profesional (e.g., mejora a nivel económico, posibilidad de entrenar a mayor nivel, mayor estatus y reconocimiento como entrenadores) que conlleva (e.g., Charbonneau et al., 2020; Samuel et al., 2020). Sin embargo, estos mismos autores señalaron también los costes que puede traer consigo esta migración tanto a nivel personal (e.g., problemáticas de adaptación, pérdida vínculos sociales y familiares, experiencias de aislamiento y soledad) como a nivel profesional (e.g., una mayor inestabilidad laboral, dificultades para adaptarse al nuevo sistema deportivo). Pese a que se han explorado los beneficios, retos y dificultades asociados a las experiencias migratorias de los entrenadores y las entrenadoras, no se ha encontrado evidencia alguna que analice directamente el impacto que puede tener la transición cultural en la salud mental de los entrenadores y las entrenadoras, como sí que se ha hecho con deportistas (Schinke et al., 2018). Conviene que futuras investigaciones exploren este fenómeno.

En general, los trabajos sobre carrera deportiva y transiciones sugieren que algunos de los resultados encontrados con deportistas respecto a la migración (Prato et al., 2020) o los programas de asistencia de carrera (Torregrossa et al., 2020) son aplicables directamente a la experiencia de los entrenadores. Sin embargo, dado que son procesos migratorios que se producen en momentos vitales distintos, se espera que haya diferencias en aspectos como las implicaciones familiares o el tipo de relaciones sociales que se establecen en el país de destino. Prato et al. (2020) observaron que el idioma puede afectar de manera general a los y las deportistas en su carrera profesional en el extranjero, influyendo a nivel deportivo (e.g., decisión del entrenador sobre participación en competiciones), psicológico (e.g., efectos en la autoconfianza, motivación y estado emocional) y social (e.g., facilitando la segregación o el aislamiento social). Sin embargo, al contrario de lo que parece ocurrir con los deportistas, Borges et al. (2020) señalaron que las relaciones culturales entre países y el idioma no parecen ser un elemento relevante en la migración de entrenadores y entrenadoras. En otra revisión sobre migración y aspectos psicológicos de deportistas, Souza et al. (2021) hallaron que, entre los deportistas, no es una práctica habitual buscar información sobre el país o el contexto deportivo en el que se insertarán. Estos datos van en línea opuesta a lo señalado por Bespomoshchnov (2023), que observó como los entrenadores sí que investigaban sobre el club, la liga y el país de destino. Conviene que futuras investigaciones exploren, de manera específica, si el hecho de buscar información previa ayuda en el proceso de adaptación o no y otras posibles similitudes y diferencias entre los procesos migratorios de deportistas y de entrenadores y entrenadoras. Es importante considerar, además, que los modelos teóricos que se utilizan en la actualidad para describir las experiencias de unos y otros son basados en deportistas y futuras investigaciones deberían valorar la necesidad de adaptar los modelos teóricos existentes a la figura de los entrenadores y entrenadoras o de crear nuevos modelos teóricos que se ajusten a sus características específicas.

Se ha observado una clara tendencia a una mayor participación de entrenadores que de entrenadoras en los trabajos incluidos en esta revisión. Estos datos van en línea con lo hallado por Prato et al. (2020) en su revisión sobre transición cultural y migración de deportistas y con lo expuesto por Borrueco et al. (2023), que señalaron que el número de entrenadoras es menor y que están invisibilizadas. Investigaciones futuras deberían explorar, de manera específica, las experiencias migratorias de las entrenadoras y analizar las posibles similitudes y diferencias con las de los entrenadores.

Otras características (e.g., nacionalidad, edad, experiencias migratorias previas, si se viaja acompañado/a de familia o no) han sido, en ocasiones, descritas en los trabajos, aunque no se ha analizado de manera específica cómo estas pueden influir en el proceso migratorio. Conviene que futuras investigaciones atiendan de manera específica a las necesidades de las entrenadoras migrantes y a las diferencias de los y las participantes. Además, es conveniente que se explore, de manera específica, la relación entre la tradición cultural deportiva y/o los resultados obtenidos en los países de origen y de destino de los entrenadores y las entrenadoras. Tal y como señalan Samuel et al. (2020), también es importante explorar los efectos de la movilidad a corto plazo y, como señalan Prato et al. (2020), las vivencias experimentadas por las redes sociales del contexto de origen y analizar su papel en el proceso de adaptación de los entrenadores y las entrenadoras.

Implicaciones Prácticas

De acuerdo con los resultados obtenidos en esta revisión y tomando como referencia las propuestas de Torregrossa et al. (2016) y Prato et al. (2020) con deportistas, ofrecemos una serie de recomendaciones prácticas a distintos niveles. En

primer lugar, a nivel cultural deportivo, donde es importante que se promueva el desarrollo de la investigación en materia de transición cultural de entrenadores y entrenadoras, identificando necesidades en función de determinadas características personales o profesionales y contextos culturales específicos, se conciencie sobre las dificultades que puede conllevar una transición cultural, y se forme a dirigentes de clubes, federaciones y organizaciones sobre su papel en la adaptación de los profesionales a un nuevo contexto sociocultural. En segundo lugar, a nivel del entorno del entrenador y la entrenadora, investigando el papel que tiene en la adaptación de los entrenadores y las entrenadoras, formándoles en el desarrollo de estrategias de afrontamiento y ofreciéndoles apoyo y acompañamiento psicológico. En tercer y último lugar, a nivel individual del entrenador y la entrenadora, formándoles durante su preparación académica sobre los desafíos que conlleva la transición cultural para que puedan desarrollar estrategias de afrontamiento y acompañando y asesorándoles psicológicamente durante los diferentes momentos de su transición.

Limitaciones

Este trabajo cuenta con determinadas limitaciones. El único criterio de inclusión de esta revisión fue que los trabajos debían centrarse en el transnacionalismo y los procesos migratorios de los entrenadores y las entrenadoras profesionales. Algunos de los trabajos que fueron excluidos por no cumplir con este criterio de inclusión, podrían aportar información relevante sobre la temática. Son ejemplos de esto Lenartowicz (2022), que exploró las diferencias culturales de las organizaciones deportivas y la relación deportista/entrenador; Carter (2011), que analizó las rutas y las estrategias de migración deportiva transnacional, los riesgos y los costes de la movilidad y las políticas migratorias o Morela (2017), que investigó las preferencias de aculturación de los inmigrantes y las expectativas de aculturación de la comunidad de acogida en relación con la participación deportiva y el entorno de motivación deportiva. Sería conveniente que futuras investigaciones exploren el transnacionalismo y los procesos migratorios de entrenadores y entrenadoras también desde estas perspectivas. Conviene que futuras investigaciones atiendan, de manera específica, al deporte de los entrenadores y de las entrenadoras. Otra limitación de este artículo la encontramos en la Figura 2, que fue diseñada con la información obtenida en los trabajos incluidos en la revisión. Al no haber incluido una escala de colores, la Figura 2 otorga la misma importancia visual a aquellos países con un único participante migrando desde o hacia allí que a los países con más participantes. Además, en algunos de los trabajos no se halló la información completa sobre los países de origen y de destino de los participantes, por lo que la Figura 2 podría no estar representando con exactitud la realidad descrita en los trabajos. Sin embargo, consideramos oportuno incluirla como punto de partida.

Conclusiones

Este artículo es, según nuestro conocimiento, la primera revisión sistemática realizada sobre el transnacionalismo y los procesos migratorios de los entrenadores y las entrenadoras profesionales. Se han identificado los trabajos más relevantes y sus características principales y se han sintetizado sus resultados en base a tres momentos temporales de su migración: (a) antes de migrar, identificando los motivos para migrar y cómo es la preparación para la migración; (b) al llegar al nuevo contexto, identificando las principales barreras, desafíos y facilitadores para la adaptación y (c) al adaptarse al nuevo contexto sociocultural, identificando los principales mediadores del proceso de aculturación. Se ha puesto de manifiesto la necesidad de seguir explorando la transición cultural de los entrenadores y entrenadoras, tratando de llenar algunos vacíos existentes a día de hoy como la influencia de la migración en la salud mental de los entrenadores y las entrenadoras, las similitudes y diferencias entre los procesos migratorios de deportistas y entrenadores y entrenadoras o la escasez de entrenadoras participantes como muestra en los trabajos realizados hasta la fecha.

Declaración del Comité de Ética

No aplica debido a que el estudio de investigación no involucra la participación de seres humanos, ya sea directamente o por el uso de su material biológico o registros médicos.

Conflicto de Intereses

Los autores declaran que no tienen conflicto de intereses.

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Contribución de los Autores

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Declaración de Disponibilidad de Datos

Datos disponibles bajo demanda al autor de correspondencia (fran.herruzo@autonoma.cat).

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Effects of Teaching Personal and Social Responsibility Model: systematic review and meta-analysis

Efectos de la enseñanza del modelo de responsabilidad personal y social: revisión sistemática y metanálisis

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Teaching Personal and Social Responsability

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Abstract

Teaching Personal and Social Responsibility (TPSR) model comes has been shown to be a crucial model to enable and promote the appropriate progress of students. The objective of this study is to evaluate the efficacy of the TPSR model on children and adolescents' physical education students. The study employed a systematic search of three major databases, up to 31 March 2022. This meta-analysis adhered to the PRISMA guidelines and it was registered at PROSPERO. The study quality was assessed using the PEDro score. The meta-analysis demonstrated that the TPSR model had a significant impact on all the investigated variables, namely, social responsibility (DEM = 1.62; $p < .001$), personal responsibility (DEM = 1.05; $p < .001$), sportsmanship (DEM = .66; $p = < .001$), autonomy (DEM = 1.18; $p < .001$), competence (DEM = 0.69; $p < .001$), social relations (DEM = 1.37; $p < .001$), intrinsic motivation (DEM = 1.48; $p < .001$), extrinsic motivation (DEM = - 0.34; $p = .002$), and demotivation (DEM = - .91; $p < .001$). The findings of this study indicate that the TPSR model has significant educational potential in the promotion of multiple variables, thereby enhancing the teaching-learning process and the holistic development of students of physical education.

Keywords: Physical education, pedagogical model, motivation, basic psychological needs, sportsmanship.

Resumen

El modelo de Enseñanza de la Responsabilidad Personal y Social (TPSR) se ha mostrado como un modelo crucial para posibilitar y promover el progreso adecuado de los alumnos. El objetivo de este estudio es evaluar la eficacia del modelo TPSR en niños y adolescentes estudiantes de educación física. El estudio empleó una búsqueda sistemática en tres bases de datos principales, hasta el 31 de marzo de 2022. Este meta-análisis se adhirió a la guía PRISMA y se registró en PROSPERO. La calidad del estudio se evaluó mediante la puntuación PEDro. El meta-análisis demostró que el modelo TPSR tuvo un impacto significativo en todas las variables investigadas, a saber, responsabilidad social (DEM = 1.62; $p < .001$), responsabilidad personal (DEM = 1.05; $p < .001$), deportividad (DEM = 0.66; $p = < .001$), autonomía (DEM = 1.18; $p < .001$), competencia (DEM = .69; $p < .001$), relaciones sociales (DEM = 1.37; $p < .001$), motivación intrínseca (DEM = 1.48; $p < .001$), motivación extrínseca (DEM = - 0.34; $p = .002$), y desmotivación (DEM = - .91; $p < .001$). Los resultados de este estudio indican que el modelo TPSR tiene un potencial educativo significativo en la promoción de múltiples variables, mejorando así el proceso de enseñanza-aprendizaje y el desarrollo holístico de los estudiantes de educación física.

Palabras clave: Educación física, modelo pedagógico; motivación, necesidades psicológicas básicas, deportividad.

Introduction

In recent times, there has been mounting apprehension regarding negative attitudes and conduct displayed by Physical Education students, which may lead to unsportsmanlike tendencies. This issue can impede the teaching and learning process (Menéndez-Santurio & Fernández-Río, 2016). Consequently, educational institutions have urged the development of plans and tools within the educational milieu to cultivate skills and competencies that can eliminate such attitudes.

During the teaching-learning process of physical education, responsibility is considered a fundamental element, understood as a moral obligation that the subject has towards oneself and towards others (Menéndez-Santurino & Fernández-Río, 2016). In this sense, both social and personal responsibility can be enhanced through physical education thanks to the fact that it presents an eminently procedural learning environment where numerous interactions arise between the student (Molina et al., 2020). There are two fundamental types of responsibility: personal and social. Social responsibility corresponds to values such as respect for the rights and opinions of others, social sensitivity, and empathy, while personal responsibility corresponds to values such as effort and autonomy (Hellison, 2011).

In this regard, intrinsic motivation is related to adaptive behaviours such as life satisfaction (Méndez-Giménez et al., 2016). The Self-Determination Theory (Deci & Ryan, 2002) has established itself as one of the most significant frameworks for the study of motivational processes. It indicates that an individual's motivations are reflected along a continuum of self-determination made up of different types of motivational regulations: intrinsic motivation, extrinsic motivation, and demotivation. Intrinsic motivation refers to the act of engaging in an activity for one's own pleasure and interest. It is a type of motivation that is entirely hedonistic in nature. Extrinsic motivation, on the other hand, refers to behaviours that are influenced by external factors (for example a prize). Finally, demotivation is characterised by the absence of internal or external motivation (Deci & Ryan, 1985). Moreover, The Self-Determination Theory establishes the existence of three basic psychological needs (competence, autonomy, and relatedness) that can affect the different types of existing motivation (Deci & Ryan, 2002). The need for relationships with others is understood as the feeling of belonging to a group of equals that an individual experiences when they share situations with individuals with whom they feel connected. The need for competence refers to the desire to act effectively with the environment, to experience opportunities in which to show and develop one's own capabilities (Vlachopoulos et al., 2010). Finally, autonomy refers to the regulation that a person exercises over themselves (Ryan & Deci, 2006).

In this sense, self-determined behaviours have been associated with greater sportsmanship and the practice of fair play (Guzmán & Carratalá, 2006). The physical education teacher tries to work on sportsmanship within his classrooms by promoting courtesy towards classmates, respecting turns, favoring his own efforts and that of others (Hernández-Andreo et al., 2020).

In this sense, it will be desirable to promote sportsmanship in physical education classes with the objective of increasing the levels of self-determination that is associated with greater behaviors oriented towards fair play and therefore, as a result, will result in fewer events of aggression and behaviours dangerous unsportsmanlike (Gómez-Buendia, et al., 2022). This is where the Teaching Personal and Social Responsibility (TPSR) model assumes significance, as it has been demonstrated to be a pivotal model in facilitating and promoting the appropriate progress of students (Wright & Walsh, 2020). In fact, it has been established that students imbued with TPSR have successful experiences that enable them to develop their personal and social skills and responsibility in sport and in life (Escartí et al., 2013: 159; Martinek & Hellinson, 2016). To this end, responsible behaviours are fostered through various and diverse means with TPSR, enabling primary and secondary education students to confront the vicissitudes and difficulties in their lives with greater ease and advance their holistic development (Escartí et al., 2013; Martinek & Hellinson, 2016).

Similarly, the TPSR model presents numerous advantages: (1) it provides an opportunity for learners to express their opinions, thoughts and engage in deliberation; (2) it encourages reflection and collaboration with students to instill values; (3) it is receptive to new ideas or changes due to its open-ended nature; and (4) it establishes achievable objectives that are employed as a framework for evaluating learners (Jiménez, 2000). Furthermore, research has demonstrated that meeting basic psychological needs positively impacts learners' perception of learning. It has also been established that the implementation of strategies to fulfill basic psychological needs results in increased satisfaction of autonomy and competence, as well as intrinsic motivation (Franco & Coterón, 2017). In addition, numerous studies have indicated that the TPSR model leads to improvement in values related to personal and social responsibility, such as respect, self-worth, self-control, effort, self-esteem, emotional stability, and leadership (Cecchini et al., 2007; García-García et al., 2020; Merino-Barrero et al., 2020). Notably, sportsmanship demonstrates a significant correlation with the factors of commitment to practice, social conventions, and respect for rules, which are crucial values to be nurtured in adolescents as they undergo skill and capacity development (Sánchez-Alcaraz, Ocaña-Salas, et al., 2020).

TPSR, developed by Hellison in 1970, aimed to instill positive values in adolescents at high risk of exclusion through sport. Later, it was adapted for educational purposes to promote these values in students (Pardo & García-Arjona, 2011). TPSR seeks to equip students with the necessary tools to become effective individuals in their social environment and to develop responsibility for themselves and others, allowing them to take control over their lives (Sánchez-Alcaraz et al., 2019).

TPSR can be applied to all students, as it facilitates the development of crucial psychosocial aspects such as respect, self-control, confidence, empathy, autonomy, cooperation, and leadership in various sporting contexts (Pardo & García-Arjona, 2011). The model is built upon four key principles: (1) integration to prevent physical activity content from being replaced or deleted; (2) cession of responsibilities to allow students to reflect and make decisions; (3) communication and interaction to build trust between teacher and student; and (4) transfer of learned values to students' daily life contexts (Hellison, 2011).

The TPSR model consists of five levels that serve as the foundation of the model: (1) respect for the participation and learning of others without disrupting these processes; (2) student participation and effort, avoiding negative situations, which tends to foster intrinsic motivation and commitment to the sessions; (3) learner autonomy by becoming more proactive and self-regulating their own learning; (4) cooperation with others without seeking a reward, as the decision to act should be intrinsic to the learner; and (5) transfer of all that was learned in the sessions to the students' lives outside of school (Hellison, 2011).

TPSR is an interesting teaching alternative to promote participation and learning in students, and is considered an ideal and perfect pedagogical model for teaching physical education (Pozo et al., 2016). With regards to this issue, the systematic review carried out by Pozo et al. (2016) highlights the use of diverse methodologies for program implementation and the presence of high heterogeneity among the analysed samples. In general, intervention programmes have been found to display significant effects for students at risk of social exclusion; however, these effects may vary from those seen in students who are not considered to be at risk (Sánchez-Alcaraz, Courel, et al., 2020). Thus, it is considered crucial to explore the varying effects of such programmes amongst different populations.

For all these reasons, there is a need to carry out an analysis of the scientific evidence on this updated model that includes and summarizes the main findings with respect to the relevant justified variables: social and personal responsibility, sportsmanship, motivation and the three fundamental psychological needs (autonomy, competence, and social relationships).

Hence, this study seeks to investigate the impact of the TPSR model onsocial responsibility, personal responsibility, sportsmanship, fundamental psychological needs (autonomy, competence, and social relationships) and motivation on children and adolescents' physical education students.

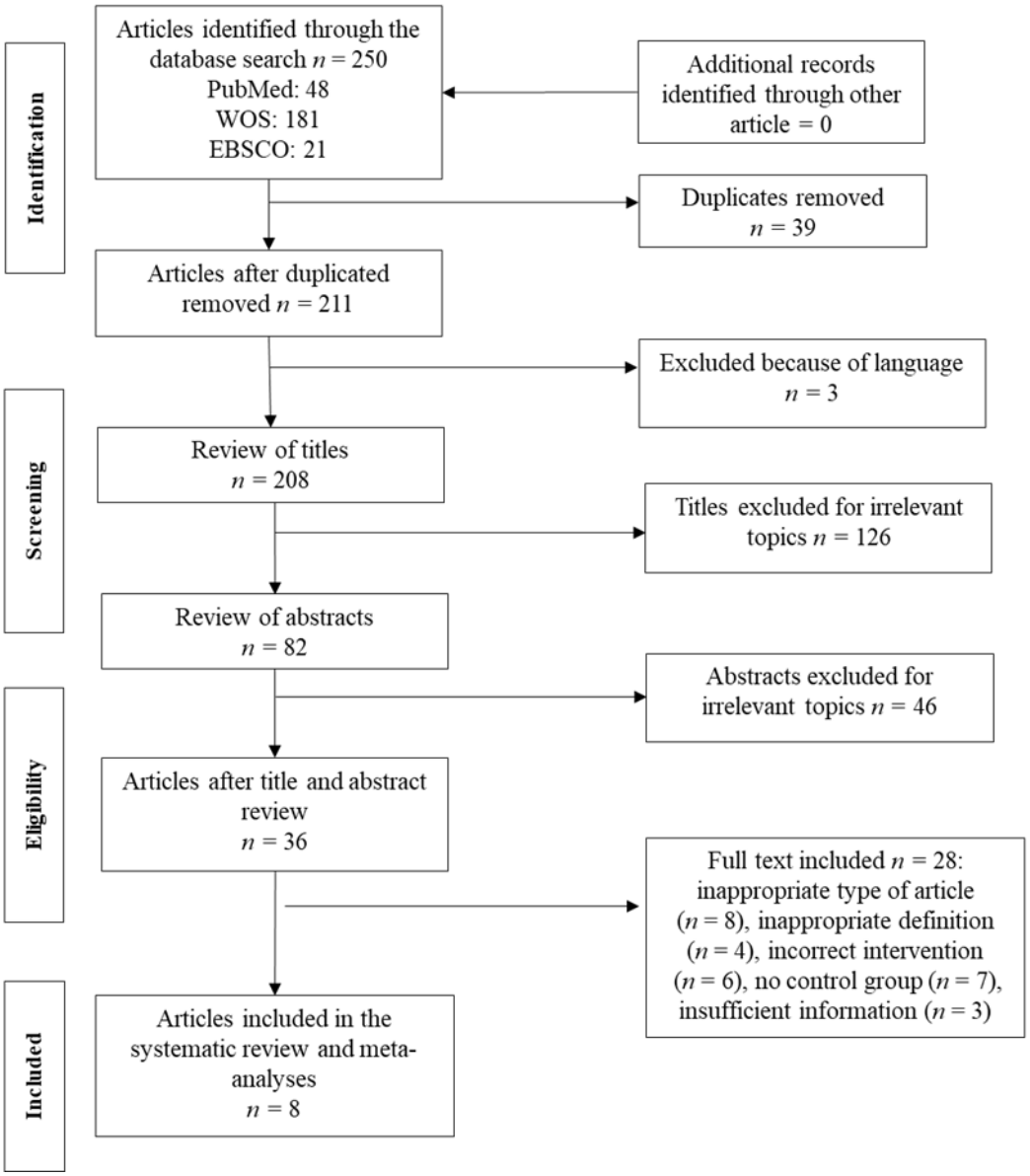
Materials and Methods

Search Strategies and Article Identification

This systematic review and meta-analysis was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (PRISMA) (Page et al., 2021), following the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2011). The process of selecting articles for inclusion in the systematic review and meta-analysis can be seen in Figure 1.

The literature search and screening were performed independently by two researchers (PNT and NGG). If there was any disagreement, the search was conducted again. In this sense, the reliability between the two authors was calculated using Cohen's Kappa, which showed a strong level of agreement with an index of .88 (McHugh, 2012). This sense, the reliability between the two authors was calculated using Cohen's Kappa, which showed a strong level of agreement with an index of .88 (McHugh, 2012).

Figure 1
Flowchart of the study selection



The inclusion criteria for research to be included in this paper were: (a) studies about TPSR model-based with pre- and post-test intervention measures and control group; (b) children and adolescents physical education students (primary, secondary and high school); (c) articles published in English and Spanish; (d) articles that measure social responsibility, personal responsibility, sportsmanship, basic psychological needs, intrinsic motivation, extrinsic motivation, or demotivation before and after the intervention; and (d) articles that included at least a sample size of 30 subjects, since a small sample size may lead to lack of precision and inconsistency in meta-analysis. In addition, exclusion criteria were also established: (a) articles that included subjects at risk of social exclusion and/or with behavioural problems; (b) intervention models that used a variant of the selected model; and (c) conference publications, systematic reviews, and theoretical works.

Three databases were searched for this purpose: PubMed, Web of Science (WOS) and EBSCO, during the month of March 2022, using specific keyword combinations. The terms "personal and social responsibility" were always used in combination with "model," "education," "physical activity," "program," "hybridised," "approach," "school," "pupils," "children," "adolescents," "classroom," "training," and "curriculum." For instance, the following phrase was used for WOS: ((("personal and social responsibility") AND ("Model" OR "Education" OR "Physical activity" OR "Program" OR "Hybridized" OR "Approach" OR "School" OR "Pupils" OR "Children" OR "Adolescents" OR "Classroom" OR "Training" OR "curriculum"))). This search was customized for each database.

Risk of Bias Assessment

The quality of the studies was assessed using the "Physiotherapy Evidence Database" score (PEDro) (Maher et al., 2003). The PEDro scale provides information on the validity and reliability of the articles (Moseley et al., 2011). A risk of bias summary graph was created to identify the authors' judgments, broken down according to each risk of bias criterion in all included studies.

Statistical Analysis

The meta-analysis was conducted using R software version 3.6.0 (Copyright (C) 2019, R Foundation for Statistical Computing) with the metacont package. The forest plots were created using the forestplot package. Continuous data was used for the meta-analysis, with sample size and changes in mean and standard deviation between pre- and post-test measures of the TPSR interventions. Each study included an experimental group (EG) that received the TPSR model-based intervention and a control group (CG) that was compared to the experimental group. The mean (M) and standard deviation (SD) between the pre- and post-test measures of the interventions were obtained and analyzed. If any necessary data was not reported, the authors were contacted for the required data. Manzano-Sánchez et al. (2019) provided their data separately for male and female genders, where 1 was associated with males and 2 with females in this meta-analysis (Manzano-Sánchez et al., 2019, 2021).

If studies did not present the necessary data, standard deviations were calculated and imputed when possible, using standard errors and confidence intervals. The appropriateness of the application of a fixed or random effects model for the pooled analysis was determined based on the Cochrane Q test (), Higgins I2, and significance (p). The DerSimonian-Laird (Cohen) pooling method was used, and heterogeneity was assessed.

The meta-analysis was conducted using a random or fixed effects model, as appropriate, to determine the pooled estimated standardized mean difference (*SMD*). Cohen's d (Cohen, 1988) was used to interpret the DerSimonian-Laird (Cohen) effect size estimates as small (0 to .2), medium (.3 to .7), and large (≥ .8). Significant differences were determined at a level of $p < .05$. The quality of the included studies was assessed using the PEDro scale to evaluate their validity and reliability. A risk of bias summary graph was created to identify the authors' judgments, broken down according to each risk of bias criterion in all included studies.

Results

Table 1 displays the characteristics of the included studies. In terms of sample size, an average of 186.62 students from primary, secondary, and baccalaureate education participated. The eight studies had a total of 1396 students, with 700 in the experimental group and 696 in the control group. The average duration of the interventions was 19.25 weeks with a frequency of two sessions per week for all studies, and a mean deviation of 8.25. The duration of each session was 55 minutes, except for two studies (Cecchini et al., 2007; Sánchez-Alcaraz et al., 2019) where sessions lasted 60 minutes, resulting in an average duration of 56.25 minutes per session, with a mean deviation of 1.875.

Football was the chosen sport in two studies (Cecchini et al., 2003, 2007), while other sports such as basketball, handball, volleyball, hockey, baseball, badminton, table tennis, and acrobatic gymnastics were used in other interventions (Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2019). However, the sport used was not specified in the remaining interventions (García-García et al., 2020; Manzano-Sánchez et al., 2019, 2021; Sánchez-Alcaraz et al., 2013).

Most control groups received traditional and conventional methodology with three distinct parts: (1) warming up; (2) main part; and (3) cool down. They also used a traditional direct instruction methodology (García-García et al., 2020; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2013, 2019). The methodology used in other investigations was not specified. All experimental groups in all studies received the TPSR model-based intervention.

The studies focused on the first (Cecchini et al., 2003) and third year of secondary education (Cecchini et al., 2007), baccalaureate (Manzano-Sánchez et al., 2019), and the last year of primary education (sixth grade) combined with another secondary course (García-García et al., 2020; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2013, 2019).

Table 1
Characteristics of research included in the systematic review and meta-analyses

Author	Design/sample/ genre	Age/course/ sport	Time	Criteria	Intervention	Variables
Cecchini et al. (2003)	E / TS = 142; EG = 72; CG = 70	AR = 12-13 years; MA = 12.5 years / Secondary /Futsal	D = 8 weeks WF = 2 days ST = 55'	Public school students 12-13 y	EGI = TPSR	SPO
Cecchini et al. (2007)	E / TS = 124; EG = 63; CG = 61	AR = 13-14 years; MAM = 13.4; MAF = 13.8 / Secondary/Futsal	D = 8 weeks WF = 2 days ST = 60'	-	EGI = TPSR	SPO
García-García et al. (2020)	QE / TS = 57; EG = 26; CG = 31; EM = 61.5%; EF = 38.5%	AR = 11-14 years; MA = 11.93 / Primary and Secondary/ contents under the law	D = 20 weeks WF = 2 days ST = 55'	IC = Attendance, and demographic characteristics	EGI = TPSR CGI = conventional	SR, PR
Manzano-Sánchez et al. (2019)	QE / TS = 85; EG = 35; CG = 50; EM = 47.2%; EF = 52.8%	AR = 14-18 years; MA = 16.22/ Secondary and Baccalaureate/ contents under the law	D = 35 weeks WF = 2 days ST = 55'	IC = Demographics, accessibility and convenience. EX = Pre- and post-test and items	EGI = TPSR	SR, PR, AU, COMP, SOCR, IM, EM, DEM
Manzano-Sánchez et al. (2021)	QE / TS = 167; EG = 100; CG = 67; EM = 37%; EF = 63%	MA = 15.97 years / Secondary/ contents under the law	D = 35 weeks WF = 2 days ST = 55'	IC = Accessibility and convenience. EC = Scales and no response (90%)	EGI = TPSR	SR, PR, COMP, SOCR, IM, EM, DEM
Merino-Barrero et al. (2020)	QE / TS = 72; EG = 35; CG = 37; EM = 60%; EF = 30%	AR = 11-13 years; MA = 12.05 / Primary and Secondary/ contents under the law	D = 20 weeks WF = 2 days ST = 55'	IC = Attendance and questionnaire	EGI = TPSR CGI = Direct instruction	SR, PR, SPO, AU, COMP, SOCR, IM, EM, DEM
Sánchez-Alcaraz et al. (2013)	E / TS = 186; EG = 90; CG = 96	MAP = 11.99; MAS = 15.49 / Primary and Secondary	D = 12 weeks WF = 2 days ST = 55'	-	EGI = TPSR CGI = conventional	SR, PR
Sánchez-Alcaraz et al. (2019)	QE / TS = 563; EG = 280; CG = 293	AR = 12-15 years; MA = 13.73 / Primary and Secondary/ Futsal, basketball, handball, volleyball and traditional games	D = 16 weeks WF = 2 days ST = 60'	IC = Territorial division	EGI = TPSR CGI = conventional	SR, PR, SPO

Note: E: Experimental; QE: Quasi-experimental; TS: total sample; EG: experimental group; CG: control group; EM: experimental male; EF: experimental female; MA: mean age; AR: age range; MAM: mean age male; MAF: mean age female; MAP: mean age primary; MAS: mean age secondary; WF: weekly frequency; D: duration; ST: session time; IC: inclusion criteria; EG: exclusion criteria; EGI: experimental group intervention; CGI: control group intervention; SPO: sportsmanship; SR: social responsibility; PR: personal responsibility; AU: autonomy; COM: competence; SOCr: social relation; IM: intrinsic motivation; EM: extrinsic motivation; DEM: demotivation; IR: internal regulation; IDR: identified regulation; ER: external regulation.

The most researched and analyzed variables were personal and social responsibility, investigated in five studies (García-García et al., 2020; Manzano-Sánchez et al., 2021; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2013, 2019). Sportsmanship was investigated in four articles (Cecchini et al., 2003, 2007; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2019). Basic psychological needs (autonomy, competence, and relatedness), intrinsic and extrinsic motivation, and demotivation were studied in three investigations (Manzano-Sánchez et al., 2019, 2021; Merino-Barrero et al., 2020). Extrinsic motivation was analyzed in two different ways: as a single variable (Manzano-Sánchez et al., 2019) and as three

distinct parts: external regulation, identified regulation, and introjected regulation (Manzano-Sánchez et al., 2021; Merino-Barrero et al., 2020). The variables studied in each investigation can be seen in Table 1.

Table 2 presents the scores acquired on the PEDro scale for each of the studies encompassed in the analysis. The findings demonstrate that the quality scores varied from six to nine points, indicating an acceptable level of quality in the selected studies. Additionally, Figure 2 provides a condensed overview of the risk of bias, outlining the authors' assessments concerning each bias criterion across all studies analyzed.

Table 2
Articles scores on the PEDro scale

Research	1	2	3	4	5	6	7	8	9	10	11	Final score
Cecchini et al. (2003)	1	1	0	1	1	0	0	1	1	1	1	7
Cecchini et al. (2007)	1	1	0	0	1	1	0	1	1	1	1	7
García-García et al. (2020)	1	0	0	1	1	0	1	1	1	1	1	7
Manzano-Sánchez et al. (2019)	1	0	0	1	1	0	1	1	1	1	1	7
Manzano-Sánchez et al. (2021)	1	0	0	0	1	0	1	1	1	1	1	6
Merino-Barrero et al. (2020)	1	1	0	0	1	1	1	1	1	1	1	8
Sánchez-Alcaraz et al. (2013)	1	1	0	0	1	0	0	1	1	1	1	6
Sánchez-Alcaraz et al. (2019)	1	1	0	0	1	0	0	1	1	1	1	6

Figure 2
Risk of bias summary: authors´ judgements broken down according to each risk of bias criterion across all included studies

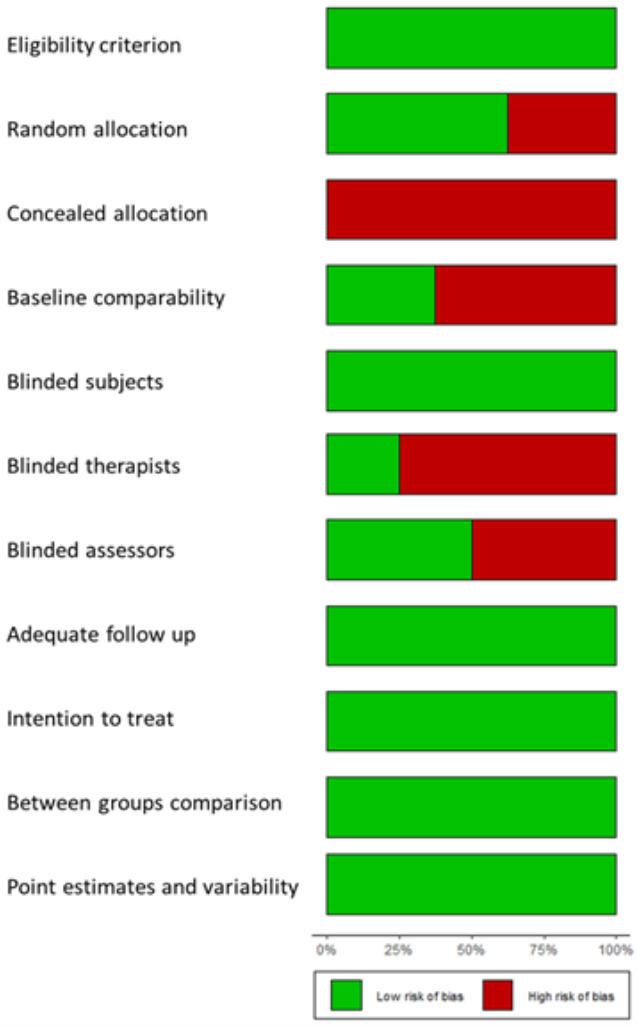
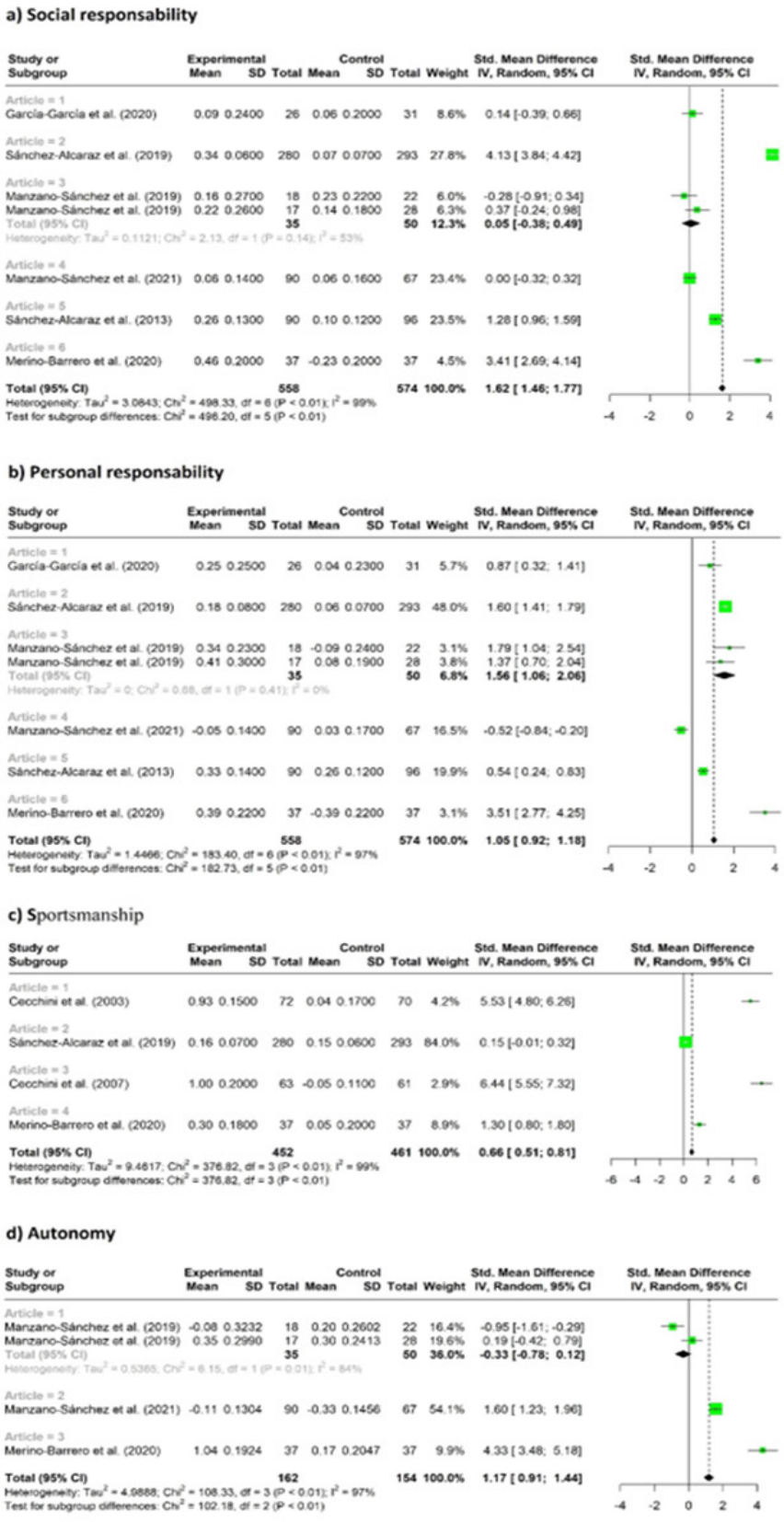
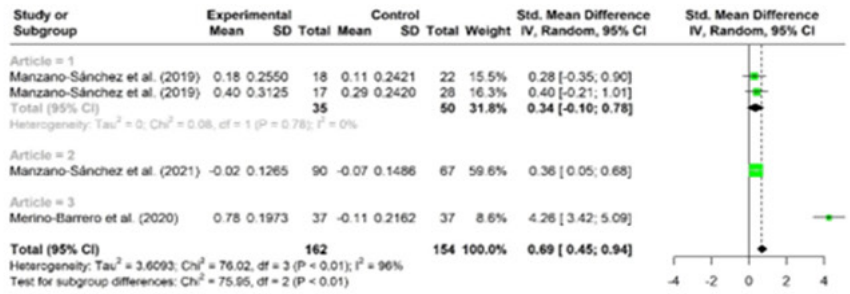


Figure 3

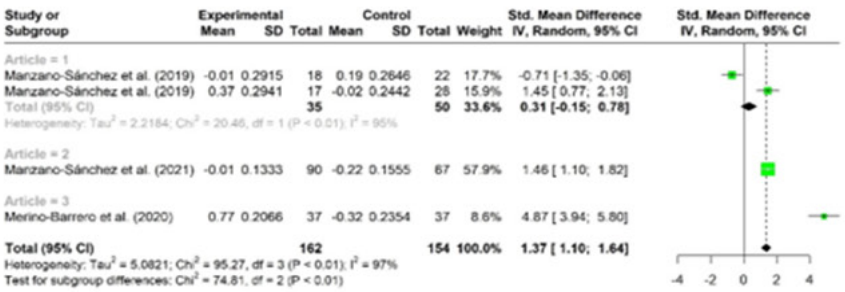
Meta-analysis of a) social responsibility, b) personal responsibility, c) sportsmanship, d) autonomy, e) competence, f) social relations, g) intrinsic motivation, h) extrinsic motivation, and i) demotivation



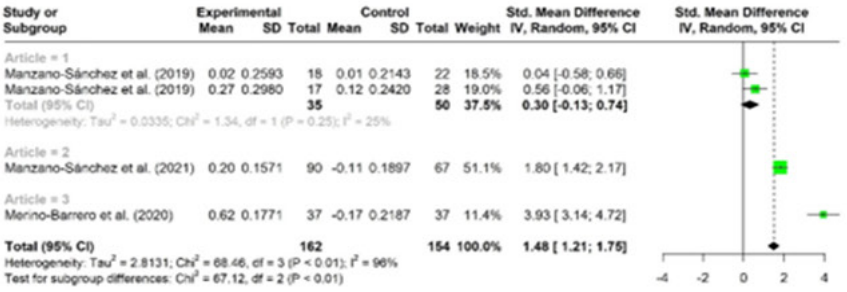
e) Competence



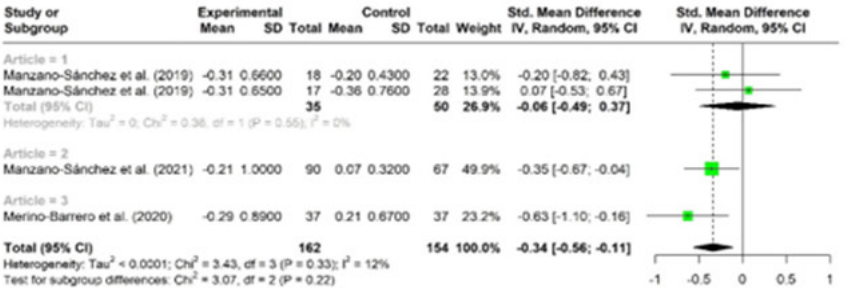
f) Social relations



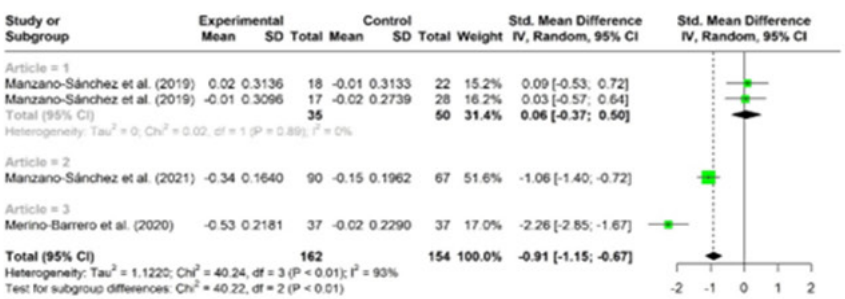
g) Intrinsic motivation



h) Extrinsic motivation



i) Demotivacion



In terms of social and personal responsibility, three out of seven (Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2013, 2019) and five out of seven (Manzano-Sánchez et al., 2019; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2013, 2019) studies, respectively, demonstrate an improvement in the experimental group (EG) following the implementation of the TPSR model-based program. Four studies analyzed the sportsmanship variable, all of which showed significant improvements after applying the TPSR model-based (Cecchini et al., 2003, 2007; Merino-Barrero et al., 2020; Sánchez-Alcaraz et al., 2019).

Regarding basic psychological needs (autonomy, competence, and relatedness), one out of four investigations reported significant differences in autonomy, two out of four cases demonstrated significant improvements in competence, and one out of three cases showed improvement in relatedness after the intervention with the TPSR model-based (Merino-Barrero et al., 2020). With respect to intrinsic and extrinsic motivation, two out of four (Manzano-Sánchez et al., 2019; Merino-Barrero et al., 2020) and two out of three (Manzano-Sánchez et al., 2021; Merino-Barrero et al., 2020) cases showed improvements following the intervention, respectively.

Extrinsic motivation was investigated in two different ways: as a single factor or as three factors (external, identified, and introjected regulation). One study did not show improvement in extrinsic motivation as a single factor (Manzano-Sánchez et al., 2019), while the other two studies found improvements in external regulation (Manzano-Sánchez et al., 2021), identified regulation (Merino-Barrero et al., 2020), and introjected regulation (Manzano-Sánchez et al., 2021), respectively.

Finally, demotivation was analyzed, and two out of four cases demonstrated improvements after applying the TPSR model-based (Manzano-Sánchez et al., 2021; Merino-Barrero et al., 2020), while the other two studies did not report any improvements (Manzano-Sánchez et al., 2019). Figure 3 illustrates the meta-analysis of social responsibility, personal responsibility, sportsmanship, basic psychological needs (autonomy, competence, and relatedness), intrinsic motivation, extrinsic motivation, and demotivation, respectively. In all analyses, significant differences between the experimental and control groups were observed in relation to the pre- and post-tests (all $p < .001$).

Discussion

The purpose of this study was to investigate the impact of the TPSR model on social responsibility, personal responsibility, sportsmanship, fundamental psychological needs (autonomy, competence, and social relationships) and motivation on children and adolescents physical education students. The TPSR model had a significant effect on all these variables. This is the first meta-analysis that summarizes and analyses the effect of this pedagogic model on children and adolescents' physical education students. In this sense, systematic reviews have been previously carried out, however they mainly focus on the competitive and extracurricular field (Baptista et al, 2020) and previous systematic review indicated that there is little research carried out in this regard in the school environment and that the application of this model in physical education classes is a minority, being applied mainly in the extracurricular context (Caballero-Blanco et al., 2013). In addition, another's systematic review of this model did not include a meta-analysis (Pozo et al., 2016; Shen et al., 2022).

The results showed a significant improvement in social responsibility, which is in line with other studies (Baptista et al., 2020; Caballero-Blanco et al., 2013; Menéndez-Santurio & Fernández-Río, 2016). Improvements in social responsibility were also associated with a reduction in aggressive and disruptive behaviour among students and an increase in positive social behaviours, including conflict resolution (Gordon, 2010). The meta-analysis found significant differences in most studies that analysed this variable, indicating that the TPSR model could have a significant effect compared to a conventional methodology. However, four investigations did not reach significant differences (García-García et al., 2021; Manzano-Sánchez et al., 2019; Manzano-Sánchez et al., 2021). The main reasons for these results could be the duration of the interventions and that social responsibility is presented at the last level of the intervention program.

Similarly, the meta-analysis found significant differences in personal responsibility, which is related to a decrease in aggression and disruptive behaviours in students (Gordon, 2010); as well as in other reviews in similar and extracurricular contexts (Caballero-Blanco et al., 2013; Menéndez-Santurio & Fernández-Río, 2016). The development of personal responsibility can lead students to associate sportsmanship as a positive characteristic and violence as a negative one (Cecchini et al., 2003). The TPSR model can also create a positive learning environment that influences behavior in physical education (PE) and allows students to make decisions and express their opinions (Dyson et al., 2020). The meta-analysis found significant differences in this variable, indicating that the TPSR model could be more effective compared to a conventional methodology.

Regarding sportsmanship, the meta-analysis found significant differences. The TPSR model is ideal for developing sportsmanship in students, according to other studies (Wright & Burton, 2008). Improvements in responsibility can be associated with increased levels of sportsmanship, leading to educational sporting practices based on pro-social values and the reduction of violence, allowing the existence of an ideal school climate for the development of the students' learning process (Gutiérrez et al., 2011). The TPSR model could also help to reduce unsporting behavior associated with foul play

or giving too much importance to winning (Wright & Burton, 2008). Additionally, values such as "self-control, care and empathy" play an essential role in the development of students' sportsmanship (Merino-Barrero et al., 2020). However, one investigation found opposite results (Sánchez-Alcaraz et al., 2019). Generally, significant differences are obtained with respect to the investigations that studied sportsmanship, indicating that the TPSR model could have a greater effect compared to a conventional methodology.

In relation to the basic psychological needs, the meta-analysis reveals significant differences for autonomy, competence, and social relations, supported by other studies (Caballero-Blanco et al., 2013; Pardo & García-Arjona, 2011). Higher levels of responsibility among students are linked to greater perceptions of autonomy, competence, and relatedness, resulting in self-determined motivation (Belando-Pedreño et al., 2015). Intrinsic motivation is also positively associated with autonomy (Menéndez-Santurio & Fernández-Río, 2016). Autonomous activities are essential to develop both types of responsibility (Escartí et al., 2013). However, interventions focusing on female students did not lead to significant differences in autonomy (Manzano-Sánchez et al., 2019), nor did another intervention that did not compare gender (Menéndez-Santurio & Fernández-Río, 2016). Competence was improved in connection with other investigations (Menéndez-Santurio & Fernández-Río, 2016), and social responsibility was found to be a crucial factor for student development and success in the TPSR model (Hellison, 2011). This variable had a greater effect compared to autonomy and competence (Merino-Barrero et al., 2020). In general, the meta-analysis shows significant differences in the three variables of basic psychological needs, indicating that the TPSR model may have a greater impact compared to conventional methodologies.

There is a possible relationship between basic psychological needs and intrinsic motivation (Méndez-Giménez et al., 2017). This meta-analysis found improvement in intrinsic motivation, as well as other studies (Escartí et al., 2013). Personal and social responsibility are positively associated with intrinsic motivation in PE (Li et al., 2008). Improving intrinsic motivation has significant benefits for students, including increased intention to be physically active (Méndez-Giménez et al., 2017). However, one intervention did not show significant differences in intrinsic motivation for either gender (Manzano-Sánchez et al., 2019). Nevertheless, the meta-analysis determines significant differences in this variable, indicating that the TPSR model may have a better influence compared to conventional methodologies.

The meta-analysis reveals significant differences in pre- and post-test extrinsic motivation for both groups in the two investigations, supported by other studies (Escartí et al., 2013). A novel project-based model was also found to have a significant effect compared to traditional methodology (Bayonas-Plazas & Baena-Extremera, 2017). However, educators should understand that an extrinsic motivational climate may not promote long-term development and may impede the development of an intrinsic motivational climate.

Based on the findings of this study, significant differences in demotivation were observed in two articles (Manzano-Sánchez et al., 2021; Merino-Barrero et al., 2020), which is consistent with previous research (Escartí et al., 2013; Valero-Valenzuela et al., 2020). These studies suggest that the Teaching Personal and Social Responsibility (TPSR) model promotes motivation and interest in the subject, while reducing demotivation and boredom. However, the meta-analysis also reveals non-significant results for both genders in some interventions (Manzano-Sánchez et al., 2019), and it is suggested that the baccalaureate-designed intervention may not have improved extrinsic motivation. Other studies with similar results did not separate gender, but had longer interventions with more participants, which may have influenced the significant findings (Manzano-Sánchez & Valero-Valenzuela, 2019). TPSR is found to decrease demotivation and increase motivation, leading to increased participation and interest in the subject (García-Castejón et al., 2021), and the meta-analysis indicates that TPSR may have a greater effect compared to more conventional methodologies.

However, it is important to note that the interventions in this study were all conducted in schools in Spain, and results may differ in other countries with different cultures. Furthermore, while TPSR is considered a consolidated model, it is not one of the most prominent pedagogical models in the educational field, and there are fewer interventions with pre- and post-test measures compared to other models. Therefore, more studies are needed to provide consistent results.

In terms of future applications, further research should explore additional variables related to physical activity, quality of life, academic performance, and happiness to determine whether TPSR can also lead to significant improvements in these areas. For example, the Sport Education model conducted a meta-analysis on the variables of basic needs, intrinsic motivation, and prosocial attitudes and similar investigations could be carried out with TPSR. Likewise, it could be linked to specific curricular elements, such as previous research that proposes an innovative model of applying and adapting the principles of sports teaching during physical fitness tests (Carriedo, et al., 2020).

Conclusions

The meta-analysis reveals that the TPSR model-based intervention is significantly more effective in promoting social and personal responsibility, sportsmanship, basic psychological needs, intrinsic and extrinsic motivation, and reducing demotivation on children and adolescents' physical education students compared to other more conventional and traditional

pedagogical approaches. Thus, the study provides evidence for the benefits and positive effects of the TPSR model on students, facilitating their holistic development and enhancing the teaching-learning process. Given the advantages of the TPSR model, it represents a valuable alternative to the more widely used conventional pedagogical approaches in Physical Education. Furthermore, despite being one of the least known and utilized models, the significant outcomes of this research suggest that the TPSR model should be more frequently implemented in educational settings.

Ethics Committee Statement

Not applicable due to the type of systematic review research presented.

Conflict of Interest Statement

The authors have no conflict of interest.

Authors' Contribution

Conceptualization P.N.T., E.R.L. & N.G.G; Methodology P.N.T. & N.G.G.; Software P.N.T. & E.R.L.; Validation E.R.L. & N.G.G.; Formal Analysis P.N.T. & N.G.G.; Investigation P.N.T., E.R.L. & N.G.G.; Resources P.N.T. & E.R.L.; Data Curation P.N.T.; Writing – Original Draft P.N.T., E.R.L. & N.G.G.; Writing – Review & Editing P.N.T., E.R.L. & N.G.G.; Visualization E.R.L. & N.G.G.; Supervision E.R.L. & N.G.G. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author [erlara@ucam.edu].

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Eating disorders and psychological well-being in non-elite team athletes

Trastornos de la conducta alimentaria y bienestar psicológico en deportistas de equipo no elite

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Abstract

The aim of this preliminary work was to determine the prevalence of Eating Disorders (ED) in non-elite national team sports athletes and to describe their perceived psychological well-being based on the PERMA model. Additionally, it analyzes psychological well-being based on the risk of presenting symptoms related to ED. Seventy-one athletes participated in the study. The 'PERMA-Profiler' questionnaires and the abbreviated version of the Athlete's Eating Habits Questionnaire, CHAD-B, were used. The results show that 25.3% of the athletes are at high risk of suffering from an eating disorder. There are no statistically significant differences based on sex in the risk of ED. Athletes report a psychological well-being score of 7.6 on a scale of 0-10. The most prominent dimensions are social relationships and meaning; on the other hand, the Accomplishment scale received the lowest scores. We did not observe significant differences in psychological well-being based on the risk of ED, nor based on sex. This study provides relevant information for coaches and sports psychologists, who should pay special attention to the detection of ED cases that are invisible, denied, or unrecognized. Additionally, it is recommended to enhance optimism, emotional intelligence, and intrinsic motivation for improved well-being.

Keywords: Psychological well-being, PERMA, eating disorders, sport, mental health.

Resumen

El objetivo de este trabajo preliminar fue conocer la prevalencia de Trastornos de la Conducta Alimentaria (TCA) en deportistas de deportes de equipo nacionales no-élite y describir su bienestar psicológico percibido a partir del modelo PERMA. Además, analizar el bienestar psicológico en función del riesgo de presentar sintomatología relacionada con TCA. En el estudio participaron 71 deportistas. Se utilizaron los cuestionarios «PERMA-Profiler», y el Cuestionario de Hábitos Alimentarios del Deportista, versión abreviada CHAD-B. Los resultados muestran que un 25.3% de los deportistas presentan alto riesgo de sufrir un TCA. No hay diferencias estadísticamente significativas en función del sexo en el riesgo de TCA. Los deportistas presentan un bienestar psicológico de 7.6 en un rango de 0-10. Las dimensiones más destacadas son Relaciones sociales y Significado; por el contrario, la escala Sentimientos de Logro fue la que obtuvo menores puntuaciones. No observamos diferencias significativas en el bienestar psicológico en función del riesgo de TCA, ni en función del sexo. Este estudio nos ofrece información relevante para entrenadores y psicólogos deportivos, que tendrían que poner especial atención en la detección de casos de TCA, invisibilizados, negados o no reconocidos. Además, se recomienda aumentar su optimismo; inteligencia emocional; y motivación intrínseca; para una mejora del bienestar.

Palabras clave: Bienestar psicológico, PERMA, Trastornos de alimentación, deporte, salud mental.

Introduction

While sports participation provides unquestionable benefits for individuals' health and well-being, it is known that athletes are exposed to additional risks that can affect their mental health, such as an increased risk of Eating Disorders (ED) (Chang et al., 2019).

ED present a hurried social expansion, increasing their prevalence from 3.5% for the period 2000-2006 to 7.8% for the period 2013-2018; These disorders are characterized by serious alterations in eating behavior and body weight, which lead to multiple psychiatric and somatic complications that can, sometimes, cause an increase on mortality; ED are common in adolescents and even more so in young adults, with a higher prevalence in women than in men (Galmiche et al., 2019).

During the COVID-19 pandemic, the incidence of ED has continued to growing up (Silén & Keski-Rahkonen, 2022); Furthermore, it has been described that the prevalence of ED could be underestimated due to the lack of inclusion of all types of ED in epidemiological surveys (Qian et al., 2022).

It is known that ED means a threat to the physical, psychological and social well-being of the person. Furthermore, in the case of athletes, the imbalance caused by an ED can be aggravated due to exercising without the necessary availability of energy and nutrients (Baldó-Vela et al., 2021). In fact, previous studies have shown a high prevalence of low energy availability in female athletes and dancers (Torres-McGehee et al., 2021) either for unintentional reasons (such as an involuntary dietary deficit or excessive energy expenditure) or intentional (for example, by purgative methods associated with ED).

A recent meta-analysis has concluded that athletic and non-athletic women report similar levels of ED (Chapa et al., 2022) with concerns mostly focused on weight loss (Treasure et al., 2020). However, in high-performance athletes, ED are more prevalent than in the normal population (Sundgot-Borgen & Torstveit, 2004), reaching up to 36% of prevalence (Perry et al., 2022).

In men, ED present concerns mainly focused on their body image and muscles (Treasure et al., 2020). These are disorders that can be invisible and underestimated due to their own prejudices, since historically ED are a kind of mental disorders associated with the female and with an external appearance, sometimes deceptively healthy (Limbers et al., 2018). Elite male athletes are more vulnerable to ED compared to men in the general population (Souter et al., 2018), as happened with elite female athletes (Sundgot-Borgen & Torstveit, 2004).

ED in sports have been classically associated with women who practice aesthetic sports, sports with a weight category, gym, endurance sports (Baldó-Vela et al., 2021) and elite sports (Perry et al., 2022; Rice et al., 2016; Souter et al., 2018). This has led to a lack of studies of male populations and non-elite team athletes (semi-professional or amateur), although there are previous studies that have begun to question the traditional classification of sports as high or low risk of ED (Godoy-Izquierdo et al., 2019). Therefore, it is possible to hypothesize that non-elite male athletes may be a population that is particularly vulnerable to ED, due to greater pressure from intermediate categories to reach the highest level of performance without having all the resources needed to do so (Baldó-Vela & Bonfanti, 2019; Baldó-Vela et al., 2021).

Although ED may be more prevalent in some athletes, other studies affirm that sport can be a protective factor, due, for example, to an increase in self-confidence and well-being. Psychological well-being has been the object of study in athletes, but there are no previous studies that start from the analysis of the perception of well-being in athletes with the Seligman's (2011) model, constituting the theoretical framework called PERMA, which evaluates elements of well-being such as positive emotions, engagement, relationships, meaning and accomplishment. There is also no previous evaluation of differences based on sex, which could be substantial (Romero et al., 2009).

Therefore, taking into account the background above mentioned, the aim of this work was to know the updated prevalence of ED in non-elite young adult athletes of national team sports and to describe its relationship with perceived psychological well-being and its fundamental elements through of the PERMA model.

Materials and Methods

Participants

Seventy-one Spanish, federated, non-elite athletes (semi-professional and amateur) took part in the present study, from five non-aesthetic team sports disciplines: football, volleyball, hockey, basketball and futsal. Thirty-eight of the athletes were women (54.16%) and 33 were men (45.83%), aged between 18 and 40 years (M = 24.5; SD = 4.7). Convenience sampling has been carried out.

The athletes evaluated were young adults covering ages within the vulnerability range for eating disorders (ED) (Galmiche et al., 2019). Furthermore, they were semi-professional and amateur, to collect information from non-elite athletes (the vast majority of athletes), that is, federated athletes participating in regulated competitions whose dedication and remuneration is less than professional; and athletes who practice sports for leisure, health or exercise reasons, but without receiving any salary in return.

Most of the sample (62.5%) had a university degree or were university students, 19.4% had a high school degree, and 18.1% had technical education. All study participants had been practicing sports for five or more years. 31.1% of the sample practiced sports less than 4 days per week, while 68.1% training or playing at least four times or more per week. Twelve of the athletes surveyed were mildly or moderately injured at the time of data collection (16.7%). All athletes were interviewed during training and/or competition periods.

Instruments

A questionnaire was developed ad hoc for this study was applied to the athletes, which included 3 sections. Through this self-developed questionnaire, sociodemographic and sports variables were collected (date of birth, sex, type of sport, etc.).

The second section of the questionnaire included the "PERMA-Profiler" test (Butler & Kern, 2016) to evaluate perceived psychological well-being. The PERMA-Profiler is a scale that measures the five pillars or dimensions of well-being proposed in the PERMA theory: positive emotions, engagement, relationships, meaning and accomplishment, together with contrast variables (negative emotions, loneliness and the perception of health).

Positive Emotions refers to how pleasant and satisfying emotions are experienced, such as optimism, gratitude and humor. These emotions are important for well-being and have the potential to increase people's personal, intellectual, and social resources.

Engagement means being completely involved and engaged to life. This includes having optimal experiences using personal strengths to successfully complete tasks in everyday life.

Interpersonal Relationships is the pillar of well-being that deals with the ability to establish and experience healthy relationships in various life areas. This includes empathy, the development of healthy social relationships, affective bonds, and social intelligence.

The Meaning dimension is found in the identification and application of personal strengths to carry out activities that transcend the individual. This may involve altruistic actions to benefit others, contribute to social well-being, and establish healthy relationships at different stages of development.

Accomplishment refers to achieving personal goals and objectives that have significant intrinsic value. It involves developing individual potential by striving for meaningful results in different life areas and persevering despite challenges.

The PERMA-Profiler scale was translated into Spanish following the International Testing Commission's Guidelines for the translation and adaptation of tests (International Testing Commission, 2017). This translation, like the original scale, is composed of 23 Likert-type response items in the range of 0 to 10. It presents a Cronbach's α of between .65 and .94 for each of the factors.

Finally, the third section of the questionnaire includes an instrument to detect the risk of ED specific to athletes. Specifically, the Athlete's Eating Habits Questionnaire in its abbreviated version CHAD-B was applied (Díaz & Dosil, 2012) (available upon request). This test was designed and validated specifically to evaluate the risk of eating pathology in Spanish athletes, and the abbreviated version consists of 20 Likert-type response items, ranging from 1 to 6 (1 "completely disagree" (not It never happens to me) and 6 "completely disagree" (it always happens to me). According to the authors, the 20 items constitute four dimensions. Dimension 1 is the fear of gaining weight during periods of rest and physical exercise. Dimension 2 is defined as psychological discomfort associated with weight and body shape against comments and attitudes of others. Dimension 3 is obsessive concern about food and weight in relation to peers, while Dimension 4 expresses cognitions related to body satisfaction and self-image. Currently, it constitutes the only screening questionnaire in Spanish, valid, reliable and specific for the detection of ED in sport players. It has been validated with a Cronbach's α of .93. A score of ≥ 60 points indicates high risk and ≥ 66 is the cut-off point to determine very high risk (Díaz & Dosil, 2012). The Cronbach's α observed in this study was .96 for the total scale.

Procedure

To carry out this research, different sports clubs in Cantabria were contacted through their coaches or physiotherapists, to explain the aim of the work and request the possibility of collecting the data. At the time when consent was obtained, as a team, an appointment was made to go to the sports facilities where the training sessions of the different clubs took place. A thoroughly explanation of the objectives of the research was conducted. The attendance of this session was necessary for the study participants to complete the test. In this session, participants gave their consent to participate, assuming the confidentiality and anonymity of the data. Furthermore, if they wish, they could dropout the survey at any time, and the responses will be withdrawn from the study. The procedure was approved by the Ethics Committee of the Catholic University of Murcia CEO072301.

Statistical Analysis

A cross-sectional observational study has been carried out. Descriptive analyzes and frequency studies have been carried out, as appropriate. The Kolmogorov-Smirnoff test was used to determine the normality of the variables. To compare the scores obtained in well-being and risk of ED, the *t* test for independent samples was used, and the Levene test was carried out to check the homogeneity of variances. All these procedures were done to compare whether there were possible differences between groups depending on different variables. All statistical procedures were carried out with the SPSS-27.0 statistical program. A statistical significance level of $p < .05$ was established.

Results

Of the athletes, 25.3% were at risk of developing an eating disorder (ED) (18.3% women and 7.0% men). Athletes at high risk for ED showed notable self-reported psychological well-being ($M = 7.7$). The least highlighted area was Positive Emotions ($M = 7.17$), and the most strengthened area was Relationships ($M = 8.6$). There are no statistically significant differences in CHAD scores between men and women ($p = .20$) although women had higher mean scores for ED risk.

The psychological well-being perceived by athletes was similar between those with high risk of ED and those without ($p = .52$). However, the Engagement dimension had higher scores in athletes with high risk of ED ($p = .01$) (Table 1).

Table 1
Total well-being scores (PERMA) and its dimensions in not elite teams athletes depending on whether or not they were at risk of eating disorders

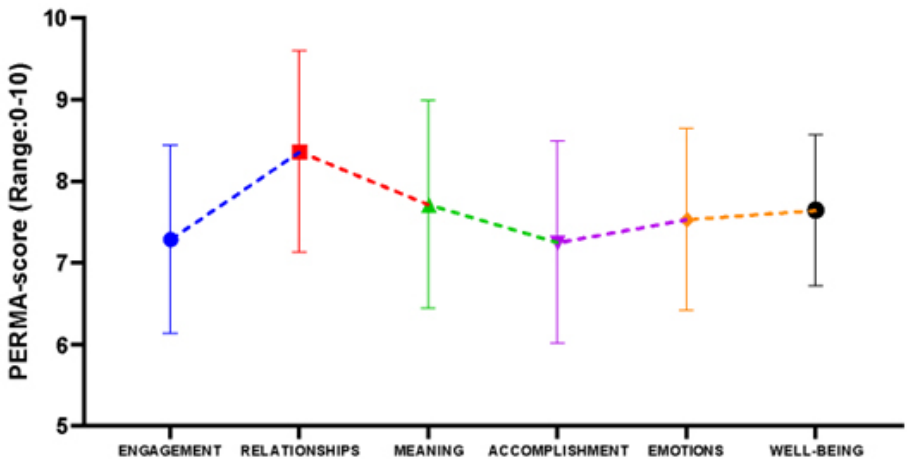
	NO RISK (*n* = 53)	RISK (*n* =18)	*t*	*p*	Effect size (*d*)
ENGAGEMENT	7.09 ± 1.12	7.87 ± 1.09	- 2.5562	.013	- 0.6974
RELATIONSHIPS	8.26 ± 1.2	8.67 ± 1.04	- 1.2001	.234	- 0.3274
MEANING	7.71 ± 1.26	7.74 ± 1.33	- 0.0861	.932	- 0.0235
ACCOMPLISHMENT	7.18 ± 1.28	7.46 ± 1.13	- 0.8283	.410	- 0.2260
EMOTIONS	7.66 ± 1.04	7.17 ± 1.30	1.6365	.106	0.4464
WELL-BEING	7.60 ± 0.94	7.77 ± 0.89	- 0.6417	.523	- 0.1750

Note: Data represent mean ± *SD*. To compare athletes with or without risk of eating disorders, the Student t test was used. The effect size has been determined according to Cohen's parameter.

The perceived psychological well-being for all athletes had a mean score of 7.6 and a *SD* = 0.92 in a range of 0-10, with minimum scores of 4.75 and maximum scores of 9.19. The average score for the 25th percentile was 7.12, for the p50 7.84, and for the p75 the score was 8.25.

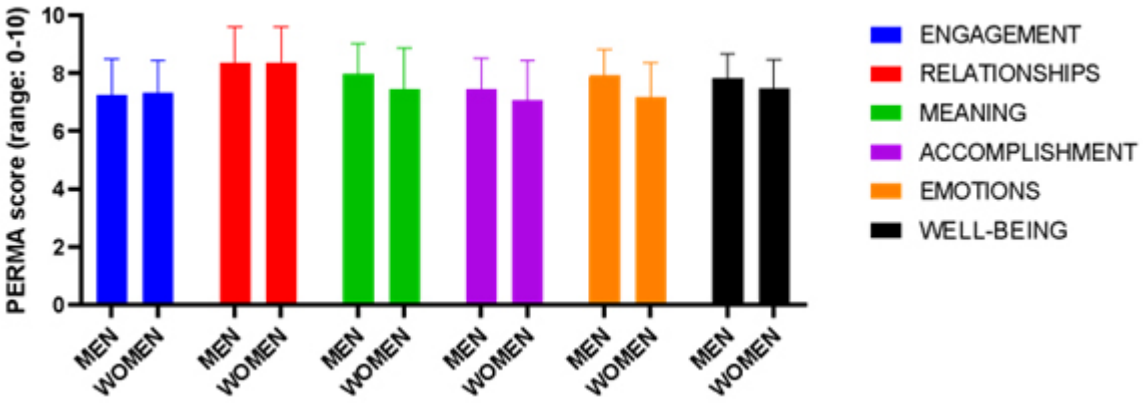
The dimensions of perceived psychological well-being exhibited different levels, as shown in Figure 1. The dimension of relationships was the one that showed the highest score, compared to the dimensions of engagement and accomplishment, which showed the lowest values. Nevertheless, both total well-being and all dimensions were always within a range of high scores (above seven out of ten points) (Figure 1).

Figure 1
Total well-being scores (PERMA) and its dimensions in athletes non-elite team de equipo no-elite



Reviewing differences in well-being based on sex, the data showed a higher score in men in the Positive Emotions dimension ($p < .001$). On the other hand, although no significant differences were observed in the perceived psychological well-being ($p = .100$) between men and women, the mean scores were higher in men (Figure 2).

Figure 2
Total well-being scores (PERMA) and its dimensions in team athletes non-elite based on sex



Discussion

The present work arose with the objective of knowing the prevalence of Eating Disorders (ED) in non-elite young adult athletes of national team sports and describing its relationship with psychological well-being perceived from the PERMA model. According to this, it can be stated that 26.4% of the participants in the study presented symptoms compatible with the presence of an ED, 7% are men, which indicates a lower prevalence of ED risk than that detected in other studies such as the de Baldó-Vela et al. (2022) who detected a 20.36% prevalence of a clinical profile compatible with an eating disorder in male athletes from amateur, professional and semi-professional teams; and also less than the 14% found in Spanish semi-professional team athletes (Baldó-Vela & Bonfati, 2019). These differences could be related to the professional category considered, the different sports used or other contexts.

It is important to understand that these data must be known to be able to prevent, detect and avoid comorbidities, such as substance abuse, already described in other studies (Limbers et al., 2018), with a higher prevalence in men (Souter et al., 2018), and that in the medium-long term they could likely disrupt the well-being and performance of athletes.

It should be noted that, in our athletes, no differences in ED based on sex were observed, although women had higher scores. In the same line, recent studies show how female athletes have a higher risk of developing an ED than men (Díaz & Díaz, 2012; Godoy & Díaz, 2021), probably due to pressure, both the sporting and social contexts, to maintain a certain weight or body image (Allan & Owen, 2019).

The fact that there are no differences by sex in the symptomatology of risk detection of an ED is noteworthy, since the care offered for the prevention, detection and treatment of ED symptomatology by coaches and sports psychologists is frequent in the female sex, leaving aside the male.

An initially contradictory result derived from the present work was that the athletes interviewed showed high levels of reported well-being, regardless of the presence or not of ED. This issue is quite striking due to the knowledge of the comorbid problems associated with them, which seem to be invisible, denied or not recognized.

The most prominent dimension of well-being in athletes coincides with the most prominent in the literature within the psychological well-being of the PERMA model, which specifically is Relationships, or the ability to establish and experience healthy relationships in various areas of life, including empathy, the development of healthy social relationships, emotional bonds and social intelligence. These social relationships could be protecting the overall well-being of athletes.

The least prominent dimension in the perceived well-being of the athletes evaluated in the present work was Accomplishment, which refers to achieving personal goals and objectives that have significant intrinsic value. Accomplishment involves developing individual potential by dealing with meaningful results in different areas of life and persevering despite challenges. This information highlights the importance of continuing to work on the intrinsic motivation of athletes.

In the case of athletes detected as being at high risk of presenting an ED, experiencing positive, pleasant and desirable emotions is observed as the most damaged area in their well-being.

The reported well-being was higher in men, as reported in previous research (Reche et al., 2022), although not significantly in the present study. Male athletes scored higher than female athletes on how they experienced pleasant and satisfying emotions, such as optimism, gratitude, and humor. These emotions are important for well-being and have the potential to increase personal, intellectual, and social resources.

The limitations of the present study are associated with its cross-sectional nature, in addition to the small sample size due to its preliminary nature. On the other hand, this study was carried out with a self-report methodology, which is related to the limitations of this research methodology.

Regarding practical application, this study shows the importance of encouraging positive emotions in non-elite Spanish team sport women and improving accomplishment, both in men and women.

Thus, it is recommended to pay special attention to emotional intelligence, a variable that has been seen to affect the psychological well-being of athletes (Núñez et al., 2011). Furthermore, it is suggested to intervene in dispositional optimism since it has been described that a high optimism is associated with higher Accomplishment dimension of the PERMA model (Fernández Abascal & Díaz, 2022). Likewise, it is recommended to mediate to improve intrinsic motivation, and to develop strategies focused on the task and the sports experience, which appear in previous studies as predictors of sports psychological well-being (Cantón-Chirivella et al., 2015).

Another practical application is the need to raise awareness of the high existence of ED (without differences based on sex) among football, volleyball, hockey, basketball and futsal coaches, despite the perceived well-being of the athletes. The prevalence estimates for EDs can vary by sport and context, but what, certainly, these disorders are likely underrecognized, underreported, and frequently, underdiagnosed, especially in men (Eichstadt et al., 2020). Finally, it would be necessary to carry out psychoeducational programs to give athletes skills to become aware of their disorder.

As future lines of research, it would be interesting to implement positive third-generation interventions and psychoeducation in athlete care programs, taking into account the sex differences found, and to evaluate progression of these athletes at long-term.

Conclusions

According to the results of this study and its discussion and analysis, the following main conclusions can be drawn:

The psychological well-being perceived by non-elite athletes is medium-high. The dimension that stands out the least is accomplishment and the most strengthened are relationships. Men present greater positive emotions than women.

Twenty-five percent of team athletes are at high risk of having an ED, mostly women in our national context. Their symptoms related to an ED do not interfere with their perceived psychological well-being.

Men and women do not differ in perceived psychological well-being or ED, although men's scores were higher in the case of well-being and lower in symptomatology related to an ED.

Male non-elite team sports players present the same risk as women for developing ED.

The same attention should be carried out for men and women, mainly by coaches and sports psychologists, in the prevention, detection and treatment of ED symptoms, to generate programs that can make athletes aware of their disorder, whether denied, invisible or not recognized.

This study also shows the need to screen for ED among non-elite team athletes and not underestimate the real prevalence, which reaches 25% of them. In this way, we promote early detection of ED symptoms for intervention.

Ethics Committee Statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad Católica de Murcia (registration code CEO072301., date of approval: 21 July 2023).

Conflict of Interest Statement

None.

Authors' Contribution

Conceptualization I.D.C. & C.R.G.; Methodology I.D.C.; Software J.J.H.M.; Validation J.J.H.M., & C.R.G.; Formal Analysis C.R.G.; Investigation I.D.C.; Resources J.J.H.M.; Data Curation C.R.G.; Writing – Original Draft I.D.C. & C.R.G.; Writing – Review

& Editing J.J.H.M. & C.R.G.; Visualization J.J.H.M.; Supervision J.J.H.M.; Project Administration C.R.G.; Funding Acquisition None. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available under reasonable request to the corresponding author (jjhernandez@ucam.edu).

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Trastornos de la conducta alimentaria y bienestar psicológico en deportistas de equipo no elite

Eating disorders and psychological well-being in non-elite team athletes

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Resumen

El objetivo de este trabajo preliminar es conocer la prevalencia de Trastornos de la Conducta Alimentaria (TCA) en deportistas de deportes de equipo nacionales no-élite y describir su bienestar psicológico percibido a partir del modelo PERMA. Además, analizar el bienestar psicológico en función del riesgo de presentar sintomatología relacionada con TCA. En el estudio participaron 71 deportistas. Se utilizaron los cuestionarios «PERMA-Profiler», y el Cuestionario de Hábitos Alimentarios del Deportista, versión abreviada CHAD-B. Los resultados muestran que un 25.3% de los deportistas presentan alto riesgo de sufrir un TCA. No hay diferencias estadísticamente significativas en función del sexo en el riesgo de TCA. Los deportistas presentan un bienestar psicológico de 7.6 en un rango de 0-10. Las dimensiones más destacadas son Relaciones sociales y Significado; por el contrario, la escala Sentimientos de Logro fue la que obtuvo menores puntuaciones. No observamos diferencias significativas en el bienestar psicológico en función del riesgo de TCA, ni en función del sexo. Este estudio nos ofrece información relevante para entrenadores y psicólogos deportivos, que tendrían que poner especial atención en la detección de casos de TCA, invisibilizados, negados o no reconocidos. Además, se recomienda aumentar su optimismo; inteligencia emocional; y motivación intrínseca; para una mejora del bienestar.

Palabras clave: Bienestar psicológico, PERMA, Trastornos de alimentación, deporte, salud mental.

Abstract

The aim of this preliminary work is to know the prevalence of Eating Disorders (ED) in non-elite national team sports athletes and to describe their perceived psychological well-being based on the PERMA model. Additionally, analyze psychological well-being based on the risk of presenting symptoms related to ED. 71 athletes participated in the study. The "PERMA-Profiler" questionnaires and the Athlete's Eating Habits Questionnaire, CHAD-B abbreviated version, were used. The results show that 25.3% of athletes are at high risk of suffering from an eating disorder. There are no statistically significant differences based on sex in the risk of ED. Athletes present a psychological well-being of 7.6 in a range of 0-10. The most prominent dimensions are social relationships and meaning; In other hand, the Feelings of Achievement scale was the one that obtained the lowest scores. We did not observe significant differences in psychological well-being depending on the risk of ED, nor depending on sex. This study offers us relevant information for coaches and sports psychologists, who would have to pay special attention to the detection of ED cases, made invisible, denied or not recognized. Additionally, it is recommended to increase your optimism; emotional intelligence; and intrinsic motivation; for improved well-being.

Keywords: Psychological well-being, PERMA, eating disorders, sport, mental health.

Introducción

Mientras que la participación deportiva proporciona incuestionables beneficios a la salud y bienestar de los individuos, es sabido que los deportistas están expuestos a riesgos adicionales que pueden afectar su salud mental, como los Trastornos de la Conducta Alimentaria (TCA) (Chang et al., 2019).

Los TCA presentan una vertiginosa expansión social, aumentando su prevalencia de un 3.5% para el periodo de 2000-2006 al 7.8% para el periodo de 2013-2018; estos trastornos se caracterizan por alteraciones graves en el comportamiento alimentario y el peso corporal, que conducen a múltiples complicaciones psiquiátricas y somáticas que, en ocasiones, pueden causar la muerte de la persona; son frecuentes en adolescentes y más aún en adultos jóvenes, con una prevalencia mayor en mujeres que en hombres (Galmiche et al., 2019).

Durante la pandemia de COVID-19, la incidencia de los trastornos alimentarios ha seguido aumentando (Silén & Keski-Rahkonen, 2022); y además, se ha descrito que la prevalencia de los trastornos alimentarios podría estar subestimada por falta de inclusión de todos los tipos de TCA en las encuestas epidemiológicas (Qian et al., 2022).

Es sabido que los TCA suponen una amenaza para el bienestar físico, psicológico y social de la persona. Además, en el caso de los deportistas, el desequilibrio originado por un TCA puede agravarse debido a la práctica de ejercicio sin la necesaria disponibilidad de energía y nutrientes (Baldó-Vela et al., 2021). De hecho, estudios previos han mostrado una alta prevalencia de baja disponibilidad de energía en atletas y bailarinas femeninas (Torres-McGehee et al., 2021) ya sea por motivos no intencionados (como un déficit alimentario no voluntario o un excesivo gasto energético) o intencionados (por ejemplo, por métodos purgativos asociados a TCA).

Recientemente, se ha concluido por meta análisis que las mujeres deportistas y no deportistas reportan niveles similares de TCA (Chapa et al.,2022) con preocupaciones mayoritariamente centradas en la pérdida de peso (Treasure et al., 2020). Sin embargo, en deportistas de alto rendimiento, los TCA son más prevalentes que en población normal (Sundgot-Borgen & Torstveit, 2004), alcanzando hasta a un 36% de los mismos (Perry et al., 2022).

En el caso de los hombres, los TCA presentan preocupaciones centradas con su imagen corporal y musculatura (Treasure et al., 2020). Se trata de trastornos que pueden ser invisibles y subestimados debido a sus propios prejuicios, ya que históricamente los TCA son una patología asociada al sexo femenino y con una apariencia externa, en ocasiones, engañosamente saludable (Limbers et al., 2018). Los deportistas élite masculinos son más vulnerables a los trastornos alimentarios en comparación con los hombres de la población general (Souter et al., 2018), al igual que se observa con las deportistas élite (Sundgot-Borgen & Torstveit, 2004).

Los TCA en el deporte se han asociado clásicamente a mujeres que practican deportes estéticos, deportes con categoría de peso, gimnasio, deportes de resistencia (Baldó-Vela et al., 2021) y deporte de élite (Perry et al., 2022; Rice et al., 2016; Souter et al., 2018). Esto ha dado lugar a una falta de estudios de poblaciones masculinas y deportistas de equipo no élite (semiprofesionales o amateur), a pesar de que hay trabajos que han empezado a cuestionar la clasificación tradicional de los deportes como alto o bajo riesgo (Godoy-Izquierdo et al., 2019). Por ello, es posible hipotetizar que los hombres deportistas no de élite pueden ser una población particularmente vulnerable a los TCA, por una mayor presión de las categorías intermedias para alcanzar el nivel más alto de competencia sin tener todos los recursos materiales y económicos necesarios para ello (Baldó-Vela & Bonfanti, 2019; Baldó-Vela et al., 2021).

A pesar de que los TCA pueden ser más prevalentes en algunos deportistas, otros estudios afirman que el deporte puede ser un factor protector, debido, por ejemplo, a un aumento de la autoconfianza y el bienestar. El bienestar psicológico ha sido objeto de estudio en deportistas, pero no hay estudios previos que partan del análisis de la percepción de bienestar en deportistas con el modelo de Seligman (2011), constituyendo el marco teórico denominado PERMA, que evalúa elementos del bienestar como las emociones positivas, el compromiso, las relaciones, el significado y los logros. Tampoco lo hay evaluando diferencias en función del sexo, diferencias que podrían ser sustanciales (Romero et al., 2009).

Por tanto, teniendo en cuenta los antecedentes recién comentados, el objetivo de este trabajo es conocer la prevalencia actualizada de TCA en deportistas de adultos jóvenes no élite de deportes de equipo nacionales y describir su relación con el bienestar psicológico percibido y sus elementos fundamentales a través del modelo PERMA.

Material y Métodos

Participantes

En el presente estudio participaron 71 deportistas (semiprofesionales y amateur) no-élite españoles, federados, de cinco disciplinas de deportes de equipo no estéticos: fútbol, voleibol, hockey hierba, baloncesto y fútbol sala. Treinta y ocho de las deportistas fueron mujeres (54.16%) y 33 hombres (45.83%), de edades comprendidas entre los 18 y 40 años (M = 24.5; DT = 4.7). Se ha llevado a cabo un muestreo de conveniencia.

Los deportistas evaluados fueron adultos jóvenes abarcando edades consideradas vulnerables para los TCA (Galmiche et al., 2019). Además, fueron semiprofesionales y amateur, para recoger información de deportistas no-élite (la gran mayoría de los deportistas), es decir, deportistas federados participantes en competiciones regladas cuya dedicación y remuneración es inferior a la profesional; y deportistas que practican deporte por motivos de ocio, de salud o para hacer ejercicio, pero sin recibir a cambio ningún sueldo.

Un 62.5% de la muestra poseían o cursaban una titulación universitaria, un 19.4% bachillerato, y el 18.1% formación profesional. Todos los participantes del estudio practicaban deporte desde hace 5 o más años. El 31.1 % de la muestra practicaba deporte menos de 4 días por semana, siendo el 68.1% los que entrenaban o jugaban al menos 4 veces o más por semana. Doce de los deportistas encuestados se encontraban lesionados de forma leve o moderada en el momento de recoger los datos (16.7%). Todos los deportistas fueron entrevistados en periodo de entrenamiento y/o competición.

Instrumentos

Se aplicó a los deportistas un cuestionario elaborado ad hoc para este estudio en el que se incluían 3 secciones. Un cuestionario de elaboración propia mediante el que se recogieron variables sociodemográficas y deportivas (fecha de nacimiento, sexo, tipo de deporte, etc.).

La segunda sección del cuestionario incluyó el test «PERMA-Profiler» (Butler & Kern, 2016) para evaluar el bienestar psicológico percibido. El PERMA-Profiler es una escala que mide los cinco pilares o dimensiones del bienestar propuestos en la teoría PERMA: emociones positivas, compromiso, relaciones, significado y logros, unidos a variables de contraste (las emociones negativas, la soledad y la percepción de la salud).

Las Emociones positivas se refiere a cómo se experimentan emociones agradables y satisfactorias, como el optimismo, la gratitud y el humor. Estas emociones son importantes para el bienestar y tienen el potencial de aumentar los recursos personales, intelectuales y sociales de las personas.

El Compromiso implica estar completamente involucrado y comprometido con la vida. Esto incluye tener experiencias óptimas al utilizar las fortalezas personales para realizar tareas de manera satisfactoria en la vida cotidiana.

Las Relaciones interpersonales es el pilar del bienestar que trata de la capacidad de establecer y experimentar relaciones sanas en diversas áreas de la vida. Esto incluye la empatía, el desarrollo de relaciones sociales saludables, los vínculos afectivos y la inteligencia social.

El Significado o Sentido se encuentra en la identificación y aplicación de las fortalezas personales para realizar actividades que trasciendan al individuo. Esto puede involucrar acciones desinteresadas en beneficio de otros, contribuir al bienestar social y establecer relaciones saludables en diferentes etapas del desarrollo.

Los sentimientos de Logro se refieren a alcanzar metas y objetivos personales que tienen un valor intrínseco significativo. Implica desarrollar el potencial individual al luchar por obtener resultados significativos en diferentes áreas de la vida y perseverar a pesar de los desafíos.

La escala PERMA-Profiler fue traducida al español siguiendo las Directrices de la Comisión Internacional de Pruebas para la traducción y adaptación de pruebas (Comisión Internacional de Pruebas (ITC), 2017). Esta traducción, igual que la escala original, está compuesta por 23 ítems de respuesta tipo Likert en rango de 0 a 10. Presenta un α de Cronbach de entre .65 y .94 para cada uno de los factores.

Por último, la tercera sección del cuestionario incluye un instrumento para detectar el riesgo de TCA específico para deportistas. En concreto, se aplicó el Cuestionario de Hábitos Alimentarios del Deportista en su versión abreviada CHAD-B. (Díaz & Dosil, 2012) (disponible bajo petición). Este test fue diseñado y validado específicamente para evaluar el riesgo de patología alimentaria en deportistas españoles, y la versión abreviada consta de 20 ítems de respuesta tipo Likert, donde las opciones de respuesta van de 1 a 6 (1 "completamente en desacuerdo" (no me pasa nunca) y 6 "completamente desacuerdo" (me pasa siempre). Según los autores que han validado esta herramienta, los 20 ítems constituyen cuatro dimensiones. La dimensión 1 es el miedo a engordar en periodos de descanso y práctica de ejercicio físico como método de pérdida de peso. La dimensión 2 se define como malestar psíquico asociado al peso y la figura ante comentarios y actitudes de los otros significativos. La dimensión 3 es la preocupación obsesiva por los alimentos y el peso en relación con los compañeros, mientras que la dimensión 4 expresa las cogniciones relativas a la satisfacción corporal y la autoimagen. Actualmente, constituye el único cuestionario de cribado en castellano, válido, fiable y específico para la detección de TCA en el deporte. Ha sido validado con un α de Cronbach de .93. Una puntuación de ≥ 60 puntos indica alto riesgo y ≥ 66 es el punto de corte para determinar un riesgo muy alto (Díaz & Dosil, 2012). El α de Cronbach observado en este estudio fue de .96 para la escala total.

Procedimiento

Para llevar a cabo esta investigación, se contactó con diferentes clubes deportivos de Cantabria a través de sus entrenadores o fisioterapeutas para explicar en qué consiste el trabajo y solicitar la posibilidad de recoger los datos en su club. En el momento en que se obtuvo el consentimiento, como equipo, se concertó una cita para acudir a las instalaciones deportivas en las que se llevaron a cabo los entrenamientos de los diferentes clubes con el objetivo de explicar los objetivos de la investigación y prestar la ayuda que fuera necesaria a los participantes del estudio en la cumplimentación de la prueba. En esta encuesta los participantes dan su consentimiento de participación asumiendo la confidencialidad y anonimato de los datos. Además, en caso de desearlo, podrían abandonar la encuesta en cualquier momento, siendo retiradas las respuestas del estudio. El procedimiento fue aprobado por el Comité de Ética de la Universidad Católica de Murcia CEO072301.

Análisis Estadístico

Se ha llevado a cabo un estudio observacional de corte transversal. Se han realizado análisis descriptivos y estudio de frecuencias, según corresponda. Se empleó el test de Kolmogorov -Smirnoff para conocer la normalidad de las variables. Para comparar las puntuaciones obtenidas en bienestar y riesgo de TCA, se usó la prueba t para muestras independientes, y el test de Levene para comprobar la igualdad de varianzas. Todo ello para comparar si existen diferencias en las medias entre grupos en función de distintas variables. Todos los procedimientos estadísticos se llevaron a cabo con el programa estadístico SPSS-27.0. Se estableció un nivel de significación estadística de $p < .05$.

Resultados

El 25.3% de los deportistas presentaban riesgo de desarrollar un TCA (18.3% mujeres y 7.0% hombres). Los deportistas con alto riesgo de TCA mostraban un notable bienestar psicológico auto-reportado ($M = 7.7$). El área menos destacada fue la de Emociones positivas ($M = 7.17$), y el área más fortalecida fue la de Relaciones sociales ($M = 8.6$). No hay diferencias estadísticamente significativas en las puntuaciones del CHAD entre hombres y mujeres ($p = .20$) aunque las mujeres presentaban puntuaciones medias más elevadas en riesgo de TCA.

El bienestar psicológico percibido por los deportistas fue similar entre aquellos con alto riesgo de TCA y los que no ($p = .52$). Sin embargo, la dimensión de Compromiso presentaba puntuaciones más elevadas en los deportistas con alto riesgo de TCA ($p = .01$) (Tabla 1).

Tabla 1
Puntuaciones de bienestar total (PERMA) y de sus dimensiones en deportistas de equipo no-elite en función de si presentaban riesgo o no de TCA

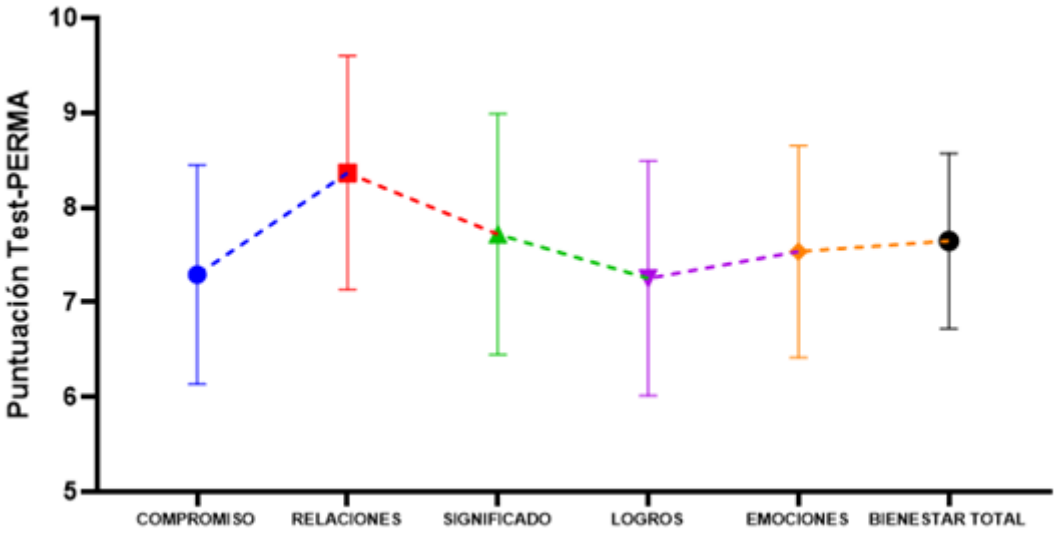
	NO RIESGO (*n* = 53)	RIESGO (*n* = 18)	*t*	*p*	Tamaño efecto (*d*)
COMPROMISO	7.09 ± 1.12	7.87 ± 1.09	- 2.5562	.013	- 0.6974
RELACIONES	8.26 ± 1.2	8.67 ± 1.04	- 1.2001	.234	- 0.3274
SIGNIFICADO	7.71 ± 1.26	7.74 ± 1.33	- 0.0861	.932	- 0.0235
LOGROS	7.18 ± 1.28	7.46 ± 1.13	- 0.8283	.410	- 0.2260
EMOCIONES	7.66 ± 1.04	7.17 ± 1.30	1.6365	.106	0.4464
BIENESTAR	7.60 ± 0.94	7.77 ± 0.89	- 0.6417	.523	- 0.1750

Nota: Los datos representan media ± *DE*. Para comparar deportistas con riesgo o sin riesgo de TCA, se usó la prueba de la t de Student. El tamaño del efecto se ha determinado según el parámetro d de Cohen.

El Bienestar psicológico percibido para la totalidad de deportistas presentaba una puntuación media de 7.6 y una *DT* = 0.92 en un rango de 0-10, con puntuaciones mínimas de 4.75 y máximas de 9.19. La media de puntuaciones del percentil 25 es 7.12, del p50 7.84 y del p75 8.25.

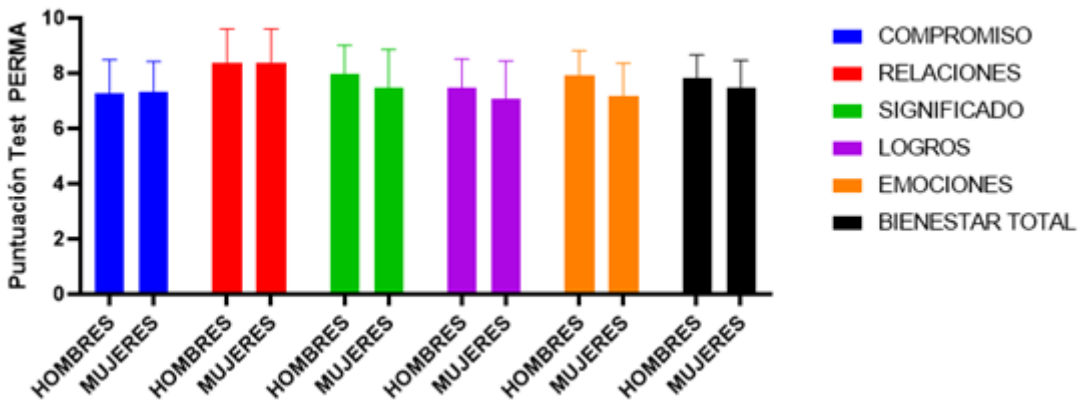
Las dimensiones del bienestar psicológico percibido exhibían diferentes niveles, tal y como se muestra en la figura 1. Las dimensión de Relaciones interpersonales fue la que mostró una mayor puntuación, frente a las dimensiones de compromiso y sentimiento de logro, que mostraron los valores más reducidos. De todos modos, tanto el bienestar total como todas las dimensiones se situaron siempre en un rango de puntuaciones elevadas (por encima de 7 de 10 puntos) (Figura 1).

Figura 1
Puntuaciones de bienestar total (PERMA) y de sus dimensiones en deportistas de equipo no-elite



Revisando diferencias en bienestar en función del sexo, los datos mostraron una puntuación mayor en los hombres en la dimensión de Emociones positivas (p < .001). Aunque no se observaron diferencias significativas en la puntuación total de bienestar psicológico percibido (p = .10) entre hombres y mujeres, las puntuaciones medias fueron más elevadas en los hombres (Figura 2).

Figura 2
Puntuaciones de bienestar total (PERMA) y de sus dimensiones en deportistas de equipo no-elite en función del sexo



Discusión

El presente trabajo surgió con el objetivo de conocer la prevalencia de Trastornos de la Conducta Alimentaria (TCA) en deportistas adultos jóvenes no-élite de deportes de equipo nacionales y describir su relación con el bienestar psicológico percibido desde el modelo PERMA. Según esto, se puede afirmar que el 26.4% de los participantes en el estudio presentaban síntomas compatibles con la existencia de un TCA, el 7% son hombres, lo que indica una prevalencia de riesgo de TCA menor a lo detectado en otros estudios como el de Baldó-Vela et al. (2022) quienes detectaron 20.36% en deportistas hombres de equipo Amateur, profesional y semiprofesional, con un perfil clínico compatible con un TCA; y menos también al 14% encontrado en deportistas de equipo semiprofesionales españoles (Baldó-Vela & Bonfati, 2019). Estas diferencias podrían tener relación con la categoría profesional considerada, los diferentes deportes utilizados u otros contextos.

Destacar que hay que conocer estos datos para poder prevenir, detectar estos trastornos y los comórbidos, como el abuso de sustancias, ya descritos en otros estudios (Limbers et al., 2018), con mayor prevalencia en hombres (Souter et al., 2018), y que quizás a medio-largo plazo puedan interrumpir en el bienestar y rendimiento de los deportistas.

Es de señalar que en nuestros deportistas no se observan diferencias en TCA en función del sexo, aunque las mujeres tenían puntuaciones más elevadas. En la misma línea, recientes estudios ponen de manifiesto cómo las mujeres deportistas tienen más riesgo de desarrollar un TCA que los hombres (Díaz & Díaz, 2012; Godoy & Díaz, 2021), probablemente por una presión tanto desde el contexto deportivo como social a mantener un determinado peso o imagen corporal (Allan & Owen, 2019).

El hecho de que no haya diferencias por sexo en la sintomatología de detección de riesgo de un TCA es de resaltar, pues la atención ofrecida para la prevención, detección y tratamiento de la sintomatología de TCA por parte de entrenadores y psicólogos deportivos es frecuente en el sexo femenino, dejando de lado el masculino.

Un dato inicialmente contradictorio fue que los deportistas entrevistados mostraban niveles elevados de bienestar reportado, independientemente de la presencia o no de TCA. Esta cuestión es bastante llamativa por el conocimiento de los problemas comórbidos asociados a los mismos, que parecen estar invisibilizados, negados o no reconocidos.

El pilar del bienestar más destacado en los deportistas coincide con el más destacado en la literatura dentro del bienestar psicológico del modelo PERMA, que en concreto es el de Relaciones personales, o capacidad de establecer y experimentar relaciones sanas en diversas áreas de la vida, incluyendo la empatía, el desarrollo de relaciones sociales saludables, los vínculos afectivos y la inteligencia social. Estas relaciones sociales podrían estar protegiendo el bienestar global de los deportistas.

La dimensión menos destacada en el bienestar percibido de los deportistas evaluados en el presente trabajo fue la de Sentimientos de Logro, que se refiere a alcanzar metas y objetivos personales que tienen un valor intrínseco significativo. Los sentimientos de logro implican desarrollar el potencial individual al luchar por obtener resultados significativos en diferentes áreas de la vida y perseverar a pesar de los desafíos. Esta información resalta la importancia de seguir trabajando en la motivación intrínseca de los deportistas .

En el caso de los deportistas detectados como con alto riesgo de presentar un TCA, se observa como área más dañada en su bienestar la de experimentar emociones positivas, agradables y deseables.

El bienestar reportado fue mayor en los hombres, como se refiere en investigaciones previas (Reche et al., 2022), aunque no de forma significativa en el presente caso. Los hombres deportistas puntuaron más elevado que las mujeres en cómo experimentaban emociones agradables y satisfactorias, como el optimismo, la gratitud y el humor. Estas emociones son importantes para el bienestar y tienen el potencial de aumentar los recursos personales, intelectuales y sociales de las personas.

Las limitaciones del presente estudio se asocian a su carácter transversal, además del tamaño de la muestra reducido debido a su preliminaridad. Por otra parte, este estudio se realizó con una metodología de autoinforme, lo que está relacionado con las limitaciones propias de esta metodología de investigación.

En cuanto a la aplicación práctica, este estudio muestra la importancia de incentivar las emociones positivas en las mujeres de deporte de equipo españolas no-élite y mejorar los sentimientos de logro, tanto en ellas como en los hombres.

Es así que se recomienda atender la inteligencia emocional, variable que se ha visto media en el bienestar psicológico de los deportistas (Núñez et al., 2011). Además, se sugiere intervenir en optimismo disposicional ya que se ha descrito que cuanto más optimista es la persona más aumenta su puntuación en la dimensión Logros del modelo PERMA (Fernández-Abascal & Díaz, 2022). Así también, se recomienda intervenir para mejora de la motivación intrínseca, y las estrategias centradas en la tarea y la experiencia deportiva, que aparecen en estudios previos como predictoras del bienestar psicológico deportivo (Cantón-Chirivella et al., 2015).

Otra aplicación práctica es la necesidad de sensibilizar sobre la existencia elevada de TCA (sin diferencias en función del sexo) a los entrenadores de fútbol, voleibol, hockey hierba, baloncesto y fútbol sala, a pesar del bienestar percibido de los deportistas. Sabemos que las estimaciones de prevalencia de los TCA pueden variar según deporte y contexto, pero lo que es seguro es que estos trastornos es probable que no se reconozcan, notifiquen, ni diagnostiquen lo suficiente; sobre todo en hombres (Eichstadt et al., 2020). Por último, sería necesario hacer programas psicoeducativos para que los deportistas puedan tomar conciencia de su trastorno.

Como futuras líneas de investigación sería interesante implementar intervenciones positivas de tercera generación y psicoeducación en los programas de atención al deportista, teniendo en cuenta las diferencias de sexo encontradas, y evaluar los progresos.

Conclusiones

De acuerdo con los resultados de este estudio y de su discusión y análisis se pueden extraer las siguientes conclusiones principales:

El bienestar psicológico percibido por los deportistas no-élite es medio alto. La dimensión que menos destaca son los sentimientos de logro y la más fortalecida las relaciones sociales. Los hombres presentan mayores emociones positivas que las mujeres.

Son 25% los deportistas de equipo con alto riesgo de presentar un TCA, mayoritariamente mujeres en nuestro contexto nacional. Su sintomatología relacionada con un TCA no interfiere en su bienestar psicológico percibido.

Hombres y mujeres no difieren en bienestar psicológico percibido o TCA, aunque las puntuaciones de los varones fueron mayores en el caso del bienestar y menores en la sintomatología relacionada con un TCA.

Los jugadores masculinos de deportes de equipo no élite pueden ser un grupo tan de riesgo como el de mujeres en el desarrollo de trastornos alimentarios

Se sugiere igualar la atención ofrecida para la prevención, detección y tratamiento de la sintomatología de TCA por parte de entrenadores y psicólogos deportivos en estos deportistas, así como generar programas que puedan hacer tomar conciencia a los deportistas de su trastorno, negado, invisible o no reconocido.

Este estudio muestra también la necesidad de hacer cribados de TCA entre deportistas no-élite de equipo y no subestimar la prevalencia real, que alcanza a un 25% de los mismos. De este modo promocionar una detección de síntomas de TCA de forma temprana, para su intervención.

Declaración del Comité de Ética

El estudio se realizó siguiendo la Declaración de Helsinki y fue aprobado por el Comité de Comité de Ética de la Universidad Católica de Murcia (código de registro CEO072301, fecha de aprobación: 21 de julio de 2023).

Conflicto de Intereses

Los autores declaran que no existe conflicto de intereses.

Contribución de los Autores

Conceptualización: I.D.C. & C.R.G.; Metodología: I.D.C.; Software J.J.H.M.; Validación: J.J.H.M., & C.R.G.; Análisis formal: C.R.G.; Investigación: I.D.C.; Recursos: J.J.H.M.; Análisis de datos: C.R.G.; Escritura – versión original: I.D.C. & C.R.G.; Escritura – revisión y edición: J.J.H.M. & C.R.G.; Visualización J.J.H.M.; Supervisión J.J.H.M.; Administración del proyecto: C.R.G. Todos los autores han leído y aceptado la versión publicada del manuscrito.

Declaración de Disponibilidad de Datos

Los datos están disponibles bajo una solicitud razonable al autor de correspondencia (jjhernandez@ucam.edu).

Agradecimientos

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Effect of maturation and extracurricular sports activities on motor coordination. A longitudinal study

Efecto de la maduración y las actividades deportivas extraescolares sobre la coordinación motriz. Un estudio longitudinal

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Abstract

The objective of this study was to analyze the behavior of motor coordination during the school period between 6 and 11 years of age and to longitudinally study the effect of participation in extracurricular sports activities and peak height velocity on this variable motor development. A longitudinal descriptive design was used (67 primary school children). Motor coordination was measured using the 3JS test. During the investigation, the subjects regularly participated in extracurricular sports activities. The maturation is reduced by calculating the peak height velocity. The present longitudinal study carried out over six years in boys and girls in Primary Education showed: 1) an increase in the level of motor coordination from 6 to 11 years of age, 2) a different motor coordination behavior between the group of children and girls who performed regular extracurricular sports activities and the group that did not perform these activities, and 3) the predictive value of the level of motor coordination at 6 years of age, regular participation in extracurricular sports activities, and peak height velocity over the degree of motor coordination at age 11.

Keywords: Motor development, schoolchildren, peak height velocity, Primary School.

Resumen

El objetivo de este estudio fue analizar el comportamiento de la coordinación motriz de forma longitudinal en escolares entre los 6 y 11 años de edad y estudiar el efecto sobre ella de la participación en actividades deportivas extraescolares y el pico de velocidad máxima de crecimiento. Se utilizó un diseño de tipo descriptivo longitudinal (participaron 67 escolares de Educación Primaria de un centro educativo andaluz). La coordinación motriz fue medida a través del test 3JS. Los resultados muestran: 1) un aumento del nivel de coordinación motriz desde los 6 años hasta los 11 años (incremento de 16.08 a 24.03 en niños y de 12.63 a 19.67 en niñas), 2) un comportamiento de la coordinación motriz diferente entre el grupo de niños y niñas que realizaron regularmente actividades deportivas extraescolares y el grupo que no realizó estas actividades y 3) el mejor valor predictivo del nivel de coordinación motriz a los 6 años, la participación regular en actividades deportivas extraescolares y la edad del pico de velocidad máxima de crecimiento sobre el grado de coordinación motriz a los 11 años (β Estandarizado= .463 frente a .348 y -.225 respectivamente). Podemos concluir que la coordinación motriz a los 6 años es el mejor predictor de la misma a los 11.

Palabras clave: Desarrollo motor, enseñanza primaria, tiempo libre, educación física.

Introduction

Motor development is a process in which multiple variables intervene to enable people to feel competent in overcoming various motor tasks posed to them (Ruiz, 2004). One of these variables is motor coordination (MC), which is an essential trait in the correct development of human motor skills (Chiva-Bartoli & Estevan, 2019) and is decisive in comprehensive development during childhood (Smits-Engelsman et al., 1998). Several factors influence this process. MC improves with age; it is greater in boys than in girls with regard to object control (Cenizo et al., 2019), varies depending on geographical location, and may be lower in urban environments (Torralba et al., 2016). It also depends on culture (Luz et al., 2019) and family characteristics, since older siblings have better MC (Chiva-Bartoli & Estevan, 2019), socioeconomic status (Valdivia et al., 2018), extracurricular sports practices (Ericsson, 2011; González et al., 2009), and growth and maturation (Hills &Byrne, 2010).

MC is one of the most important elements of motor competence and is best related to health (Herlitz et al., 2021; Reyes et al., 2019; Ruiz-Pérez et al., 2015), because it is It is about the ability to order and organize motor actions oriented toward a given objective with precision, efficiency, economy and harmony, which requires the activity of the nervous system that integrates all the motor, sensitive and sensory factors necessary for the adequate performance of tasks movements (Hernández & Velázquez, 2004).

From a global perspective, MC is related to physical and mental health because better MC is related to improved movement control, which leads to a reduction in the number of injuries (Shumway-Cook & Woollacott, 2007), better cognitive and physical development (Diamond, 2000), and improved executive function (Zwicker et al., 2010).

Multiple cross-sectional studies have indicated that participation in extracurricular sports activities (ESA) entails psychological benefits (motivation, positive self-esteem, self-regulation, self-control, and personal satisfaction) (Suárez & Moreno, 2022; Wang et al., 2020), education (Gonzáles & Portalés, 2014), physical condition (Chacón et al., 2020), motor competence (Santos et al., 2013; Skowroński et al., 2019), and health (García & Fernández, 2020; Jiménez-Pavón et al., 2010; Kamba et al., 2014). Therefore, it is important to promote physical sports activities outside school hours (Reverter et al., 2020; Reverter et al., 2014) to benefit schoolchildren. However, other studies have not concluded that extracurricular physical activity is a predictor of significant improvement in motor skills (Chivas & Estevan, 2019).

In the scientific literature, longitudinal studies have shown an inverse relationship between children's weight and future MC level and vice versa (Hondt et al., 2014), and a reciprocal relationship between children's MC and body fat and peak oxygen consumption during seven years of follow-up (6-13 years) (Lima et al., 2019). However, no longitudinal studies have analyzed the effects of ESAs on motor coordination.

In addition to extracurricular activities, the process of maturation and growth is another variable that influences the motor skills of schoolchildren, given the complex interactions between genetic, environmental, and developmental factors (Malina, 2004). These conditions interfere with various skills, including sports and physical exercise (Hills & Byrne, 2010).

Physical growth is a biological process that begins before birth and ends during adolescence (Garrote-Escribano & Villarroel, 2021). During this process, certain periods of faster growth are observed without a constant rhythm (Garrote-Escribano & Villarroel, 2021). During childhood, an increase in the speed of growth is perceived, stabilizing during the next few years and accelerating again in adolescence and puberty when the peak of maximum growth speed (PHV) occurs (Malina & Rogol, 2011).

The study of physical growth allows us to understand the variability in human maturation owing to genetic potential, biological characteristics, and environmental factors (Gómez-Campos et al., 2016). This type of study is essential because motor development progresses as a function of growth, maturation, and learning (Hills & Byrne, 2010).

In growth studies, PHV is considered a somatic indicator of maturation during puberty and adolescence, which indicates the age at which maximum growth occurs during this stage. The proposal by Mirwald et al. (2002), based on simple anthropometric measurements, is a reliable indicator for analyzing the PHV of children and adolescents.

The relationship between maturation and participation in extracurricular sports activities and MC has been investigated in cross-sectional design studies (Chiva & Estevan, 2019; Freitas et al., 2015; González de Mesa et al., 2009), with consequent limitations when establishing a cause-effect relationship. However, it remains unclear to what extent continuous participation in ESA and PHV influences the development of MC, and whether both variables are interconnected or mutually reinforcing (Freitas et al., 2016; Luz et al., 2016).

Therefore, the objective of this study was to longitudinally analyze motor coordination behavior during the school period between 6 and 11 years and to study the effects of a) participation in extracurricular sports activities and the peak of maximum growth speed on motor development.

Materials and Methods

Design

This was a longitudinal descriptive study with two groups (Bisquerra, 2012). The effects of participating in extracurricular activities and the age of PHV were analyzed in locomotion and object control during the 6-year school period (between 6 and 11 years).

Participants

The final sample consisted of 67 schoolchildren from a Primary Education center, selected using the intentional non-probabilistic sampling method (Bisquerra, 2012). The initial sample comprised 80 students, thirteen of whom left the center or repeated a grade throughout the 6 years that the students attended the Primary Education stage.

The Center's School Council approved the participation in this study. The Helsinki recommendations for research with people were considered for its development. The legal representatives of the schoolchildren were informed by the researchers in detail and in writing of their characteristics and procedures, as well as by signing informed consent.

Procedure

All measurements were carried out during Physical Education class time, always by the same researchers and under similar conditions. The MC evaluation tests were carried out in the educational center facilities for a period of two days in December of each school year.

MC (locomotion and object control) was measured using the 3JS test, which was validated with internal consistency (Cronbach's alpha = .827), temporal stability (correlation coefficient = .99), and inter-observer agreement (correlation coefficient = .95) (Cenizo et al., 2016). The protocol detailed by the authors for its application is as follows (Cenizo et al., 2017). This test evaluates the children's motor development by measuring locomotion and object control in two dimensions. It consists of seven tasks that are performed consecutively, in which participants must perform three vertical jumps on a suspended pike, a longitudinal turn, two throws with one hand above the head, two kicks with the foot at a goal, a race with change of direction, a moving bounce, and driving the ball with the foot. The final obtained value serves as a reference for the motor coordination level.

For the comparison of MC levels, the variable intervals (INT) (Cenizo et al., 2015) were used, which categorizes the MC variable. With this division of sample scores, an absolute measure is achieved that allows assessing the distance of each subject with respect to the average of the age group (Morales, 2011). This categorization is important in the field of motor development, where the level of each subject must be compared with that of the members of the group. The sample was divided by age into five intervals, each of which comprised a standard deviation (except for the two extremes), resulting in five groups of MC levels, where each level was equivalent to the same difference (standard deviation), except for the first and last intervals. The mean was used as a reference, and the difference between the right and half on the left was calculated. This range is defined as interval 3 or normal MC. Next, a reference is calculated on both sides, achieving Intervals 2 (bad MC) and 4 (good MC). Finally, the remaining samples on both sides constitute intervals 1 (very bad MC) and 5 (very good MC).

During the 6 years of the Primary Education stage, the regular participation of the subjects in extracurricular sports activities was recorded with a monitor in schools or sports clubs, comparing the information provided by the legal guardians of the subjects with that provided by the trainers-monitors. for each sports modality (football, basketball, dance, swimming, rhythmic gymnastics, skating, karate, athletics, and boxing). Two groups were formed: one with students who had participated in ESA regularly in at least one sport during the six years of the study (27 boys and 20 girls), and another with students who had not participated in ESA or had not attended regularly (10 boys and 20 girls).

The level of biological maturation was determined using the equation proposed by Mirwald et al. (2002) for December, when all the students were aged 11 years, allowing cross-sectional calculation of the PHV. This procedure involves the interaction between the anthropometric variables of age, weight, height, and head-trunk height to estimate the date on which the subject reaches PHV, which is considered an index of biological maturation, expressed as a function of time (years). This procedure is missing or has elapsed between the chronological age and PHV.

The chronological age was determined using the decimal date of the day of birth and the decimal date of the control day. To determine body mass (kg), the subjects were barefoot with as little clothing as possible, and a Tanita digital scale with a precision of 100 g was used on a scale from 0 to 150 kg. To evaluate the height (cm), a Seca brand aluminum stadiometer was used, graduated in millimeters and with a scale of 0-250 cm. Trunk head height was assessed by placing the subjects on the Frankfurt plane without shoes and using a wooden bench with a firm backrest with a height of 50 cm and a measurement scale of 0-150 cm and with a precision of 1 mm. Two measurements of the Weight, standing height, and head-trunk height were measured.

Statistical analysis

The Friedman test was applied to study significant differences between the measurements of the variable that organizes the levels of MC, called "INT" of the same group of schoolchildren during the six years of primary education (Cenizo et al., 2015). Multiple comparisons were performed using the Wilcoxon rank test because each variable was an ordinal measurement.

For the dependent variable MC, a mixed design factorial analysis of variance was carried out, in which the performance of ESA and sex were between-subjects fixed effects factors, while the time of measurement of the dependent variable was a measurement factor. Six levels were repeated intra-subject because six measurements were carried out, one in each of the years of the Primary Education stage.

To predict the effect of the variables "motor coordination 6 years" (MC6), "extracurricular sports activities" (ESA), and "maturation" on the dependent variable "motor coordination 11 years" (MC11), a multiple regression model was calculated using the stepwise method. Standardized values of the maturation variables were used to allow them to be included in the model. The non-collinearity of the independent variables was also assessed.

SPSS statistics28 software was used for statistical analysis. The significance level was set at 5% for all analyses.

Results

The PHV range was in boys (mean = -2.07 ± 0.419; maximum = -1.20; minimum = -2.90) and in girls (mean = -0.35 ± 0.50; maximum = 0.70; minimum = -1.30)

Table 1 shows the mean values and standard deviation of the MC of the subjects in each of the six years in which they were evaluated. The mean scores and standard deviation of each of the five INTs were also observed in different years, and differences were identified by sex.

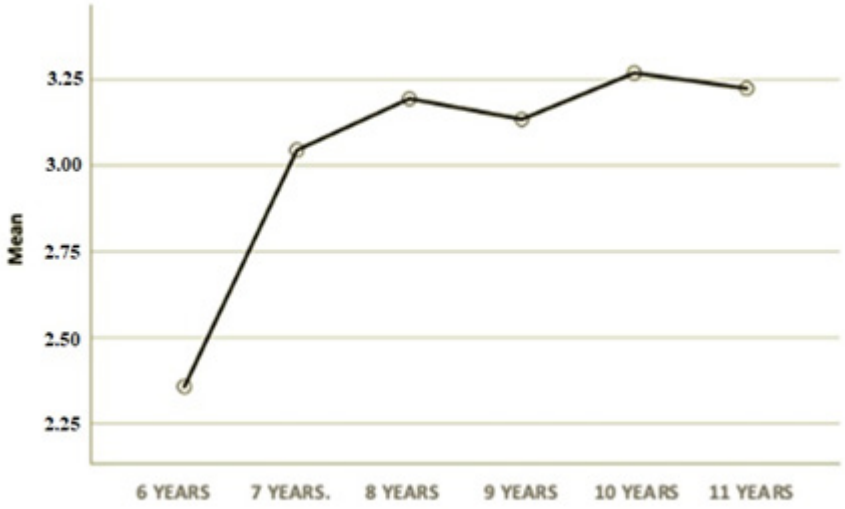
Table 1
Evaluation of motor coordination depending on age, sex and the variable intervals. Data are shown as mean ± standard deviation

		6 YEARS	7 YEARS	8 YEARS	9 YEARS	10 YEARS	11 YEARS
MC	Boys (n = 37)	16.08 ± 2.68	19.57 ± 2.35	21.35 ± 2.84	22.19 ± 2.90	23.03 ± 2.71	24.03 ± 2.53
	Girls (n = 30)	12.63 ± 2.31	16.13 ± 1.71	17.80 ± 2.04	18.17 ± 1.78	19.27 ± 1.59	19.67 ± 1.80
INT 1	Boys	(n = 5) 12.00 ± 0.00	(n = 0)	(n = 0)	(n = 0)	(n = 1) 17.00 ± 0.00	(n = 0)
	Girls	(n = 5) 9.40 ± 0.89	(n = 3) 12.67 ± 0.57	(n = 0)	(n = 1) 14.00 ± 0.00	(n = 0)	(n = 0)
INT 2	Boys	(n = 13) 14.38 ± 1.26	(n = 6) 16.33 ± 1.21	(n = 7) 17.57 ± 0.53	(n = 8) 18.25 ± 0.85	(n = 1) 19.14 ± 0.90	(n = 5) 19.20 ± 1.30
	Girls	(n = 16) 12.00 ± 0.73	(n = 6) 14.83 ± 0.40	(n = 7) 15.14 ± 1.06	(n = 4) 15.75 ± 0.50	(n = 4) 16.75 ± 0.50	(n = 4) 17.00 ± 0.00
INT 3	Boys	(n = 15) 17.87 ± 0.83	(n = 18) 18.78 ± 0.80	(n = 17) 20.53 ± 1.37	(n = 12) 21.00 ± 0.85	(n = 12) 22.64 ± 9.29	(n = 13) 23.00 ± 0.70
	Girls	(n = 7) 15.14 ± 0.69	(n = 14) 16.36 ± 0.49	(n = 13) 17.54 ± 0.51	(n = 20) 18.20 ± 0.83	(n = 20) 18.30 ± 0.48	(n = 22) 19.54 ± 1.14
INT 4	Boys	(n = 4) 20.00 ± 0.00	(n = 12) 21.92 ± 0.99	(n = 10) 23.90 ± .87	(n = 16) 24.75 ± 1.06	(n = 16) 25.60 ± 0.63	(n = 18) 25.89 ± 7.58
	Girls	(n = 2) 17.00 ± 0.00	(n = 7) 18.29 ± 0.48	(n = 9) 19.78 ± 0.97	(n = 5) 20.80 ± 0.83	(n = 5) 20.50 ± 0.89	(n = 4) 22.75 ± 0.50
INT 5	Boys (n = 0)	(n = 0)	(n = 1) 25 ± 0.00	(n = 3) 26.33 ± 0.57	(n = 1) 27.00 ± 0.00	(n = 0)	(n = 1) 28.00 ± 0.00
	Girls (n = 0)	(n = 0)	(n = 0)	(n = 1)	(n = 0)	(n = 0)	(n = 0)

Note: CM: motor coordination; INT: variable intervals (categorization of motor coordination).

The Friedman test, with which the MC INT of the group measured in the six years of primary education studied, showed significant differences ($p < .001$) in the intra-measurements. -subject. Significant differences were observed only between the MC measured at the beginning of 6 years and the MC of the same group measured ($Z = 5.582$, $p < .001$). In subsequent years, the group's MC remained in the same range, without significant changes from 7 to 11 years (Figure 1).

Figure 1
Arithmetic mean of the motor coordination intervals of the same group of schoolchildren throughout the six years of Primary Education



In the mixed design factorial variance analysis, the Mauchly statistic showed that the assumption of sphericity ($p < .001$) is not met, so the univariate Huynh-Feldt alternative was used for the calculation of the F statistic (Table 2).

The results show significant differences between the MC measures over the six years of Primary Education studied, with a large effect size ($F = 294.02$, $p < .001$, $\eta^2 = .824$).

Table 2
Test of intra-subject effects of the development of motor coordination

	Type III sum of squares	Degrees of freedom	Mean square	*F* (Huynh-Feldt)	*Sig.*	*Partial eta squared*	Non-centrality parameter	Observed power
Year	2055.358	4.045	508.184	294.016	.001	.824	1189.153	1.000
Year*ESA	20.622	4.045	5.099	2.950	.020	.45	11.931	.790
Year*Sex	3.396	4.045	0.840	0.486	.748	.008	1.965	.166
Year*ESA*Sex	0.929	4.045	0.230	0.133	.971	.002	0.538	.078

Note: ESA: Extracurricular sports activities.

It is observed that there is a main effect of the "ESA" factor on MC ($F = 2.95$, $p < .05$, $\eta^2 = .45$), whereas sex did not show to have an effect on it ($F = 0.486$, $p = .727$, $\eta^2 = .008$), and neither did the interaction of the factors. The evolution of MC behaves differently only between the group with ESA and the group that does not perform ESA (Figure 2 and Figure 3).

Through stepwise multiple regression, a model was obtained that includes the three variables, "MC6", "ESA" and "maturation" that significantly improved the prediction of the dependent variable "MC11".

The collinearity indices of the independent variables were acceptable (Table 3), and the Durbir-Watson statistic indicated the independence of the residuals ($DW = 2.303$). Regression analysis revealed the existence of a significant relationship between variables ($F = 35.496$, $p < .001$).

The change in MC at 11 years of age can be explained by the proposed model, which includes the predictor variables of MC at 6 years, RDW, and maturation, with an $R2 = .66$. Table 2 shows the standardized coefficients and their probability values. The standardized β value shows that the predictive value of the variables is greater in the case of 6-year MC, followed by ESA and finally maturation, which is negatively related; thus, MC is greater as schoolchildren approach the peak of the maximum maturation speed.

Figure 2
Estimated marginal measures of motor coordination development according to participation in extracurricular sports activities during the 6 years of study

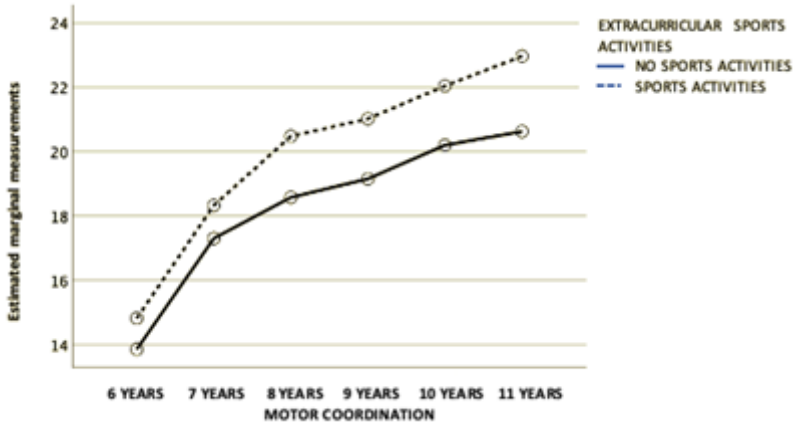


Figure 3
Evolution of motor coordination development according to participation in extracurricular sports activities during the 6 years of study, differentiating by sex

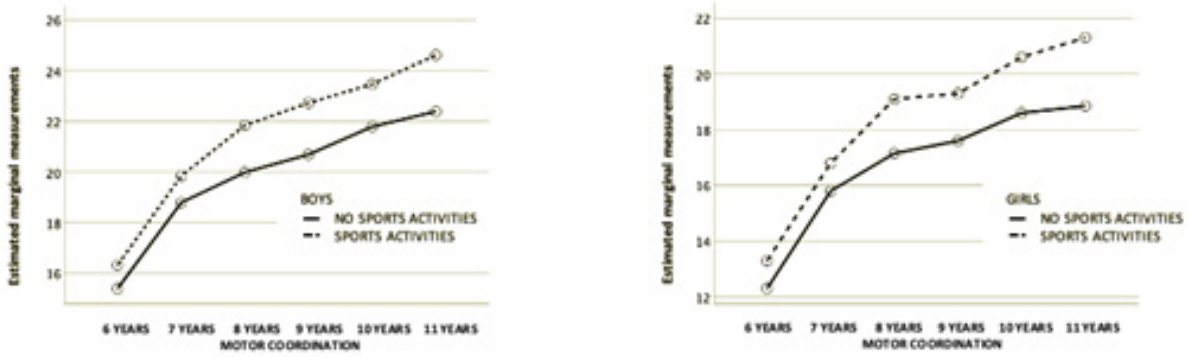


Table 3
Multiple regression analysis (Stepwise)

					Collinearity	
	β	***SE β***	***β* Standardized**	***Sig.***	**Tolerance**	**VIF**
Constant	14.006	1.381				
CM6	0.471	0.096	.463	< .001	.688	1.453
ADE	2.152	0.528	.348	< .001	.850	1.177
Maturation	-0.820	0.341	-.225	.02	.707	1.414
R^2 adjusted = .641; Durbin-Watson = 2.303.						

Note: ESA: Extracurricular sports activities; CM6: motor coordination at 6 years; VIF: variance inflation factor.

Discussion

The objective of this study was to analyze the behavior of MC longitudinally during the school period between 6 and 11 years of age, and to analyze the effect of PHV and participation in ESA on this characteristic of motor development.

The results indicate an increase in the MC level between 6 and 11 years, an increase in the INT at 7 years, and the maintenance of the MC level up to 11. Furthermore, a different MC behavior was observed between the group that regularly participated in ESA during the six years and the group that did not engage in ESA during that period. Finally, the results

indicate that the level of MC was at 6 years of age, performing ESA every year within the studied age range, and that PHV can predict the degree of MC at age 11.

The results of the present longitudinal study show that MC increases progressively with age, and that it is therefore dependent on the passage of time, coinciding with other previous works, such as the cross-sectional studies by Cenizo et al. (2019) with children aged 6 to 11 years and from Rosa et al. (2020) with samples between 6 and 8 years old, and Valentini et al. (2016) with children from 3 to 10 years old using the TGMD II and Torralba et al. (2016) with children from 7 to 10 years old evaluated through the KTK. Similarly, Biino et al. (2023), in a longitudinal study, found that MC improves with age during the school period, although it is negatively affected by increased weight during puberty.

Analysis of the relationship between MC and sex revealed an upward trend for both sexes throughout the study period. These results are in agreement with those found by Cenizo et al. (2019), in which boys had better values at six years old than girls, but both experienced a similar progression in relative terms each year, and there were no significant differences between them at the assessment moments during the period studied. In this study, improvement in both sexes was greater in the first years; therefore, there is less room for qualitative improvement from the age of 9 to 11 years. In relation to this, Valentini et al. (2016) showed a greater positive evolution of locomotor skills from early childhood to middle childhood, subsequently producing a plateau in the development of these skills.

When we assessed the behavior of the MC by analyzing its categorical evolution in the INT, an increase in this capacity was observed between 6 and 7 years, and maintenance was maintained until 11 years. This corroborates the upward evolution of MC throughout the study period given that it is necessary to increase the MC value throughout life to maintain INT (Cenizo et al., 2015). However, there was an increase in INT within the first two years of life. Some of the reasons that may justify this are that these children began to participate in weekly Physical Education sessions at the age of six years, and the offer and participation in ESA is usually greater from this age onwards. In this regard, it has been shown that participation in school (Latorre et al., 2018) and extracurricular physical activity programs (García-Marín & Fernández-López, 2020) during the early childhood education stage improves various motor variables. This was verified by a cross-sectional study conducted by Delgado-Lobete and Montes-Montes (2017), in which the motor development of boys and girls aged 3–6 years who regularly participated in ESA was significantly higher than that of their peers who did not participate.

Regarding the influence of ESA on the level of MC, it was observed that the subjects who practiced some type of sporting activity during the six years obtained better levels than those who did not participate regularly. These data agree with those of a nine-year longitudinal study conducted by Ericsson (2011), in which the group that received five weekly physical education sessions showed higher MC levels than the group that received two weekly sessions. Similar results were found by González de Mesa et al. (2009), who involved children aged 4 to 14 years. These differences confirm that regular ESA at school age improve motor development.

In relation to the regular practice of ESA, it is important to highlight that in both boys and girls, differences are observed in the level of MC between those who practice ESA and those who do not.

On the other hand, according to the regression model, it was observed that the MC was at six years, the regular practice of ESA during the six years studied, and the PHV predicted the MC level at 11 years.

According to these results, the MC level at six years is of special interest. At this age, the compulsory educational stage begins, and boys and girls face important demands (Mathisen, 2016), where motor development plays a fundamental role in academic success (Herrera-González, 2015). This was demonstrated in different longitudinal studies, in which an optimal motor skill level at age 6 favored motor development during the rest of childhood. Reyes et al. (2019), in a longitudinal study over three years with boys and girls who were initially between 4 and 9 years old, concluded that the strongest and most agile children presented more pronounced trajectories of thick MC with age. Likewise, a seven-year longitudinal study conducted by Lima et al. (2019) found that lower body fat and higher maximal oxygen consumption at 6 years of age were associated with greater motor competence during childhood.

In addition to MC at six years, regular ESA practice during the study period predicted MC at 11 years. This aspect, together with the fact that boys and girls who regularly performed ESA obtained higher MC values, highlights the importance of this type of activity during non-school hours on the motor development of students. In a longitudinal study carried out by Ericsson & Karlsson (2014) over nine years, in the experimental group that received five weekly sessions of Physical Education, only 7% of the subjects showed deficits in their motor skills compared to 47% of the control group who only completed two weekly Physical Education sessions during the same period.

The age of the PHV plays a fundamental role in the prediction of MC at age 11 years. This occurs in the middle of the pubertal period (range: girls, 10-12 years; boys, 12-14 years) (Temboury, 2009). At this moment, great hormonal mobilization is triggered until reaching the state of adult maturity, causing an increase in height and weight, as well as the completion of skeletal growth accompanied by a marked increase in bone mass, changes in body composition (Gómez-Campos et

al., 2013; Malina & Rogol, 2011), and increases in physical performance (Carvalho et al., 2011). Growth and maturation as biological processes, along with development, occur simultaneously and interact, and can be influenced by physical activity and can affect activity, performance, and physical condition (Malina, 2014). This is supported by a study by Dalen et al. (2017), who concluded that Norwegian students aged 13 to 16 with a higher level of physical maturity have an advantage in Physical Education and sports. In our study, boys and girls who were close to PHV had better MC values at age 11.

This prediction of the level of MC at age 11 offered by the present study suggests that starting at age 6 with a high level of MC, participating regularly every year in the ESA, and being close to the PHV age significantly favors the level of the MC. Malina (2014) advocated the need to recognize the interaction between biology and behavior (biocultural approach) as a possible influence on motor competence. Hence, based on the results of this study, we support the proposal defended by the authors.

Despite the conclusive data of this study, its limitations make us cautious with its statements, as this study only included students from the same school and in a limited number.

Conclusion

This longitudinal study carried out over six years in boys and girls in Primary Education found the following: 1) an increase in the level of MC from 6 years to 11 years; 2) different MC behaviors between the group of boys and girls who regularly performed ESA and the group that did not perform these activities; and 3) the predictive value of the level of MC at 6 years, regular participation in ESA, and the age of the PHV on the degree of MC at 11 years.

Therefore, the Early Childhood Education stage should reinforce the motor area, which influences global motor skills, which is a determinant of MC, given that it is the best predictor of MC at the end of the school stage. Given the importance of ESAs in the development of MC, they must be adapted for each age group.

The results of this study provide useful information for physical education teachers and professors to help them individualize the teaching-learning process of their students, considering the level of MC, PHV, and regular practice in ESA.

Future studies should analyze the effects of different types of ESA on MC.

Ethics Committee Statement

It does not apply because the tests performed were non-invasive.

Conflict of Interest Statement

There is no conflict of interest. The funding entities or institutions had no influence on the design of the study, the analysis of the data or the interpretation of the results.

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Authors' Contribution

Conceptualization J.M.C.B., J.G.G., J.R.L., & S.F.M.; Methodology J.M.C.B., J.G.G., J.R.L., & S.F.M.; Software J.M.C.B., J.G.G., J.R.L., & S.F.M.; Validation J.M.C.B., J.G.G., J.R.L., & S.F.M.; Formal Analysis S.F.M.; Investigation J.M.C.B., J.G.G., J.R.L., & S.F.M.; Resources J.M.C.B.; Data Curation J.M.C.B., J.G.G., J.R.L., & S.F.M.; Writing – Original Draft J.M.C.B., J.G.G., J.R.L., & S.F.M.; Writing – Review & Editing J.M.C.B., J.G.G., & J.R.L.; Visualization J.M.C.B., J.G.G., & J.R.L.; Supervision J.M.C.B., J.G.G., & J.R.L.; Project Administration J.M.C.B., J.G.G., J.R.L., & S.F.M. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Data available upon request to the corresponding author (jrlechuga@upo.es).

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Efecto de la maduración y las actividades deportivas extraescolares sobre la coordinación motriz. Un estudio longitudinal

Effect of maturation and extracurricular sports activities on motor coordination. A longitudinal study

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Resumen

El objetivo de este estudio fue analizar el comportamiento de la coordinación motriz de forma longitudinal en escolares entre los 6 y 11 años de edad y estudiar el efecto sobre ella de la participación en actividades deportivas extraescolares y el pico de velocidad máxima de crecimiento. Se utilizó un diseño de tipo descriptivo longitudinal (participaron 67 escolares de Educación Primaria de un centro educativo andaluz). La coordinación motriz fue medida a través del test 3JS. Los resultados muestran: 1) un aumento del nivel de coordinación motriz desde los 6 años hasta los 11 años (incremento de 16.08 a 24.03 en niños y de 12.63 a 19.67 en niñas), 2) un comportamiento de la coordinación motriz diferente entre el grupo de niños y niñas que realizaron regularmente actividades deportivas extraescolares y el grupo que no realizó estas actividades y 3) el mejor valor predictivo del nivel de coordinación motriz a los 6 años, la participación regular en actividades deportivas extraescolares y la edad del pico de velocidad máxima de crecimiento sobre el grado de coordinación motriz a los 11 años (β Estandarizado= .463 frente a .348 y -.225 respectivamente). Podemos concluir que la coordinación motriz a los 6 años es el mejor predictor de la misma a los 11.

Palabras clave: Desarrollo motor, enseñanza primaria, tiempo libre, educación física.

Abstract

The objective of this study was to analyze the behavior of motor coordination during the school period between 6 and 11 years of age and to longitudinally study the effect of participation in extracurricular sports activities and peak height velocity on this variable motor development. A longitudinal descriptive design was used (67 primary school children). Motor coordination was measured using the 3JS test. During the investigation, the subjects regularly participated in extracurricular sports activities. The maturation is reduced by calculating the peak height velocity. The present longitudinal study carried out over six years in boys and girls in Primary Education showed: 1) an increase in the level of motor coordination from 6 to 11 years of age, 2) a different motor coordination behavior between the group of children and girls who performed regular extracurricular sports activities and the group that did not perform these activities, and 3) the predictive value of the level of motor coordination at 6 years of age, regular participation in extracurricular sports activities, and peak height velocity over the degree of motor coordination at age 11.

Keywords: Motor development, schoolchildren, peak height velocity, Primary School.

Introducción

El desarrollo motor es un proceso en el que intervienen múltiples variables para que las personas puedan llegar a sentirse competentes en la superación de las distintas tareas motrices que se les plantean (Ruiz, 2004). Una de estas variables es la coordinación motriz (CM), dado que es una capacidad que puede llegar a representar un rasgo esencial en el correcto desarrollo de la motricidad humana (Chiva-Bartoli & Estevan, 2019) y es determinante en el desarrollo integral durante la infancia (Smits-Engelsman et al., 1998). Muchos son los factores que influyen en este proceso. La CM mejora con la edad, siendo mayor en los niños que en las niñas respecto al control de objetos (Cenizo et al., 2019), y varía en función de la localización geográfica, pudiendo ser menor en entornos urbanos (Torralba et al., 2016). También, depende de la cultura (Luz et al., 2019), las características familiares, pues aquellos con hermanos mayores tienen mejor CM (Chiva-Bartoli & Estevan, 2019), el estatus socioeconómico (Valdivia et al., 2018), la práctica deportiva extraescolar (Ericsson, 2011; González et al., 2009), el crecimiento y la maduración (Hills & Byrne, 2010).

La CM es uno de los elementos más importantes de la competencia motriz y que mejor se relaciona con la salud (Herlitz et al., 2021; Reyes et al., 2019; Ruiz-Pérez et al., 2015), debido a que se trata de la capacidad de ordenar y organizar las acciones motrices orientadas hacia un objetivo determinado con precisión, eficacia, economía y armonía, lo que requiere la actividad del sistema nervioso que integra todos los factores motores, sensitivos y sensoriales necesarios para la realización adecuada de movimientos (Hernández & Velázquez, 2004).

Desde un punto de vista global, la CM se relaciona con la salud física y mental, dado que una mejor CM se relaciona con una mejora del control del movimiento que conlleva una reducción del número de lesiones (Shumway-cook & Woollacott, 2007), un mejor desarrollo cognitivo y físico (Diamond, 2000) y una mejora de las funciones ejecutivas (Zwicker et al., 2010).

Existen evidencias de múltiples estudios transversales que indican que la participación en actividades deportivas extraescolares (ADE) conlleva beneficios a nivel psicológico (motivación, autoestima positiva, autorregulación, autocontrol, satisfacción personal) (Suárez & Moreno, 2022; Wang et al., 2020), educativo (Gonzáles & Portalés, 2014), de condición física (Chacón et al., 2020), de competencia motriz (Santos et al., 2013; Skowroński et al., 2019) y de salud (García & Fernández, 2020; Jiménez-Pavón et al., 2010; Kamba et al., 2014). Por lo tanto, es importante la promoción de este tipo de actividades físico-deportivas en horario extraescolar (Réa et al., 2020; Reverter et al., 2014) para provocar beneficios en los escolares. No obstante, hay otros estudios que no concluyen que la actividad física extraescolar sea predictora de mejoras significativas en la motricidad de los participantes (Chivas & Estevan, 2019).

En la literatura científica se encuentran estudios longitudinales que muestran una relación inversa entre el peso de los niños y el futuro nivel de CM y viceversa (Hondt et al., 2014) y una relación recíproca entre la CM de los niños y la grasa corporal y el consumo de oxígeno pico durante siete años de seguimiento (6-13 años) (Lima et al., 2019). Sin embargo, no se han encontrado estudios que analicen el efecto de las ADE en la CM de manera longitudinal.

Además de las actividades extraescolares, el proceso de maduración y crecimiento es otra variable que influye en la motricidad de los escolares, dado que hay una interacción compleja entre factores genéticos, ambientales y de desarrollo (Malina, 2004). Estos interfieren en diversas competencias, entre las que se encuentran el deporte y el ejercicio físico (Hills & Byrne, 2010).

El crecimiento físico es un proceso biológico que empieza desde antes del nacimiento y termina con el final de la adolescencia (Garrote-Escribano & Villarroel, 2021). Dentro de este proceso se observan ciertos períodos de crecimiento más rápidos, sin llevar un ritmo constante (Garrote-Escribano & Villarroel, 2021). Durante la infancia se percibe un aumento en la velocidad del crecimiento, estabilizándose durante los próximos años y volviéndose a acelerar en la adolescencia y pubertad, donde se produce el pico de velocidad máxima de crecimiento (PHV) (Malina & Rogol, 2011).

El estudio del crecimiento físico permite comprender la variabilidad del proceso de maduración del ser humano debido a su potencial genético, características biológicas y factores ambientales (Gómez-Campos et al., 2016). Dicho estudio es fundamental debido a que el desarrollo motor progresa en función del crecimiento, la maduración y el aprendizaje (Hills & Byrne, 2010).

Dentro del estudio del crecimiento, el PHV se considera un indicador somático de la maduración en la pubertad y adolescencia que indica la edad de máximo crecimiento durante esta etapa. La propuesta de Mirwald et al. (2002), basada en medidas antropométricas simples, constituye un indicador muy fiable para analizar el PHV de niños y adolescentes.

La relación entre la maduración y la participación en actividades extraescolares deportivas y la CM ha sido principalmente investigada en estudios de diseño transversal (Chiva & Estevan, 2019; Freitas et al., 2015; González de Mesa et al., 2009), con las consiguientes limitaciones a la hora de establecer una relación causa-efecto. Sin embargo, aún no está claro en qué medida la participación continua en ADE y el PHV influyen en el desarrollo de la CM y si ambas variables están interconectadas o se refuerzan mutuamente (Freitas et al., 2016; Luz et al, 2016).

Por ello, el objetivo de este estudio fue analizar longitudinalmente el comportamiento de la coordinación motriz durante el periodo escolar comprendido entre los 6 y 11 años y estudiar el efecto de a) la participación en actividades deportivas extraescolares y b) del pico de velocidad máxima de crecimiento sobre esta variable del desarrollo motor.

Material y Método

Diseño

El diseño que se utilizó en esta investigación fue de tipo descriptivo longitudinal con dos grupos (Bisquerra, 2012). Se analizó el efecto de la participación en actividades extraescolares y la edad del PHV en los dos ámbitos de la CM, locomoción y control de objetos, durante el periodo escolar de 6 años (entre 6 y 11 años).

Participantes

La muestra final estuvo formada por 67 escolares de un centro de Educación Primaria, seleccionados mediante el método de muestreo no probabilístico intencional (Bisquerra, 2012). La muestra inicial fue de 80 estudiantes, trece de los cuales abandonaron el centro o repitieron curso a lo largo de los 6 años que los escolares cursaron la etapa de Educación Primaria.

El Consejo escolar del centro aprobó la participación en el estudio. Para su desarrollo se tuvieron en cuenta las recomendaciones de Helsinki para la investigación con personas. Los representantes legales de los escolares fueron informados por los investigadores detalladamente y por escrito de las características y procedimientos a realizar, firmando un consentimiento informado.

Procedimiento

Todas las medidas fueron realizadas durante el horario de la clase de Educación Física y siempre por los mismos investigadores y en similares condiciones. Las pruebas de evaluación de la CM se realizaron en las instalaciones del centro educativo durante un periodo de dos días en el mes de diciembre de cada curso escolar.

La CM (locomoción y control de objetos) fue medida a través de la prueba 3JS, instrumento que fue validado con una consistencia interna (Alfa de Cronbach = .827), estabilidad temporal (coeficiente correlación = .99) y concordancia inter-observadores (coeficiente correlación = .95) (Cenizo et al., 2016). Se siguió el protocolo detallado por los autores para su aplicación (Cenizo et al., 2017). Este test evalúa el desarrollo motor infantil, midiendo las dos dimensiones de la motricidad gruesa, locomoción y control de objetos. Se compone de siete tareas que se realizan de forma consecutiva, en las que los participantes deben realizar tres saltos verticales sobre una pica suspendida, un giro longitudinal, dos lanzamientos con una mano por encima de la cabeza, dos golpeos con el pie a una portería, carrera con cambio de dirección, bote en desplazamiento y conducción de balón con el pie. El valor final obtenido es una referencia del nivel de coordinación motriz.

Para la comparación de los niveles de CM se utilizó la variable intervalos (INT) (Cenizo et al., 2015) que categoriza la variable CM. Con esta división de las puntuaciones de la muestra se logra una medida absoluta que permite valorar la distancia de cada sujeto con respecto a la media del grupo de edad (Morales, 2011). Esta categorización es importante en el ámbito del desarrollo motor, en el cual se debe comparar el nivel de cada sujeto con el de los integrantes de su grupo. Se dividió la muestra por edades en cinco intervalos, donde cada uno de ellos comprende una desviación típica (excepto los dos extremos) obteniéndose cinco grupos de nivel de CM donde cada uno equivale a una misma diferencia (desviación típica), exceptuando el primer y el último intervalo. Se toma como referencia la media, se calcula media diferencia a la derecha y media a la izquierda. Ese rango es el Interval 3 o CM normal. A continuación, se calcula una referencia a ambos lados, lográndose los Interval 2 (CM mala) y 4 (CM buena). Por último, el resto de la muestra a ambos lados constituyen los Interval 1 (CM muy mala) y 5 (CM muy buena).

Durante los 6 años de la etapa de Educación Primaria se registró la participación regular de los sujetos en las actividades deportivas extraescolares con monitor en escuelas o clubes deportivos, cotejando la información aportada por los tutores legales de los sujetos con la aportada por los entrenadores-monitores correspondientes a cada modalidad deportiva (fútbol, baloncesto, baile, natación, gimnasia rítmica, patinaje, kárate, atletismo y boxeo). Se realizaron dos grupos, uno con el alumnado que había participado en ADE de manera regular en, al menos, un deporte durante los seis años del estudio (27 niños y 20 niñas) y un grupo con el alumnado que no había participado en ADE o no había asistido con regularidad (10 niños y 20 niñas).

El nivel de maduración biológica se determinó a través de la ecuación propuesta por Mirwald et al. (2002) en el mes de diciembre cuando todo el alumnado tenía 11 años, permitiendo el cálculo del PHV de forma transversal. Este procedimiento implica la interacción entre las variables antropométricas de edad, peso, estatura y estatura tronco-cefálica, estimando la fecha en la que el sujeto alcanza el PHV, considerado como un índice de maduración biológica, expresado en función del tiempo (años) que falta o que ha transcurrido entre la edad cronológica y el PHV.

La edad cronológica se determinó utilizando la fecha decimal del día de nacimiento y la fecha decimal del día de control. Para determinar la masa corporal (kg) los sujetos se colocaron descalzos, con la menor cantidad de ropa posible y usando una balanza digital de la marca Tanita, con una precisión de 100 g y con una escala de 0 a 150 kg. Para evaluar la estatura

(cm) se utilizó un tallímetro de aluminio de la marca Seca, graduado en milímetros y con una escala de 0-250 cm. La estatura tronco-cefálica se valoró situándolos en el plano de Frankfurt, sin zapatos y utilizando un banco de madera con respaldo firme con 50 cm de altura y una escala de medición de 0-150 cm y con precisión de 1 mm. Se realizaron dos medidas del peso, estatura de pie y estatura tronco-cefálico.

Análisis Estadístico

Se aplicó la prueba de Friedman para estudiar diferencias significativas entre las mediciones de la variable que organiza los niveles de la CM denominada "INT" del mismo grupo de escolares durante los seis años de la etapa de Educación Primaria (Cenizo et al., 2015). Las comparaciones múltiples se realizaron con la prueba de rangos de Wilcoxon dado que la variable es de medida ordinal.

Para la variable dependiente CM, se realizó un análisis de varianza factorial de diseño mixto en el que la realización de ADE y el sexo fueron factores de efectos fijos inter-sujetos, mientras que el momento de medición de la variable dependiente fue un factor de medidas repetidas intra-sujetos con seis niveles ya que se realizaron seis mediciones, una en cada uno de los años de la etapa de Educación Primaria.

Para predecir el efecto de las variables "coordinación motriz 6 años" (CM6), "actividades deportivas extraescolares" (ADE) y "maduración" sobre la variable dependiente "coordinación motriz 11 años" (CM11) se calculó un modelo de regresión múltiple con el método por pasos (stepwise). Se utilizaron los valores estandarizados de la variable maduración para poder incluirla en el modelo. Se comprobó la no colinealidad de las variables independientes.

Para llevar a cabo el análisis estadístico se utilizó el software SPSS statistics28. El nivel de significación fue del 5% para todos los análisis.

Resultados

El rango del PHV fue en los niños (media = -2.07 ± 0.419; máximo = -1.20; mínimo = -2.90) y en las niñas (media = -0.35 ± 0.50; máximo = 0.70; mínimo = -1.30).

En la Tabla 1 se muestran los valores medios y la desviación típica de la CM de los sujetos en cada uno de los seis años en los que fueron evaluados. También se pueden observar las puntuaciones medias y desviación típica de cada uno de los cinco INT en los diferentes años estudiados, diferenciando por sexo.

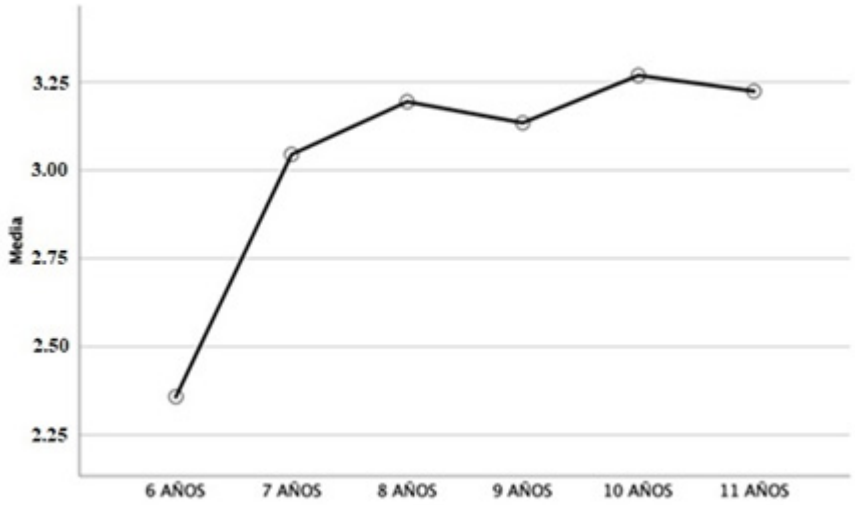
Tabla 1
Resultados de la evaluación de la coordinación motriz en función de la edad, el sexo y la variable intervalos. Los datos se muestran como media ± desviación típica

		6 AÑOS	7 AÑOS	8 AÑOS	9 AÑOS	10 AÑOS	11 AÑOS
CM	Niños (n = 37)	16.08 ± 2.68	19.57 ± 2.35	21.35 ± 2.84	22.19 ± 2.90	23.03 ± 2.71	24.03 ± 2.53
	Niñas (n = 30)	12.63 ± 2.31	16.13 ± 1.71	17.80 ± 2.04	18.17 ± 1.78	19.27 ± 1.59	19.67 ± 1.80
INT 1	Niños	(n = 5) 12.00 ± 0.00	(n = 0)	(n = 0)	(n = 0)	(n = 1) 17.00 ± 0.00	(n = 0)
	Niñas	(n = 5) 9.40 ± 0.89	(n = 3) 12.67 ± 0.57	(n = 0)	(n = 1) 14.00 ± 0.00	(n = 0)	(n = 0)
INT 2	Niños	(n = 13) 14.38 ± 1.26	(n = 6) 16.33 ± 1.21	(n = 7) 17.57 ± 0.53	(n = 8) 18.25 ± 0.85	(n = 1) 19.14 ± 0.90	(n = 5) 19.20 ± 1.30
	Niñas	(n = 16) 12.00 ± 0.73	(n = 6) 14.83 ± 0.40	(n = 7) 15.14 ± 1.06	(n = 4) 15.75 ± 0.50	(n = 4) 16.75 ± 0.50	(n = 4) 17.00 ± 0.00
INT 3	Niños	(n = 15) 17.87 ± 0.83	(n = 18) 18.78 ± 0.80	(n = 17) 20.53 ± 1.37	(n = 12) 21.00 ± 0.85	(n = 12) 22.64 ± 9.29	(n = 13) 23.00 ± 0.70
	Niñas	(n = 7) 15.14 ± 0.69	(n = 14) 16.36 ± 0.49	(n = 13) 17.54 ± 0.51	(n = 20) 18.20 ± 0.83	(n = 20) 18.30 ± 0.48	(n = 22) 19.54 ± 1.14
INT 4	Niños	(n = 4) 20.00 ± 0.00	(n = 12) 21.92 ± 0.99	(n = 10) 23.90 ± .87	(n = 16) 24.75 ± 1.06	(n = 16) 25.60 ± 0.63	(n = 18) 25.89 ± 7.58
	Niñas	(n = 2) 17.00 ± 0.00	(n = 7) 18.29 ± 0.48	(n = 9) 19.78 ± 0.97	(n = 5) 20.80 ± 0.83	(n = 5) 20.50 ± 0.89	(n = 4) 22.75 ± 0.50
INT 5	Niños (n = 0)	(n = 0)	(n = 1) 25 ± 0.00	(n = 3) 26.33 ± 0.57	(n = 1) 27.00 ± 0.00	(n = 0)	(n = 1) 28.00 ± 0.00
	Niñas (n = 0)	(n = 0)	(n = 0)	(n = 1)	(n = 0)	(n = 0)	(n = 0)

Nota: CM: coordinación motriz; INT: variable intervalos (categorización de la coordinación motriz).

La prueba de Friedman, con la que se compararon los INT de CM del grupo medida en los seis años estudiados de Educación Primaria, mostró diferencias significativas ($p < .001$) en las medidas intra-sujeto. Con las comparaciones múltiples se observó diferencias significativas únicamente entre la CM medida al inicio en 6 años y la CM del mismo grupo medida en 7 años ($p < .001$). En los años sucesivos la CM del grupo se mantuvo en el mismo intervalo, sin cambios significativos de 7 a 11 años (Figura 1).

Figura 1
Media aritmética de los intervalos de coordinación motriz del mismo grupo de escolares a lo largo de los seis años de Educación Primaria



En el análisis de varianza factorial de diseño mixto, el estadístico de Mauchly mostró que no se cumple el supuesto de esfericidad ($p < .001$), por lo que se utilizó la alternativa univariada de Huynh-Feldt para el cálculo del estadístico F (Tabla 2).

Los resultados muestran diferencias significativas entre las medidas de CM en los seis años estudiados de Educación Primaria, con un tamaño del efecto grande ($F = 294.02$, $p < .001$, $\eta^2 = .824$).

Tabla 2
Prueba de efectos intra-sujetos del desarrollo de la coordinación motriz

	Tipo III de suma de cuadrados	Grados de libertad	Media cuadrática	*F* (Huynh-Feldt)	*Sig.*	*Eta parcial al cuadrado*	Parámetro de no centralidad	Potencia observada
Año	2055.358	4.045	508.184	294.016	.001	.824	1189.153	1.000
Año*ADE	20.622	4.045	5.099	2.950	.020	.45	11.931	.790
Año*Sexo	3.396	4.045	0.840	0.486	.748	.008	1.965	.166
Año*ADE*Sexo	0.929	4.045	0.230	0.133	.971	.002	0.538	.078

Nota: ADE: Actividades deportivas extraescolares.

Se observa que existe un efecto principal del factor "ADE" sobre la CM ($F = 2.95$, $p < .05$, $\eta^2 = .45$), mientras que el sexo no mostró tener efecto sobre la misma ($F = 0.486$, $p = .727$, $\eta^2 = .008$), y tampoco la interacción de los factores. Se puede observar que la evolución de la CM se comporta de forma diferente sólo entre el grupo con ADE y el grupo que no realiza ADE (Figura 2 y figura 3).

Mediante una regresión múltiple por pasos, se obtuvo un modelo que incluye las tres variables, "CM6", "ADE" y "maduración" que mejoró significativamente la predicción de la variable dependiente "CM11".

Los índices de colinealidad de las variables independientes resultaron ser aceptables (Tabla 3) y el estadístico de Durbir-Watson indicó la independencia de los residuos ($DW = 2.303$). El análisis de la regresión mostró la existencia de una relación significativa entre las variables ($F = 35.496$, $p < .001$).

El cambio de la CM a los 11 años puede ser explicado por el modelo propuesto que incluye las variables predictoras CM en 6 años, ADE y maduración con un $R2 = .66$. En la tabla 2 se muestran los coeficientes tipificados y sus valores de proba-

bilidad. El valor de β estandarizado nos muestra que el valor predictivo de las variables es mayor en el caso de la CM de 6 años, seguido de la realización de ADE y por último la maduración que se relaciona de forma negativa, de manera que la CM es mayor a medida que los escolares se acercan al pico de velocidad máxima de maduración.

Figura 2
Medidas marginales estimadas de desarrollo de la coordinación motriz según la participación en actividades deportivas extraescolares durante los 6 años de estudio

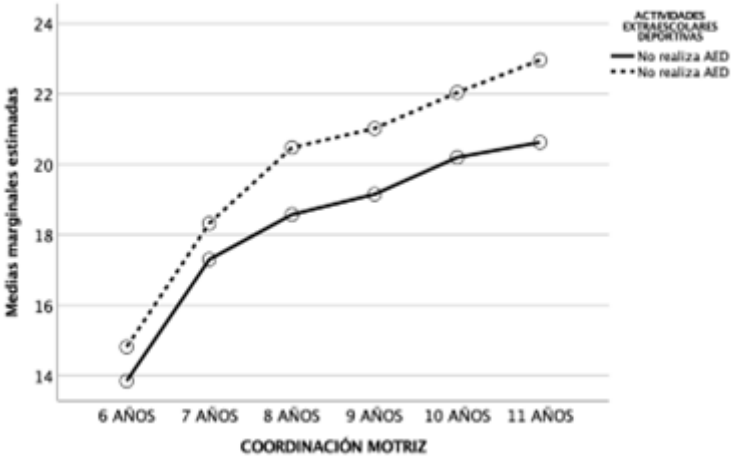


Figura 3
Evolución del desarrollo de la coordinación motriz según la participación en actividades deportivas extraescolares durante los 6 años de estudio diferenciando por sexos

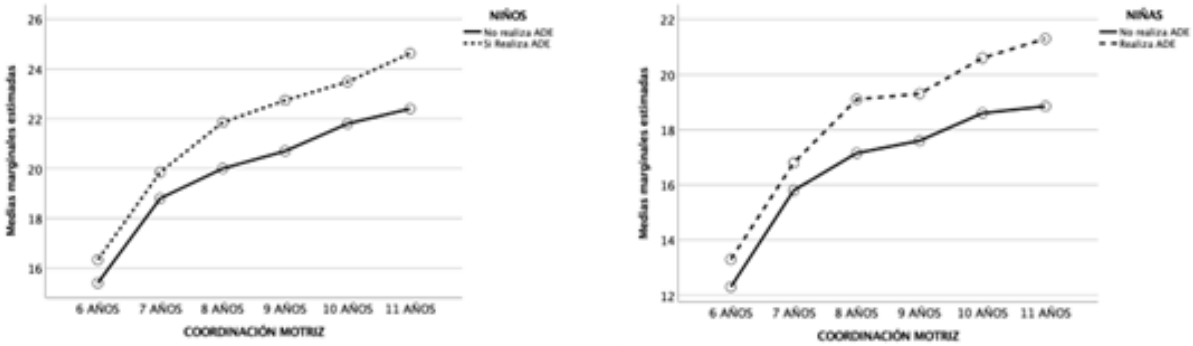


Tabla 3
Análisis de regresión múltiple (Stepwise)

					Colinealidad	
	β	***SE β***	***β* Estandarizado**	***Sig.***	**Tolerancia**	**VIF**
Constante	14.006	1.381				
CM6	0.471	0.096	.463	< .001	.688	1.453
ADE	2.152	0.528	.348	< .001	.850	1.177
Maduración	-0.820	0.341	-.225	.02	.707	1.414
R^2 ajustado = .641; Durbin-Watson = 2.303.						

Nota: ADE: Actividades deportivas extraescolares; CM6: coordinación motriz a los 6 años; VIF: factor de inflación de varianza.

Discusión

El objetivo de este estudio fue analizar el comportamiento de la CM de forma longitudinal durante el periodo escolar comprendido entre los 6 y 11 años y analizar el efecto del PHV y de la participación en ADE sobre esta característica del desarrollo motor.

Los resultados indican un aumento del nivel de CM entre los 6 y los 11 años, incrementando el INT a los 7 años y manteniéndolo hasta los 11 años. También, se aprecia un comportamiento de la CM diferente entre el grupo que ha participado regularmente en ADE durante los 6 años y el grupo que no ha realizado ADE durante ese periodo. Por último, los resultados indican que el nivel de CM a los 6 años, la realización ADE todos los años dentro del rango de edad estudiado y el PHV predicen el grado de CM a los 11 años.

Los resultados del presente estudio longitudinal muestran que la CM aumenta progresivamente con la edad, y que por tanto es dependiente del paso del tiempo, siendo coincidente con otros trabajos anteriores, como los estudios transversales de Cenizo et al. (2019) con niños de 6 a 11 años y de Rosa et al. (2020) con muestras entre 6 y 8 años, y de Valentini et al. (2016) con niños de 3 a 10 años usando el TGMD II y de Torralba et al. (2016) con niños de 7 a 10 años evaluados a través del KTK. Igualmente, Biino et al. (2023), también en un estudio longitudinal, encuentran que la CM mejora con la edad en el periodo escolar, aunque se ve negativamente afectada con el incremento del peso en la pubertad.

Al analizar la relación de la CM con el sexo, los datos muestran una evolución ascendente en ambos sexos a lo largo del periodo estudiado. Estos resultados están en concordancia con los encontrados por Cenizo et al. (2019), en el que los niños tienen a los 6 años mejores valores que las niñas, pero ambos experimentan una progresión similar en términos relativos cada año y no hay diferencias significativas entre ambos en los diferentes momentos de valoración en el periodo estudiado. En este estudio, la mejora en ambos sexos ha sido mayor en los primeros años, teniendo, por ello, menor margen de mejora a nivel cualitativo desde los 9 a los 11 años. En relación con ello, Valentini et al. (2016) mostraron una mayor evolución positiva de las habilidades locomotoras desde la primera infancia hasta la infancia media, produciéndose posteriormente una meseta en el desarrollo de estas habilidades.

Cuando valoramos el comportamiento de la CM analizando su evolución categórica en los INT, se observa un aumento en esta capacidad entre los 6 y 7 años y un mantenimiento hasta llegar a los 11 años. Esto corrobora la evolución ascendente de la CM a lo largo del periodo estudiado, dado que es necesario aumentar el valor de la CM a lo largo de la edad para poder mantener el INT (Cenizo et al., 2015). No obstante, es importante resaltar el aumento de INT en las dos primeras edades estudiadas. Probablemente, algunas de las razones que pueden justificarlo es porque estos niños comenzaron a participar en sesiones semanales de Educación Física a los 6 años y la oferta y participación en ADE suele ser mayor a partir de esta edad. En este sentido, se ha demostrado que la participación en programas de actividad física escolar (Latorre et al., 2018) y extraescolar (García-Marín & Fernández-López, 2020) en la etapa de Educación Infantil produce mejoras en diferentes variables de la motricidad. Así lo verifica el estudio transversal realizado por Delgado-Lobete & Montes-Montes (2017) donde el desarrollo motor de los niños y niñas de 3 a 6 años que participaban regularmente en ADE fue significativamente superior al de sus compañeros que no realizaban.

En cuanto a la influencia de la ADE sobre el nivel de CM, se observa que los sujetos que practicaron algún tipo de actividad deportiva durante los 6 años obtuvieron mejores niveles que los que no participaron de forma regular. Estos datos concuerdan con los del estudio longitudinal de nueve años realizado por Ericsson (2011), donde el grupo que recibió cinco sesiones semanales de Educación Física mostró niveles de CM mayor que los que realizaban dos sesiones semanales. De igual manera, similares resultados se muestran en el estudio transversal llevado a cabo por González de Mesa et al. (2009) con niños de 4 a 14 años. Estas diferencias confirman que la práctica de ADE regular en edad escolar favorece mejoras en el desarrollo motor.

También en relación con la práctica regular de ADE, es importante resaltar que tanto en los niños como en las niñas se observan diferencias en el nivel de CM entre los que practican ADE y los que no lo hacen.

Por otro lado, de acuerdo con el modelo de regresión se observa que la CM a los 6 años, la práctica regular de ADE durante los seis años estudiados y el PHV predicen el nivel de CM a los 11 años.

De acuerdo con estos resultados, el nivel de CM a los 6 años reviste especial interés. A esta edad comienza la etapa educativa obligatoria y los niños y niñas tienen que enfrentarse a nuevos aprendizajes con exigencias importantes (Mathisen, 2016) donde el desarrollo motor juega un papel fundamental en los éxitos académicos (Herrera-González, 2015). Así se muestra en diferentes estudios longitudinales en los que un nivel óptimo de motricidad a los 6 años favorece el desarrollo motor durante el resto de la infancia. Reyes et al. (2019), en un estudio longitudinal durante tres años con niños y niñas que inicialmente tenían entre 4 y 9 años, concluyen con que los más fuertes y ágiles presentaban trayectorias más pronunciadas de CM gruesa con la edad. Igualmente, en un estudio longitudinal de 7 años realizado por Lima et al. (2019) encontraron que una menor grasa corporal y niveles más altos de consumo máximo de oxígeno a los 6 años se asociaba con una mayor competencia motora durante la infancia.

Además de la CM a los 6 años, la práctica regular de ADE durante el periodo estudiado también predice el nivel de CM a los 11 años. Este aspecto, unido a que los niños y niñas que realizaron de forma regular ADE obtuvieron valores más altos de CM, nos hace pensar la importancia que tienen este tipo de actividades en horario no lectivo sobre el desarrollo motor

del alumnado. En un estudio longitudinal realizado por Ericsson & Karlsson (2014) durante nueve años, en el grupo experimental que recibió cinco sesiones semanales de Educación Física, solamente el 7% de los sujetos mostró déficits en sus habilidades motrices frente al 47% del grupo control que solamente realizó dos sesiones semanales de Educación Física durante el mismo periodo.

También en relación con la predicción de la CM a los 11 años, la edad del PHV juega un papel fundamental. Este se produce en la mitad del periodo puberal (rango = en niñas, 10-12 años; en niños, 12-14 años) (Temboury, 2009). En este momento se desencadena una gran movilización hormonal hasta alcanzar el estado de madurez adulto provocando un aumento de la estatura y peso, así como la finalización del crecimiento esquelético que va acompañado por un marcado aumento de la masa ósea, cambios en la composición corporal (Gómez-Campos et al., 2013; Malina & Rogol, 2011) e incrementos en el rendimiento físico (Carvalho et al., 2011). El crecimiento y la maduración como procesos biológicos, junto con el desarrollo ocurren simultáneamente e interactúan y pueden verse influidos por la actividad física y también pueden intervenir en la actividad, el rendimiento y la condición física (Malina, 2014). Así, lo corrobora el estudio de Dalen et al. (2017), quienes concluyeron que los estudiantes noruegos de 13 a 16 años con un nivel de madurez física mayor tienen una ventaja en Educación Física y en los deportes. En nuestro estudio, en relación con los resultados, los niños y las niñas que estaban más cercanos al PHV obtuvieron mejores valores de CM a los 11 años.

Esta predicción del nivel de CM a los 11 años que ofrece el presente estudio sugiere que comenzar a los 6 años con un nivel alto de CM, participar regularmente todos los años en ADE y estar cerca de la edad PHV favorece de forma significativa el nivel de la CM. Malina (2014) aboga por la necesidad de reconocer la interacción de la biología y el comportamiento (enfoque biocultural) como posible influencia sobre, la competencia motriz. De ahí que, de acuerdo con los resultados del presente estudio, podamos apoyar la propuesta que defiende este autor.

Pese a los datos concluyentes de este estudio, las limitaciones del mismo nos hacen ser cautos con las afirmaciones realizadas, pues esta investigación sólo incluye al alumnado de un mismo centro escolar y en un número limitado.

Conclusión

Este estudio longitudinal realizado durante seis años en niños y niñas de Educación Primaria ha encontrado: 1) un aumento del nivel de CM desde los 6 años hasta los 11 años, 2) un comportamiento de la CM diferente entre el grupo de niños y niñas que realizaron regularmente ADE y el grupo que no realizó estas actividades y 3) el valor predictivo del nivel de CM a los 6 años, la participación regular en ADE y la edad del PHV sobre el grado de CM a los 11 años.

Por ello, la etapa de Educación Infantil debería reforzar el ámbito motriz, incidiendo sobre la motricidad global que es determinante de la CM, dado que es la mejor predictora de CM al final de la etapa escolar. Dada la importancia de las ADE en el desarrollo de la CM, estas deben estar adaptadas a cada edad.

Los resultados de este estudio proporcionan una información útil a los maestros y profesores de Educación Física para poder individualizar el proceso de enseñanza-aprendizaje de su alumnado teniendo presentes el nivel de CM, el PHV y la práctica regular en ADE.

Trabajos futuros deberían orientarse a analizar el efecto de los diferentes tipos de ADE en la CM.

Declaración del Comité de Ética

No aplica debido a que las pruebas realizas no fueron invasivas.

Conflicto de Intereses

No existe conflicto de intereses. Las entidades o instituciones financiadoras no tuvieron influencia en el diseño del estudio, en el análisis de los datos o en la interpretación de los resultados.

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Contribución de los Autores

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Declaración de Disponibilidad de Datos

Datos disponibles bajo demanda al autor de correspondencia (jrlechuga@upo.es).

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Analysis of physical activity levels and adherence to the mediterranean diet in spanish children and adolescents during the Covid-19 pandemic

Análisis de los niveles de actividad física y adherencia a la dieta mediterránea en niños y adolescentes españoles durante la pandemia Covid19

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Abstract

During the health crisis in Spain caused by the SARS-COVID19 pandemic, the activities that children and adolescents could usually engage in were disrupted, resulting in a decline in physical activity and dietary habits. The aim of this study was to assess the evolution of healthy physical activity and dietary habits among school-aged population in Spain during the school years affected by the pandemic and its restrictive measures. A longitudinal descriptive study was conducted with 1016 participants (8-14 years old) over 4 school years, using the PAQ-C questionnaire for physical activity and the KIDMED questionnaire to assess adherence to the Mediterranean diet. The results revealed a decrease in physical activity during the period with the strictest restrictions, which was not the case for healthy dietary habits, where adherence to the Mediterranean diet improved significantly year after year during the analyzed period. This study demonstrated a greater impact of confinement on the physical activity of children compared to another research. Regarding the Mediterranean diet, an increase was observed, likely due to family eating habits and awareness campaigns promoting healthy habits.

Keywords: COVID-19, healthy habits, mediterranean diet, physical activity, school population.

Resumen

Durante la crisis sanitaria en España provocada por la pandemia SARS-COVID19 se alteraron las actividades que los niños y adolescentes podían realizar de forma habitual, viéndose perjudicada la actividad física, así como los hábitos alimentarios. El objetivo del presente estudio fue evaluar la evolución de los hábitos saludables de actividad física y alimentación en población escolar en España durante los cursos escolares afectados por la pandemia y sus medidas restrictivas. Se llevó a cabo un estudio descriptivo longitudinal con 1016 participantes (8-14 años) durante cuatro cursos escolares, utilizando los cuestionarios PAQ-C para actividad física y KIDMED para evaluar la adherencia a la dieta mediterránea. Los resultados revelaron un descenso de actividad física en el período con mayores restricciones, no siendo así en el caso de los hábitos alimentarios saludables, donde la adherencia a la dieta mediterránea, que ha ido mejorando significativamente año tras año en el periodo analizado. Este estudio mostró un mayor impacto del confinamiento en la actividad física de los niños/as en comparación con otras investigaciones. En cuanto a la dieta mediterránea, se pudo observar un incremento probablemente producido por la alimentación en el entorno familiar y las campañas de concienciación de hábitos saludables.

Palabras clave: COVID-19, hábitos saludables, dieta mediterránea, actividad física, población escolar.

Introduction

The correct physical and psychological development is crucial for children and adolescents. In this regard, physical activity (PA) plays a decisive role in this function, especially considering the levels reported in some cases, reaching approximately 80% of adolescents (Guthold et al., 2020). Furthermore, PA is considered a priority means for the prevention of various pathologies, the improvement of health, and the reduction of childhood obesity (Kunzle-Elizeche et al., 2018; Medina et al., 2018; United Nations, 2020), increasing its effectiveness when physical activity is accompanied by healthy eating habits (Aguilar-Cordero et al., 2014; Briones-Villalba et al., 2018). Based on this, the stages of maturational development should be considered as a crucial moment to promote healthy behaviors that mitigate negative effects on their health and proper development, including psychosocial well-being (Hinkley et al., 2018) and mental health (Loades et al., 2020).

Currently, obesity is considered the epidemic of the 21st century, constituting a highly detrimental chronic disease for people's health and well-being (Aguilar-Cordero et al., 2014). Obesity, along with overweight, represents the fifth leading risk factor for death worldwide. The World Health Organization (WHO) has classified childhood obesity as one of the most serious public health challenges of the 21st century, associated with a series of physical, social, and psychological consequences. In relation to this disease, a high body mass index (BMI) is an important risk factor that increases the likelihood of suffering from cardiovascular disorders (Freedman et al., 1999). Additionally, excess weight in children is associated with a decrease in quality of life (De Onis et al., 2010; Ul-Haq et al., 2013). Hence, the importance of addressing obesity with good daily physical activity, combined with healthy eating habits. There is a general consensus on the need to increase physical activity levels, and various studies highlight the beneficial effect that regular physical exercise has on weight loss (Aguilar Corberó et al., 2017; Siegrist et al, 2013). Despite this, there is currently a prevalence and trend of physical inactivity in school-aged children and adolescents (Hu & Staiano, 2022). For this and other reasons, and based on the health benefits for young people that physical activity brings, in 2018, the World Health Organization (WHO) launched a new action plan that included new goals for a relative reduction of 15% in the prevalence of physical inactivity by 2030 among adolescents and adults (World Health Organization, 2018). Currently, it is estimated that approximately 120 WHO member countries know their prevalence of sufficient physical activity, and 56% have an action plan to increase active minutes (World Health Organization, 2017).

During the lockdown resulting from the health crisis in Spain, the activities that children and adolescents could habitually perform were altered. In this way, a reduction in the levels of daily physical activity recommended by the World Health Organization (Geneviève et al., 2020; World Health Organization, 2010) was observed for various reasons such as the closure of schools, parks, recreational and sports facilities. The WHO and other researchers (Moore et al., 2020) warn that this could have led to an increase in physical inactivity, weight gain, and a notable increase in screen time during the COVID-19 pandemic (Geneviève et al., 2020; López-Bueno et al., 2020; World Health Organization, 2020; Xiang et al., 2020).

Physical activity greatly contributes to healthy behaviors, and the three-month lockdown prevented children from doing the necessary exercise (Geneviève et al., 2020) based on the recommendation to engage in one hour of intense or vigorous activity (World Health Organization, 2020). Additionally, there are the particular conditions in which each household faced the situation: limited space, diverse socioeconomic and cultural conditions, daily schedules and routines, work commutes, number of household members, or attendance to online classes, among other factors (Capel & Blair, 2019). While it is true that some authors have mentioned some advantages of virtual education (Gómez-Gerdel et al., 2020) such as the possibility for children to acquire greater autonomy in daily household tasks and improve family relationships by spending more time together (Moore et al., 2020). However, these improvements have not yet been demonstrated in the case of improvements in physical activity. In fact, regardless of the fact that in many cases the recommendations for physical exercise were met, in Europe healthy habits and the level of physical activity were reduced (Kovacs et al., 2021). Similarly, some available data from countries like China, Canada, and the USA showed a decrease in physical activity and a notable increase in screen time during the first wave of the COVID-19 pandemic (Geneviève et al., 2020; Haycraft et al., 2020; Kovacs et al., 2021; Xiang et al., 2020).

To mitigate the effects of the pandemic and lockdown, a series of recommendations were proposed with the aim of combating physical inactivity and bad habits (Cachón-Zagalaz et al., 2021; González-Valero et al., 2020; Lozano et al., 2019). These authors recommended a healthy combination of lifestyle behaviors in childhood that involved less screen time, healthy eating patterns, and balanced daily physical activity.

Among the possible factors of healthy eating patterns, we can highlight the Mediterranean diet, which is characterized by the predominant consumption of fruits, vegetables, whole grains, legumes, nuts, and seeds, with olive oil being the main source of fat (Idelson et al., 2017). Other characteristics of this diet are the regular but moderate intake of dairy products (milk, yogurt, and cheese), the low to moderate intake of fish and poultry, and the low consumption of red meat (Kafatos et al., 2000). Other aspects to highlight are the use of local products, seasonality, and biodiversity, in addition to the cultural influence where traditional recipes stand out (Psaltopoulou et al., 2004). According to Idelson et al. (2017), the eating

patterns associated with the Mediterranean diet are more established in the countries bordering the Mediterranean Sea (including Spain), although the children and adolescents of these regions do not seem to demonstrate greater adherence to these patterns.

Other researchers highlight the relationship between the Mediterranean diet and healthy habits (Aguilar et al., 2014; Cachón-Cuberos et al., 2018; Quiroga et al., 2019). Other publications state that weight loss is more successful in a program that includes diet plus exercise, rather than diet or exercise alone (Chomentowski et al., 2009; Foster-Schubert et al., 2012; Frimel et al., 2008; Ghroubi et al., 2009). Additionally, the good quality of a healthy diet is related to greater life satisfaction, a higher level of physical activity, and better academic performance (Grao-Cruces et al., 2013). Therefore, the practice of physical activity (PA) and sports has become an essential component of a healthy lifestyle along with healthy dietary patterns (Oberlin et al., 2017), with particular emphasis on habits established at an early age, as it has been shown that these tend to persist into adulthood (Kostecka, 2014).

Finally, recent studies have observed a significant reduction in the physical activity levels of adults during the COVID-19 lockdown (Giustino et al., 2020; López-Bueno et al., 2020). Despite this, there are only a few longitudinal studies on physical activity and the Mediterranean diet in Spain. Therefore, this study can provide the opportunity to relate the data obtained on a large school population over a prolonged period before, during, and after the pandemic. Consequently, the aim of the present study was to evaluate, through validated questionnaires, the evolution of healthy physical activity and eating habits in the school population of Spain during the pre- and post-COVID period, and to determine if the health crisis has caused these habits to vary from a normal situation to one with restrictions.

Materials and Methods

Design

A quantitative study with a longitudinal descriptive design was conducted, based on similar studies developed during the SARS-COVID19 pandemic (Kovacs et al., 2021; Martínez-de-Quel et al., 2021).

Participants

The sample, selected by convenience, initially consisted of 5142 children enrolled in official education, aged between 8-14 years, and belonging to 31 public and private schools in the Community of Madrid, Valencian Community, Basque Country, and Andalusia. From the initial sample of 5142 children, a final sample of 1016 participants were selected who responded to the questionnaires over 4 years. Of the participants, 54.5% were male and the remaining 45.5% were female, with 53.8% in primary education and 46.2% in secondary education. The inclusion criterion for this study was being enrolled in courses for ages 8 to 14, while the only exclusion criterion was having suffered from any type of illness that prevented the practice of physical exercise during the last week.

Instruments

An online questionnaire used by the NGO DES (Deporte para la Educación y la Salud) was utilized, including questions from the physical activity questionnaire for children (PAQ-C) (Kowalski et al., 2004) and the Mediterranean Diet Quality Index questionnaire (KIDMED) (Serra-Majen et al., 2004). The included variables were those belonging to the aforementioned questionnaires and validated for the Spanish population (Machola-González, 2017; Serra Majen et al., 2004), as well as the gender, age, and academic grade of the participants. The KIDMED questionnaire consists of 16 dichotomous response items (YES/NO), 12 of which have a positive value and the remaining 4 have a negative value. The results were expressed in a numerical value with a maximum score of 12 points and in different subcategories: ≤ 3, Very low-quality diet; 4 to 7: Need to improve dietary pattern; ≥ 8: Optimal Mediterranean diet. Regarding the PAQ-C questionnaire, it is composed of 9 items measured on a Likert scale of 1-5, from which a numerical score is obtained.

Procedure

The questionnaire was electronically distributed to the schools participating in the program for the transformation of educational centers of "Schools Committed to Sport and Health," developed by the NGO Deporte para la Educación y la Salud (DES). After holding an in-person or telephone meeting with the physical education teacher responsible at each center, the questionnaire was sent via email with a direct link to a Google Forms and activated for 60 days. The school grades that participated in this study were those included between 3rd grade of Primary Education and 4th grade of Compulsory Secondary Education. The recommendations given by the researchers to the schools for completing the questionnaire were that it be done in the computer room and individually, under the supervision of the physical education teacher. The first section of the questionnaire included a statement on data protection and usage, guaranteeing the anonymity of the responses based on Organic Law 3/2018. The research is approved by the research and doctoral commission of the Universidad Europea and complies with the Helsinki Protocol.

Data Analysis

Data are presented as mean ± standard deviation. The Kolmogorov-Smirnov test was used to check that the data distribution was normal. Subsequently, a repeated measures analysis of variance with one factor (ANOVA) was conducted. After obtaining a significant F value, a post-hoc analysis was performed to identify the differences between means using the Bonferroni procedure. The effect size was estimated by calculating partial eta squared (η2p). A significance level of $p \leq .05$ was set for all comparisons. Statistical procedures were performed using the SPSS statistical software (v24.0, IBM, USA).

Results

As shown in Table 1, the data from the PAQ-C questionnaire indicate that in the academic years 18/19, 19/20, and 20/21, children engaged in less physical activity compared to the 21/22 academic year. Additionally, physical activity in the 19/20 academic year was greater than in the 20/21 academic year. Regarding the data obtained from the KIDMED questionnaire, adherence to the Mediterranean diet was lower in the 18/19 academic year compared to the other years, and it was also lower in the 19/20 academic year compared to the 20/21 and 21/22 academic years. From the results obtained and reflected in the PAQ-C and KIDMED tables for all children from the 18/19 to the 21/22 academic years, we can observe that, in the case of physical activity, the data reflect an increase except for the 20/21 academic year. It is worth noting that the results for the 18/19 and 20/21 academic years are very similar. The year with the lowest recorded physical activity for children was the 20/21 academic year (with greater restrictions due to COVID-19). However, regarding the KIDMED, the year with COVID-19 restrictions (20/21) surpassed the two previous years, indicating a growth over the four academic years, something not observed in the PAQ-C tables. Additionally, since the 18/19-year, adherence to the Mediterranean diet has significantly improved.

Table 1
PAQ-C and KIDMED results of all participating children from the 18/19 to 21/22 academic years

	N	18/19	19/20	20/21	21/22	*F*	*p*	*η²p*	Post Hoc
PAQC	1016	2.94±0.64	3.01±0.69	2.92±0.72	3.18±0.60	31.06	0.000	0.030	19/20 > 20/21: (p = .032) 21/22 > 18/19: (p < .001) 21/22 > 19/20: (p < .001) 21/22 > 20/21: (p < .001)
KIDMED	1016	6.77±2.45	7.11±2.58	8.32±2.36	8.44±2.27	124.77	0.000	0.109	19/20 > 18/19: (p= .017) 20/21 > 18/19 (p < .001) 20/21 > 19/20 (p < .001) 21/22 > 18/19 (p < .001) 21/22 > 19/20 (p < .001)

Discussion

The purpose of this study was to evaluate the impact of the COVID-19 pandemic on physical activity and healthy eating habits based on the Mediterranean diet in Spanish schoolchildren during the 18/19 to 21/22 academic years and to compare the results of physical activity and healthy eating habits obtained before, during, and after the COVID-19 restrictions.

Our data revealed that, in the case of physical activity, significant differences were observed at different levels. The academic years 18/19 and 20/21 showed lower levels of physical activity compared to the academic years 19/20 and 21/22, respectively. Thus, the data obtained in the 18/19 academic year (the first year of our study) and the 20/21 academic year (with greater COVID-19 restrictions) showed very similar results, with the lowest physical activity values recorded in the 20/21 year. However, no statistically significant differences were found between the first year 18/19 and the 20/21 year. On the other hand, in the case of adherence to the Mediterranean Diet, the year with COVID-19 restrictions (20/21) reflected better adherence to the Mediterranean Diet than in the previous two years, showing a positive progressive increase over the four years analyzed. Moreover, it is noteworthy that in the years when restrictions were gradually lifted, the average values exceeded 8 points, indicating optimal diet quality levels (Serra-Majen et al., 2004).

In comparison with the above and with other studies conducted during the same period (Kovacs et al., 2021; López-Bueno et al., 2020; Schmidt et al., 2020), the impact of the lockdown on children's physical activity was more evident in this sample of Spanish schoolchildren. The data obtained showed that the number of schoolchildren who met the WHO PA recommendation decreased compared to what was observed in the year before and after the lockdown (Chaput et al., 2020; Kovacs et al., 2021). In this regard, the results obtained highlight the enormous impact that adequate PA measures have on the school population. A global concern is that the changes evidenced in behavior due to COVID-19 may continue to have a permanent impact. According to available data from various recent studies (García-Solano et al., 2021; Gasol

Foundation, 2019; Moreno et al., 2016; Ortiz-Marrón et al., 2016) the results are worrying and tend to show that fewer children meet the physical activity recommendations.

It is evident that the situation generated by COVID-19 is exceptional and unprecedented. Therefore, it may be extremely complex to determine the most effective option to address it with guarantees. However, what is known is the positive effect that adequate PA, diet, and a healthy lifestyle have in the prevention and treatment of COVID-19 (Hasson et al., 2022). In this regard, it is important to recognize the significance of healthy lifestyles and, therefore, to invest in optimal PA levels. Support from interested administrations, which must take responsibility for promoting healthy lifestyles, families, schools, and the community at large is fundamental to ensuring adequate PA levels in the school and leisure environments for children and to prevent the levels observed in the aforementioned studies from becoming the norm.

Regarding the impact of COVID-19 on adherence to the Mediterranean diet, the data from our study reflect a lower incidence and even an improvement during the lockdown compared to the previous two years, in contrast to what some studies indicate (Cifuentes-Faura, 2020) about the food insecurity children will be exposed to, resulting in an increase in unhealthy diets.

It is true that some studies (Gebremariam et al., 2016; Grao-Cruces et al., 2013) highlight that both parental guidance and example can positively influence children's behaviors regarding diet and physical activity habits, especially during the lockdown. Parents often remain the best resource (and the closest, due to the lockdown) for children to receive help. The data obtained in our study show a clear progressive improvement in the Mediterranean Diet over the course of the study and align with other studies during the same period. Notably, a recent survey among Spanish adults reported that most maintained a good diet during the first 5 weeks (Romeo-Arroyo et al., 2020). Additionally, another study shows data on an increased consumption of foods related to the Mediterranean Diet, such as olive oil, during this period (Tárraga Marcos et al., 2023). Furthermore, the decline in the consumption of food outside the home is linked to positive changes in diet quality (Altman et al., 2015).

The main limitations of this study include the high attrition rate of the sample and the absence of other anthropometric values or physiological parameters that could shed light on the true effect of lockdown on the health of the analyzed population. Similarly, other important values related to diet and exercise, such as variables related to mental health, could be included (Richard et al., 2023).

Among the main practical applications of this work, emphasis should be placed on obtaining valid and reliable measures that allow decision-making based on the information collected about the healthy lifestyles of schoolchildren. Similarly, it is necessary to delve into the development of education and awareness strategies on dietary and/or sports habits. Finally, based on the results obtained, the implementation of teaching strategies aimed at teaching the different possibilities of engaging in physical exercise in exceptional situations may allow an increase in activity in such particular contexts.

Conclusions

In conclusion, the data provided by the study to evaluate the impact of the COVID-19 pandemic on physical activity and healthy habits in Spanish schoolchildren during the 18/19 to 21/22 academic years revealed lower physical activity values in two of the four school years studied (18/19 and 20/21). Thus, in the period with the most restrictions, a somewhat greater decrease was observed, although it is true that the data obtained in the 18/19 academic year were very similar. On the contrary, this did not occur in the case of healthy eating habits, which reflect better adherence to the Mediterranean Diet, progressively improving over the analyzed period. This study showed a greater impact of the lockdown on children's physical activity compared to others. Compliance with the WHO PA recommendations decreased. Regarding the Mediterranean Diet, an increase can be observed, likely due to eating within the family environment and awareness campaigns promoting healthy habits.

Ethics Committee Statement

The research is approved by the Research and Doctoral Committee of the European University and complies with the Helsinki Protocol.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

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Authors' Contribution

Conceptualization E.D., & P-G, B. ; Methodology F-L, A., & B, P.; Formal Analysis I-B,I. & F-E, V.; Investigation E.D., & F-E, V.; Resources E.D. & F-E, V; Data Curation Analysis I-B,I. & F-E, V.; Writing – Original Draft E.D., & P-G, B.; Writing – Review & Editing F-L, A., & B, P. All authors have read and agree with the published version of the manuscript.

Data Availability Statement

The data is not available due to its privacy policy.

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Análisis de los niveles de actividad física y adherencia a la dieta mediterránea en niños y adolescentes españoles durante la pandemia Covid19

Analysis of physical activity levels and adherence to the mediterranean diet in spanish children and adolescents during the Covid-19 pandemic

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Resumen

Durante la crisis sanitaria en España provocada por la pandemia SARS-COVID19 se alteraron las actividades que los niños y adolescentes podían realizar de forma habitual, viéndose perjudicada la actividad física, así como los hábitos alimentarios. El objetivo del presente estudio fue evaluar la evolución de los hábitos saludables de actividad física y alimentación en población escolar en España durante los cursos escolares afectados por la pandemia y sus medidas restrictivas. Se llevó a cabo un estudio descriptivo longitudinal con 1016 participantes (8-14 años) durante cuatro cursos escolares, utilizando los cuestionarios PAQ-C para actividad física y KIDMED para evaluar la adherencia a la dieta mediterránea. Los resultados revelaron un descenso de actividad física en el período con mayores restricciones, no siendo así en el caso de los hábitos alimentarios saludables, donde la adherencia a la dieta mediterránea, que ha ido mejorando significativamente año tras año en el periodo analizado. Este estudio mostró un mayor impacto del confinamiento en la actividad física de los niños/as en comparación con otras investigaciones. En cuanto a la dieta mediterránea, se pudo observar un incremento probablemente producido por la alimentación en el entorno familiar y las campañas de concienciación de hábitos saludables.

Palabras clave: COVID-19, hábitos saludables, dieta mediterránea, actividad física, población escolar.

Abstract

During the health crisis in Spain caused by the SARS-COVID19 pandemic, the activities that children and adolescents could usually engage in were disrupted, resulting in a decline in physical activity and dietary habits. The aim of this study was to assess the evolution of healthy physical activity and dietary habits among school-aged population in Spain during the school years affected by the pandemic and its restrictive measures. A longitudinal descriptive study was conducted with 1016 participants (8-14 years old) over 4 school years, using the PAQ-C questionnaire for physical activity and the KIDMED questionnaire to assess adherence to the Mediterranean diet. The results revealed a decrease in physical activity during the period with the strictest restrictions, which was not the case for healthy dietary habits, where adherence to the Mediterranean diet improved significantly year after year during the analyzed period. This study demonstrated a greater impact of confinement on the physical activity of children compared to another research. Regarding the Mediterranean diet, an increase was observed, likely due to family eating habits and awareness campaigns promoting healthy habits.

Keywords: COVID-19, healthy habits, mediterranean diet, physical activity, school population.

Introducción

El correcto desarrollo físico y psíquico es primordial para niños y adolescentes. En este sentido, la actividad física (AF) juega un papel determinante en esta función y, más si cabe teniendo en cuenta los niveles reportados en algunos casos, llegando a ser de aproximadamente del 80% de los menores (Guthold et al., 2020). Además, la AF se considera un medio prioritario para la prevención de diversas patologías, la mejora de la salud y la reducción de la obesidad infantil (Kunzle-Elizeche et al., 2018; Medina et al., 2018; United Nations, 2020), incrementando su efectividad cuando la actividad física se acompaña de unos hábitos alimentarios saludables (Aguilar-Cordero et al., 2014; Briones-Villalba et al., 2018). En base a ello, las etapas de desarrollo madurativo deben considerarse como un momento crucial para promover comportamientos saludables que palien efectos negativos sobre su salud y buen desarrollo, incluido el bienestar psicosocial (Hinkley et al., 2018) y la salud mental (Loades et al., 2020).

En la actualidad la obesidad es considerada la epidemia del siglo XXI, constituyendo una enfermedad crónica altamente perjudicial para la salud y el bienestar de las personas (Aguilar-Cordero et al., 2014). La obesidad representa, junto al sobrepeso, el quinto factor principal de riesgo de defunción en el mundo. La Organización Mundial de la Salud (OMS) ha clasificado la obesidad infantil como uno de los desafíos de salud pública más graves del siglo XXI, asociada a una serie de consecuencias físicas, sociales y psicológicas. En relación con esta enfermedad, un alto índice de masa corporal (IMC) es un factor importante de riesgo que incrementa la probabilidad de sufrir trastornos cardiovasculares (Freedman et al. 1999). Además, el exceso de peso en los niños se asocia con una disminución de la calidad de vida (De Onis et al., 2010; Ul-Haq et al., 2013). De ahí, la importancia de incidir sobre la obesidad con una buena actividad física diaria, unida a unos hábitos alimentarios saludables. Existe un consenso general en la necesidad de incrementar los niveles de la actividad física y diferentes estudios señalan el efecto beneficioso que la práctica regular de ejercicio físico tiene sobre la pérdida de peso (Aguilar Corberó et al., 2017; Siegrist, et al., 2013). A pesar de ello, en la actualidad encontramos una prevalencia y tendencia de inactividad física en niños y adolescentes en edad escolar (Hu & Staiano, 2022). Por este y otros motivos, y basándose en los beneficios para la salud de los jóvenes que tiene la realización de actividad física, en 2018, la Organización Mundial de la Salud (OMS) puso en marcha un nuevo plan de acción que incluía nuevas metas de reducción relativa en un 15% de la prevalencia de actividad física para 2030 entre los adolescentes y los adultos (World Health Organization, 2018). En la actualidad, se estima que aproximadamente 120 países miembros de la OMS conocen su prevalencia de actividad física suficiente y el 56% tiene un plan de acción para incrementar los minutos activos (World Health Organization, 2017).

Durante el confinamiento derivado de la crisis sanitaria en España se alteraron las actividades que los niños y adolescentes podían realizar de forma habitual. De esta forma, se observó una reducción en los niveles de actividad física diaria recomendada por la Organización Mundial de la Salud (Geneviève et al., 2020; World Health Organization, 2010) por diferentes motivos como el cierre de Centros escolares, parques, instalaciones recreativas y deportivas. La OMS y otros investigadores (Moore et al., 2020) adviertes de que pudo afectar a un aumento de la inactividad física, a una ganancia de peso de peso y a un incremento notable en el tiempo de pantalla durante la pandemia de COVID-19 (Geneviève et al., 2020; López-Bueno et al., 2020; World Health Organization, 2020; Xiang et al., 2020).

La actividad física contribuye enormemente a los comportamientos saludables, y el confinamiento de tres meses impidió que los niños hicieran el ejercicio necesario (Geneviève et al., 2020) en base a la recomendación de realizar una hora de actividad intensa o vigorosa (World Health Organization, 2020). A esto, hay que añadir las condiciones particulares en las que cada hogar afrontaba la situación: espacios reducidos, condiciones socioeconómicas y culturales diversas, horarios y rutinas diarias, desplazamientos laborales, números de miembros convivientes o asistencia a clases online, entre otros factores (Capel & Blair, 2019). Si bien es cierto que algunos autores han mencionado algunas ventajas de la educación virtual (Gómez-Gerdel et al., 2020) como la posibilidad de que los niños adquieran una mayor autonomía en las tareas diarias del hogar y mejorar las relaciones familiares al pasar más tiempo juntos (Moore et al., 2020). Sin embargo, estas mejoras todavía no han sido demostrado en el caso de las mejoras de la realización de actividad física. De hecho, independientemente de que en muchos casos se cumplieron con las recomendaciones de ejercicio físico, en Europa los hábitos saludables y el nivel de actividad física se vieron reducidos (Kovacs et al., 2021). De la misma forma, algunos datos disponibles de países como China, Canadá y EE. UU. demostraron una disminución en la actividad física y un aumento notable en el tiempo de pantalla durante la primera ola de la pandemia de COVID-19 (Geneviève, et al., 2020; Haycraft et al., 2020; Kovacs et al., 2021; Xiang et al., 2020).

Para paliar los efectos de la pandemia y el confinamiento se han propusieron una serie de recomendaciones con el objetivo de luchar contra la inactividad física y los malos hábitos (Cachón-Zagalaz et al., 2021; González-Valero et al., 2020; Lozano et al., 2019). Estos autores, recomendaron una combinación saludable de comportamientos de estilo de vida en la infancia que implicaban menos tiempo de pantalla, patrones de alimentación saludables y actividad física diaria equilibrada.

Entre los posibles factores de patrones de alimentación saludables podemos destacar la dieta mediterránea, que se caracteriza por el consumo predominante de frutas, verduras, cereales integrales, legumbres, frutos secos y semillas, siendo

el aceite de oliva la principal fuente de grasa añadida (Idelson et al., 2017). Otras características de esta dieta son la ingesta regular pero moderada de productos lácteos (leche, yogur y queso), la ingesta baja a moderada de pescado y carne de ave, o el bajo consumo de carne roja (Kafatos et al., 2000). Otros aspectos a destacar son el uso de productos locales, la estacionalidad y la biodiversidad a lo que hay que añadir la influencia cultural donde destacan las recetas tradicionales (Psaltopoulou et al., 2004). Según Idelson et al. (2017) los patrones de alimentación asociados a la dieta mediterránea están más instaurados en los países bañados por el Mar Mediterráneo (incluyendo España), aunque los niños y adolescentes de estas regiones no parecen demostrar una adherencia mayor a estos patrones.

Otros investigadores ponen de manifiesto la relación que tiene la dieta mediterránea con los hábitos saludables (Aguilar et al., 2014; Cachón-Cuberos et al., 2018, Quiroga et al., 2019). En otras publicaciones se expone que la pérdida de peso es más exitosa en un programa que incluye dieta más ejercicio, que dieta o ejercicio por separado (Chomentowski et al., 2009; Foster-Schubert et al., 2012; Frimel et al., 2008; Ghroubi et al., 2009). Además, la buena calidad de una dieta saludable se relaciona con una mayor satisfacción con sus vidas, un mayor nivel de actividad física o un mayor rendimiento académico (Grao-Cruces et al., 2013). Por todo ello, la práctica de actividad física (AF) y deporte se ha convertido en un componente esencial de un estilo de vida saludable junto con patrones dietéticos saludables (Oberlin et al., 2017), cobrando además especial relevancia aquellos hábitos instaurados a edades tempranas, pues se ha demostrado la prevalencia de estos a continuar durante la edad adulta (Kostecka, 2014).

Por último, estudios recientes han observado una reducción significativa en los niveles de actividad física de los adultos durante el confinamiento de Covid-19 (Giustino et al., 2020; López-Bueno et al., 2020). A pesar de ello, sólo existen unos pocos estudios longitudinales sobre actividad física y dieta mediterránea en España, por eso, este estudio puede ofrecer la posibilidad de relacionar los datos obtenidos sobre una población escolar amplia y en un tiempo prolongado antes, durante y post pandemia. Por todo ello, el objetivo del presente estudio fue evaluar, a través de cuestionarios validados, la evolución de los hábitos saludables de actividad física y hábitos alimentarios en población escolar de España durante la etapa pre y post covid, y comprobar si la crisis sanitaria ha hecho que estos hábitos varíen de una situación normal a otra con restricciones.

Materiales y Métodos

Diseño

Se realizó un estudio cuantitativo con un diseño descriptivo longitudinal, basándose en otros estudios semejantes desarrollados durante la pandemia SARS-COVID19 (Kovacs et al., 2021; Martínez-de-Quel et al., 2021).

Participantes

La muestra, seleccionada por conveniencia, estuvo formada inicialmente 5142 por niños matriculados en enseñanzas oficiales con edades comprendidas entre los 8-14 años y pertenecientes a 31 colegios públicos y privados de la Comunidad de Madrid, Comunitat Valenciana, País Vasco y Andalucía. De la muestra inicial de 5142 niños, se seleccionó una muestra final de 1016 participantes que respondieron los cuestionarios durante los 4 años. El 54.5% de los participantes eran hombres frente al 45.5% restante de mujeres, que estaban en educación primaria (53.8%) y educación secundaria (46.2%). El criterio de inclusión de este estudio fue estar matriculados en los cursos comprendidos entre los 8 y 14 años, mientras que el único criterio de exclusión de los participantes fue haber padecido algún tipo de enfermedad que impidiera la práctica de ejercicio físico durante la última semana.

Instrumentos

Se utilizó un cuestionario online utilizado por la ONG DES (Deporte para la Educación y la Salud), incluyendo las preguntas pertenecientes al cuestionario de actividad física para niños (PAQ - C) (Kowalski et al., 2004), el cuestionario del Índice de Calidad de la Dieta Mediterránea (KIDMED) (Serra-Majen et al., 2004). Las variables incluidas fueron aquellas pertenecientes a los cuestionarios anteriores y validadas para la población española (Machola-González, 2017; Serra Majen et al., 2004), así como el género, edad y curso académico de los participantes. El cuestionario KIDMED consiste en 16 ítems de respuesta dicotómica (SÍ/NO), 12 de ellos con valor positivo y los 4 restantes con valor negativo. Los resultados se expresaron en un valor numérico con un valor máximo de 12 puntos y en las diferentes subcategorias: ≤ 3, Dieta de muy baja calidad; 4 a 7: Necesidad de mejorar el patrón alimentario; ≥ 8: Dieta Mediterránea óptima. Respecto al cuestionario PAQ-C, este se compone de 9 ítems medidos con escala likert 1-5, de los cuáles se obtiene una puntuación numérica.

Procedimiento

El cuestionario fue distribuido electrónicamente a los Centros pertenecientes al programa para la transformación de Centros educativos de (DES) "Colegios Comprometidos con el Deporte y la Salud", desarrollado por la ONG Deporte para la Educación y la Salud (DES), y una vez mantenida reunión presencial o telefónica con el profesor responsable de la asignatu-

ra de Educación Física de cada Centro, a través de mail con enlace directo a un formulario Google Forms y activado durante 60 días. Los cursos escolares que participaron en este estudio fueron los incluidos entre 3º de Educación Primaria y 4º de Educación Secundaria Obligatoria. Las recomendaciones dadas por los investigadores a los centros para la realización del cuestionario fueron que éste se realizara en la sala de informática y de manera individual, con la supervisión del profesor de educación física. El cuestionario incluía en su primer apartado una declaración de protección y uso de los datos garantizando el anonimato de las respuestas en base a la Ley orgánica 3/2018. La investigación está aprobada por la comisión de investigación y doctorado de la Universidad Europea y cumple con el protocolo de Helsinki.

Análisis Estadístico

Los datos se presentan como media ± desviación estándar. Se utilizó la prueba de Kolmogorov-Smirnov para comprobar que la distribución de los datos fue normal. Posteriormente se analizó un análisis de la varianza de medidas repetidas de 1 factor (ANOVA). Después de obtener un valor de F significativo, se realizó un análisis post-hoc para identificar las diferencias entre medias con el procedimiento de Bonferroni. El tamaño del efecto se estimó mediante el cálculo de eta parcial cuadrado (η2p). Se estableció un nivel de significancia de $p \leq .05$ para todas las comparaciones. Los procedimientos estadísticos se realizaron con el software estadístico SPSS (v24.0, IBM, EEUU).

Resultados

Como puede observarse en la tabla 1, los datos referentes al cuestionario PAQC muestran que en los cursos académicos 18/19, 19/20 y 20/21 los niños realizaron menor cantidad de actividad física respecto al curso 21/22. Y que la actividad física realzada en el curso académico 19/20 fue mayor que en el curso 20/21. Con relación a los datos obtenidos del cuestionario KIDMED, la adherencia a la dieta mediterránea de los niños fue inferior en el curso 18/19 respecto al resto de cursos, y también fue inferior en el curso 19/20 en comparación a los cursos 20/21 y 21/22. De los resultados obtenidos y reflejados en las tablas PAQ-C y KIDMED de todos los niños desde el curso 18/19 al 21/22, podemos observar que, en el caso de la actividad física, los datos reflejan un crecimiento a excepción del curso 20/21, si bien es cierto, que los resultados de los cursos 18/19 y 20/21 son muy similares. El año en el que menor actividad física registraron los niños/as fue el curso 20/21 (con mayores restricciones derivados del COVID 19). Sin embargo, respecto al KIDMED, el año con restricciones derivados del COVID 19 (20/21) superó a los dos previos, por lo que los datos obtenidos reflejan un crecimiento durante los cuatro cursos escolares, algo que no sucedió en las tablas del PAQ-C. Asimismo, desde el año 18-19 la adherencia a la dieta mediterránea fue mejorando significativamente.

Tabla 1
Resultados PAQC y KIDMED de todos los niños participantes desde el curso 18/19 al 21/22

	N	18/19	19/20	20/21	21/22	*F*	*p*	*η²p*	Post Hoc
PAQC	1016	2.94±0.64	3.01±0.69	2.92±0.72	3.18±0.60	31.06	0.000	0.030	19/20 > 20/21: (p = .032) 21/22 > 18/19: (p < .001) 21/22 > 19/20: (p < .001) 21/22 > 20/21: (p < .001)
KIDMED	1016	6.77±2.45	7.11±2.58	8.32±2.36	8.44±2.27	124.77	0.000	0.109	19/20 > 18/19: (p = .017) 20/21 > 18/19 (p < .001) 20/21 > 19/20 (p < .001) 21/22 > 18/19 (p < .001) 21/22 > 19/20 (p < .001)

Discusión

El propósito de este estudio fue evaluar el impacto de la pandemia de COVID 19 en actividad física y hábitos alimentarios saludables basados en la dieta mediterránea en escolares españoles durante los cursos 18/19 al 21/22 y comparar los resultados de AF y hábitos alimentarios saludables obtenidos antes, durante y después de las restricciones de COVID 19.

Nuestros datos revelaron que, en el caso de la actividad física, se observaron diferencias significas en los diferentes niveles. Los cursos 18/19 y 20/21 presentaron menores niveles de actividad física en relación con los cursos 19/20 y 21/22 respectivamente. De esta forma, los datos obtenidos en los cursos 18/19 (primer año de nuestro estudio) y el curso 20/21 (con mayores restricciones derivados del COVID 19) arrojaban unos resultados muy similares, registrándose los menores valores de actividad física en el año 20/21. En cambio, no se encontraron diferencias estadísticamente significativas entre el primer curso 18/19 y el curso 20/21. Por el contrario, en el caso de la adherencia a la Dieta Mediterránea, el año con restricciones derivados del COVID 19 (20/21) reflejan una mejor adherencia a la Dieta Mediterránea que en los dos años anteriores, produciéndose un aumento progresivo positivo en los cuatro años analizados. Además, es destacable observar

que en los años en los que las restricciones fueron eliminándose de forma progresiva, los valores medios superaron los 8 puntos, lo que se traduce en unos niveles de calidad de dieta óptima (Serra-Majen et al., 2004).

En comparación con lo expuesto anteriormente y con otros estudios realizados durante el mismo período (Kovacs et al., 2021; López-Bueno et al., 2020; Schmidt et al., 2020) el impacto del confinamiento en la actividad física de los niños/as fue más evidente en esta muestra de escolares españoles. Los datos obtenidos reflejaron que el número de escolares que cumplieron con la recomendación de AF de la OMS se redujo en comparación con lo observado en el curso anterior y posterior al confinamiento (Chaput et al., 2020; Kovacs et al., 2021). En este sentido, los resultados obtenidos ponen el foco sobre la enorme incidencia que tienen las medidas adecuadas de AF en la población escolar. Una preocupación mundial es que los cambios evidenciados en el comportamiento derivado del COVID 19 puedan seguir incidiendo de manera permanente. Según los datos disponibles de diferentes estudios recientes (García-Solano et al., 2021, Gasol Foundation, 2019; Moreno et al., 2016; Ortiz-Marrón et al., 2016;) los resultados son preocupantes y suelen mostrar que cada vez menos niños/as cumplen con las recomendaciones de actividad física.

Es evidente, que la situación generada por el COVID 19 es excepcional y sin precedentes. Por ello, puede resultar extremadamente complejo conocer cuál será la opción más efectiva para afrontarla con garantías. Pero lo que sí se conoce, es el efecto positivo que tiene la adecuada práctica de AF, la dieta y un estilo de vida saludable en la prevención y tratamiento del COVID 19 (Hasson et al., 2022). En este sentido, es importante dar la importancia que tienen los estilos de vida saludable y, por lo tanto, invertir en niveles óptimos de AF. El apoyo por parte de las administraciones interesadas y que deben asumir su responsabilidad de promover estilos de vida saludable, a las familias, escuelas y en general a toda la comunidad es fundamental para poder garantizar niveles adecuados de AF en el entorno a escolar y de ocio de los niños/as, y se logre alejar de la normalidad los niveles aparecidos en los diferentes estudios mencionados anteriormente.

En cuanto a la incidencia del COVID 19 en la adherencia a la dieta mediterránea, los datos de nuestro estudio reflejan una incidencia menor e incluso una mejora durante el confinamiento en relación a los dos años anteriores, en contraposición a lo que reflejan algunos estudios (Cifuentes-Faura, 2020), sobre la inseguridad alimentaria a la que estarán expuestos los niños/as, produciéndose un aumento de las dietas poco saludables.

Es cierto que algunos estudios (Gebremariam et al., 2016; Grao-Cruces et al., 2013) ponen de manifiesto que tanto la guía como el ejemplo de los padres pueden influir positivamente en los comportamientos de los niños/as con respecto a la dieta y los hábitos de actividad física, más si cabe, durante el confinamiento. Los padres siguen siendo a menudo el mejor recurso (y el más cercano, debido al confinamiento) para que los niños reciban ayuda. Los datos obtenidos en nuestro estudio evidencian una clara mejoría progresiva de la Dieta Mediterranea a lo largo del mismo y se sitúan en la línea de otros estudios en el mismo periodo. No en vano, una encuesta reciente entre adultos españoles informó que la mayoría mantuvo una buena dieta las primeras 5 semanas (Romeo-Arroyo et al., 2020). Así como otro estudio arroja datos de un aumento de consumo de alimentos relacionados con la Dieta Mediterránea como el aceite de oliva durante este periodo (Tárraga Marcos et al., 2023). Además, que el descenso del consumo de alimentos fuera del hogar se vincula con cambios positivos en la calidad de la dieta (Altman et al., 2015).

Como principales limitaciones de este estudio nos encontramos la elevada mortalidad de la muestra y la ausencia de otros valores o índices antropométricos o parámetros fisiológicos que pudieran arrojar luz sobre el verdadero efecto de un confinamiento en la salud de la población analizada. De igual manera, podrían incluirse otros valores importantes asociados a la dieta y el ejercicio como son las variables relacionadas con la salud mental (Richard et al., 2023).

Entre las principales aplicaciones prácticas de este trabajo se debe poner énfasis en la obtención de medidas válidas y fiables que permitan la toma de decisiones en base a la información recogida sobre los hábitos de vida saludables de los escolares. De la misma forma, se deberá profundizar en la elaboración de estrategias de educación y concienciación sobre hábitos de alimentación y/o deportivos. Por último, y en base a los resultados obtenidos, la implementación de estrategias docentes orientadas a la enseñanza de las diferentes posibilidades de realización de ejercicio físico en situaciones excepcionales, puede permitir un aumento de la actividad en este tipo de contextos particulares.

Conclusiones

En conclusión, los datos arrojados por el estudio para evaluar el impacto de la pandemia de COVID 19 en actividad física y hábitos saludables en niños/as españoles en edad escolar durante los cursos 18/19 al 21/22, revelaron menores valores de actividad física en dos de los cuatro cursos escolares estudiados (18/19 y 20/21). De esta forma, en el período con mayores restricciones se observó un descenso algo mayor, si bien es cierto, que los datos obtenidos en el curso 18/19 fueron muy similares. Al contrario, esto no ocurrió en el caso de los hábitos alimentarios saludables, donde refleja una mejor adherencia a la Dieta Mediterránea, que ha ido mejorando progresivamente en el periodo analizado. En este estudio, se pudo observar un mayor impacto del confinamiento en la actividad física de los niños/as en comparación con otros. Se redujo el cumpli-

miento de las recomendaciones de AF de la OMS. En cuanto a la Dieta Mediterránea se puede observar un incremento probablemente producido por la alimentación en el entorno familiar y las campañas de concienciación de hábitos saludables.

Declaración del Comité de Ética

La investigación está aprobada por la comisión de investigación y doctorado de la Universidad Europea y cumple con el protocolo de Helsinki.

Conflicto de Intereses

Los autores declaran que no existen conflictos de intereses.

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Contribución de los Autores

Conceptualización E.D., & P-G, B. ; Metodología F-L, A., & B, P.; Análisis formal I-B,I. & F-E, V.; Investigación E.D., & F-E, V.; Recursos E.D. & F-E, V; Análisis de datos I-B,I. & F-E, V.; Escritura – Versión original E.D., & P-G, B.; Escritura – Revisión y edición F-L, A., & B, P. Todos los autores han leído y están de acuerdo con la versión publicada del manuscrito.

Declaración de Disponibilidad de Datos

Los datos no se encuentran disponibles debido a la política de privacidad de estos.

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ESTADÍSTICAS Y REVISORES

Resumen de Visibilidad, Calidad Editorial y Científica e Impacto de CCD (modificado a partir de la Tabla Resumen de la Memoria Anual de CCD)

Visibilidad
ISI Web of Science, SCOPUS, EBSCO, MIAR, LATINDEX, REDIB, REDALYC, DIALNET, COMPLUDOC, RECOLECTA, ERIHPLUS, CEDUS, REDINET, SPORTDISCUS, PSICODOC, DOAJ, ISOC, IN-RECS, DULCINEA, SCIRUS, WORLDCAT, LILACS, GTBib, RESEARCH GATE, SAFETYLIT, REBIUN, Universal Impact Factor, Index Copernicus, e-Revistas, Cabell's Directory, SJIF, DLP, Fuente Académica Plus, ERA, BVS, PRESCOPUS RUSSIA, JournalTOCs, Viref, Genamics

Calidad
REDALYC: Superada
LATINDEX: (Total Criterios Cumplidos: 33/33)
CNEAI: (Total Criterios Cumplidos: 18/18)
ANECA: (Total Criterios Cumplidos: 22/22)
ANEP: Categoría A
CIRC (2020): Categoría B
Valoración de la difusión internacional (DICE): 14.25
DIALNET: C1 (DEPORTE Y EDUCACIÓN)
MIAR (2020): 9.7
ARCE 2014 (FECYT): Sello de calidad - Actualizado 2020
ERIH PLUS (European Reference Index for Humanities and Social Sciences): Indexada

Redes sociales
Twitter: https://twitter.com/UCAM_CC

Impacto
ISI Web of Science 2021: 0.15 (JCI). Cuarto cuartil en Hospitality, Leisure, Sport & Tourism.

SCOPUS: 2021: 0.184 (SJR). Índice H: 14. Cuarto cuartil en Health (Social Science), Physical Therapy, Sports Therapy and Rehabilitation y en Sports Science.

Emerging Sources Citation Index (ESCI): 2023 1.1 (JCR). Tercer cuartil en HOSPITALITY, LEISURE, SPORT & TOURISM.

FECYT 2020: Ranking de Calidad de las Revistas Científicas Españolas Segundo cuartil en Ciencias de la Educación (puntuación: 34.23), y Psicología (puntuación: 32.23).

Ranking Iberoamericano de Revistas (REDIB) 2020: primer cuartil en el área temática de Ciencias Sociales y Humanidades, materia Hostelería, Ocio, Deporte y Turismo.

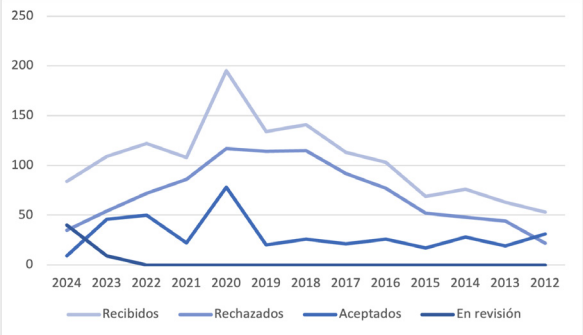
IN-RECS Education (2011): 0.103. Second quartile. Position: 47/162

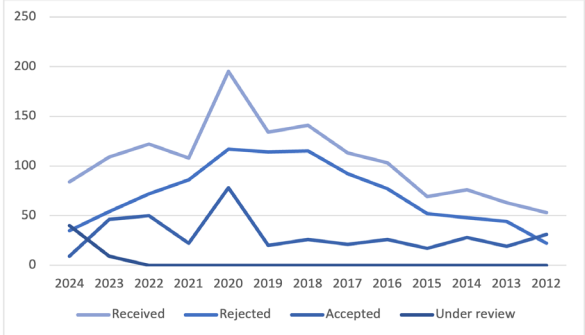
Índice H (2013-17): 11. Mediana H: 18. Posición 36/96

Scientific Journal Impact Factor (SJIF) 2018: 6.91

Nivel CONICET (Res. 2249/14): Grupo 1

Estadísticas





Lista revisores CCD 60

Ainara Bernal	Frano Giakoni	Mado Gonzalez	Rafael Baena González
Alberto Moreno Doña	Gabriel Hernandez Oñate	María Garrido Muñoz	Rubén Jiménez-Alfageme
Ana Belén López Martínez	Georgina Alvarez	María Isabel Cifo Izquierdo	Ruperto Menayo
Antonio José Cardona Linares	Jonathan Adrian Luna Muñoz	María Jesús	Ruth Alvarado Ruano
David Romero García	Juan Hurtado Almonacid	María José Álvarez Barrio	Samuel Pérez Norambuena
Diana Carolina Preciado-Martínez	Karina Franco Paredes	Pedro Ángel Latorre Román	Sandro Fernandes da Silva
Elena Conde	Kevin oswaldo lozano martinez	Pedro Gil Madrona	Verónica Alcaraz Muñoz

NORMAS DE PRESENTACIÓN DE ARTÍCULOS EN CULTURA, CIENCIA Y DEPORTE

La Revista *Cultura, Ciencia y Deporte* considerará para su publicación trabajos de investigación relacionados con las diferentes áreas temáticas y campos de trabajo en Educación Física y Deportes, que estén científicamente fundamentados. Dado el carácter especializado de la revista, no tienen en ella cabida los artículos de simple divulgación, ni los que se limitan a exponer opiniones en vez de conclusiones derivadas de una investigación contrastada. Los trabajos se enviarán telemáticamente a través de nuestra página web, en la que el autor se deberá registrar como autor y proceder tal como indica la herramienta.

1. Envío

Cada envío estará compuesto por DOS DOCUMENTOS. El primero corresponderá al "Template" y el segundo a la "Title Page".

El Template debe ser completamente anónimo: SIN NINGÚN TIPO DE INDICACIÓN QUE PERMITA A LOS REVISORES IDENTIFICAR A LOS AUTORES DEL MANUSCRITO. EL "ARTÍCULO ANÓNIMO".

Todos los autores que realicen un envío en castellano, y cuyo artículo finalmente sea aceptado, deberán remitir la **versión definitiva en castellano e inglés,** para su publicación en ambos idiomas. Este proceso no es necesario si el envío es inicialmente en inglés.

En caso de publicación en **monográfico**, durante el proceso de envío, se seleccionará la pestaña con el nombre del monográfico donde se pretende publicar.

Si se utiliza un gestor bibliográfico para las citas y referencias, a la hora de realizar el envío, se tiene que enviar el manuscrito con texto plano.

2. Tipos de artículos que se pueden someter a evaluación en Cultura, Ciencia y Deporte

2.1. Investigaciones originales

Son artículos que dan cuenta de un estudio empírico original configurados en partes que reflejan los pasos seguidos en la investigación. El texto completo debe seguir la estructura IMRDC (Introducción, Método, Resultados, Discusión y Conclusiones).

2.2. Artículos de revisión

Los artículos de revisión contemplarán los apartados y el formato de las investigaciones

originales. Las revisiones sobre el estado o nivel de desarrollo científico de una temática concreta deberán ser sistemáticas, críticas o narrativas.

2.3. Editorial

Esta sección de Cultura, Ciencia y Deporte admitirá Editorial, ensayos, correctamente estructurados y suficientemente justificados, fundamentados, argumentados y con coherencia lógica, sobre temas relacionados con el deporte. Pretende ser una sección dinámica, actual, que marque la línea editorial sobre el deporte que subyace a la revista. No precisa seguir el esquema de las investigaciones originales, pero sí el mismo formato.

3. Extensión

Abstract, no estructurado: no más de 200 palabras en inglés.

Manuscrito (artículos originales, revisiones sistemáticas): un artículo para esta revista debería tener una extensión no superior a 8000 palabras, incluyendo:

- Texto del artículo.
- Figuras.
- Tablas.

4. Información relevante de la revista

4.1. La revista Cultura, Ciencia y Deporte se adhiere al "Code of Conduct and the Best Practices Guidelines for Journals Editors del Committee on Publication Ethics – COPE" y a las recomendaciones del "International Committee of Medical Journal Editors - ICJME". Existe compromiso por parte de la revista para la detección de plagio y otros tipos de fraude en la redacción y presentación de artículos a Cultura, Ciencia y Deporte.

4.2. La política editorial de la revista promueve el uso de lenguaje inclusivo en los artículos científicos. Por favor, tenga en cuenta esta directriz y revise su documento antes de remitirlo a la revista.

5. Tratamiento de datos personales

En virtud de lo establecido en el artículo 17 del Real Decreto 994/1999, por el que se aprueba el Reglamento de Medidas de Seguridad de los Ficheros Automatizados que contengan Datos de Carácter Personal, así como en la Ley Orgánica 15/1999 de Protección de Datos de Carácter Personal, y la Ley Orgánica 3/2018, de 5 de diciembre, de Protección de Datos Personales y garantía de los derechos digitales, la Dirección de Cultura, Ciencia y Deporte garantiza el adecuado tratamiento de los datos de carácter personal.

6. Información relativa a la corrección de pruebas / galeradas una vez aceptado el artículo

Una vez aceptado el artículo para su publicación, se procederá a la maquetación del mismo. Para ello, el equipo editorial de Cultura, Ciencia y Deporte se pondrá en contacto con los autores, haciéndoles llegar el manuscrito con las modificaciones de estilo necesarias. Los autores deberán responder a las solicitudes realizadas en un plazo máximo de entre 7 y 10 días (será indicado en el email en función de los cambios a realizar).

Una vez recibidos los documentos modificados, se enviarán al equipo de maquetación para generar el PDF final del artículo. Este PDF (galeradas) será enviado a los autores para que revisen el mismo en un plazo máximo de 48 horas. En esta revisión se podrán indicar aspectos referentes

a errores ocasionados durante el proceso de maquetación, pero en ningún caso se podrá añadir contenido ni hacer cambios sustanciales en el mismo.

7. Estamentos

En el title page debe incluirse la información relativa a los siguientes estamentos:

- Declaración del comité de ética
- Conflicto de intereses
- Financiación
- Contribución de los autores
- Declaración de disponibilidad de datos
- Agradecimientos

8. Abono en concepto de financiación parcial de la publicación

De acuerdo con la filosofía de Open Access de la revista y con el fin de sufragar parte de los gastos de la publicación en aras de mejorar la calidad de la misma, la visibilidad y la repercusión de la publicación, CCD fija una tarifa de publicación de 120€ (IVA incluido). Los envíos realizados a partir del 1/09/2024 CCD fija una tarifa de publicación de 250€ (IVA incluido). Este pago deberá hacerse efectivo tras la comunicación de la aceptación del artículo.

Para ello tras la aceptación del artículo se debe enviar a ccd@ucam.edu el resguardo de la transferencia realizada al no de cuenta ES0200815089380001094420, cuyo titular es la "FUNDACIÓN UNIVERSITARIA SAN ANTONIO", indicando en el concepto "**Revista CCD + nº del artículo**".

Por otra parte, los revisores de artículos CCD tendrán derecho a una publicación sin coste por cada cinco artículos que hayan revisado en el tiempo y la forma solicitada por los editores. A tal fin, deben indicar los artículos revisados si quieren beneficiarse de la exención de pago cuando se les solicite el mismo. Los editores están exentos de pago.

9. Política de conflicto de intereses

Todos los autores deben revelar cualquier relación financiera y personal con otras personas u organizaciones que puedan influir de manera inapropiada (sesgo) en su trabajo.

Entre los ejemplos de posibles intereses contrapuestos se incluyen el empleo, las consultorías, la propiedad de acciones, los honorarios, los testimonios pagados de expertos, las solicitudes/registros de patentes y las subvenciones u otros fondos. Los autores deben revelar cualquier interés en una declaración resumida de intereses en el archivo que incluye los datos de los autores. Si no hay intereses que declarar, indíquelo: 'Declaraciones de interés: ninguna'.

10. Propuesta de publicación de monográficos en Cultura, Ciencia y Deporte

Las personas interesadas en proponer la publicación de un monográfico en la Revista Cultura, Ciencia y Deporte, deben enviar una descripción de 500-600 palabras (incluidas referencias) a la dirección email de la revista (ccd@ucam.edu). En dicho email, el coordinador o coordinadores del mismo (máximo 3 personas) deben realizar una aproximación a la temática y contenido del monográfico propuesto, así como sus CV.

Una vez aceptada la propuesta de monográfico, se establecerá un período de llamada de artículos "Call for papers" y una fecha límite de envíos "Deadline" cuya duración será determinada por el coordinador del mismo. El equipo editorial de la Revista Cultura, Ciencia y Deporte propondrá la fecha prevista de publicación del monográfico en función de su disponibilidad. Las funciones del coordinador del monográfico serán, redactar el editorial del mismo, y aportar un listado de posibles revisores que serán seleccionados por el equipo editorial para llevar a cabo las revisiones por pares de los artículos del monográfico. Para que el monográfico sea publicado serán necesarios un mínimo de 10 artículos aceptados. El coordinador del monográfico tendrá la posibilidad de invitar autores para que colaboren con sus manuscritos. La decisión final de aceptación para que un artículo forme parte del monográfico será del equipo editorial, no del coordinador del monográfico.

Todos los manuscritos aceptados para publicación, incluido el editorial, contarán con DOI.

CULTURA, CIENCIA Y DEPORTE MANUSCRIPTS SUBMISSION GUIDELINESS

The *Cultura, Ciencia y Deporte* journal shall be open to research papers related to the different thematic areas and work fields in Physical Education and Sport, provided they are scientifically founded. Due to the specialised nature of this journal, neither purely dissemination articles nor articles that merely state opinions instead of conclusions derived from contrasted research will be considered for publication. Papers shall be submitted electronically using our website, on which the author must sign up as an author and proceed as instructed.

1. Paper submission

All submissions must include TWO DOCUMENTS. The first one will correspond to the 'Template' and the second one to the 'Title Page'.

The template must be completely anonymous: THE TEMPLATE MUST BE COMPLETELY ANONYMOUS, WITHOUT ANY REFERENCE THAT WOULD ALLOW THE REVIEWERS TO IDENTIFY THE AUTHORS OF THE MANUSCRIPT. THE 'ANONYMOUS ARTICLE'.

Every author who submits a manuscript in Spanish, and whose article is finally accepted, must send the **final version in both Spanish and English**, for publication in the two languages. This is not necessary if the article is initially submitted in English.

When submitting a paper to be part of a **monograph**, select the tab with the name of the monograph in which you intend to publish it during the submission process.

If you use a citation and reference manager, you must submit the manuscript in plain text.

2. Types of articles considered for peer review in the Cultura, Ciencia y Deporte Journal

2.1. Original research

These are articles that report on an original empirical study structured in sections that reflect the steps followed in the research. The full text must follow the IMRDC structure (Introduction, Method, Results, Discussion and Conclusions).

2.2. Review article

Review articles shall follow the format and structure of original research.

Reviews on the current state or level of scientific development of a particular topic must be systematic, critical or narrative.

2.3. Editorial.

This section of the Culture, Science and Sport section shall accept essays on sport-related topics that are properly structured and sufficiently justified, well-founded, argued and logically coherent. This section is expected to be dynamic and up to date, setting the editorial line on sport that underlies the journal.

Here you do not need to follow the structure of original research, just the same format.

3. Length

Abstract, unstructured: cannot exceed 200 words in English.

Manuscript (original articles, systematic reviews): an article for this journal should be no more than 8000 words, inclusive of:

- Text of the article.
- Figures.
- Tables.

4. Relevant information about the journal

4.1. The Cultura, Ciencia y Deporte journal adheres to the Code of Conduct and Best Practices Guidelines for Journal Editors of the Committee on Publication Ethics (COPE) and to the Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals of the International Committee of Medical Journal Editors (ICJME). The journal is committed to the detection of plagiarism and other types of fraud in the writing and submission of articles to Cultura, Ciencia y Deporte.

4.2. The editorial policy of the journal promotes the use of inclusive language in scientific articles. Please consider this guideline and review your paper before submitting it to the journal.

5. Processing of personal data

Pursuant to the provisions of Article 17 of Spanish Royal Decree 994/1999, approving the Regulations on Security Measures for Automated Files containing Personal Data, as well as Spanish Organic Law 15/1999 on the Protection of Personal Data, and Spanish Organic Law 3/2018, of 5 December, on the Protection of Personal Data and the guarantee of digital rights, the Cultura, Ciencia y Deporte executive board guarantees the proper processing of personal data.

6. Information regarding proofreading / galley proofing following acceptance of the article

Once the article has been accepted for publication, it will be typeset. To this end, the editorial team of Cultura, Ciencia y Deporte will contact the authors, sending them the manuscript with the necessary stylistic modifications. Authors must respond to the requests made within a maximum period of 7 to 10 days (this will be indicated in the email depending on the changes to be made).

Once the modified documents have been received, they will be sent to the layout team to generate the final PDF of the article. This PDF (galley proofs) will be sent to the authors for review within a maximum of 48 hours. This review may indicate aspects relating to errors made

during the layout process, but under no circumstances may content be added or substantial changes made to the article.

7. Statements

The title page must include the following information:

- Ethics Committee Statement
- Conflict of Interest Statement
- Funding
- Contribution of the Author
- Data Availability Statement
- Acknowledgements

8. Payment as partial funding of the publication

According to the Open Access philosophy of this journal and in order to cover part of the publication costs and thus improve the quality, visibility and impact of the publication, Cultura, Ciencia y Deporte sets a publication fee of €120 (VAT included). From 1/09/2024 onwards, submissions will be subject to a publication fee of €250 (VAT included). This fee must be paid upon notification of acceptance of the article.

Once the article has been accepted, please complete a bank transfer to the account number ES0200815089383800010944 20, whose holder is the 'FUNDACIÓN UNIVERSITARIA SAN ANTONIO', specifying '**Revista CCD + nº of the article**' (CCD journal + article number) in the concept. Then send the proof of payment to ccd@ucam.edu.

In Cultura, Ciencia y Deporte, article reviewers are awarded one publication free of charge for every five articles they have reviewed in the time and manner requested by the editors. To that effect, they must specify the revised articles in order to benefit from the exemption from payment upon request. Editors are exempt from payment.

9. Conflict of interest policy

All authors must disclose any financial and personal relationships with other individuals or organisations that could inappropriately influence (bias) their work.

Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in a summarised statement of interests in the file that includes the details of the authors. If there are no interests to declare then please state this: 'Declarations of interest: none'.

10. Proposal for the publication of monographs in Cultura, Ciencia y Deporte

Anyone interested in submitting a proposal for the publication of a monograph in the journal Cultura, Ciencia y Deporte must send a description of 500-600 words (including references) to the email address of the journal (ccd@ucam.edu). The email must include a description of the subject matter and content of the proposed monograph, as well as the CVs of the coordinator(s) (maximum 3 people).

Upon acceptance of the monograph proposal, there will be a call for papers and a deadline for submissions, to be determined by the coordinator of the monograph. The editorial team of the Cultura, Ciencia y Deporte Journal will set a date for the publication of the monograph, depending on its availability. The duties of the coordinator of the monograph will be to write the editorial of the monograph, and to provide a list of potential reviewers who will be selected by the editorial team to carry out the peer reviews of the articles in the monograph. A minimum of 10 accepted articles will be required for the monograph to be published. The monograph coordinator may invite authors to contribute manuscripts. However, the final decision as to whether an article is accepted for inclusion in the monograph will be made by the editorial team, not by the monograph coordinator.

All manuscripts accepted for publication, including the editorial, will have a DOI.

MANUAL DE AYUDA PARA LOS REVISORES EN EL PROCESO DE REVISIÓN DE ARTÍCULOS EN CCD*

Estimado revisor, su labor es inestimable. Le estamos extraordinariamente agradecidos. Sin su aportación rigurosa, la calidad de los trabajos que se publican en CCD, no sería tal. Es por ello por lo que estamos completamente abiertos a tantas recomendaciones y aportaciones que sirvan para mejorar el ya de por sí complejo proceso de revisión. En esta nueva etapa de CCD tenemos una premisa: agilidad, eficiencia y rigor de los procesos de revisión. Por ello le pedimos que, por favor, plantee valoraciones sólidas y las argumente de forma constructiva con un objetivo principal: mejorar la calidad del artículo (siempre que sea posible). Además, le recomendamos que tenga en cuenta las premisas para los revisores que marca la *Declaración de Ética y Negligencia de la Publicación* que puede ver en el pie de página.

A continuación se presenta un manual, en el que los revisores de la revista CCD podrán seguir paso a paso todas y cada una de las tareas que deben acometer para realizar un proceso de revisión riguroso y que se ajuste a las características de la plataforma de revisión (OJS) y de la filosofía de la revista. Cualquier duda que le surja, por favor, no dude en contactar con los editores de la revista (rvaquero@ucam.edu y labenza@ucam.edu). Todas y cada una de las fases se describen a continuación:

1. El revisor recibe el e-mail de CCD con la solicitud de revisión de un artículo. Debe decidir si acepta (o no) la petición del editor de sección. Para ello, debe clicar sobre el título del artículo dentro de "Envíos activos".

2. Una vez hecho esto, aparecerá una pantalla como la siguien- te, en la que el revisor debe seleccionar si hará (o no) la revisión. Si se acepta (o no), aparecerá una ventana automática con una plantilla de correo al editor de sección para comunicarle su decisión. Independientemente de su decisión, el revisor debe enviar este correo electrónico. Una vez la revisión es aceptada el revisor debe cumplir las indicaciones que aparecen en la pantalla siguiente.

3. A continuación debe primero abrir y descargar el fichero del manuscrito; y segundo, abrir y descargar la hoja de evaluación de CCD que puede encontrar en el apartado "Normas de revisor" (parte inferior en el epígrafe 1). La revisión y todos los comentarios que el revisor realice deberán plasmarse en esta hoja de evaluación (nunca en el texto completo a modo de comentarios o utilizando el control de cambios). Con ambos documentos descargados se procederá a la revisión propiamente dicha. Es muy importante que el revisor conozca las normas de publicación de CCD, para proceder de forma exhaustiva. Si bien los editores en fases previas del proceso de revisión han dado visto/bueno al formato del artículo, es importante que se conozcan las normas a nivel general para poder evaluar el artículo con mayor rigurosidad.

4. Una vez completada la revisión y rellenada la hoja de evaluación puede escribir algunos comentarios de revisión para el autor y/o para el editor. El comité editorial de CCD recomienda no introducir comentarios específicos en estos apartados. De utilizarse (pues no es obligatorio) se recomienda que hagan una valoración global del artículo, en la que se utilice un lenguaje formal.

5. A continuación debe subir el fichero con la hoja de evaluación del manuscrito actualizada. En este apartado únicamente se debe subir un archivo con la correspondiente evaluación del artículo. No se olvide de clicar en "Subir" o de lo contrario, a pesar de haber sido seleccionado, no se subirá el archivo, y el editor de sección no podrá acceder a él.

6. Por último, se debe tomar una decisión sobre el manuscrito revisado y enviarla al editor. Para ello debe pulsar el botón de enviar el correo, ya que de no ser así el correo no será enviado. Las diferentes opciones de decisión que la plataforma ofrece son las que puede ver en la pantalla. En el caso de considerar que "se necesitan revisiones" o "reenviar para revisión" llegado el momento, el editor se volverá a poner en contacto con usted y le solicitará empezar con la segunda (o siguientes rondas de revisión), que deberá aceptar y volver a empezar el proceso tal y como se explica en el presente manual. Caso de aceptar o rechazar el manuscrito, el trabajo del revisor habrá terminado cuando informe al editor de sección de esta decisión, tal como se ha indicado anteriormente (correo al editor mediante la plataforma).

En la segunda y siguientes rondas de revisión, el revisor se encontrará con dos archivos: uno con el texto completo del manuscrito, en el que el autor ha modificado con otro color distinto al negro en función de las aportaciones sugeridas; y otro fichero adicional con la planilla de evaluación, en la que el autor ha res- pondido punto por punto en un color distinto al negro, a todas las aportaciones que usted le hizo. Por favor, compruebe que todo está correctamente modificado. Caso de no producirse, responda en la misma hoja de evaluación con tantos comentarios considere, para que el autor pueda "afinar más" y realizar las modificaciones de forma satisfactoria y rigurosa. Este proceso se repetirá tantas veces como los editores de sección consideren oportuno.

Una vez completada la segunda (o siguientes rondas de revisión) del manuscrito, se volverá a tomar una decisión sobre el mismo, y se procederá de la misma manera que en la primera ronda. Una vez se da por finalizada la revisión doble-ciego del manuscrito, desaparecerá de su perfil de revisor, en el que encontrará 0 activos.

Equipo editorial de Cultura, Ciencia y Deporte.
(ccd@ucam.edu)

RESPONSABILIDADES DE LOS REVISORES

1) Los revisores deben mantener toda la información relativa a los documentos confidenciales y tratarlos como información privilegiada.
2) Las revisiones deben realizarse objetivamente, sin crítica personal del autor.
3) Los revisores deben expresar sus puntos de vista con claridad, con argumentos de apoyo.
4) Los revisores deben identificar el trabajo publicado relevante que no haya sido citado por los autores.
5) Los revisores también deben llamar la atención del Editor-jefe acerca de cualquier similitud sustancial o superposición entre el manuscrito en cuestión y cualquier otro documento publicado de los que tengan conocimiento.
6) Los revisores no deben revisar los manuscritos en los que tienen conflictos de interés que resulte de la competencia, colaboración u otras relaciones o conexiones con alguno de los autores, empresas o instituciones en relación a los manuscritos.

INFO FOR REVIEWERS IN THE REVIEW PROCESS FOR ARTICLES IN CCD*

Dear reviewer, your work is essential. We are remarkably grateful. Without your rigorous contribution, the qua-lity of the papers published in CCD would not be the same. That is why we are completely open to recommendations and contributions that can open the already complex process of revision. In this new stage of CDD we have a premise: agility, efficiency and the exactitude of the revision process. Thus, we please ask you solid ratings, and argue constructively with one main objective: to improve the quality of the article. In addition, we recommend you to consider the premises that denotes the Statement of Ethics and Publication Malpractice that can be ob-served in the footer.

Below a manual is presented, where the CCD journal reviewers are going to be able to follow step by step the process in order to perform a rigorous review process that fits the characteristics of the review platform (OJS) and the philosophy of the journal. Any questions that may raise, please do not hesitate to contact the publishers of the journal (rvaquero@ucam.edu y labenza@ucam. edu). Each and every one of the steps are described here:

1. The reviewer receives the e-mail of CCD with the request for revision of an article. You must decide whether to accept (or not) the request of the "Section Editor". For this, you must click on the title of the article under "Active Submissions".
2. Once this is done, a screen like the following one is going to appear in which the reviewer must select whether will (or not) review the article. If accepted (or not) an automatic window ap-pears with a template email to the Section Editor to communi-cate its decision. Regardless its decision, the reviewer must send this email. Once the revision is accepted, the reviewer should fo-llow the directions that appear on the screen below.
3. The next step is to open and download the file of the ma-nuscript; and second, open and download the evaluation sheet that can be found under the "Reviewer Guidelines" (in the sec-tion 1). The review and any comments that the reviewer makes, should be written in the evaluation sheet (not in the full text as a comment). It is very important that the reviewers knows the CCD publishing standards in order to proceed exhaustively. When the editors accept the format of the article, it is crucial that the re-viewers know the general rules, to assess more rigorously the article.
4. After completing the revision and filled the evaluation sheet, you can write some review comments to the author and/or publisher. The CCD editorial committee recommends not to introduce specific comments on these sections. If it needs to be used (not required) make an overall assessment of the article, using a formal language.
5. The next step consists of uploading the manuscript evalua-tion sheet updated. Here, you only need to upload a file with the corresponding evaluation of the article. Make sure you first click on "select file" and then on "upload".
6. Eventually, a decision on the manuscript must be taken and send it to the Editor. Thus, it is needed to press the button to send the email because if not it will not be sent. The different op-tions that can be chosen appear in the screen below. In the case of considering "revisions required" or "resubmit for review", the editor will get in touch with you and ask you to start with the second round (or further rounds), having to accept and start the same process that has been explained. If the manuscript is accepted or declined, the reviewer´s job will be over, informing the Section Editor by email.

In the second and subsequent rounds of review, the reviewer will find two files: one with the full text of the manuscript in which the author has modified with another colour different to black depending on the contributions suggested, and another additional file with the evaluation form, where the author has responded point by point in a different colour to black all contri-butions that the reviewer made. Please, check that everything is correctly modified. If not, answer the same evaluation sheet with the considered comments, so that the author can "refine" and make the changes in a satisfactory and rigorous way. This process will be repeated as many times as the Section Editors consider appropriate.

Once the second (or subsequent rounds of revision) of the ma-nuscript is completed, a new decision will be made, and proceed in the same way as in the first round. Once ends the double-blind review of the manuscript, it will di-sappear from your reviewer profile, where you will find none "Active Submissions".

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RESPONSIBILITIES OF THE REVIEWERS

1) Reviewers should keep all information relating to confidential documents and treat them as privileged.
2) The revisions must be made objectively, without personal criticism of the author.
3) Reviewers should express their views clearly with supporting arguments.
4) Reviewers should identify relevant published work that has not been mentioned by the authors.
5) Reviewers also should draw the attention of Editor-in-chief about any substantial similarity or overlap between the manuscript in question and any other document of which they are aware.
6) Reviewers should not review manuscripts in which they have conflicts of interest resulting from competitive, collaborative, or other relationships or connections with any of the authors, companies, or institutions connected to the manuscripts.

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