# Pain in competitive Para athletes with physical disabilities and techniques for its management

*Dolor en Para atletas de competición con discapacidades físicas y técnicas para su manejo*


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## Abstract

Psychosocial factors are clear mediators of pain perception, so psychological techniques have been added to conventional treatment. However, their use is limited in Para athletes with physical disabilities, despite evidence highlighting their importance.
Objective: to ascertain the perception of high-level competitive Para athletes with physical disability and sport team staff (coaches, physiotherapists and psychologists) of 1) how pain can affect the development of the athlete's sports career, and 2) what techniques and/or strategies they know and/or implement for pain management.
Methodology: twenty participants linked to elite sport with physical disabilities were interviewed via videoconference. Interviews were guided using a semi-structured topic guide and ranged from 30 to 50 minutes in duration. The method of analysis used was interpretative phenomenological.
Results: pain has a negative impact on the Para athlete's sports career, either directly because it prevents the correct execution of technical gestures, or indirectly through psychological consequencessuch as fear and stress that hinder the athletes from being able to achieve their sporting goals. Participants used numerous techniques and strategies for pain management.There was a clear discrepancy between psychologists and Para athletes on psychological techniques. While psychologists indicated using psychological techniques for pain management, Para athletes perceived that these techniques were oriented to improving sports performance and not to supporting them in pain management.
Conclusions: Several factors were found to negatively influence the Para athlete's sporting career. Future research should include psychological techniques, which help the physically disabled athlete in this aspect.



## Keywords

Chronic pain; competition; Para athlete; physical disability; psychological models.



## Resumen

Los factorespsicosociales son claros mediadores en la percepción del dolor, por lo que se han añadido técnicas psicológicas al tratamiento convencional. Sin embargo, su uso es limitado en Para atletas con discapacidad física, a pesar de la evidencia que destaca su importancia.
Objetivo: conocer la percepción que tienen los Para atletas de alto nivel competitivo con discapacidad física y el personal de los equipos deportivos (entrenadores, fisioterapeutas y psicólogos) sobre 1) cómo el dolor puede afectar el desarrollo de la carrera deportiva deldeportista, y 2) qué técnicas y/o estrategias conocen y/o implementan para el manejo del dolor.
Metodología: veinte participantes vinculados al deporte de élite con discapacidad física fueron entrevistados a través de videoconferencia. Las entrevistas fueron guiadas mediante una guía temática semiestructurada y tuvieron una duración de 30 a 50 minutos. El método de análisis utilizado fue fenomenológico interpretativo.
Resultados: El dolor tiene un impacto negativo en la carrera deportiva del Para atleta, ya sea directamente porque impide la correcta ejecución de gestos técnicos, o indirectamente a través de consecuencias psicológicascomo el miedo y el estrés que impiden que los atletas puedan alcanzar sus objetivos deportivos. Los participantes utilizaron numerosas técnicas y estrategias para el manejo del dolor.Hubo una clara discrepancia entre los psicólogos y los Para atletas en cuanto a las técnicas psicológicas. Los Para atletas percibieron que las técnicas estaban orientadas a mejorar el rendimiento deportivo y no a apoyarles en el tratamiento del dolor.
Conclusiones: Se evidenció que varios factores influían negativamente en la carrera deportiva del Para atleta. Futuras investigaciones deberían incluir técnicas psicológicas, que ayuden al deportista con discapacidad física en este aspecto.



## Palabras clave

Competición; dolor crónico; discapacidad física; modelos psicológicos;Para atleta.

## Introduction

The present study partially focuses on chronic pain as one of the main health problems affecting elite athletes with physical disabilities (Fagher et al., 2023). However, it is important to consider that physical disability is a multidimensional construct that transcends pain. In addition to functional physical limitations, physical disability can lead to psychological difficulties such as low self-esteem, emotional problems and difficulties in social inclusion (Rodriguez et al., 2022; Hammer et al., 2020).Interest in the health of Para athletes continues to grow. However, there is little research that has looked at health parameters beyond injury and illness in this population of athletes, in fact elite Para athletes report relatively high levels of anxiety/depression, low levels of sleep, pain during sport and pain in their daily lives, which is of concern (Fagher et al., 2023, Fagher et al., 2020). In this sense, future studies should explore in greater depth other dimensions of physical disability, such as functional, psychological and social aspects.

Likewise, it would be advisable to analyze the perspectives and experiences of Para athletes with physical disabilities themselves, as well as integrate quantitative approaches that allow the findings to be generalized to broader populations (Fagher et al., 2020, Hirschmüller et al., 2020). Ultimately, a thorough understanding of all facets of physical disability could help improve clinical care and support for these high-performance Para athletes.

### *Chronic Pain*

Chronic pain represents a major public health problem, with an estimated 20% of the European population suffering from it (European Pain Federation, [EFIC], 2016), showing a higher incidence of high intensity pain in women versus men (García-Esquinas et al., 2019; National Institute of Statistics, 2020). Likewise, the prevalence in Para athletes is much higher as impairment-specific chronic pain includes pain related to amputation, spinal cord injury and cerebral palsy (Grobler et al., 2018). Such as, the prevalence of neuropathic pain (caused by nervous system injury or disease) which is between 58% and 85% in people with spinal cord injury (Burke et al., 2017; Hunt et al., 2021).

The International Association for the Study of Pain (IASP) defines pain as "An unpleasant sensory and emotional experience associated with, or similar to that associated with, actual or potential tissue damage" (Raja et al., 2020). This definition underscores the importance of the emotional and cognitive dimension of the pain experience as chronic pain can cause cognitive and emotional disorders that result in decreased quality of life, affecting the functional, psychological, social and occupational spheres (Vernaza et al., 2019).

The IASP recognizes nociceptive (tissue damage), neuropathic (injury or disease affecting the peripheral nervous system or the central nervous system), and nociplastic pain (sensitized nervous system) as distinct pain types driven by different mechanisms (Cohen et al., 2021). According to the duration of pain, chronic pain is defined as persistent or recurrent painlasting 3 months or more and is considerably more complex than acute pain. The main difference between chronic pain and acute pain lies in the mechanisms underlying each, in the nature of the psychic phenomena and changes, and in the changes in the central nervous system to which chronic pain is related, which is more disabling and physically deteriorating (Torrijos, 2019).

### *Psychosocial factors and chronic pain*

In research on the general population (referred in this research to the population that does not include competitive athletes with or without physical disability), it is observed that states of anxiety, depression, and emotions such as anger are the most common among patients with chronic pain. These emotions, present in chronic pain patients, lead to a greater intolerance to pain (Castro et al., 2014; Pomares-Ávalos et al., 2018). This fact causes a vicious circle: pain anxiety-tension or stiffness-pain (Arango-Dávila & Rincón Hoyos, 2018).

In “The Multidimensional Model of Pain”, based on the Pain Gate Theory of Melzack and Wall (1967), a new approach is introduced. Expectancy attention and learning, are presented as cognitive processes that can modulate the manner in which the felt experience of pain as well as influence the experience of pain intensity. Essential dimensions in the conceptualization and intervention of pain experience are sensory/discriminative dimensions (anatomophysiological mechanisms), cognitive/evaluative

(e.g., beliefs, cultural values, cognitive variables such as self-efficacy, perception of control, attention and expectation) and affective/motivational (subjective quality of the pain experience such as suffering, emotional changes) (Gligorov, 2017). It is observed that current intervention models highlight the role of coping style, pain acceptance, fear, anxiety, experiential avoidance, and attentional bias in the development, maintenance, and response to chronic pain.

Other theories use passive coping strategies, such as the model based on fear-avoidance, reporting movement-related fear of pain (Meulders, 2019) are associated with greater pain intensity, whereas the use of active coping strategies facing of pain results in better psychological adaptation process. Particularly relevant are the coping styles based on catastrophic thinking (characterised by evaluating the pain situation as uncontrollable, by the presence of ruminations in relation to the pain, by the presence of expectations of negative consequences and by the magnification of such consequences), and experiential avoidance, defined as avoidant coping behaviour whereby one tries to avoid pain by suppressing experiences that hypothetically could trigger or increase pain and are characterised by high levels of pain and suffering, with more visits to the doctor, need for higher doses of analgesics, and increased dysfunctionality (Pomares-Ávalos et al., 2018; Meulders, 2019).

Fear of pain is defined as a negative emotional reaction to pain and is associated with greater pain intensity and greater disability, as it encourages passive or avoidant coping behaviours (Sturgeon, 2014). However, acceptance of pain, which involves giving up trying to control it, has been related to lower pain intensity, lower anxiety, lower levels of depression, lower physical and psychological disability, and with better performance in day-to-day life and a better employment status. Finally, some studies show that the attentional bias of patients with chronic pain towards bodily signals and sensations that could indicate or predict pain, and towards discourses related to pain and its consequences (McCracken & Morley, 2014) as well as the hypervigilance generated by painful stimuli, seem to be related to fear of pain (Martínez, 2015).

Salgueiro et al. (2009) in their study on social factors and pain, emphasis the effect of the social support received by the patient on the intensity of pain, valuing mainly the support of partner, specialist physician, primary care physician, family nucleus and finally, the social environment. As a result, patients who enjoy greater social support show lower rates of anxiety and depression.

***Interventions in chronic pain in the general population and in athletes with and without physical disability.***

Despite evidence about the role of psychosocial factors as mediators in the development and maintenance of chronic pain, chronic pain management is still dominated by pharmacological or physiotherapy-based interventions (Gligorov, 2017; Araya-Medrano, 2020; Hidrobo& Ceballos, 2015; Muyor et al., 2013; Olmedilla-Caballero et al., 2020; Setuain et al., 2017).

There are numerous investigations in the general population with chronic pain, which apply different psychotherapeutic interventions aimed at favouring the ability to cope with and accept pain.

The most commonly used psychotherapeutic approaches in the general population with chronic pain and physical disability have been Sturgeon (2014): (a) Behavioural therapy (Martin y Pear, 2007), (b) Cognitive behavioural therapy (González-Reyes et al., 2017) and (c) Contextual or third generation therapies (Mindfulness-based therapy, Acceptance and Commitment Therapy and Basal Body Awareness Therapy) (Kabat-Zinn, 1990, 2012; Pleman et al., 2019).

Research on the application of psychological therapies for pain management focuses on the general population, but not on competitive Para athletes with physical disabilities. These psychological therapies have also been applied to competitive athletes with and without physical disability, although not with the aim of managing pain but oriented to favouring sport performance (Brewer, 2019; Cumming & Ramsey, 2009; González-Campos et al., 2015; González-Reyes et al., 2017; Muyor et al., 2013; Olmedilla et al., 2017; Olmedilla et al., 2019). For example, there is evidence in the general population of therapies such as mindfulness that reduce perceived pain from stress management (Kabat-Zinn, 2012). In contrast, in studies that have conducted interventions with mindfulness programmes, in non-disabled competitive athletes (Francisco-Pereira et al., 2024; Kabat-Zinn, 1990, 2012; Kaufman et al., 2018) and in Paralympic athletes (Lundqvist et al., 2018; Olmedilla-Caballero et al., 2020) the goal was stress reduction for sports performance improvement and not to manage pain.

For pain management and injury prevention, non-psychological techniques and/or strategies are applied. The most relevant in competitive athletes without disability, are: adjustment of loads, training volume and intensity, modification of training sessions and programmes, implementation of individual specific exercise programmes, performing compensatory programmes and integrating routines in training (Muyor et al., 2013; Anderson et al., 2003; Hervada, 2019). Studies in athletes with and without physical disabilities propose individualised biomechanical work as an indispensable tool to design a treatment or injury prevention protocol, with the aim of reducing injury pain (Muyor et al., 2013; Castro, 2010; García-Gómez, 2018) and improving performance (Veeger et al., 1992). Moreover, some investigations in the general population (Fuentes, 2014; Jürgens, 2006) and in competitive Para athletes with physical disabilities (Brizuela et al., 2016), propose the practice of sports to improve physical and mental health as it favours pain management.

Most research in Para athletes with physical disabilities focuses on high-level wheelchair basketball players. In these studies, pain is associated with limited range of motion and numbness, which leads to musculoskeletal injuries (García-Gómez, 2018; Pérez-Tejero & García-Gómez, 2016), and they address chronic pain caused by injuries through prevention programmes based on active mobility, strengthening and stretching (Castro, 2010; García-Gómez, 2018).

Other studies in groups of minors, women and people with physical disabilities (Vicente-Herrero et al., 2019), in competitive athletes without physical disabilities (Reeves et al., 2010) and general population (Catalán et al., 2006) report that the physical and psychological recovery of the patient is improved by good coordination between specialists, since they take into account various contexts (family, social and cultural environment).

To conclude, the general young population with physical disability suffering from chronic pain (De la Vega et al., 2018) and young Para athletes with physical disability (Puce et al., 2017) report higher pain intensities than the population without physical disability, and that this pain causes a strong impact on the performance of the subjects' activities, which could indicate that this population may have different needs for pain assessment and management. Furthermore, despite ample evidence of the role of psychosocial factors in chronic pain in the general population, there is little consideration of this biopsychosocial model of pain in the assessment and management of patients (Turk & Monarch, 2018).

In order to learn more about these competitive Para athletes with acquired physical disabilities (disability acquired by a person during their lifetime, either through illness or accident) or congenital disabilities (disability with which a person is born, and develops within the first three years of life or even before birth), the following objectives were set: i) gain insight into competitive Para athletes and sport team staff perceptions of how pain may affect sports career development of the Para athlete, and ii) determine what techniques competitive Para athletes and sport team staff are aware of and what techniques are finally implement for pain management.

## Method

This study employed the Consolidated Criteria Reporting Qualitative Research Checklist (COREQ) (Tong et al., 2007) for interviews to ensure explicit and comprehensive reporting of this study (see Supplemental Appendix A).

Appendix A. *Consolidated Criteria for Reporting Qualitative Research (COREQ) Checklist.*

| Item | | Description |
|---|---|---|
| Domain 1: Research team and reflexivity | | |
| *Personal Characteristics* | | |
| 1. | Interviewer/facilitator | All of the interviews were conducted by the lead researcher. |
| 2. | Credentials | PhD in Physical Activity and Sport Sciences. |
| 3. | Occupation | Professor in Physical Activity and Sport Sciences. |
| 4. | Gender | Female. |
| 5. | Experience and training | Training in qualitative methodology and data collection. Supervision of published projects. Online training activities with NVivo. |
| *RelationshipwithParticipants* | | |
| 6. | Relationshipestablished | The researcher had no contact with participants of the study prior to the interviews except for email and telephone conversations to arrange interview times. |

| | |
|---|---|
| 7. Participant knowledge of the interviewer | Participants were aware that the researcher was a student of the PhD in Physical Activity and Sport Sciences and that this research project was being conducted under the supervision of her University tutor. |
| 8. Interviewercharacteristics | The researcher had prior knowledge and personal experience of the research topic. The motivation for this research has been personal, she has a physical disability, is a competitive athlete and suffers from chronic pain. This research was developed to extract information and create a questionnaire for athletes with physical disabilities to gain an in-depth understanding of their perception of pain in various aspects (ID: NCT05639842). |
| Domain 2: Study design | |
| *Theoreticalframework* | |
| 9. Methodologicalorientation and theory | Interpretative Phenomenological Analysis (IPA) was the qualitative analytical methodology used following the contributions by Smith et al. (1999). |
| *Participantselection* | |
| 10. Sampling | Participants were selected through different strategies. Specifically, from sport team staff and athletes, information research in the Spanish Paralympic Olympic Committee, references between groups and knowledge in the field of study (Para athlete, physiotherapy, training and psychology). |
| 11. Method of approach | In November 2020, participants were recruited through the aforementioned strategies. An initial telephone contact was made to present the objectives of the study, to inform the subjects about the duration of the interview, to ask for their collaboration and to set a date and time for the interview if they gave their informed consent. In this first contact, the interviewer explained her research career and her concerns about the object of study in order to facilitate rapport in the interview. |
| 12. Samplesize | A total of 20 participants (7 Para athletes with physical disabilities, 4 physiotherapists, 5 coaches and 4 psychologists). |
| 13. Non-participation | All participants completed the interview. |
| *Setting* | |
| 14. Setting of data collection | Due to the mobility of the researcher and the different cities of the participants, all interviews took place over the videoconference. |
| 15. Presence of non-participants | No non-participants were present during data collection other than the researcher as each interview was conducted over the videoconference. |
| 16. Description of simple | Specific characteristics of the participants were collected (e.*g., age, degree of disability, sport, and profession*). |
| *Data collection* | |
| 17. Interview guide | The interview topic guide was based on research on chronic pain in young people with physical disabilities (De la Vega et al., 2018) and young athletes with physical disabilities (Puce et al., 2017), previous interpretative phenomenological analysis research in the field of the impact and lived experiences of chronic pain (McDonagh et al., 2021) and was reviewed by the researcher to adapt the present investigation. The researcher introduced open questions to increase the depth of the analysis. |
| 18. Repeat interviews | Interviews were not repeated |
| 19. Audio/visual recording | Interviews were recorded with an audio recorder and the computer camera. |
| 20. Field notes | Field notes were made during and after the interviews. |
| 21. Duration | The duration of interviews ranged from 30 minutes to 50 minutes. |
| 22. Data saturation | Data saturation was reached with the interviews conducted. |
| 23. Transcriptsreturned | Transcripts were returned to participants to comment check for accuracy and resonance with their experiences (Birt et al., 2016). |
| Domain 3: Analysis and findings | |
| *Data analysis* | |
| 24. Number of data coders | Coding was carried out by the lead researcher. |
| 25. Description of the coding tree | Thematic analysis of their content was carried out according to the specific objectives of the study. The steps for the transcription were first to transcribe the interviews and to carefully read through the interviews in order to locate the key words that would serve as the thematic cores of the interview script. This enabled us to define the codes for each keyword for use in the data processing software (NVivo). Subsequently, a thematic "map" of the analysis was made in order to properly code the most relevant aspects of the data by organising the selected text fragments. |
| 26. Derivation of themes | Themes were derived from the data using an inductive approach. |
| 27. Software | NVivo (Version 14) was used to manage the data. |
| 28. Participantchecking | To check for accuracy and resonance with their experiences, the transcript to participants (Birt et al., 2016). |
| *Reporting* | |
| 29. Quotationspresented | Quotations shown illustrate and support the conclusions. Quotes refer to specific participants by code (*e.g., D3*). |
| 30. Data and findingsconsistent | There is consistency between the data reported and the findings. Theme was considered for the unit of analysis, rather than the frequency of statements. |
| 31. Clarity of majorthemes | Once the thematic cores have been established, a thematic "map" of the analysis was made in order to properly code the most relevant aspects of the data by organising the selected text fragments to respond to the specific objectives. They are clearlylabelled and described in the conclusions. |
| 32. Clarity of minorthemes | No minor themes were observed. |

## *Participants*

A total of 20 participants were interviewed on a voluntary basis (7 competitive Para athletes with physical disabilities, 4 physiotherapists, 5 coaches and 4 psychologists) after being informed of the research objectives. The sport team staffs (coaches, physiotherapists and psychologists) were active and worked with high-level Para athletes in their professional field. As for the Para athletes, all were active except one, who had been retired for eight years, and took part in national and international competitions and Paralympic Games in their respective sports disciplines. All of them belonged to the Spanish Sports Federation for People with Physical Disabilities (FEDDF) and did not receive material incentives for their participation. Table 1 presents the characteristics of the competitive Para athletes (D) and Table 2 the characteristics of the professionals: physiotherapists (Ph), coaches (C) and psychologists (Ps).

Table 1. Description of participants. Para athletes

| Participant | Gender | Age | Injury | Adapted sport | Category | Years in practice | Highest professional achievement | Professional fields |
|---|---|---|---|---|---|---|---|---|
| D1 | Male | 38 | Paraplegia | Canoeing | Absolute | 8 | P.G. | Professional Para athlete |
| D2 | Female | 38 | Paraplegia | Triathlon | Absolute | 6 | P.G. | Professional Para athlete |
| D3 | Male | 30 | Cerebral palsy | Athletics (Shot put, discus and javelin) | Absolute | 10 | World Champion-ships | Para athlete. Student of Agricultural Engineering |
| D4 | Male | 48 | Paraplegia | Cycling and Karate | Absolute | 9 | P.G. | Professional Para athlete |
| D5 | Male | 29 | Leg amputation | Ski | Absolute | 4 | European Champion-ships | Retired professional Para athlete. Musician and physiotherapist |
| D6 | Female | 21 | Cerebral palsy | Athletics 100m and 200m sprint | Under 23 | 5 | Spanish Champion-ships | Professional Para athlete. Secondary school physical education teacher |
| D7 | Male | 16 | Arm malformation | Triathlon | Youth | 5 | Spanish Champion-ships | Professional Para athlete. TAFAD Student |

Note: Para athlete (D). P. G. (Paralympic Games).

Table 2. Description of participants. Physiotherapists, trainers and psychologists

| Participant | Gender | Age | Years of profession | Highest professional achievement |
|---|---|---|---|---|
| Ph1 | Male | 40 | 21 | Olympic and Paralympic Games, IOC member, own clinic. |
| Ph2 | Female | 35 | 15 | Doctor in CAFD, member of the CEDI, collaborator with FEDDF. |
| Ph3 | Female | 46 | 18 | Paralympic Games, member of the COE, international classifier. |
| Ph4 | Male | 37 | 15 | University lecturer, researcher, own clinic. |
| C1 | Male | 45 | 20 | Paralympic Games, Doctor in CAFD, director of the CEDI, university lecturer. |
| C2 | Male | 42 | 6 | Spanish Championships, trainer of elite athletes. |
| C3 | Male | 38 | 18 | Paralympic Games, World Series, trainer of elite athletes. |
| C4 | Male | 30 | 7 | World Series, coach of elite athletes. |
| C5 | Male | 49 | 23 | Paralympic Games, COEcoach. |
| Ps1 | Female | 52 | 26 | Olympic and Paralympic Games, COE member, own consultation. |
| Ps2 | Female | 39 | 4 | Member of the CEDI. Own consultancy. |
| Ps3 | Female | 36 | 13 | Olympic Games, participationin the CAR, Spanish and Madrid Federation, own consultancy. |
| Ps4 | Female | 39 | 14 | European Championships, Doctor in Psychology, member of the FCYLF Own consultancy. |

Note: Physiotherapists (Ph), coaches (C) and psychologists (Ps). Physical Activity and Sport Sciences (CAFD). Centre for Studies on Inclusive Sport (CEDI), Spanish Sports Federation for Persons with Physical Disabilities (FEDDF), Spanish Paralympic Committee (COE), High Performance Centre (HPR), Castilla and Leon Football Federation (FCYLF).

## *Design*

Interpretative phenomenological analysis (IPA) is the qualitative analytical method used in this study. The analysis was conducted following the description provided by Smith et al. (1999). This method is well suited for the exploration of under-researched topics (Smith, 1996), offering an insight into experiences of the subject with the environment (Conrad, 1987). IPA has been used in similar research studying the perceptions of participants experiences (McDonagh et al., 2021), which contributes to its appropriateness.

## *Instrument and Procedure*

The thematic cores that served as a script for the interview were for Para athletes and sport team staffs: 1) sports characteristics of professionals (e.g., presentation of the interviewee, profession, time they have been training), 2) perception of how pain affects this type of Para athletes and what impact it has on the development of their sports career (experience with pain and effects of that pain on the

development of your sports career), and 3) knowledge about techniques and/or strategies for pain management (e.g., what do they do to manage pain).

The interviews were carried out in Spain and participants were selected through different strategies. Specifically, from sport team staff and Para athletes, information research in the Spanish Paralympic Committee, references between groups and knowledge in the field of study (Para athlete, physiotherapy, training and psychology). In order to be part of the research, the following inclusion criteria were established: for the Para athlete, to have a physical disability, participate in high performance competition and be aged between 15 and 55 years old; for the sport team staff, to exercise their profession with high performance Para athletes with physical disabilities.

To carry out the interviews, an initial telephone contact was made to present the objectives of the study, to inform the subjects about the duration of the interview, to ask for their collaboration and to set a date and time for the interview if they gave their informed consent. In this first contact, the interviewer explained her research career and her concerns about the object of study in order to facilitate rapport in the interview. The interviews with the participants were semi-directed, based on the thematic cores described in the previous section, and were conducted by videoconference (Skype). With the written authorisation of the participants, all the interviews were recorded, both in video and audio. The duration of the interviews ranged from 30 to 50 minutes, concluding with the end of the participant's discourse.

### *Data analysis*

After transcription of all interviews, validation by the respondents was applied for the reliability of the research. This consisted of returning the transcript to participants to check for accuracy and resonance with their experiences (Birt et al., 2016), followed by a thematic analysis of their content was carried out according to the specific objectives of the study. The steps for the transcription were first to transcribe the interviews and to carefully read through the interviews in order to locate the key words that would serve as the thematic cores of the interview script. This enabled us to define the codes for each keyword for use in the data processing software (NVivo) that was used to facilitate the coding and analysis process. Subsequently, a thematic "map" of the analysis was made in order to properly code the most relevant aspects of the data by organising the selected text fragments. Without observing any incidence, the report was drawn up (Braun & Clarke, 2006).

To ensure data quality, two types of triangulation were applied (Flick, 2014). Firstly, a researcher triangulation was carried out to check for concordance in the relevance of the literal comments for each specific objective. Two researchers (one with a background in Psychology and the other with a background in Physical Activity and Sport Sciences) independently carried out the thematic organisation, with the aim of balancing, from a single criterion, the bias derived from the process. Secondly, data triangulation was applied, characterised by the verification and comparison of the data obtained from the different agents involved in the phenomenon studied. For the preparation of the report (description of the results), the most relevant fragments (verbatim) of the interviews are quoted, together with the identification code of the participant for each specific objective. Each participant was assigned an identification code (see Tables 1 and 2).

## Results

The purpose of this study was to respond to the specific objectives set out in this research from the perspective of competitive Para athletes and sport team staff (Kvale, 2012). On the one hand, we will present the results obtained on pain and the sports career, and on the other hand, the techniques and/or strategies for pain management.

### *Perceptions of how pain may affect sports career development of the Para athlete*

All interviewees seem to agree that pain impacts on the Para athlete's sporting career, either directly or through its psychological consequences. Para athletes, physiotherapists and coaches all agree that

the injury affects other areas of the body and prevents the correct performance of technical gestures. For example, D3 said that when he had to work on his injured part he hurt continued to feel pain even on a greater extent simply because the musculature was already affected: "*Pain does affect my sports career, sometimes the pain is stronger than in others, because I have worked that part more, but there are some other times that you have no choice, so to speak, but to work it incorrectly to avoid feeling pain*". The physiotherapists also stated that the injury caused other damage to the body. Just as Ps3 pointed out: "*They have a partial or total affectation of certain musculature that also impacts other parts of the body, parts which should in principle not be affected by the initial injury*". However, the coaches do not mention pain, they allude to the physical aspects of the injury, which give rise to a physical decompensation and this is what directly affects the correct sports technique. For example, C2 said: "*Pain affected him (the Para athlete) to the physical level, evidently because of the lack of mobility that he had on his left side, because in the end, everything leads to a general imbalance*". Para athletes reported that to prevent injuries that affect their athletic performance, they have to try to protect anatomical structures that are directly involved in their sports discipline. As D1 shows: "*If I walked with crutches, my performance would drop, so it has not been bad for me to help me decide what I have to conserve or choose for what*". In addition, Para athletes reported that they had to include self-care routines to prevent future injuries. For example, D3 highlights the consequences of his injury and how it influenced his daily life and performance: "*My disability, apart from the limitations of movement, is also associated with a degree of stiffness. It's a degree of spasticity, basically a stiffness...that's why I take so much care of myself* ".

In relation to the psychological consequences, all agree that pain generates a series of negative feelings, although they point out different aspects. For the Para athletes, pain generates anger, rage, frustration, irritability, and mood swings, and these negative emotional states cause them more pain. For example, Ph3 said: "*When I get nervous or have an upset or something, it increases my neuropathic pain*". This is in line with the physiotherapists who indicate that pain affects the Para athlete psychologically. In this case Ps2 mentioned: "*Propelling the chair, which is one of the variables that was always related to the issue of pain...In the long term, these are things that can affect the emotional and physical level and have repercussions on the sports career*". In addition, they indicate that acquired disability is more complex in terms of managing pain, both physically and psychologically. In addition, another relevant aspect pointed out by the physiotherapists was that acquired disability is more complex in terms of managing pain, both physically and psychologically, and that they needed more support. Ph1 indicated: "*Pain is not the same in acquired and congenital disability, there is a therapeutic cushion between the acquired disability and the basic disability [ ] The person who has the acquired disability a posteriori starts from that point of fear, the other person who was born with it, does not know anything else*". To conclude, coaches and psychologists relate frustration, fear, oppression, anxiety, anger, and concern with performance, because they imply limitations in training and/or competition and not reaching the objectives. C3 in particular highlighted how his Para athlete's state of mind varied: "*The day she has something, you can see it, because she is already overwhelmed: -What if I am not going to train well, what if I am not going to be able to do this.... That pain sometimes creates anxiety in competition, and with her, it is very easy to see*". Psychologists reported that enduring pain affects the Para athlete psychologically and therefore his or her sports performance. Ps3 underlined: "*Pain directly affects the sports career, because in the end, she has to tolerate certain degrees of discomfort and pain many times [ ] so that it scares them to stop their activity, and to think that they have to stand still, that they will not reach some of the objectives and that they cannot continue training*".

***Pain management techniques and/or strategies.***

All seem to know and apply pain management techniques and/or strategies in their professional field. In relation to the techniques and/or strategies they apply, they are diverse. The Para athletes usually go to a physiotherapist to treat the injury and the parts that compensate for the injury. For example, D7 said: "*To recover I apply massages [ ] Every week I have physiotherapy, especially for back pain and when my legs are very heavy*". They also indicated that playing sport helped them. In particular D3 mentioned: "*If I don't go to the gym I have pain for the rest of the day*".

The coaches mention the compensatory prevention work and biomechanical work as techniques for pain control. For example, C2 indicated: "We work especially in the swimming sector, in trying to balance those imbalances in all their body structure [ ] The coach, he was in charge of the

compensation part [ ]...we do specific exercises to correct the biomechanics". The coaches also underlined the importance of proper loads and intensity of the workouts in order to prevent injuries. C5 mentioned: "If there is pain, we lower the sessions and the loads of the sessions [ ] Explain to them that it can be dangerous and that it can have repercussions on the training [ ] We carry out the principle of progression with loads of all types".

Furthermore, physiotherapists tend to use the same techniques in both disabled and non-disabled Para athletes and recognise that acquired disability presents more difficulties in having to address it. Ps1 suggested: "In the adapted or mobility problem athlete, the technique has to be adapted because the injury is greater and you already have a complication [ ] The adapted athlete...is a little bit more complex, but in the end the type of techniques used and professional approach in the end is the same". Also they direct specific individualised programmes (strength, stretching and adaptations) that they incorporate as part of the routine in the programming of their workouts. In particular Ps3 remarked: "I use a lot of global postural re-education, which can be used both, to correct posture, but also as direct and acute attention therapy...basic myofascial release".

In relation to the psychological aspects of pain, Para athletes use some psychological techniques such as relaxation and meditation to control their pre-competition stress level. Ph3 reported: "At certain times I do meditations...and the truth is that it helps a lot...but no, I don't have any technique, I try to lead a quiet life". Psychologists apply relaxation as a technique to manage pain and modify physiological behaviour. For example, Ps4 indicated: "I work on a physiological level with breathing and relaxation, mindfulness". However, Para athletes report that they do not need the support of the psychologist and that they had not had it at their disposal, and if they had had it, it was to improve performance and not to treat pain as the psychologists report. Two Para athletes in particular said: "We did not have a psychologist on the team, nor that it was necessary or anything ... the sport helped us" (D5) and "Psychologists always work on sports performance, at any time unless it affects sports performance, they are not looking for you to be okay ..." (D1).

In addition, Para athletes emphasise the importance of knowing their pain in order to anticipate it and apply the technique and/or self-care strategy that best suits each situation for its management. For example, C1 indicated: "If you have an injury, that pain is going to be there, you have to know how to move with the pain, know it and know what is the best way each one has to deal with that pain". This is consistent with some of the techniques that psychologists reported applying, focused on reinforcing the qualities of the Para athlete through self-confidence and self-knowledge, so that the Para athlete develops emotional skills to manage negative emotional states. For example, Ps2 reported: "I have dealt with different acquired and congenital disabilities...the perception is very different and that is where I believe that self-confidence is fundamental". Psychologists also reported using cognitive and behaviour modification techniques (stopping and changing thoughts from negative to positive). For example, Ps4 mentioned: "At the level of thinking, learning to reverse that thought that usually stops or blocks me, generates frustration, and makes you contract and causes more pain...learning to recognise the situation and anticipate [ ] "At the cognitive level, we worked on thought distortion, thought stopping, changing from negative to positive thinking, mainly the regulation of frustration [ ] Visualisation, which is also a very powerful strategy [ ] Working on attention and concentration [ ] "Generating routines also to reduce stress levels".

All sport team staffs (coaches, physiotherapists and psychologists), agree that collaborative work is necessary and benefits the Para athlete. For example, coach C4 said: "I was very vigilant and in constant communication with the physiotherapist", physiotherapist Ph1 mentioned: "We do a lot of interdisciplinary therapies, it is to try to see the needs that arise in the more medical or therapeutic parts or training and how they behave with the part of sports psychology" and psychologist Ps3 reported: "I work with the interdisciplinary group and we approach it from all points of view".

To conclude, coaches and physical therapists recognise the importance of psychological aspects in pain. The coaches mention that knowing the main triggers of injuries and a good emotional state of the Para athlete help to manage pain. C1 mentioned: "Having studied a little bit what the main injuries are or doing preventive work" and C3 said: "One very important thing is the head in this pain thing, because in the end your management depends a lot on the state of mind, precisely, to protect the shoulders". Also, the physiotherapists recognise the importance of the psychologist as a support for

the Para athlete, to address different difficult situations. In particular, Ph1 reported: "The sports psychologist helps us to focus on that, trying to learn resources at specific times".

## Discussion

With respect to the first objective of this study, which was to ascertain the perception of Para athletes and sport team staffs of how pain can affect the Para athlete's sports career, either directly or indirectly through its psychological consequences; Para athletes, coaches and physiotherapists reported that pain affected Para athletes directly in the performance of technical sports gestures, with a physical impact involving both the injured area and other areas of the body to compensate for the lack or immobility of the affected limb, preventing correct movement. This is congruent with various studies conducted with wheelchair basketball players who possess a physical disability; with elite runners with physical disability (spinal cord injury) and wheelchair users (non-athletes), and the limitation, caused by pain, of the range of motion of the affected limb in the performance of the technique (Castro et al., 2014; García-Gómez, 2018; Pérez-Tejero & García-Gómez, 2016). More specifically, Para athletes reported that they have to conserve anatomical structures directly involved in their sports discipline and establish self-care routines to prevent future injuries. This is in line with the contributions of García-Gómez (2018) who stress the importance of integrating routines in training and daily life to prevent injuries, and report that it is convenient to conserve those anatomical structures that intervene directly in the sports discipline.

The coaches, despite being asked specifically about how pain affected the development of the sports career, when pointing out negative aspects did not refer to pain. They alluded either to the physical aspects of the injury, which result in physical decompensation in the Para athlete and directly affect the correct execution of the sports technique, or to how technical gestures performed incorrectly can cause pain. This result is congruent with the study by Muyor et al. (2013) conducted with athletes without physical disability who report on the work of injury prevention programmes and biomechanical studies to avoid decompensation. In addition, the study by Hervada (2019) with Para athletes with physical disabilities underlines the importance of the application of compensatory programmes by coaches to prevent imbalances that give rise to an injury and/or affect the performance of their Para athletes.

In relation to the way in which pain can affect the Para athlete's sports career, through its psychological consequences, they all agreed that pain generates a series of negative consequences and feelings. The Para athletes perceived two closely related phenomena. First, pain can generate a negative emotional state such as anger, rage, frustration, irritability, and mood swings. In addition, this negative emotional state causes an increase in perceived pain. No studies have been found that address these findings in physically disabled Para athletes. However, they are congruent with the results found in other studies in non-disabled athletes which show that the emotional and psychological state of the athlete manifested with an injury, causes certain psychological alterations (e.g., mood change, negative thoughts, irritability) (Muyor et al., 2013; Olmedilla et al., 2017). Other studies in the general population with pain associate the pain to states of anxiety and depression and with emotions such as anger (Castro et al., 2014; Arango-Dávila & Rincón-Hoyos, 2018) and cognitive modulation of pain (attention and expectancy) may influence the experience of pain intensity (Gligorov, 2017). Secondly, and in line with the previously cited research on the psychological alterations caused by pain, sport team staffs (coaches, physiotherapists and psychologists) suggested that pain had negative psychological consequences. The physiotherapists emphasised that pain caused certain psychological consequences; and the pain is not the same in acquired and congenital disability. They indicated that acquired disability is more complex in terms of pain management. No research has been found in competitive No studies have been found that address these findings in physically disabled Para athletes with physical disability, addressing the prevalence of pain in disability types. Physiotherapists also reported that the psychologist's help received by No studies have been found that address these findings in physically disabled Para athletes was very important in coping with difficult situations, such as the loss of a limb. This is congruent with the contributions of diverse research reporting on support for coping with difficult situations (McCracken & Morley, 2014).

Finally, coaches and psychologists defined negative feelings, such as frustration, fear, oppression, anxiety, anger, seriousness, stress and worry, which could imply limitations in training and/or competition. These results are similar to those found in the general population with pain, which underline that a negative emotion can aggravate the clinical condition of the person and can trigger a greater mismatch in muscle response (Pomares-Ávalos et al., 2018). Also, in the mentioned studies on the general population with pain, they establish a relationship between chronic pain and disorders such as anxiety and depression and emotional disorders such as anger (Castro et al., 2014; Arango-Dávila & Rincón-Hoyos, 2018). They also point out, that in addition to the fear and stress produced in the Para athletes by not being able to achieve their sports objectives, the perception of pain triggered negative emotional states. This result is congruent with that reported by González-Reyes et al. (2017) in athletes without disabilities, who emphasise the importance of applying resources in psychological skills to manage anxiety and negative feelings.

In relation to the second objective of this research on the techniques and/or pain management strategies known and/or applied by Para athletes and sport team staffs, Para athletes in general tended to attend physiotherapy consultation as a technique to manage pain. This result is congruent with that reported by Setuain et al. (2017) in able-bodied athletes, who emphasise that physiotherapy pursues the adaptation and recovery of the athlete's body mobility. Most of the Para athletes complemented physiotherapy with exercise programmes focused on improving health, minimising pain and reducing and/or preventing injuries. This result is in line with another study in the general population, which highlights the exercise programme as the most used treatment in physiotherapy (Calvo-Muñoz et al., 2018). Finally, they mentioned sports practice as a technique to manage pain, either to reduce it or to control attentional processes linked to pain perception. This result is in line with studies on how sports practice in Para athletes with physical disabilities, favours physical fitness and psychosocial well-being (Fuentes, 2014; Brizuela et al., 2016). Similarly, other studies in the general population highlight the benefits of sports practice for managing pain (Jürgens, 2006).

Coaches reported using as techniques and/or strategies the performance of compensatory prevention work, with the aim of anticipating and decreasing the severity of the injury and avoiding its occurrence. Some studies have been found that address this issue in wheelchair athletes with physical disabilities with a compensatory prevention programme (Pérez-Tejero & García-Gómez, 2016). In addition, they suggest biomechanical work with the same objective previously described by coaches. This is congruent with other studies that have investigated Para athletes with physical disabilities that consider biomechanics as an indispensable tool for injury prevention in these athletes (Castro et al., 2014) and for the technical and mechanical efficiency of the sports gesture to improve performance (Veeger et al., 1992). Other studies in able-bodied athletes to design a treatment protocol and favour injury prevention, consider the biomechanical study (Muyor et al., 2013) and the adjustment of loads and intensity of training in training sessions and programmes (Anderson et al., 2003) as fundamental.

Physiotherapists directed their techniques and/or strategies to prevent injuries and reduce pain in the Para athlete to specific individualised programmes, such as mobility programmes, strength, stretching and the adaptations required by each Para athlete. These techniques were incorporated as part of the routine in their training programme. This finding is congruent with other research in competitive wheelchair athletes, which points out the importance of the practice and implementation of a specific training programme to work on upper body imbalance and avoid injuries (Hidribo & Cevallos, 2015; García-Gómez, 2018). Another study with able-bodied athletes highlights specific exercise programmes to prevent injuries (Araya-Medrano, 2020).

Ultimately, the sport team staff (coaches, physiotherapists and psychologists), indicated that collaborative work among them to manage pain is important. In relation to this result, several investigations in able-bodied athletes have been found that report the need for collaborative work among sport team staffs (Vicente-Herrero et al., 2019; Reeves et al., 2010; Catalán et al., 2006; Turk & Monarch, 2018).

In relation to the results on psychological techniques, Para athletes perform relaxation and meditation to control their pre-competition stress level. Psychologists apply relaxation as a technique to manage pain and modify physiological behaviour. However, the Para athletes report that they do not need the support of the psychologist and had not had it at their disposal, and if they had had it, it was to improve performance, not to manage pain as mentioned by the psychologists. In relation to the

psychological techniques that some Para athletes incorporated (relaxation and meditation), they are congruent with the results found in other research in the general population to control stress (Kabat-Zinn, 2012).

Para athletes also mentioned the importance of knowing about pain as it allows them to anticipate and foresee the onset of pain; in addition, they mentioned the importance of knowing the technique and/or self-care strategy that best suits each situation to manage pain. This finding is congruent with that found in other studies in the general population with pain (Sturgeon, 2014; González-Reyes et al., 2017; Kabat-Zinn, 2012; Pleman et al., 2019) and is consistent with some of the techniques that psychologists claim to apply. Psychologists, in their consultancies, generally used techniques to address physiological behaviour (relaxation), cognitive behaviour (most of them as a priority), and also some behaviour modification techniques (establishing routines).

At the physiological level, psychologists applied breathing, relaxation, meditation and mindfulness techniques. These techniques were aimed at training the regulation of stress activation. This is congruent with research by Lundqvist et al. (2018) with Paralympic athletes showing psychological intervention programmes, such as the application of mindfulness with the aim of reducing stress for the improvement of sports performance and not for pain management. Along the same lines, numerous studies with non-disabled athletes highlight the regular practice of mindfulness with the same objective of reducing stress to improve sports performance (Francisco-Pereira et al., 2024; Kabat-Zinn, 1990, 2012; Kaufman et al., 2018).

At the cognitive level, the work they carried out with the Para athlete was focused on self-confidence and self-knowledge. Their aim was to develop the emotional ability to manage negative emotional states produced by the Para athlete's self-confidence problems, such as stress, insecurity and anxiety. To do this, they focused on reinforcing their qualities. This result is in line with the cognitive-evaluative dimension of Gligorov (2017) in the general population and other research that aims to develop psychological skills to achieve a higher level of sport, as proposed in the study with non-disabled athletes by González-Campos et al. (2015). Olmedilla-Caballero et al. (2020) in their research with competitive Para athletes with disabilities also aimed to control pain. In addition, the psychologists used the techniques of stopping and changing from negative to positive thinking. These cognitive techniques allowed the Para athlete to focus attention on other nurturing thoughts and avoid focusing on the pain. These results coincide with some studies in able-bodied athletes that address cognitive coping strategies to manage pain through thought (González-Reyes et al., 2017), that establish a direct relationship between pain and negative mood (Brewer, 2019) or the influence that mood has on sports performance (Ruiz & Hanin, 2004). They also applied the visualisation technique to manage pain in Para athletes. These results are in line with other findings that highlight the benefits of the practice of this technique in the field of health and sport, to reduce the physiological activation produced by negative emotional states such as stress and anxiety (Cumming & Ramsey, 2009).

The psychologists also reported that they applied behaviour modification techniques. The establishment of routines and strategies in the Para athlete's life allowed, at the same time, to recognise their pain and to anticipate possible situations triggering negative emotions, which may raise their stress level and trigger an increase. No research has been found in Para athletes with physical disabilities. However, this result is congruent with the motivational-affective dimension of Gligorov (2017) and with what has been found in other research in athletes without disabilities that indicates that an adjustment of the perception of reality implies a certain prevention of injuries, in addition athletes can distinguish the stimuli and adapt preventive behaviour as a personal coping technique (González-Reyes et al., 2017),

Finally, coaches and physiotherapists recognised the importance of the psychological aspects of pain. On the one hand, coaches reported that knowing the main triggers of injury in Para athletes helped them in the detection and prevention of injuries. This is in line with other research in non-disabled athletes, which indicates that knowing the characteristics of the injury and the impact of intense practice of a sport reduces the number of injuries (Muyor et al., 2013). In addition, they reported that a good emotional state in Para athletes favours pain management. This result is in line with other research in able-bodied athletes, which concludes that psychological factors influence the risk of injury in athletes and their recovery (Noya & Sillero, 2012).

On the other hand, physiotherapists recognised the importance of the psychologist in supporting the Para athlete in dealing with different difficult situations, such as accepting the loss of a body member and helping to manage changes in emotional states. This is congruent with the results observed in the general population with physical disability, where knowing the psychosocial variables of the patient (e.g., emotional state, social environment) in the physiotherapy intervention can determine the progress of the treatment (Catalán et al., 2006).

## Limitations and future lines of research

The present study was planned and there were no unforeseen circumstances with the participants. The interviews were conducted by videoconference, taking into account the mobility needs of the researcher and the cities of the participants. The study provides novel insights into how pain can affect the sporting career of physically disabled competitive Para athletes and the techniques used by the interviewees. Nonetheless, some limitations should be acknowledged.

Firstly, the study sample consisted of Spanish Para athletes and sport staff only, thus the generalizability of findings to physically disabled competitive Para athletes from other countries may be limited. Future research could explore this population internationally using both qualitative and quantitative methods to support these preliminary findings. Studying Para athletes from diverse cultural backgrounds may also uncover additional dimensions to pain experiences and management approaches (Malfliet et al., 2017).

Secondly, the study centred on pain as the main dimension of physical disability. However, disability encompasses functional, psychological and social aspects that were not explored but warrant further investigation (Pomares-Ávalos et al., 2018). Future research could adopt a broader biopsychosocial approach considering other barriers physically disabled athletes may face beyond pain (Brizuela et al., 2016). Mixed-methods involving quantitative questionnaires alongside qualitative interviews may help examine multiple facets of physical disability

Thirdly, recall and social desirability biases are inherent limitations of self-reported qualitative data. Para athletes and staff representations of pain and management techniques may not fully reflect actual experiences and practices. Objective measures and longitudinal designs could overcome such biases.

Finally, findings suggest a need to review current biomedical models dominant in sport healthcare and incorporate formalised psychological programmes for pain. However, changes require political will. Comparative health policy analysis of physical disability support across countries may help understand real world implementation challenges and pathways for reform (Grabowska et al., 2022; Mithen et al., 2015).

In conclusion, this study provides a foundation to develop improved clinically-based assessment and treatment for pain management in Para athletes with physical disabilities. Multidisciplinary research addressing its limitations can advance both theory and practice to enhance career development opportunities and quality of life for this population.

## Conclusions

Pain represents a significant challenge for Para athletes with physical disabilities. It has a negative impact on their sporting career directly and indirectly. In the first case, the injury affects directly other areas of the body causing a physical decompensation, which affects the correct execution of the sporting technique becoming a new potential source of additional pain, or how technical gestures can cause pain. Secondly, the psychological consequences of pain indirectly by generating a series of negative effects and feelings, which affect the general well-being of the Para athlete.

The prevention and treatment strategies identified, such as physiotherapy, sports practice, specific individualised compensatory programmes (strength and flexibility), adjustment of loads, volume and intensity of training, modification of sessions and knowledge of pain in order to anticipate its onset, demonstrate the importance of a comprehensive approach to pain management. However, even

though Para athletes and sport team staff recognize the important role of psychological factors in pain in the recovery process, the most commonly applied techniques for pain management exclude psychological factors and focus mainly on the physical treatment of the injury.

Although sports psychologists report numerous techniques for pain management, Para athletes claim not to receive psychological support and not to have had access to it when they needed it. On the occasions when the psychologist is available, Para athletes perceive that pain treatment was always aimed at improving physical performance, not necessarily at improving the pain and the emotional state in which they were immersed and which causes them additional pain beyond the injury itself. Therefore, a multidisciplinary approach that integrates psychological support in an explicit and collaborative manner between sports agents staff and the Para athlete, incorporating psychological therapy programs for effective pain management, may be fundamental to address both physical and emotional pain. This approach should contribute by reducing pain and optimizing performance, as well as strengthening the overall well-being of Para athletes with physical disabilities, enabling them to approach their sporting careers in a more holistic and sustainable manner.

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