Article

Not peer-reviewed version

# Analysis of Psychological and Sleep Quality Characteristics of Young and Adult Para-Athletes with Cerebral Palsy During Competitive Period

Fernando Muñoz-Hinrichsen *, Felipe Herrera-Miranda, Sonny Riquelme, Matías Henríquez, Joel Álvarez-Ruf, María Isabel Cornejo, Luis Felipe Castelli Correia Campos

Posted Date: 16 April 2025

doi: 10.20944/preprints202504.1318.v1

Keywords: football; paralympic; cerebral palsy; disability

 doi:10.20944/preprints202504.1318.v1



*Article*

# Analysis of Psychological and Sleep Quality Characteristics of Young and Adult Para-Athletes with Cerebral Palsy During Competitive Period

**Fernando Muñoz-Hinrichsen [1,2,*], Felipe Herrera-Miranda [3], Sonny Riquelme [4], Matías Henríquez [5], Joel Álvarez-Ruf [2,6,7], María Isabel Cornejo [5] and Luis Felipe Castelli Correia Campos [8]**

[1] Laboratorio de Actividad Física, Salud, y Rendimiento Humano, Departamento de Kinesiología. Facultad de Artes y Educación Física, Universidad Metropolitana de Ciencias de la Educación, Chile; fernando.munoz_h@umce.cl

[2] ParaLab, Departamento de Kinesiología, Facultad de Artes y Educación Física, Universidad Metropolitana de Ciencias de la Educación, Chile; fernando.munoz_h@umce.cl

[3] Facultad de Ciencias de la Vida, Universidad Viña del Mar, Chile; fherrera@uvm.cl

[4] Escuela de Ciencia del Deporte y Actividad Física, Facultad de Salud, Universidad Santo Tomás, Chile. sonny.riquelme@inrpac.cl

[5] Escuela de Kinesiología, Facultad de Salud, Universidad Santo Tomás, Chile; mhenriquez24@santotomas.cl isa.cornejo27@gmail.com

[6] Laboratorio de Cognición y Comportamiento Sensoriomotor, Departamento de Kinesiología, Facultad de Artes y Educación Física, Universidad Metropolitana de Ciencias de la Educación, Chile; joel.alvarez@umce.cl

[7] Laboratorio de Biomecánica Clínica, Carrera de Kinesiología, Facultad de Medicina Clínica Alemana de Santiago-Universidad del Desarrollo, Chile: jalvarez@udd.cl

[8] Núcleo de Investigación en Ciencias de la Motricidad Humana. Universidad Adventista de Chile. Chillan, Chile; luisfelipe@cbdv.org.br

* Correspondence: fernando.munoz_h@umce.cl; Tel.:+56995390673

**Abstract:** Emotional processes and sleep quality have become fundamental aspects of performance in Paralympic sports among elite and youth athletes. The objective of this study was to compare levels of depression, stress, anxiety, and sleep quality among youth and adult athletes with cerebral palsy (CP) belonging to the national CP Football team in Chile. 10 adult and 12 youth national team athletes participated, completing the DASS 21, Pittsburg Sleep Quality Index, and Epworth Sleepiness Scale questionnaires. The athletes were competing in their respective categories at the 2024 Parapan-American Games. Significant differences were found where young athletes had lower levels of depression ($\chi^2 = 4.77$, p = 0.02, OR = 11.0) and anxiety ($\chi^2 = 6.71$, p = 0.01, OR=16.5). Similar differences could be observed in favor of young athletes in sleep latency ($p = 0.04$; $d = 0.34$), bedtime ($p = 0.02$; $d = 0.20$), total hours of sleep ($p = 0.04$; $d = 0.10$), subjective sleep quality ($p = 0.002$; $d = 0.56$) and objective sleep quality ($p<0.001$; $d=0.65$). This study suggests that adult para-athletes from a national CP Football team exhibit higher levels of depression and anxiety compared to their youth counterparts. Additionally, objective and subjective measures show that adults experience poorer sleep quality. These findings highlight the need for targeted interventions by psychological support teams, aiming to enhance athlete performance by promoting healthy habits that address these mental health challenges.

**Keywords:** Football; Paralympic; Cerebral Palsy; Disability

## 1. Introduction

 doi:10.20944/preprints202504.1318.v1



Studies related to emotional processes in the athlete population, particularly concerning depression, stress, and anxiety, have gained notorious attention in recent years due to their crucial relevance and significant impact on sports performance, both in the Olympic and Paralympic arenas [1–3]. Inadequate emotion management can become a risk factor depending on an individual's personal and sporting conditions and circumstances [4]. These factors may contribute to situations that trigger musculoskeletal complications, which can significantly stress athletes and often lead to physical pain, reduced sports performance, and time away from competition [5,6]. Moreover, the substantial psychological pressure to succeed [4] and the physical and emotional demands of training can become significant stressors, especially when these challenges are combined with additional responsibilities, such as school or work [7]. Similarly, the environment in which an athlete develops can significantly impact their mental health, and some athletes may exhibit perfectionist tendencies, setting high standards for themselves and demanding exceptional performance [8,9].

Furthermore, research suggests that for effective emotional management, the quality of sleep and rest should be prioritized when planning the preparation and training of athletes at all levels, highlighting its influence on relevant factors contributing to sports performance [10,11]. Muscle repair and growth occur during sleep, particularly in the deep sleep stages, which is a process crucial for regulating hormones associated with muscle growth, metabolism, and stress, including growth hormone and cortisol [12]. Sleep deprivation can impair cognitive function, affecting concentration, decision-making, and coordination, resulting in athletes' slower reaction times, reduced accuracy in technical movements, and poor strategic planning during competition [10,13]. Previous studies show that sleep and rest are integral to athletic training, preparation, and competition performance.

Cerebral palsy football is a sport specifically designed for those with congenital or acquired brain injuries, including impairments such as spasticity, ataxia, or dyskinesia, which is globally regulated by the International Federation of CP Football (IFCPF) [14]. This modality involves 7 participants on each side, playing on a field more minor than the standard dimensions (i.e., 70 x 50 m) with smaller goals (i.e., 5 x 2 m) and an offside rule not applied [15]. Footballers of this discipline present physical and physiological characteristics that impact their motor performance in sports with intermittent demands like those of their able-bodied counterparts [16]. This modality involves a competitive cycle including young and adult athletes participating in world and regional circuits with the highest standards, exposing them to the psychological demands of high performance [17].

Consequently, physical, physiological, and psychological differences between young people and adults are relevant during training and competition. Young people are in a crucial stage of development, where their systems continue to grow, and may experience significant emotional and social instability in a sports competition context [18,19]. At this stage, sleep disorders are becoming increasingly common and may contribute to the development of stress and depression 10. Individuals with disabilities, particularly those with neurodevelopmental disorders, may face more significant challenges in falling asleep compared to the non-disabled population [20]. Therefore, this study aimed to compare levels of depression, stress, anxiety, and sleep quality between youth and adult athletes with CP belonging to national para-football teams.

## 2. Materials and Methods

### *2.1. Participants*

A cross-sectional design was used to compare parameters of depression, stress, anxiety, and sleep quality of youth and adult male athletes with CP of a national team selected to compete in a regional event (i.e., youth and adult Parapanamerican Games). The sample was selected using a non-probabilistic convenience method. It included athletes from national CP football teams in the 'Youth' categories who participated in the 2023 Youth Parapanamerican Games and were under 21 years of age (n = 12, 17.66 ± 2.01 years) and adults competing in the 2023 Parapanamerican Games (n = 10; 29.20 ± 3.85 years) (Table 1). The study's objectives and protocols were explained to all participants who participated voluntarily. Informed consent was obtained from all participants, with minors

 doi:10.20944/preprints202504.1318.v1



requiring guardians' permission. All procedures received approval from the Diego Portales University Ethics Committee (Code 18-2024).

**Table 1.** General characteristics of athletes with cerebral palsy from a national football team.

| Athlete | Category | Age (Years) | Sport Classes | Game Position |
|---|---|---|---|---|
| 1 | Youth | 21 | 2 | Goalkeeper |
| 2 | Youth | 16 | 2 | Defender |
| 3 | Youth | 16 | 2 | Defender |
| 4 | Youth | 18 | 2 | Defender |
| 5 | Youth | 19 | 2 | Defender |
| 6 | Youth | 15 | 2 | Midfielder |
| 7 | Youth | 15 | 2 | Midfielder |
| 8 | Youth | 19 | 2 | Midfielder |
| 9 | Youth | 19 | 2 | Midfielder |
| 10 | Youth | 20 | 2 | Midfielder |
| 11 | Youth | 16 | 1 | Striker |
| 12 | Youth | 18 | 1 | Striker |
| 13 | Adult | 30 | 2 | Goalkeeper |
| 14 | Adult | 30 | 1 | Goalkeeper |
| 15 | Adult | 34 | 1 | Goalkeeper |
| 16 | Adult | 30 | 2 | Defender |
| 17 | Adult | 32 | 2 | Defender |
| 18 | Adult | 33 | 2 | Defender |
| 19 | Adult | 23 | 2 | Midfielder |
| 20 | Adult | 25 | 2 | Midfielder |
| 21 | Adult | 31 | 3 | Midfielder |
| 22 | Adult | 24 | 2 | Striker |

*2.2. Procedures*

Participants completed different assessments to evaluate psychological aspects and sleep quality during their training sessions one week before each competitive event. The questionnaires were sent to them via text message and were filled out online. The Spanish version of the Depression, Anxiety, and Stress Scale (DASS-21) questionnaire was used to rate aspects of mental health in the study participants [21,22]. This questionnaire consists of 21 items, each rated on a Likert scale. The scale ranges from 0 to 3, with the following meanings: 0 indicates 'Did not apply to me at all'; 1 corresponds to 'Applied to me to some degree, or some of the time'; 2 signifies 'Applied to me to a considerable degree, or a good part of the time'; and 3 represents 'Applied to me very much, or most of the time'. The items are grouped into three subscales, which are analyzed after a correction process that reorganizes them as follows: Depression (items 3, 5, 10, 13, 16, 17, and 21), Anxiety (items 2, 4, 7, 9, 15, 19, and 20), and Stress (items 1, 6, 8, 11, 12, 14, and 18). To evaluate each subscale independently, the scores of the corresponding items are summed and interpreted as follows: Depression: 5-6 indicates mild depression, 7-10 moderate, 11-13 severe, and 14 or more extremely severe; Anxiety: 4 indicates mild anxiety, 5-7 moderate, 8-9 severe, and 10-12 moderate, 13-16 severe, and 17 or more extremely severe [23].

Regarding sleep quality, the Spanish version of the "Pittsburg Sleep Quality Index" was used, a direct and self-applied evaluation with questions corresponding to the factors involved in sleep quality [24,25]. This questionnaire includes 19 questions designed to evaluate seven dimensions of sleep quality. These dimensions are subjective sleep quality, which refers to how well or poorly individuals perceive their sleep; sleep latency, or the time it takes to fall asleep; sleep duration, measured by the number of hours slept; sleep efficiency, calculated as the percentage of time spent sleeping relative to the time spent in bed; sleep disturbances, encompassing symptoms such as

 doi:10.20944/preprints202504.1318.v1



insomnia, apnea, and difficulties in maintaining sleep; use of sleep medications; and daytime dysfunction, which involves feelings of sleepiness during the day and the potential challenges that may arise from it [26].

Sleepiness was analyzed with the Spanish version of the "Epworth Sleepiness Scale"[27]. This questionnaire asks, "How likely are you to feel drowsy, nod off, or fall asleep in the following situations instead of just feeling tired? The instrument uses the following scale for each situation: 0 = No likelihood of nodding off or falling asleep; 1= Low likelihood of nodding off or falling asleep; 2= Moderate likelihood of nodding off or falling asleep; and 3= High likelihood of nodding off or falling asleep. 8 questions totaling 24 points, where 1-6: normal, 7-8: average sleepiness, and 9-24: abnormal (i.e., possibly pathological) sleepiness.

### *2.3. Statistical Analysis*

Descriptive statistics were employed to summarize the results from each questionnaire, including frequencies, means, standard deviations, and percentages where appropriate. To assess the distribution of the data, the Shapiro-Wilk test (for sample sizes n < 50) was employed, which confirmed the suitability of parametric statistical methods. Subsequently, parametric tests were used to analyze variables related to Depression, Anxiety, and Stress. For the DASS-21 test, the Chi-Square test of proportions ($\chi^2$) was used to evaluate the balance of response proportions and calculate the Odds Ratio (OR) with a 95% confidence interval (CI). Sleepiness and quality were examined through Sleep Latency, Sleep Quantity, and Sleep Quality metrics. The student's t-test was performed to compare means and calculated effect sizes (d) with thresholds for interpretation: > 0.80 indicates a large effect, > 0.50 and < 0.79 a moderate effect, > 0.25 and < 0.49 a small effect, and < 0.25 a trivial effect [28]. A significant level of $p < 0.05$ was set for all tests. The analysis used Jamovi "The Jamovi project 2022", and Microsoft Excel 365 [29].

## 3. Results

Analysis of the DASS-21 scale scores revealed that 8.3% of youth-level athletes exhibited symptoms of depression. In contrast, 50.0% of adult athletes experienced depression, primarily at a moderate level, indicating a significant difference between the two groups ($\chi^2 = 4.77$, $p = 0.02$, OR = 11.0). A similar pattern is observed in the "Anxiety" condition, where 8.3% of youth athletes are affected, compared to a significantly higher 60.0% in adults ($\chi^2 = 6.71$, $p = 0.01$, OR=16.5). Although the differences in the "Stress" condition are not statistically significant, adults still exhibit a higher prevalence at 50.0%, compared to 16.7% in youth (Tables 2 and 3).

**Table 2.** Description of the degrees of depression, anxiety, and stress based on the DASS 21 questionnaire of athletes with cerebral palsy from a national team.

| Variables | | Characteristic | | |
|---|---|---|---|---|
| **Athletes** | **Level** | **Depression** | **Anxiety** | **Stress** |
| 1 | Youth | 0 (No depression) | 0 (No anxiety) | 2 (No stress) |
| 2 | Youth | 0 (No depression) | 0 (No anxiety) | 1 (No stress) |
| 3 | Youth | 1 (No depression) | 1 (No anxiety) | 1 (No stress) |
| 4 | Youth | 0 (No depression) | 0 (No anxiety) | 3 (No stress) |
| 5 | Youth | 0 (No depression) | 0 (No anxiety) | 2 (No stress) |
| 6 | Youth | 1 (No depression) | 1 (No anxiety) | 6 (No stress) |
| 7 | Youth | 1 (No depression) | 1 (No anxiety) | 9 (Slight) |
| 8 | Youth | 1 (No depression) | 3 (No anxiety) | 4 (No stress) |
| 9 | Youth | 3 (No depression) | 3 (No anxiety) | 5 (No stress) |
| 10 | Youth | 3 (No depression) | 1 (No anxiety) | 1 (No stress) |
| 11 | Youth | 5 (Slight) | 8 (Severe) | 10 (Moderate) |
| 12 | Youth | 1 (No depression) | 2 (No anxiety) | 4 (No stress) |
| 13 | Adult | 9 (Moderate) | 4 (Slight) | 8 (Leve) |

 doi:10.20944/preprints202504.1318.v1



| | | | | |
|---|---|---|---|---|
| 14 | Adult | 3 (No depression) | 4 (Slight) | 7 (No stress) |
| 15 | Adult | 8 (Moderate) | 8 (Severe) | 10 (Moderate) |
| 16 | Adult | 10 (Moderate) | 5 (Moderate) | 7 (No stress) |
| 17 | Adult | 2 (No depression) | 3 (No anxiety) | 8 (Slight) |
| 18 | Adult | 0 (No depression) | 1 (No anxiety) | 3 (No stress) |
| 19 | Adult | 2 (No depression) | 1 (No anxiety) | 0 (No stress) |
| 20 | Adult | 8 (Moderate) | 9 (Severe) | 11 (Moderate) |
| 21 | Adult | 0 (No depression) | 0 (No anxiety) | 5 (No stress) |
| 22 | Adult | 10 (Moderate) | 11 (Extreme) | 13 (Severe) |

Note: Data expressed in the categorization of the DASS 21 instrument.

**Table 3.** Percentages and odds ratio based on DASS 21 of athletes with cerebral palsy from a national team.

| | Category | | | $\chi^2$ | $p$ | OR | IC 95% |
|---|---|---|---|---|---|---|---|
| | **Youth** | **Adults** | **Total** | | | | |
| No Depression | 91.7% | 50.0% | 72.7% | 4.77 | 0.02* | 11.0 | 1.00-120 |
| Depression | 8.3% | 50.0% | 27.3% | | | | |
| No Anxiety | 91.7% | 40.0% | 68.2% | 6.71 | 0.01* | 16.5 | 1.49-183 |
| Anxiety | 8.3% | 60.0% | 31.8% | | | | |
| No Estress | 83.3% | 50.0% | 68.2% | 2.79 | 0.09 | 5.00 | 0.70-35.5 |
| Estress | 16.7% | 50.0% | 31.8% | | | | |

Note: $p < 0.05$*, percentages based on column per category (Depression, Anxiety, Stress).

Significant differences in sleep quality were observed between the groups, particularly in sleep latency, where adult athletes had a longer latency of 35.64 ± 27.81 min ($p$ = 0.04; $d$ = 0.34, small). Additionally, there were significant differences in bedtime ($p$ = 0.02; $d$ = 0.20, trivial), with adults going to bed later, at an average time of 23:24. This later bedtime affected the total hours of sleep, with the adult group averaging 6.72 ± 1.34 hours, significantly less ($p$ = 0.04; $d$ = 0.10, trivial) than the youth team, which averaged 7.75 ± 0.75 hours of sleep (Table 4). In terms of sleep quality, subjective analysis reveals that youth participants perceive their sleep as 'Quite bad' (2.41 ± 0.51), while adults rate theirs as 'Quite good' (1.54 ± 0.52), reporting significant differences ($p$ = 0.002; $d$ = 0.56, moderate). However, this contrasts with the objective measurements of sleep quality, where youth athletes fall closer to the 'Fairly good' range (5.91 ± 1.37), whereas adults remain in the 'Good' category (8.54 ± 2.29), with a more pronounced significant difference ($p$ < 0.001; $d$ = 0.65, moderate). Regarding sleepiness, both groups were categorized as 'Normal' (Table 4).

**Table 4.** Sleep quality and sleepiness of athletes with cerebral palsy from a national team.

| Variable | Category | Mean (SD) | Min-Max | $p$ ($d$) |
|---|---|---|---|---|
| Sleep latency (min) | Youth | 14.75±12.50 | 2.00-45.00 | 0.04* (0.34) |
| | Adult | 35.64±27.81 | 2.00-90.00 | |
| Bedtime (hours) | Youth | 22:17±0.62 | 21:00-23:00 | 0.02* (0.20) |
| | Adult | 23.24±1.27 | 21:30-02:00 | |
| Wake up time (hours) | Youth | 7:22±1.75 | 5:00-12:20 | 0.96 (0.03) |
| | Adult | 6.45±1.05 | 5:00-9:00 | |
| Amount of sleep (hours) | Youth | 7.75±0.75 | 7.00-9.00 | 0.04* (0.10) |
| | Adult | 6.72±1.34 | 5:00-9:00 | |
| Subjective sleep quality (Likert score) | Youth | 2.41±0.51 | 2.00-3.00 | 0.002* (0.56) |
| | Adult | 1.54±0.52 | 1.00-2.00 | |
| Objective sleep quality (Score) | Youth | 5.91±1.37 | 3.00-7.00 | <0.001* (0.65) |
| | Adult | 8.54±2.29 | 6.00-14.00 | |
| Sleepiness (Score) | Juvenil | 1.08±0.28 | 1.00-2.00 | 0.017* (0.49) |
| | Adult | 1.91±0.94 | 1.00-3.00 | |

 doi:10.20944/preprints202504.1318.v1



Note: $p < 0.05$*; $t$ de Student, $d$ = Effect size.

## 4. Discussion

This study aimed to compare the levels of depression, stress, anxiety, and sleep quality between youth and adult para-athletes with CP who are members of national para-football teams. The results revealed a significantly higher proportion of anxiety among adult team members (60%) compared to their youth counterparts (8.3%). This finding contrasts with what was observed in adult athletes, where anxiety symptoms were lower in more experienced individuals [9] , possibly because they tend to develop more advanced coping mechanisms over their careers to manage the challenges of high-level competition [30]. In addition, younger athletes may require additional developmental-specific support to progress these skills due to their immaturity or limited exposure to such situations [31]

Youth athletes may experience heightened anxiety due to several factors, including the pressure to perform in competition, expectations from coaches and parents, whether conveyed implicitly or explicitly, and the challenge of balancing sports with other aspects of their lives, such as academics, leisure activities, and daily routines [19]. Similarly, adult para-athletes may report higher anxiety levels, potentially linked to the complexities of managing their disability, the pressure to represent a marginalized group, and the need to prove their capabilities despite facing social and physical barriers [32,33]. This situation is repeated when observing the traits linked to the presence of depression in the adult group versus the youth group (50% versus 8.3%, respectively). Possibly this difference is likely influenced by the unique risk factors adult athletes face, such as the pressure to maintain elite-level performance, the challenges of aging, uncertainty about life after sports, and the expectations of sponsors and media, which are factors that could affect mental health [34]. Additionally, another relevant issue that may be a factor to highlight is career transitions, such as retirement from sports, which can be a high-risk period for depression due to the loss of identity, daily structure, and social support that sport provides [35].

Furthermore, a previous study on Australian paraparathletes reported lower self-esteem than non-parathletes, highlighting a factor that should be considered when addressing this population's specific needs for mental health [36]. Similarly, Meidl et al.[2] found high rates of mental health issues among German elite para-athletes, emphasizing the need for continued monitoring to enable early detection and appropriate intervention. Effective interventions for both groups include access to mental health services, education about depression, and creating a sports environment that encourages mental well-being, especially considering the particularities of athletes with a disability [37].

By analyzing sleep hours, it is possible to describe two relevant issues in the different groups of athletes with a disability. First, the results indicated that adult athletes (6.72 ± 1.34 hours) do not meet the standard of hours of sleep recommended by the literature, and youth athletes (7.75 ± 0.75 hours) remain on the limit, which indicates that adult athletes should get ~ 7 hours per night [38]. However, some studies suggest that adults can benefit from up to 7 to 8 hours of sleep to maximize recovery. In young individuals, the recommendation is to sleep between 8 and 10 hours per night since adolescents have more significant sleep needs due to their stage of development, and the combination of intense training with their academic demands can increase these requirements [39,40]. The present results are similar to those of Duran Agüero et al.[41] , who studied a Chilean sample of para-athletes and described low sleep quality and insomnia, factors that can influence performance. Moreover, early studies found a high prevalence of sleep disorders and an association between the severity of health problems and sleep quality, reflecting the complications faced by athletes with a disability [42]. The specific health characteristics of athletes with CP, such as spasticity, involuntary movements, or muscle spasms, may impact sleep duration and quality, factors that should be addressed to achieve improvements [43]. The second point to analyze is that there are significant differences in favor of youth category athletes regarding hours of sleep, which coincides with the recommendations regarding differences according to age [12]. Given the importance of sleep for development and

 doi:10.20944/preprints202504.1318.v1



athletic performance, strategies to optimize sleep should be tailored to the specific health conditions that may affect it in young athletes with CP [40].

This study has certain limitations, particularly the specificity of the participant sample, which introduces complexity when making comparisons. Additionally, the participants were evaluated during different tournaments, corresponding to their respective categories, which may have introduced variability in their responses due to differing contextual factors. However, the strength of this research lies in its novelty within the region, providing data on national team athletes contextualized to a Latin American country reality. The high percentage of national team members in both categories addressing this issue also suggests it is a phenomenon of relevance for this population. Future studies could explore the relationships between physiological variables that affect emotional states and sleep quality and the potential impact of medication use, spasticity, or hypertonia on sleep patterns. In addition, studying women para-athletes in this sports discipline may allow for a deeper understanding of these factors that influence overall well-being. The results have practical implications for coaches and health staff, highlighting the importance of monitoring psychological factors such as depression, anxiety, stress, and sleep duration while considering age groups, health particularities, and the competitive season.

## 5. Conclusions

This study suggests that adult para-athletes from a national CP Football team exhibit higher levels of depression and anxiety compared to their youth counterparts. Additionally, both objective and subjective measures show that adults experience poorer sleep quality. These findings highlight the need for targeted interventions by psychological support teams, aiming to enhance athlete performance by promoting healthy habits that address these mental health challenges.

**Author Contributions:** The following statements should be used: Methodology, J.A.R.; formal analysis, F.M.H.; investigation, F.M.H, J.A.R.; data curation, F.M.H.; writing—original draft preparation, F.M.H., M.H., F.H.M, L.F.C; writing—review and editing, S.R., M.I.C, L.F.C; project administration, F.M.H. All authors have read and agreed to the published version of the manuscript."

**Funding:** This research received no external funding

**Institutional Review Board Statement:** The study was conducted by the Declaration of Helsinki and approved by the Ethics Committee of Universidad Diego Portales, Chile

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** All research data is available upon request at fernando.munoz_h@umce.cl

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Abbreviations

The following abbreviations are used in this manuscript:

| | |
|---|---|
| CP | Cerebral Palsy |
| IFCPF | International Federation of CP Football |
| DASS-21 | Depression, Anxiety, and Stress Scale |

## References

1. Bentzen, M.; Kenttä, G.; Karls, T.; Fagher, K. Monitoring Mental Distress in Para Athletes in Preparation, during and after the Beijing Paralympic Games 2022: A 22 Week Prospective Mixed-Method Study. Front. Sports Act. Living 2022, 4, 945073. https://doi.org/10.3389/fspor.2022.945073.
2. Meidl, V.; Dallmann, P.; Steffen, K.; Bretthauer, B.; Busch, A.; Kubosch, E. J.; Leonhart, R.; Hirschmueller, A. Mental Health Surveillance in Elite Para Athletes: Early Identification and Follow-up of Athletes at Risk

 doi:10.20944/preprints202504.1318.v1



of Mental Health Problems. Br J Sports Med 2024, 58 (16), 902–909. https://doi.org/10.1136/bjsports-2023-107995.

3. Swartz, L.; Hunt, X.; Bantjes, J.; Hainline, B.; Reardon, C. L. Mental Health Symptoms and Disorders in Paralympic Athletes: A Narrative Review. Br J Sports Med 2019, 53 (12), 737–740. https://doi.org/10.1136/bjsports-2019-100731.
4. Reardon, C. L.; Hainline, B.; Aron, C. M.; Baron, D.; Baum, A. L.; Bindra, A.; Budgett, R.; Campriani, N.; Castaldelli-Maia, J. M.; Currie, A.; Derevensky, J. L.; Glick, I. D.; Gorczynski, P.; Gouttebarge, V.; Grandner, M. A.; Han, D. H.; McDuff, D.; Mountjoy, M.; Polat, A.; Purcell, R.; Putukian, M.; Rice, S.; Sills, A.; Stull, T.; Swartz, L.; Zhu, L. J.; Engebretsen, L. Mental Health in Elite Athletes: International Olympic Committee Consensus Statement (2019). Br J Sports Med 2019, 53 (11), 667–699. https://doi.org/10.1136/bjsports-2019-100715.
5. Nixdorf, I.; Frank, R.; Hautzinger, M.; Beckmann, J. Prevalence of Depressive Symptoms and Correlating Variables Among German Elite Athletes. Journal of Clinical Sport Psychology 2013, 7 (4), 313–326. https://doi.org/10.1123/jcsp.7.4.313.
6. Rogers, D. L.; Tanaka, M. J.; Cosgarea, A. J.; Ginsburg, R. D.; Dreher, G. M. How Mental Health Affects Injury Risk and Outcomes in Athletes. Sports Health: A Multidisciplinary Approach 2024, 16 (2), 222–229. https://doi.org/10.1177/19417381231179678.
7. Schaal, K.; Tafflet, M.; Nassif, H.; Thibault, V.; Pichard, C.; Alcotte, M.; Guillet, T.; El Helou, N.; Berthelot, G.; Simon, S.; Toussaint, J.-F. Psychological Balance in High Level Athletes: Gender-Based Differences and Sport-Specific Patterns. PLoS ONE 2011, 6 (5), e19007. https://doi.org/10.1371/journal.pone.0019007.
8. Daley, M. M.; Shoop, J.; Christino, M. A. Mental Health in the Specialized Athlete. Curr Rev Musculoskelet Med 2023, 16 (9), 410–418. https://doi.org/10.1007/s12178-023-09851-1.
9. Rice, S. M.; Gwyther, K.; Santesteban-Echarri, O.; Baron, D.; Gorczynski, P.; Gouttebarge, V.; Reardon, C. L.; Hitchcock, M. E.; Hainline, B.; Purcell, R. Determinants of Anxiety in Elite Athletes: A Systematic Review and Meta-Analysis. Br J Sports Med 2019, 53 (11), 722–730. https://doi.org/10.1136/bjsports-2019-100620.
10. Charest, J.; Grandner, M. A. Sleep and Athletic Performance. Sleep Medicine Clinics 2020, 15 (1), 41–57. https://doi.org/10.1016/j.jsmc.2019.11.005.
11. Simpson, N. S.; Gibbs, E. L.; Matheson, G. O. Optimizing Sleep to Maximize Performance: Implications and Recommendations for Elite Athletes. Scandinavian Med Sci Sports 2017, 27 (3), 266–274. https://doi.org/10.1111/sms.12703.
12. Fullagar, H. H. K.; Skorski, S.; Duffield, R.; Hammes, D.; Coutts, A. J.; Meyer, T. Sleep and Athletic Performance: The Effects of Sleep Loss on Exercise Performance, and Physiological and Cognitive Responses to Exercise. Sports Med 2015, 45 (2), 161–186. https://doi.org/10.1007/s40279-014-0260-0.
13. Mah, C. D.; Mah, K. E.; Kezirian, E. J.; Dement, W. C. The Effects of Sleep Extension on the Athletic Performance of Collegiate Basketball Players. Sleep 2011, 34 (7), 943–950. https://doi.org/10.5665/SLEEP.1132.
14. Reina, R.; Iturricastillo, A.; Castillo, D.; Urbán, T.; Yanci, J. Activity Limitation and Match Load in Para-footballers with Cerebral Palsy: An Approach for Evidence-based Classification. Scandinavian Med Sci Sports 2020, 30 (3), 496–504. https://doi.org/10.1111/sms.13583.
15. Henríquez, M.; Sabido, R.; Barbado, D.; Roldan, A.; Elvira, J. L. L.; Yanci, J.; Reina, R. Differences in Kinetic Characteristics during Countermovement Jump of Football Players with Cerebral Palsy According to Impairment Profiles. Front. Physiol. 2023, 14, 1121652. https://doi.org/10.3389/fphys.2023.1121652.
16. Yanci, J.; Castillo, D.; Iturricastillo, A.; Reina, R. Evaluation of the Official Match External Load in Soccer Players With Cerebral Palsy. Journal of Strength and Conditioning Research 2019, 33 (3), 866–873. https://doi.org/10.1519/JSC.0000000000002085.
17. Henríquez, M.; Reina, R.; Castillo, D.; Iturricastillo, A.; Yanci, J. Contextual Factors and Match-Physical Performance of International-Level Footballers with Cerebral Palsy. Science and Medicine in Football 2024, 8 (3), 232–241. https://doi.org/10.1080/24733938.2023.2206384.
18. Baxter-Jones, A. D. G. Physical Growth and Development in Young Athletes: Factors of Influence and Consequence. Kinesiology Review 2019, 8 (3), 211–219. https://doi.org/10.1123/kr.2019-0024.

 doi:10.20944/preprints202504.1318.v1




19. Brenner, J. S.; LaBotz, M.; Sugimoto, D.; Stracciolini, A. The Psychosocial Implications of Sport Specialization in Pediatric Athletes. Journal of Athletic Training 2019, 54 (10), 1021–1029. https://doi.org/10.4085/1062-6050-394-18.
20. Ogundele, M. O.; Yemula, C. Management of Sleep Disorders among Children and Adolescents with Neurodevelopmental Disorders: A Practical Guide for Clinicians. WJCP 2022, 11 (3), 239–252. https://doi.org/10.5409/wjcp.v11.i3.239.
21. Daza, P.; Novy, D. M.; Stanley, M. A.; Averill, P. [No Title Found]. Journal of Psychopathology and Behavioral Assessment 2002, 24 (3), 195–205. https://doi.org/10.1023/A:1016014818163.
22. Lee, J.; Lee, E.-H.; Moon, S. H. Systematic Review of the Measurement Properties of the Depression Anxiety Stress Scales–21 by Applying Updated COSMIN Methodology. Qual Life Res 2019, 28 (9), 2325–2339. https://doi.org/10.1007/s11136-019-02177-x.
23. Ruiz, F.; García Martin, M. B.; Suarez Falcón, J.; Odriozola González, P. The Ierarchical Actor Structure of the Spanish Version of Depression Anxiety and Stress Scale - 21. International Journal of Psychology and Psychological Therapy 2017, 17 (1), 97–105.
24. Buysse, D. J.; Reynolds, C. F.; Monk, T. H.; Berman, S. R.; Kupfer, D. J. The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research. Psychiatry Research 1989, 28 (2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4.
25. Hita-Contreras, F.; Martínez-López, E.; Latorre-Román, P. A.; Garrido, F.; Santos, M. A.; Martínez-Amat, A. Reliability and Validity of the Spanish Version of the Pittsburgh Sleep Quality Index (PSQI) in Patients with Fibromyalgia. Rheumatol Int 2014, 34 (7), 929–936. https://doi.org/10.1007/s00296-014-2960-z.
26. Mollayeva, T.; Thurairajah, P.; Burton, K.; Mollayeva, S.; Shapiro, C. M.; Colantonio, A. The Pittsburgh Sleep Quality Index as a Screening Tool for Sleep Dysfunction in Clinical and Non-Clinical Samples: A Systematic Review and Meta-Analysis. Sleep Medicine Reviews 2016, 25, 52–73. https://doi.org/10.1016/j.smrv.2015.01.009.
27. Gómez G., M.; Deck G., B.; Santelices B., P.; Cavada Ch., G.; Volpi A., C.; Serra M., L. Adaptación Transcultural y Validación de La Escala de Somnolencia de Epworth En La Población Chilena. Rev. Otorrinolaringol. Cir. Cabeza Cuello 2020, 80 (4), 434–441. https://doi.org/10.4067/S0718-48162020000400434.
28. Cohen, K. E.; Morgan, P. J.; Plotnikoff, R. C.; Callister, R.; Lubans, D. R. Fundamental Movement Skills and Physical Activity among Children Living in Low-Income Communities: A Cross-Sectional Study. Int J Behav Nutr Phys Act 2014, 11 (1), 49. https://doi.org/10.1186/1479-5868-11-49.
29. Jamovi. The Jamovi Project, 2022. https://www.jamovi.org.
30. Nuetzel, B. Coping Strategies for Handling Stress and Providing Mental Health in Elite Athletes: A Systematic Review. Front. Sports Act. Living 2023, 5, 1265783. https://doi.org/10.3389/fspor.2023.1265783.
31. Gould, D.; Udry, E. Psychological Skills for Enhancing Performance Arousal Regulation Strategies. Medicine & Science in Sports & Exercise 1994, 26 (4), 478–485.
32. Barbosa-Granados, S.; Aguirre-Loaiza, H.; Arenas-Granada, J.; Urrea-Cuéllar, Á.; Hernández Roldán, R.; Anderson Quiñonez, J.; Parra-Tijaro, J.; Herrera-Agudelo, L.; Nanez, J. Características Psicológicas Relacionadas Con El Deporte: Diferencias Entre Deportistas Con y Sin Discapacidad. Apunts 2024, No. 155, 19–29. https://doi.org/10.5672/apunts.2014-0983.es.(2024/2).156.03.
33. Martin, J. J.; Mushett, C. A. Social Support Mechanisms among Athletes with Disabilities. Adapted Physical Activity Quarterly 1996, 13 (1), 74–83. https://doi.org/10.1123/apaq.13.1.74.
34. Rice, S. M.; Purcell, R.; De Silva, S.; Mawren, D.; McGorry, P. D.; Parker, A. G. The Mental Health of Elite Athletes: A Narrative Systematic Review. Sports Med 2016, 46 (9), 1333–1353. https://doi.org/10.1007/s40279-016-0492-2.
35. Voorheis, P.; Silver, M.; Consonni, J. Adaptation to Life after Sport for Retired Athletes: A Scoping Review of Existing Reviews and Programs. PLoS ONE 2023, 18 (9), e0291683. https://doi.org/10.1371/journal.pone.0291683.
36. Olive, L. S.; Rice, S.; Butterworth, M.; Clements, M.; Purcell, R. Do Rates of Mental Health Symptoms in Currently Competing Elite Athletes in Paralympic Sports Differ from Non-Para-Athletes? Sports Med - Open 2021, 7 (1), 62. https://doi.org/10.1186/s40798-021-00352-4.

 doi:10.20944/preprints202504.1318.v1




37. Purcell, R.; Gwyther, K.; Rice, S. M. Mental Health In Elite Athletes: Increased Awareness Requires An Early Intervention Framework to Respond to Athlete Needs. Sports Med - Open 2019, 5 (1), 46. https://doi.org/10.1186/s40798-019-0220-1.
38. Cunha, L. A.; Costa, J. A.; Marques, E. A.; Brito, J.; Lastella, M.; Figueiredo, P. The Impact of Sleep Interventions on Athletic Performance: A Systematic Review. Sports Med - Open 2023, 9 (1), 58. https://doi.org/10.1186/s40798-023-00599-z.
39. Hirshkowitz, M.; Whiton, K.; Albert, S. M.; Alessi, C.; Bruni, O.; DonCarlos, L.; Hazen, N.; Herman, J.; Katz, E. S.; Kheirandish-Gozal, L.; Neubauer, D. N.; O'Donnell, A. E.; Ohayon, M.; Peever, J.; Rawding, R.; Sachdeva, R. C.; Setters, B.; Vitiello, M. V.; Ware, J. C.; Adams Hillard, P. J. National Sleep Foundation's Sleep Time Duration Recommendations: Methodology and Results Summary. Sleep Health 2015, 1 (1), 40–43. https://doi.org/10.1016/j.sleh.2014.12.010.
40. Imbergamo, C. M.; Patankar, A. G.; Milewski, M. D. Sleep Optimization in the Young Athlete. Journal of the Pediatric Orthopaedic Society of North America 2021, 3 (3), 306. https://doi.org/10.55275/JPOSNA-2021-306.
41. Durán Agüero, S. Calidad del sueño, somnolencia e insomnio en deportistas paralímpicos. Nutricion hospitalaria 2015, No. 6, 2832–2837. https://doi.org/10.3305/nh.2015.32.6.9893.
42. Silva, A.; Pinto Pinheiro, L. S.; Silva, S.; Andrade, H.; Pereira, A. G.; Rodrigues Da Silva, F.; Guerreiro, R.; Barreto, B.; Resende, R.; Túlio De Mello, M. Sleep in Paralympic Athletes and Its Relationship with Injuries and Illnesses. Physical Therapy in Sport 2022, 56, 24–31. https://doi.org/10.1016/j.ptsp.2022.06.001.
43. Dutt, R.; Roduta-Roberts, M.; Brown, C. Sleep and Children with Cerebral Palsy: A Review of Current Evidence and Environmental Non-Pharmacological Interventions. Children 2015, 2 (1), 78–88. https://doi.org/10.3390/children2010078.