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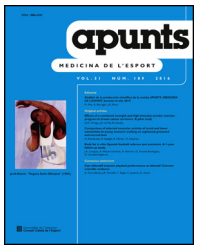

ORIGINAL ARTICLE

Profiles of mood states, depression, sleep quality, sleepiness, and anxiety of the Paralympic athletics team: A longitudinal study

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KEYWORDS
Parathletics;
Psychological factors;
Sleep

Abstract
Introduction: Determining the psychobiological profile of a team sport is important for defining the work to be performed in each phase, as well as in preparation for future competitions. The aim of this study was to draw a profile of mood states, depression, sleep quality, sleepiness and anxiety, of a Paralympic athletics team over a seven-month period.
Materials and methods: An assessment was made of 19 athletes from the Brazilian athletics team at the end of season, beginning of season, and pre-competition. The assessments were performed using following questionnaires: profile of mood states, Beck Depression Inventory, Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, and the State-Trait Anxiety Inventory. The results were expressed as the mean and standard deviation, and the significance level was set at $p < 0.05$.
Results: Most of the athletes exhibited a median level of trait-state anxiety at the end and at the beginning of the season. There was difference between: pre-competition and the end of season in the vigor domain, which was increased in the pre-competition; pre-competition and the beginning of the season in the total duration of sleep, with an increase in the pre-competition; the beginning and the end of the season, in sleep latency, with a decrease at the beginning of the season.

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Conclusions: The period during the sport season can alter psychobiological variables, such as low vigor, daytime sleepiness, with greater sleep latency at the end of the season, and poor sleep quality at the beginning of the season. On the other hand, there is good sleep quality and high vigor in the pre-competition stage, which favors a better sport performance.

PALABRAS CLAVE
Paralímpico;
Factores psicológicos;
Sueño

Perfiles de los estados de ánimo, depresión, calidad de sueño, somnolencia y ansiedad del equipo de atletismo paralímpico: un estudio longitudinal

Resumen
Introducción: Conocer el perfil psicobiológico de un deporte de equipo es importante para definir el trabajo y también en la preparación para las competiciones. El objetivo de este trabajo fue elaborar un perfil psicobiológico del equipo de atletismo paralímpico durante un período de 7 meses.
Material y métodos: Diecinueve atletas del atletismo brasileño fueron evaluados al final de la temporada, al comienzo de la temporada, y previamente a la competición. Las evaluaciones se realizaron mediante los cuestionarios siguientes: Perfil de estados de ánimo, Escala de depresión de Beck, Cuestionario de Pittsburg de calidad de sueño, Escala de somnolencia de Epworth e Inventario de la escala de ansiedad rasgo-estado.
Resultados: La mayoría de los atletas mostraron un nivel de ansiedad rasgo-estado medio en el final y el comienzo de la temporada. Hubo diferencia entre: época previa a la competición y el final de la temporada, en el dominio de vigor, que se incrementó en el período precompetición; previa a la competición y el comienzo de la temporada en la duración total del sueño, con un aumento en la precompetición; el principio y el final de la temporada, en la latencia del sueño con una disminución en el comienzo de la temporada.
Conclusiones: El período durante la temporada deportiva puede alterar las variables psicobiológicas, tales como bajo vigor, somnolencia diurna, y una mayor latencia de sueño al final de la temporada y la mala calidad del sueño al comienzo de la temporada. Por el contrario, la buena calidad del sueño y alto vigor en la etapa previa a la competición favorecen el rendimiento deportivo.

Introduction

The growth of Paralympic sports in the past decades has led to increased competitiveness among the athletes and the search for satisfying results. Several elements and feelings that compose the sports scene can help or hamper the athlete's performance, such as, mood,[1] depression,[2] sleep, sleepiness and anxiety.[3,4] The profile of mood state is considered a decisive factor in sports performance[5] including Paralympic athletes.[6] The evaluation of mood states can contribute to the detection of overtraining, allowing for interventions in the athlete's training to prevent him/her from reaching this stage.[7]

Depression is one of the most common mental disorders and athletes does not free or resistant to this mood disorder. In college athletes, the prevalence rate of depression ranges from as low as 15.6% to as high as 21%.[8,9] A recent review published by Wolanin et al.[10] explored the rate of depression among athletes and discussed relevant factors such as decline or catastrophic performance, injuries and career termination as potential risk factors that may lead depression among athletes.

The wheelchair basketball players have indicated that a source of stress was sleep related, before competition.[11] Sleep is another very important factor for the athlete's ideal performance in the process of post-exercise recovery. Muscle recovery can be potentially compromised by sleep debt, given that this process is highly regulated by anabolic and catabolic hormones. Further, sleep debt reduces the activity of protein synthesis pathways and increases the activity of degradation pathways, thereby promoting muscular atrophy.[12]

Silva et al.[3] evaluated Brazilian Paralympic athletes before the Peking Paralympic Games (2008), observing that 83.3% of the athletes exhibited excessive sleepiness in the morning and poor sleep quality. In addition, athletes who presented excessive daytime sleepiness presented lower sleep efficiency compared to non sleepy athletes. As a consequence, the process of physical and mental recovery, as well as the athletic performance during training and competition can be significantly reduced.

The capacity to handle the pressure and anxiety is an integral part of sports, especially among elite athletes.[13] In the same study cited above,[3] athletes who exhibited

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a median level of anxiety also exhibited poor sleep quality.

Although there are similarities between elite athletes with or without impairments, there are differences that should be considered. In Paralympic sports, the coach may established training periodization for amputee, visual impairment and paraplegia athletes. Also, they care for other contextual factors such as accessibility, transport and communication.[14]

In this context, conducting these evaluations in different periods is important for the assessment of how these variables behave in each stage and thus to search for strategies to avoid a negative influence of these aspects on the athletes' performance. Therefore, the aim of the present study was to monitor and describe mood states, depression, sleep quality, sleepiness and anxiety of the Brazilian Paralympic athletics team over a seven-month period.

Materials and methods

Procedures

The present study has been evaluated and approved by the Research Ethics Committee of the Federal University of São Paulo, Brazil (CEP 0294/11).

The evaluations of psychobiological aspects were performed at the Psychobiological and Exercise Research Center (Centro de Estudos em Psicobiologia e Exercício – CEPE) in the city of São Paulo. All participating athletes signed informed consent forms.

The evaluations were standardized, as was the type of interview, which was performed individually by a single evaluator. Each interview took between 40 and 50 min.

A report with all of the results was delivered to the athlete, the coach, and the coordinator of the modality, not only for their knowledge but also to allow for interventions when necessary.

Experimental design

The athletes were evaluated at three stages:

- *Evaluation 1:* End of the Season (December 2011, after the Parapan American Games in Guadalajara, Mexico).
- *Evaluation 2:* Beginning of the Season (February 2012).
- *Evaluation 3*: Pre-competition (June 2012, before the London Paralympic Games).

Subjects

The sample was defined for convenience and comprised by nineteen athletes (15 men and 4 women) of the Brazilian Paralympic athletics team participating in track (15 athletes) and field events (4 athletes) with an average age of 28 ± 6 years, average weight of 65 ± 7 kg, and average height of 169.6 ± 0.1 cm were evaluated. Of these athletes, 4 were guides, 1 with deficiency in one arm, 4 had amputations, 5 were visually impaired, 4 had cerebral palsy, and 1 was a dwarf.

Evaluations

The questionnaires were administered in the three above cited stages, except for the Trait Anxiety Inventory. The latter was administered only in the first evaluation, given that its readministration is not necessary.

Profile of mood states

The Profile of Mood States (POMS) is an instrument that evaluates mood states, of which five are negative (tension, depression, anger, fatigue and confusion) and one is positive (vigor).[15] The POMS was translated and validated for Portuguese.[16] The internal consistency (coefficient alpha) of the Brazilian version of BDI was .81 for the student sample (.83 for females and .76 for males) and .88 for the depressed sample.[17]

The POMS is a self-administered questionnaire comprised of a list with 65 adjectives related to the mood state, in which the evaluated individual must indicate how he/she feels with respect to each adjective. Each item is analyzed according to a Likert scale from 0 to 4. The statement choices are as follows: 0 – Not at All, 1 – A Little, 2 – Moderately, 3 – Quite a Bit, and 4 – Extremely. Six mood factors or affective states are measured by this instrument: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment.[15]

Beck Depression Inventory

The Beck Depression Inventory (BDI) evaluates symptoms and attitudes, such as sadness, pessimism, feeling of failure, dissatisfaction, feeling of guilt, feeling of being punished, self-depreciation, self-accusation, suicidal ideation, outbursts of tears, irritability, social isolation, indecision, body image distortion, inhibition to work, sleep disorders, fatigue, loss of appetite, weight loss, somatic concern, and decrease in libido. The validation of Portuguese version was performed by Gorenstein and Andrade.[17]

The BDI is composed of 21 items, each with four answer choices that must be checked with respect to the frequency of occurrence of the respective item. Scores from 0 to 3 indicate increasing severity of the depression.[18]

Subjects are classified into the following levels of depression according to their score: 0–9, minimal; 10–15, mild; 16–19, mild to moderate; 20–29, moderate to severe; and 30–63, severe.[19]

Pittsburgh Sleep Quality Index

The Pittsburgh Sleep Quality Index (PSQI) was elaborated by Buysse et al.[20] Bertozali et al.[21] developed the validation of Brazilian Portuguese version. The components scores of the Portuguese version had a reliability coefficient of .82.

The PSQI consists of 11 questions grouped into seven areas of sleep-related complaints, *i.e.*, subjective sleep quality, sleep latency, duration of sleep, usual sleep efficiency, sleep disturbances, use of medication to sleep, and day dysfunction. The scores of the seven components are

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added up to a global score, ranging between 0 and 21. Scores from 0 to 4 indicate good sleep quality, whereas scores from 5 to 10 indicate poor sleep quality. Scores above 10 points indicate that the person might have a sleep disorder.[20]

Epworth Sleepiness Scale

The Epworth Sleepiness Scale (ESS) was published by Johns.[22] Validation of the scale for use in Brazil was performed by Bertozali et al.[23] The items of the version had an overall reliability coefficient of .83.

This scale determines an overall measure of the degree of daytime sleepiness in adults by evaluating excessive sleepiness in several active and passive situations. The situations are as follows: sitting and reading; watching TV; sitting inactive in a public place; as a passenger in a train, car, or bus for an hour without a break; lying down to rest in the afternoon; sitting and talking to someone; sitting quietly after a lunch without alcohol; and in a car while stopped for a few minutes in the traffic. The interviewee must indicate the chance of him/her dozing off in each of the above situations by assigning a score from 0 (no chance) to 3 (high chance). The reference values are as follows: 0–6 points, normal; 7–9 points, limit; 10–14 points, mild; 15–20 points, moderate; and above 20 points, severe daytime sleepiness.[24]

State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) is one of the most commonly used instruments of subjective self-evaluation to quantify subjective components related to anxiety.[25] The STAI was translated, adapted and validate for Brazilian Portuguese.[26]

The STAI contains two parallel scales composed of 20 items each. Specifically, one scale evaluates state anxiety, and the other evaluates trait anxiety scoring is based on a 4-point Likert scale.[26]

Total scores range between 20 and 80 for each scale, indicating a degree of anxiety. A score of 0–30 indicates a mild form of anxiety, whereas a score of 31–49 indicates moderate anxiety, and a score of 50 and above a severe form of anxiety.[27,28]

Statistical analysis

The SPSS Statistics Software v19 was used for statistical analysis. The normality of the distribution was assessed (Shapiro–Wilk) and non-normality data was observed. For continuous variables, the results are described as the mean ± standard deviation (SD). The comparison between the three evaluations was performed by Friedman test. When differences were identified the Wilcoxon test was used. Categorical variables are exhibited as the frequency and were compared by Chi-squared test. The level of significance was $p < 0.05$. We used a Multiple Correspondence Analysis to group the athletes according to the pattern of their answers. This analysis allows us to demonstrate preferential relations between descriptive (categorical) and non-inferential variables. Thus, we created a profile of the athletes in the three different evaluations according to the variables state anxiety, depression, sleep quality, sleep latency, sleep efficiency, and sleepiness. We used the Eigenvalue as a quality index of the model, which shows the extent to which each variable contributed to the definition of the studied profile. The Cronbach's alpha values were used as an internal consistency measure, presenting the average of inter-correlation among the items.

Results

The frequencies of depression, sleep quality, daytime sleepiness and state-anxiety in the three periods of evaluation are described in Table 1. There was a high frequency (89.5%, 84.2% and 94.7%) of athletes with no propensity for depression in all evaluated stages ($\chi^2 = 26.947$, df = 2, $p = 0.001$; $\chi^2 = 22.211$, df = 2, $p = 0.001$; $\chi^2 = 15.211$, df = 1, $p = 0.001$; respectively for *evaluation 1*, *2* and *3*).

With respect to sleep quality, despite there being no statistically significant difference in the frequencies of good and poor sleep quality in all evaluated stages, more than half of the athletes exhibited good sleep at the end of the season (52.6%) and in the pre-competition stage (68.4%). More than half the athletes only exhibited poor sleep quality at the beginning of the season (57.9%).

Further, more than half of the athletes exhibited no daytime sleepiness at the beginning of the season and pre-competition (68% and 63%, respectively). Slightly more than half the athletes only exhibited sleepiness at the end of the season (53%). There was no statistically significant difference in the number of athletes exhibiting or failing to exhibit sleepiness in the three evaluated stages.

As for the state anxiety level (low, median and high) frequencies, many athletes exhibited a median level of anxiety at the end ($\chi^2 = 18.105$, $df = 2$, $p = 0.001$) and at the beginning of the season ($\chi^2 = 11.789$, $df = 2$, $p = 0.003$). With respect to trait anxiety, 31.6% of the athletes exhibited a low score, and 68.4% exhibited a median score; none exhibited a high score.

Regarding other sleep variables evaluated (Table 2), statistically significant differences were observed in sleep latency ($p = 0.04$) and the total duration of sleep ($p = 0.02$). Specifically, sleep latency was reduced at the beginning of the season with respect to the end of the season ($p = 0.01$), and the total duration of sleep was increased in the pre-competition period with respect to the beginning of the season ($p = 0.009$). There was no statistically significant difference in sleep efficiency between the three stages.

With respect to the POMS results, there was a statistically significant difference in the *vigor* dimension ($p = 0.007$) between pre-competition and end of season (post-competition) ($p = 0.014$), with an increase in the pre-competition stage (Table 3). The remaining dimensions exhibited no statistically significant differences between the evaluations.

The grouping of psychobiological variables was assessed by means of profile analysis (Figs. 1–3). The model's reliability analysis in each evaluation indicated that the Cronbach's alpha was $\alpha = .90$, $\alpha = .87$, $\alpha = .84$, respectively for *evaluation 1*, *2* and *3*. Of note, this value represents the reliability of the association between the variables inserted into the model to build this profile.

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Table 1 Frequency of depression, sleep quality, daytime sleepiness and state anxiety in the three stages.

Evaluations	End of season *n* (%)	Beginning of season *n* (%)	Pre-competition *n* (%)
Depression			
Minimal	17 (89.5%)*	16 (84.2%)*	18 (94.7%)*
Mild	1 (5.3%)	2 (10.5%)	1 (5.3%)
Mild to moderate	0 (0%)	1 (5.3%)	0 (0%)
Moderate to severe	1 (5.3%)	0 (0%)	0 (0%)
Sleep quality			
Good	10 (52.6%)	8 (42.1%)	13 (68.4%)
Poor	9 (47.4%)	11 (57.9%)	6 (31.6%)
Sleepiness			
Normal	9 (47%)	13 (68%)	12 (63%)
Sleepy	10 (53%)	6 (32%)	7 (37%)
Low	3 (15.8%)	5 (26.3%)	9 (47.4%)
State anxiety			
Median	15 (78.9%)*	13 (68.4%)*	10 (52.6%)
High	1 (5.3%)	1 (5.3%)	0 (0%)

The results are expressed as the frequency (%).
* Chi-squared $p < 0.05$.

Table 2 Evaluation of sleep latency, total duration of sleep, and sleep efficiency in the three stages.

Sleep variables	End of season	Beginning of season	Pre-competition
Sleep latency (min)	34.4 ± 27.8	20 ± 14.8[a]	25 ± 20.4
Total duration of sleep (h)	7.7 ± 1.5	7 ± 1.2	7.5 ± 1.1[b]
Sleep efficiency (%)	91.5 ± 8.2	95.2 ± 4.7	94.7 ± 4.5

Data are expressed as the mean ± SD.
[a] Differs from *Evaluation 1*.
[b] Differs from *Evaluation 2*.

Table 3 Evaluations of the profile of mood states in the three stages.

Domains	End of season	Beginning of season	Pre-competition
Tension-anxiety	1 ± 4.5	1.26 ± 2.7	1.32 ± 3.4
Depression-dejection	3.3 ± 6.3	2.8 ± 4.5	1.9 ± 2.2
Anger-hostility	4.9 ± 5.3	4.6 ± 5.1	2.7 ± 2.2
Vigor-activity	18.1 ± 4.5	21.5 ± 5.3	22.5 ± 4.9[a]
Fatigue-inertia	5.4 ± 6	3.1 ± 2.7	3.6 ± 3.5
Confusion-bewilderment	0.1 ± 3	−1 ± 2.4	−0.8 ± 2.7
TMD	−3.1 ± 20.6	−10.5 ± 17.17	−14.1 ± 11.5

Data are expressed as the mean ± SD. Wilcoxon–Mann–Whitney test, followed by Friedman test. Significance was set at $p \leq 0.01$ after Bonferroni correction.
[a] Differs from *Evaluation 1*. TMD: total mood disturbance score.

Fig. 1 presents two well-defined groups with respect to state anxiety at the end of the season. The athletes who indicated a median level of state anxiety exhibited a relationship with poor sleep quality, sleep efficiency <85, sleep latency >20, and sleepiness. In contrast, athletes who exhibited a low level of state anxiety were more likely to exhibit good sleep quality, sleep efficiency >85, sleep latency <20, and no sleepiness or depression.

This result demonstrates the profile of the categorical variables and how they associate at the end of the season. Specifically, state anxiety contributed the most to building the profile described above, followed by depression, sleep quality, sleep latency, and, finally, sleep efficiency and sleepiness.

With respect to the beginning of the season (Fig. 2), athletes who exhibited a low level of anxiety were more likely to experience good sleep quality, sleep efficiency >85, sleep latency <20, and no sleepiness or depression. However, a median level of anxiety was correlated with poor sleep quality, sleep efficiency <85, sleep latency >20, and sleepiness.

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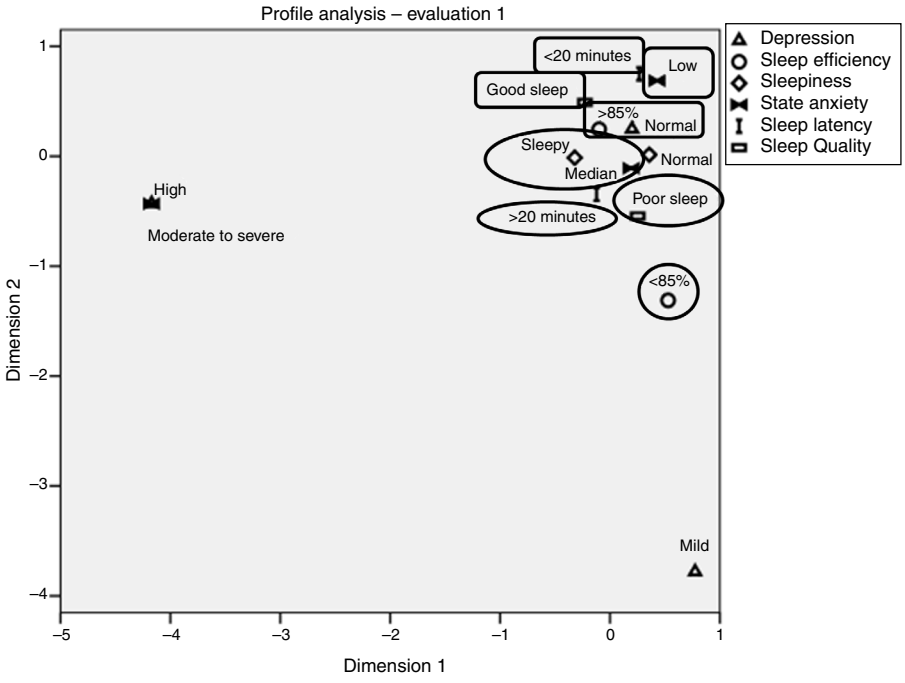

	State anxiety	Depression	Sleep Quality	Sleep latency	Sleep efficiency	Sleepiness
Eigen value	7.369	3.631	2.072	1.406	0.486	0.036

Figure 1 Analysis of the athletes's profile at the end of the season and the contribution of each categorical variable to building the profile.

Similar to the above profile, the variable state anxiety contributed the most to building this profile, also followed by the same variables, *i.e.*, depression, sleep quality, sleep latency, and, finally, sleep efficiency and sleepiness.

With respect to the pre-competition stage (Fig. 3), the athletes who exhibited poor sleep quality also exhibited a sleep latency >20 and median anxiety, whereas athletes with a sleep efficiency >85 also exhibited good sleep quality, a low level of anxiety, and no sleepiness or depression.

We analyzed the profile of the categorical variables and how they associate with the pre-competition stage. In the third evaluation, we observed a significant change in the athletes' profile, where the variable state anxiety contributed the least and the variable depression contributed the most to building the profile, followed by the variables sleep quality, sleep latency, and, finally, sleep efficiency and sleepiness.

Discussion

In the present study, the athletes exhibited a median level of trait and state anxiety, and there was no propensity for depression. Further, the evaluation of the POMS revealed an increase in the *vigor* dimension in the pre-competition stage. There was no statistically significant difference between good or poor sleep quality or between the presence or absence of sleepiness in any of the evaluated stages. The total duration of sleep was increased in the pre-competition stage, and sleep latency was decreased at the beginning of the season.

The evaluation of trait anxiety, which represents the personality of each athlete, was performed only during the first evaluation (end of the season). For Weinberg and Gould,[29] when trait anxiety is high, state anxiety tends to increase as well.

The end of the season contemplates the return of the athletes from the Parapan American Games in Guadalajara, Mexico, where the athletes reported that this competition generated physical and mental exhaustion. The POMS further confirmed that the athletes were worn out. Specifically, the positive dimension vigor was lower at the end of the season than in the other evaluations, and this difference was statistically significant when compared with the pre-competition stage. Further, more than half of the athletes exhibited daytime sleepiness and higher mean sleep latency.

According to Scott et al.,[30] variables such as sleep, rest, and relaxation can influence the levels of the athletes' vigor and fatigue, which, in turn, influence the mood states. In addition, other study points out that one factor that affects the amount of sleep an athlete obtains is the timing of their training. In particular, schedules that require athletes to train early in the morning reduce the sleep duration and increase pre-training fatigue levels.[31]

At the beginning of the season, more than half the athletes exhibited poor sleep quality, and the mean total duration of sleep was lower compared with the remaining stages. In this stage, the athletes returned from their vacation, and mental and physical recovery from the training of the past season is expected. We believe that the athletes exhibited difficulties in returning to the routine of sleeping,

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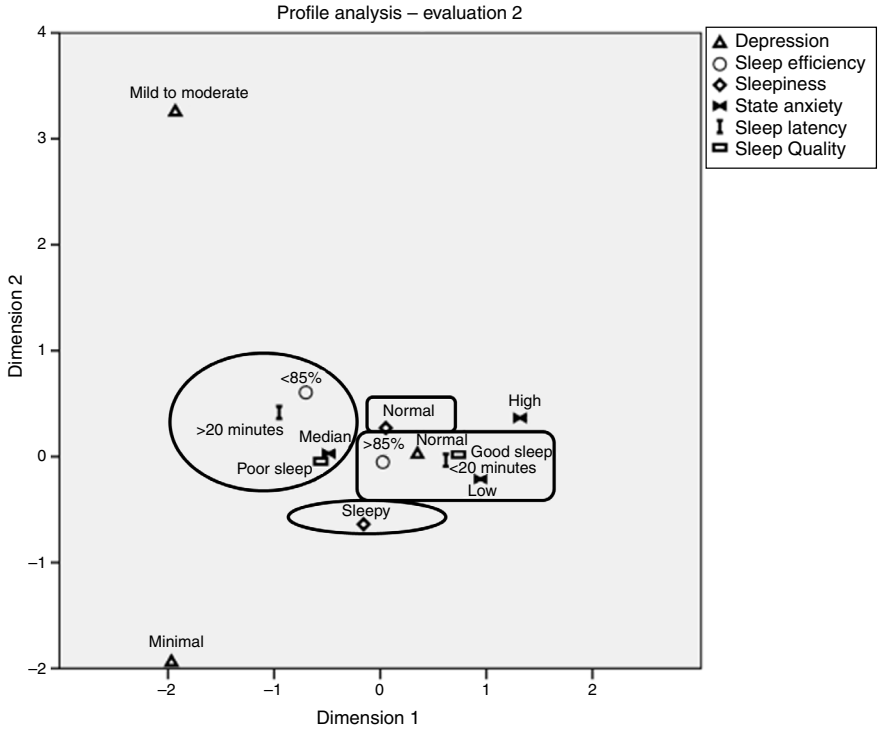

	State anxiety	Depression	Sleep Quality	Sleep latency	Sleep efficiency	Sleepiness
Eigen value	5.883	3.065	2.112	1.781	1.259	0.900

Figure 2 Analysis of the athletes's profile at the beginning of the season and the contribution of each categorical variable to building the profile.

waking, and training hours, as well as eating hours, possibly leading to distress (incapability to adapt to stress) and affecting the athletes' sleep quality. According to Erlacher et al.,[32] sleep quality can be affected before important competitions or during the normal training period, and, in the latter, poor sleep quality can be the consequence of a routine of bad sleeping habits.

During the pre-competition stage, more than half of the athletes exhibited good subjective sleep quality, which can be favorable for the athlete before a competition. Consistent with this observation, in a study with British Paralympic athletes[11] and one with Brazilian Paralympic athletes,[33] the subjects reported that sleeping badly on the night prior to the competition was a very stressing factor.

In the pre-competition period, the frequency of low-level anxiety was very similar to that of median level anxiety. Studies demonstrate the need for the athletes to be able to generate and exhibit low anxiety levels.[34–36]

In the comparison of the pre-competition stage and the end of the season, the mean of the pre-competition *vigor* domain was higher and was associated with lower levels of the other evaluated dimensions (fatigue, anger, tension, depression, and confusion). Martin, Malone and Hilyer[6] have studied if elite gold medal winning Paralympians differed in personality and mood from a slightly less elite group of athletes who attended the Paralympic selection camp but did not make the team, by means of the POMS questionnaire[15] and found that Paralympic team members, relative to the athletes failing to make the team, had more positive and adaptive mood states. The same authors cited above pointed out that in general, the mood and disability sport researches indicates that athletes with disabilities have typically reported iceberg mood profiles. Furthermore, those athletes also tend to have more positive mood states relative to nonathletes or athletes participating at lower levels of competition. Finally, authors have suggested that athletic participation might be associated with positive moods states.[6]

Most of the athletes exhibited no propensity for depression in the three evaluations. Sports scientists have used the term depression to express both negative affection (*i.e.*, depressed mood) and psychiatric disorders (*i.e.*, major depression). However, there are significant differences between a depressed mood and depression.[37]

A depressed mood is a transitional state of feeling sad or 'down', whereas depression is a medical condition consisting of a set of symptoms that go beyond a depressed mood, including reduced motivation and/or poor interest in activities, low energy, loss of pleasure, incapability to concentrate, changes in sleep and/or appetite, and feelings of uselessness and hopelessness.[37]

Analyzing the above depressive symptoms, as well as the changes in mood and sleep disorders, the values exhibited in the present study appear to lie within the normal range. This might justify the fact that the evaluated athletes exhibited no propensity for depression.

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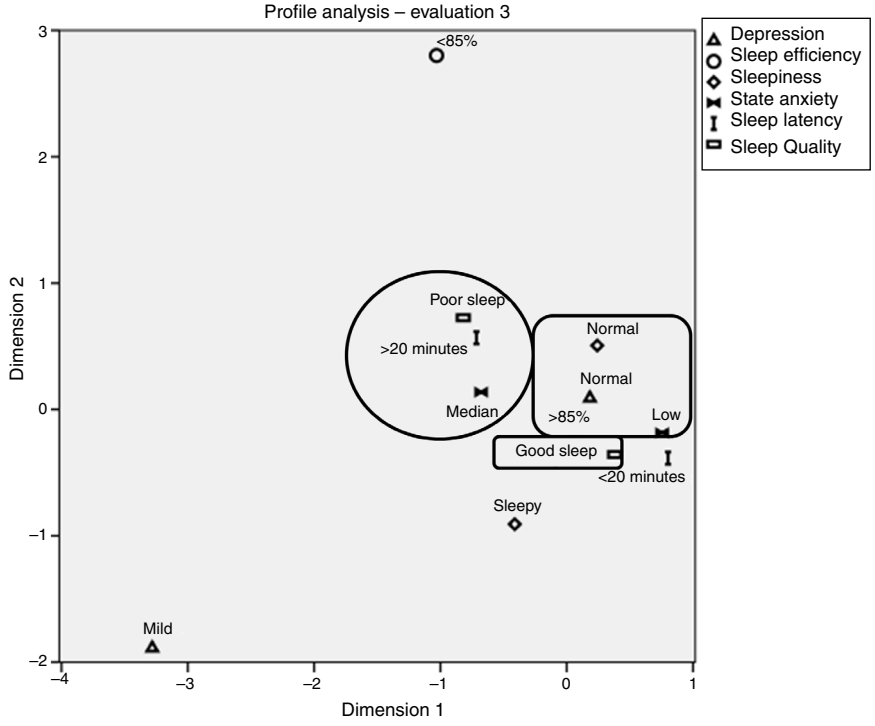

	Depression	Sleep quality	Sleep latency	Sleep efficiency	Sleepiness	State anxiety
Eigen value	5.641	3.429	2.899	1.396	0.907	0.727

Figure 3 Analysis of the athletes's profile in the pre-competition stage and the contribution of each categorical variable to building the profile.

Another variable that exhibited no statistically significant difference between the evaluated stages was sleep efficiency. The observed values lay above 85%, which is ideal for good sleep efficiency and is considered normal.[38]

We believe that the results obtained from the evaluations were a consequence of the transdisciplinary work (psychologists, physical therapists, nutritionists, doctors and professional physical education physiologists) adopted by the Brazilian Paralympic Committee (BPC) in the athletics team. Qualitative interviews and the knowledge of the psychosocial attributes of Paralympic athletes could provide the sport psychologist with comprehensive and specific information on the athlete and his/her demands of performance.[39,40] Additionally, the use of management and emotional control techniques by a transdisciplinary technical team could benefit the sport performance.

Conclusions

We conclude that the evaluation stages of the athlete can change the psychobiological variables. Specifically, low vigor and greater sleep latency were observed at the end of the season, which is considered normal after an important competition. At the beginning of the season, only the variables related to sleep were affected, demonstrate that the athletes encountered difficulties in returning to their routine. Finally, the athletes exhibited an ideal profile in the pre-competition stage, exhibiting no significant sleep-related problems and exhibiting greater vigor, which can favor better sport performances.

Thus, analyzing the psychobiological profile of these athletes before, during, and after a competition is important to aid them in preparing for later seasons.

Limitations

The limitations of the present study include the small number of athletes and the fact that include in sample athletes acting as a guide. However, the number of participants studied is significant and corresponds to a real scenario of assessment of elite athletes from a Paralympic Sport (Track and Field). Data such as use of medications, injuries, nutritional facts were not available and are factors that can interfere, at least partially, with the observed results.

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Conflict of interest

Authors declare that they don't have any conflict of interests.

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