Original Article

Analysis of mood states, trait anxiety, and state anxiety: a study with athletes before artistic gymnastics competitions

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Abstract

The objective of the present study was to analyze and associate the scores related to mood, trait anxiety, and state anxiety in artistic female gymnasts moments before sports competitions. The sample consisted of 80 female gymnasts with an average age of 13.2 ± 2.1 years of age. The athletes were selected at random and oriented to individually answer the following questionnaires at the venue of artistic gymnastics competitions 30 minutes before their performances: Competitive State Anxiety Inventory-2 (CSAI-2), to measure precompetitive state anxiety; Sport Competition Anxiety Test (SCAT), which provides a competitive trait anxiety measure; and the Brunel Mood Scale (BRUMS), to measure mood states. Most of the participants showed trait anxiety classified as intermediate to high (47.5 %), and cognitive state anxiety (47.5 %), somatic state anxiety (56.2 %), and self-confidence (43.7 %) being classified as intermediate. Concerning total mood disorder (TMD), 37 participants (46.2 %) were classified as having high TMD in comparison to the population studied. It can be concluded that the athletes evaluated in the present study showed low vigor levels and high tension and fatigue levels before artistic gymnastics performances.

Keywords: Anxiety, mood, competition, artistic gymnastics.

Introduction

Anxiety is one of the main and most frequent emotional states experienced in the sporting environment. Each individual reacts differently to anxiety, but it is known that its presence without ideal control can negatively affect the athletes' performance, and therefore deserves great attention from teachers, coaches, and sports psychologists (Robinson & Freeston, 2015; Scott-Hamilton et al., 2016). In view of the existing variation caused by individual and situational aspects, anxiety can be distinguished into two types: trait anxiety, which refers to an aspect of the personality in which nervousness, apprehension, or tension is a stable personality trait in an individual, and state anxiety, which refers to temporary feelings of anxiety in a specific situation (Horikawa & Yagi, 2012; Weinberg & Gould, 2014).

Mood states may reflect feelings of exaltation, happiness, sadness, and anguish, among others. The mood state can also vary in intensity, involving different states, being five negative (tension, depression, anger, fatigue, and confusion) and one positive state (vigor). In sports, mood states are pointed out as decisive factors, which may even explain part of the performance of athletes in a competition. Athletes with mood states characterized by a high level of vigor and low levels of fatigue, tension, depression, confusion, and anger tend to have a better sports performance (Chennaoui et al., 2016; Lane, et al., 2005; Gatti & De Palo, 2011). Because they are a consequence of the athletes' emotional, bodily, and behavioral states, which involve feelings, thoughts, and degree of enthusiasm in performing the task, mood states, when out of optimal performance conditions, may compromise athletic performance and indicate a training overload (Brandt et al., 2014; Hagtvet & Hanin, 2007; Weinberg & Gould, 2014).

In athletes, the effects of physical vigor usually surpass those of the negative variables that make up mood. This state is called an iceberg profile, a profile close to that considered ideal for athletes to achieve the best sports performance. In cases that show a profile opposite to that of the iceberg, the mood state is considered depressed, that is, a lower level of vigor and higher fatigue, tension, anger, confusion, and depression. (Morgan et al., 1987).

Understanding athletes' behavior in face of various sports situations can contribute to improving their performance and motivation, avoiding physical and psychological damage and consequently reducing the probability of sports practice withdrawal. The objectives of the present study were to analyze and associate the scores related to mood, trait anxiety, and state anxiety in artistic female gymnasts in the moments before sports competitions.

Methods

Sample

The sample was composed of 80 female gymnasts from 11 municipalities in the state of São Paulo, Brazil, with an average age of 13.2 ± 2.1 years. All the participants were part of municipal teams. The athletes reported having started the practice of artistic gymnastics at 6.48 ± 2.67 years of age and having been participating in competitions for 5.3 ± 2.5 years (Table 1).

Table 1. Basic characteristics of the sample (n=80)

	Mean	SD	Median	Minimum	Maximum
Age	13.2	2.1	13.0	9.0	18.0
Age of initiation ^a	6.5	2.7	6.0	1.0	13.0
Competition time ^b	5.3	2.5	5.0	1.0	11.0
Training sessions per week	4.8	1.2	5.0	1.0	6.0
Hours per training ^c	3.8	0.9	4.0	2.0	5.0
International competitions	0.3	0.9	0.0	0.0	5.0
National competitions	1.3	2.1	0.0	0.0	8.0
State competitions	2.2	2.5	1.0	0.0	10.0
Regional Games	3.3	2.0	3.0	0.0	9.0

Note: ^a age at which the athlete began practicing artistic gymnastics; ^b number of years with participations in artistic gymnastics competitions; ^c number of hours trained per training session, SD: Standard Deviation.

The athletes were selected at random and asked to respond to the questionnaires individually at the artistic gymnastics competitions venue approximately 30 minutes before the event. The present study was approved by the Research Ethics Committee of the School of Sciences at the State University of São Paulo under report no. 323,400.

Instruments

A demographic assessment sheet was used to collect data on the following variables: age, gender, time as an athlete, time of participation in competitions, number of participations in competitions, and other questions about training and competition.

The instrument used to assess state anxiety was the Competitive State Anxiety Inventory-2 (CSAI-2), proposed by Martens, Vealey, and Burton (1990), which aims to measure the state of pre-competitive anxiety, that is, how anxious athletes feel at a given moment. This instrument is made up of 27 questions divided into three subscales: cognitive anxiety, somatic anxiety, and self-confidence, assessed using a Likert scale, in which the person chooses one out of four degrees that best fits their emotional state, with 1 = nothing, 2 = a little, 3 = very much and 4 = completely, according to each question. The score of the subscales is obtained by summing the answers, and ranges from 9 to 36. To interpret results, cognitive anxiety, somatic anxiety, and self-confidence were categorized as low (from 9 to 18 points), intermediate (from 19 to 27 points), and high (from 28 to 36 points).

The Sport Competition Anxiety Test (SCAT), developed by Martens (1977), was used to assess trait anxiety. The version of the instrument applied in the present study was translated and adapted by De Rose Júnior and Vasconcelos (1997). It is intended to identify the anxiety profile in sports competition and has the objective of providing a reproducible and valid competitive trait anxiety measure of how anxious athletes feel before a competition. It consists of 15 questions, with some of them having an activation effect, others having a deactivation effect, and others having a placebo effect. The possible answers are: rarely (1), sometimes (2), and often (3). The sum of scores generates a total between 10 and 30 points, which is classified as low anxiety (10 to 12 points), low to intermediate anxiety (13 to 16 points), intermediate anxiety (17 to 23 points), intermediate to high anxiety (24 to 27 points), and high anxiety (over 28 points).

The Brunel Mood Scale (BRUMS) was used in the present study to allow rapid measurement of mood states. Validated by Rohlfs et al. (2008), it contains 24 simple mood indicators, such as feelings of anger, disposition, nervousness, and dissatisfaction that are perceptible to the individual being evaluated. The participants inform how they feel regarding these sensations following a 5-point scale (from 0 = nothing to 4 = extremely).

Six subjective and transient mood states are evaluated: Tension (T), Depression (D), Anger (A), Vigor (V), Fatigue (F), and Mental Confusion (C). The factors T, D, A, F, and C are considered negative factors and V is classified as a positive factor. Total Mood Disorder (TMD) is given by the following formula: $TMD = (T + D + A + F + C) - V + 100$ (Morgan et al., 1987). Mood profiles with a high value for vigor and low values for the other variables are denominated as an iceberg profile and indicate positive mental health (Morgan et al., 1987). In the present study, the question presented to the participants was cast as "How do you feel now?"

Statistical analysis

For quantitative analysis the following statistical methods were used: descriptive statistics calculations (mean, median, standard deviation, and minimum and maximum values) and absolute and relative frequency occurrence. Variance analysis (ANOVA) and the Student's t test were performed to compare the means of the groups. Pearson's linear correlation coefficient (r) was used to verify if there was a correlation between the six transient mood states, state anxiety, and trait anxiety. The degree of the correlation coefficient was evaluated qualitatively according to the proposal of Callegari-Jacques (2007) as follows: weak (between 0.00 and 0.30); regular (between 0.30 and 0.60); strong (between 0.60 and 0.90), and very strong (between 0.90 and 1.00). A significance level of 0.05 was used in all statistical tests. All data analyses were carried out with the SPSS version 20.0 program.

Results

Table 2 shows the results for descriptive analysis of the six subjective mood states (fatigue, confusion, depression, tension, anger, and vigor), TMD, trait anxiety, state anxiety (cognitive and somatic), and self-confidence. Most athletes presented average levels of trait anxiety, state anxiety (cognitive and somatic), and self-confidence. Regarding the results obtained for the six subjective mood states (Table 2 and Figure 1), low levels were observed for vigor, and high levels were found for tension and fatigue. TMD was classified as high in most athletes.

Figure 1. Iceberg profile presented in the moments before the artistic gymnastics competitions.

The results shown in Figure 1 demonstrate that the sample did not have an iceberg profile, given that the athletes presented inadequate vigor and tension for precompetitive mental health. Low vigor and high tension were the determining factors for this de-characterization.

Table 2. Descriptive statistics of the dimensions of the mood states, trait anxiety, and state anxiety assessed before the artistic gymnastics competitions (n=80)

Variables	Mean	SD	Median	Minimum	Maximum
Tension	7	3.2	6	0	13
Depression	1	2.2	0	0	9
Anger	2	3.1	1	0	14
Vigor	9	3.4	9	2	16
Fatigue	4	3.2	3	0	15
Confusion	3	2.7	3	0	10
TMD	107.35	11.3	106	86	140
Trait anxiety	23	3.9	24	13	28
Cognitive anxiety	17	4.4	17	9	30
Somatic anxiety	18	3.8	18	10	28
Self-confidence	23	4.9	23	14	33

Note: TMD: Total mood disorder, SD: Standard Deviation.

Table 3 lists the anxiety scores ranging from low (10 to 12 points), low to intermediate (13 to 16 points), intermediate (17 to 23 points), intermediate to high (24 to 27 points), or high (28 or higher), in addition to the rating for TMD, for which the cutoff was considered as 107.

Table 3. Classification, absolute values, and relative values for trait anxiety, somatic anxiety, cognitive anxiety, and total mood disorder (n=80)

Classification	Trait anxiety		Cognitive anxiety		Somatic anxiety		Self-confidence		TMD	
	n	%	n	%	n	%	n	%	n	%
Low	0	0	12	15	5	6.2	0	0	43	53.7
Low to intermediate	8	10.0	25	31.2	24	30.0	10	12.5	-	-
Intermediate	29	36.2	38	47.5	45	56.2	35	43.7	-	-
Intermediate to high	38	47.5	3	3.7	5	6.2	22	27.5	-	-
High	5	6.2	2	2.5	1	1.2	13	16.2	37	46.2

Note: TMD: Total mood disorder.

Considering the proposed classification (Table 3), most of the participants had trait anxiety classified as intermediate to high (47.5 %) and intermediate cognitive state anxiety (47.5 %), somatic anxiety (56.2 %), and self-confidence (43.7 %). Thirty-seven participants (46.2 %) were classified as having high TMD in relation to the population studied.

Table 4 shows the correlations and statistically significant differences ($p < 0.05$) between the relative scores of mood, trait anxiety, and state anxiety before the competitions. Tension had a strong positive correlation with trait anxiety ($r = 0.61$, $p < 0.001$), and anger showed a strong correlation with depression ($r = 0.78$, $p = 0.001$). TMD had a strong positive correlation with all the negative factors of mood states: tension ($r = 0.60$, $p < 0.001$), depression ($r = 0.75$, $p < 0.001$), anger ($r = 0.74$; $p < 0.001$), fatigue ($r = 0.73$, $p < 0.001$), and confusion ($r = 0.77$, $p < 0.001$). Trait anxiety, cognitive anxiety and somatic anxiety revealed a regular correlation with TMD ($r = 0.32$; $p < 0.001$, $r = 0.49$; $p < 0.001$, $r = 0.34$; $p < 0.001$, respectively).

Table 4. Correlations between mood, state anxiety, and total mood disorder (n=80).

	T.A.	C.A.	S.A.	S.C.	T.	D.	A.	V.	F.	C.	TMD.
Trait anxiety											
Cognitive anxiety	0.53 ^a										
Somatic anxiety	0.57 ^a	0.56									
Self-confidence	-0.40	-0.53 ^a	-0.23 ^a								
Tension	0.61 ^a	0.45	0.38	-0.27							
Depression	0.09	0.19	0.12	0.12	0.34						
Anger	0.08	0.25	0.12	0.02	0.30	0.78 ^a					
Vigor	0.00	-0.02	0.01	0.44 ^a	0.15	0.09	0.06				
Fatigue	0.11	0.36	0.33	-0.15	0.34	0.49	0.45	-0.01			
Confusion	0.30	0.59	0.31	-0.31	0.43	0.49	0.47	-0.10	0.48		
TMD	0.32 ^a	0.49 ^a	0.34 ^a	-0.31	0.60 ^a	0.75 ^a	0.74 ^a	-0.25	0.73 ^a	0.77 ^a	

Notes: Trait anxiety (T.A.); Cognitive anxiety (C.A.); Somatic anxiety (S.A.); Self-confidence (S.C.); Tension (T.); Depression (D.); Anger (A.); Vigor (V.); Fatigue (F.); Total mood disorder (TMD). ^a Statistically significant difference ($p < 0.05$).

There was a positive regular correlation between cognitive and somatic anxiety with trait anxiety ($r = 0.53$, $p < 0.001$ and $r = 0.57$, $p < 0.001$, respectively), and the same occurred between somatic anxiety and cognitive anxiety ($r = 0.56$, $p = 0.039$). Self-confidence, in turn, had a negative regular correlation with trait anxiety ($r = -0.40$, $p = 0.988$) and cognitive anxiety ($r = -0.53$, $p < 0.001$), a weak negative correlation with somatic anxiety ($r = -0.23$, $p < 0.001$), and a positive regular correlation with vigor ($r = 0.44$, $p < 0.001$).

Discussion

Analysis of the results of mood states revealed that vigor was higher than the other factors (tension, anger, depression, fatigue, and confusion). However, this was not enough to characterize the profile as iceberg,

which constitutes an ideal mood for competition. Although vigor was higher than the other mood state factors, it was below the expected level for a precompetitive profile considered as ideal. It is also noteworthy that tension was elevated. Studies with experienced athletes (Catalán-Eslava et al., 2016; Rotta, 2016) showed a different profile from that found in the present investigation, given that high-level athletes presented a mood state compatible with the iceberg profile proposed by Morgan et al. (1987), that is, within the ideal standards.

Still regarding mood states, it was found that 46.2 % of the athletes surveyed had high TMD. This result is worrisome because, when in combination with the trait anxiety measured for many athletes, between intermediate to high and high, it can indicate the existence of excessive training as well as excessive demand on athletes for good competition results, especially since most of the athletes reported years of training experience and a high weekly workload and, despite this, they had little experience of participating in state, national, and international competitions. Sports participation unrelated to competitions that generates high demands can be considered as a protective factor against the development of psychological alterations. As long as sporting practice is adequately tailored to the participants' profiles, respecting their levels of development and personality, activities in any modality should be stimulated among children and adolescents, especially in the sports initiation phase, because of the physical and psychological benefits the practice offers (Rosendahl et al., 2009).

Concerning anxiety, the results of the present study are in accordance with Multidimensional Anxiety Theory, from Martens et al. (1990), in which the state anxiety behavior is inversely proportional to self-confidence. For most of the athletes evaluated, this parameter was classified as being between intermediate and intermediate to high. Both cognitive and somatic state anxiety in turn, were classified as being between low to intermediate and intermediate. Thus, athletes who report reduced levels of state anxiety tend to have high self-confidence.

An anxious profile was observed in 53.7 % of the participants, given that they presented trait anxiety classified between intermediate to high and high according to Martens et al. (1990). When studying trait and state anxiety before competitions, Leite et al. (2016) also found results pointing to high levels of trait anxiety in college athletes, mainly females. Fernandes et al. (2014), in a study involving the effects of experience on the dimensions of intensity, direction, and frequency of anxiety and competitive self-confidence, found that the latter increases as athletes acquire experience in competitive participation, so individuals with little experience have lower levels of self-confidence. This hypothesis was not confirmed by the present study, given that most of the athletes showed intermediate or intermediate to high self-confidence and, as previously mentioned, do not have much experience in competitions.

By associating the variables trait anxiety, state anxiety, and mood states, correlation analysis carried out in the present study showed that the negative factors of mood states showed a strong correlation with TMD. This result is expected and has been reported in several studies (Morgan et al., 1987; Brandt et al., 2011; Boldizsárs et al., 2016; Catalán-Eslava et al., 2016; Rotta, 2016; Gil et al., 2015; Brant et al., 2014). Additionally, it was observed that the negative tension factor also showed a strong correlation with trait anxiety.

Competitive Trait Anxiety Theory determines a predisposition of the individual to perceive competitive situations as intimidating, representing an indication of how an athlete would react when interpreting certain competitive situations as threatening to their physical, psychological, and social well being (Gonçalves & Belo, 2007). Therefore, the individual with competitive trait anxiety tends to feel tense and apprehensive. Neves et al. (2016) detailed that international athletes in shooting events were more prone to anxiety, and at the same time to nervousness and tension, once again interrelating these aspects. Even outside the competitive environment, tension is associated with anxiety, and a survey of nursing students by Salles and Silva (2011) showed that the relationship between tension and anxiety was found in 75 % of the respondents.

Cognitive anxiety also had a high positive correlation with the confusion factor of mood states. This may have occurred because cognitive anxiety originates from factors that involve aspects of thinking and encompasses doubts about performance and the competitive situation, as well as the self-judgment of the athlete. Sonoo et al. (2010) observed high cognitive anxiety in volleyball athletes when they were about to face a team with a technically superior level, therefore it can be said that the uncertainty and confusion generated confronting the opponent was also related to increased cognitive anxiety.

The present study found a strong positive correlation between depression and anger, and there was no correlation between anger and anxiety. No studies were found in the sports area that analyzed this relationship explicitly, but Rotta (2016), when assessing the mood states of tennis and volleyball athletes, found that anger, depression, and confusion were the variables that related more intensively upon comparison. Thus, more studies are needed to understand the impact of anxiety on mood, depression, and anger states.

Several limitations can be highlighted in the present study. One of them is use of a convenience sample, composed only of female artistic gymnastics athletes, which prevents the generalization of results. Another aspect to be emphasized is that the present study was designed as cross-sectional, given that the measurements were performed only once (before the beginning of the competitions). However, athletes may manifest a higher or lower intensity in the perception of anxiety and mood at different moments of sports practice.

Because of the great practical implications of the results, the present study demonstrates the importance of evaluating and monitoring precompetitive psychological aspects, including anxiety and mood states, given that the performance of athletes can be influenced by their perceptions about the event and the associated symptoms before the competition, affecting the results positively or negatively. Understanding the dimensions of anxiety and mood states may allow a greater knowledge of the behavior of athletes during the competitive period. Athletes can learn to control anxiety and modify their behavior in favor of their own performance, and still manage to keep these characteristics at ideal levels.

Conclusion

Based on the results, it is concluded that the athletes evaluated in the present study presented low levels for vigor and high levels for tension and fatigue prior to the artistic gymnastics competitions. TMD was classified as high for most athletes. Tension showed a strong positive correlation with trait anxiety, as well as anger having strong correlation with depression.

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