PHYSIOLOGICAL AND ANXIETY RESPONSES TO SOCIALLY PRESCRIBED PERFECTIONISM FOR GYMNASTIC COMPETITION: CASE STUDY

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Case study

Abstract

The purpose of this study was to analyze the psychophysiological responses (anxiety, cortisol, heart rate, skin conductance) to acute psychological stress during a visualization of competition, under the influence of pressure for perfection exerted by parents, and pressure for perfection exercised by the coach. Artistic gymnasts (3 men and 3 women) with an age range of 13 to 15 years participated, who were present in four sessions for data collection that included salivary cortisol, heart rate and skin conductance. The first session was the baseline, where we apply a booklet of questionnaires that inquire about competitive anxiety and pressure for perfection. The remaining three sessions included guided viewing; session two to create mental images and live the gymnastic competition; the third highlights the pressure for perfection created by the coach (PPE); and the fourth highlights the pressure for perfection created by parents (PPP). The results showed that the visualization of competitive situation causes stress and anxiety, although the increase in salivary cortisol was within the normal daytime level. The physiological changes were greater in those gymnasts who perceived high PPE and PPP. However, for some gymnasts the situation was considered threatening (decrease in skin conductance, and small increases in heart rate), and for others was challenging (increase in skin conductance and heart rate). In conclusion, the pressure for perfection integrates a link for the different physiological responses in competition.

Keywords: *stress, interpretation, perfectionism, parents, coach.*

INTRODUCTION

Artistic gymnastics is a sport where you start at an early age, taking part in competitions of different demands in a vulnerable period such as adolescence, where gymnasts are exposed to high levels of physical and psychological stress during numerous hours of training, and number of competitions.

The competition is a situation of social evaluation of the actions, where the result is unpredictable, sometimes the situation is unstable, and the pressure to obtain a good result is present. The competition itself is a source of psychophysical activation and, eventually, stress (Núñez & García, 2017). Stress is suffered by athletes in precompetitive situations and during the competition (Jones & Hardy, 1990), which can lead to lack of concentration, tremor, restlessness, or sweating, symptoms that affect athletic performance. Stress is a psychosocial process that involves the perception of abilities to self-regulate personal factors, and the perception and interpretations of contextual factors. The stress response depends on how events are interpreted (Salvador, 2005). The interpretation can be like a threatening

situation, which involves the assessment of the potential for damage or loss; or as a challenging situation, when it considers that the event is controllable, that it depends on its effort, and is evaluated as opportunities to grow (Lazarus, 1999; Salvador, 2005). So that, stress can also be positive, preparing the body to maintain greater attention span. (Ferreira, Valdés & González, 2002).
The interpretation as a threatening situation is associated with increased cortisol, small increases in cardiac activity, stable peripheral vascular resistance, and emotions perceived as harmful (Jones, Meijen, McCarthy & Sheffield, 2009; Salvador, 2005; Seery, 2011). An answer to the threatening situation is anxiety, defined as an emotional state of nervous tension and intense fear, characterized by somatic symptoms such as tremor, restlessness, sweating, hyperventilation, palpitations, whose cognitive symptoms are psychic restlessness, hypervigilance, loss of concentration and distortions Cognitive (Saz, 2000).

On the other hand, salivary cortisol is a steroid hormone produced in the hypothalamic-pituitary-adrenal axis (HPA) that is secreted in saliva, especially when people are stressed (Aguilar et al., 2014). Then, cortisol is one of the indicators of physical and psychological stress (Boudarene, Legros & Timsit-Berthier, 2002), both in children and adolescents (Aguilar et al., 2014). The cortisol elevation derives from the stimulation of the HPA axis, indicating experiences of stress and / or physical exertion (Salvador & Acosta 2009). The competitive situation provides the potential for these conditions (Cerin, Szabo, Hunt & Williams, 2000). For example, Kim, Chung, Park & Shin (2009) obtained significant differences in the cortisol concentration between the baseline (one day before the competition) and the precompetitive moment (30 minutes before the competition) in golfers.

Filaire, Alix, Ferrand & Verger (2009) suggested a possible relationship between cortisol concentration, state anxiety, and sports physical performance, since this hormone influences decision making, attention, or memory, by inhibition in the process of information (Lautenbach & Laborde, 2016). While Robazza et al. (2018) confirmed that the increase in cortisol levels is related to high cognitive anxiety (visual attention, mental attention, memory).

On the other hand, situational demands choose whether it is a threatening or challenging interpretation (Lazarus, 1999), so that in sports stressors can be physiological and psychosocial, since sport competition involves the comparison of efforts between the best and worst athletes, while being subject to classification and social evaluation. This social evaluation, and the uncertainty of the result in competition can generate anxiety, so that competitive anxiety is also influenced by factors of a social nature.

Based on multidimensional theories of perfectionism (Frost, Marten, Lahart & Rosenblate, 1990; Hewitt & Flett, 1991), the competition provides a situation with high levels of socially prescribed perfectionism, which includes high goals in which the person has little control, that is, to pursue goals imposed by others (Hewitt & Flett, 1991); Therefore, it is related to negative consequences (Stoeber & Childs, 2010), considering it as a facet of perfectionism that is not very adaptive (Stumpf & Parker, 2000).

According to Frost, Marten, Lahart and Rosenblate (1990), Dunn, Dunn and Syrotiuk (2002) and Stoeber, Otto and Stoll (2006), those who can impose those goals unlikely to achieve on the sport, are parents and coach, suggesting the facets of pressure for perfection on the part of the parents, and pressure for perfection on the part of the coach. For these authors, the facet of pressure for perfection, represents the perception of the athlete that their parents or coach set high goals, even impossible to achieve (expectations), and that are very critical, or exert a lot of pressure to achieve

those goals or obtain a certain level of performance (criticism).

Parents and coaches can be a source of stress and anxiety (Brustad, Babkes & Smith, 2001). Outside the sports field, research indicates that socially prescribed perfectionism is related to anxiety (Hewitt & Flett, 2002); but also with happiness (Stornelli, Flett & Hewitt, 2009). In the sports field Ivanović, Milosavljević and Ivanović (2015) with youth athletes, they found that little adaptive perfectionism is related to somatic and cognitive anxiety, and negatively with self-confidence, indicating that perfectionism is an important variable that explains anxiety in sport and athletic achievement in adolescence. Dunn, Gotwals, Causgrove and Lizmore (2019), in their study carried out 24 hours before starting an important competition, found that a slightly adaptive profile of perfectionism (high efforts and high concerns) is related to concern (cognitive anxiety indicator) in young soccer players.

On the contrary, Donachie, Hill and Hall (2018), in their study carried out between 45 minutes and 120 hours before a competition with teenage soccer players, showed that socially prescribed perfectionism is not related to anxiety. Likewise, the perception of pressure for perfection by coaches and parents is related to the fear of uncertainty, and fear of evaluation and failure (indicators of cognitive anxiety) in young soccer players, although to a greater extent the pressure for the perfection of the coach (Dunn et al., 2019).

Although certain sports require athletes to achieve perfect executions, the tendency to be cognitively concerned with improvement, often undermines performance and fosters a sense of dissatisfaction with one's performance (Flett & Hewitt 2005). Miller, Chen and Cole (2009) point out that it is necessary to analyze the relationships between social context and stress. Since it is necessary to identify factors that explain the differences between athletes in their competitive emotions (Donachie et al., 2018), because psychophysiological stress factors are related to performance during the competition (Mckay, Selig, Carlson & Morris, 1997).

To date there are few studies that analyze biopsychological states of stress, and their alterations in situations under pressure due to perfection in competition, and studies that analyze the effect of pressure for perfection by parents are scarcer. Therefore, it is necessary to identify how social factors affect the competitive stress response. To do this, we rely on the biopsychosocial model of challenge and threat (Blascovich, 2008) that integrates the biological (endocrine and autonomous influences on the cardiovascular system), psychological variables (affective and cognitive influences on the evaluation process), and the social aspect (i.e. environment).

In this sense, we measure biopsychosocial states, through objective (physiological) and subjective (psychological) indices, with the purpose of analyzing psychophysiological responses (anxiety, cortisol, heart rate, skin conductance) to acute psychological stress during visualization of competition, under the influence of pressure for perfection exerted by parents, and pressure for perfection exerted by the coach.

It is hypothesized that the visualization of competitive situation will cause physiological changes (cortisol, heart rate, skin conductance), and psychological changes (anxiety), and that the physiological changes will be more evident under high pressure perception for the perfection of the coach, and high perception of pressure for the perfection of the parents.

METHODS

The sample consisted of seven youth artistic gymnasts (3 men and 4 women), with an age range of 13 to 15 years (M = 14.2 years; SD = 1.09). They were

participants of the gymnastics team of the Autonomous University of Baja California, with several years of training (M = 7.20 years; SD = 2.38), and a large amount of daily practice (M = 4 hours; SD = 1.5). Since one of the participants, registered with the number 1, only attended the first session, was excluded from the study, leaving an effective sample of six gymnasts.

The gymnasts completed a sociodemographic questionnaire that compiles information related to the participant (age, sex), sports training (age at the start of training, days of weekly training, hours of daily training), and clinical history. In the case of women, a section of gyneco-obstetrics antecedents (age of menarche, menstrual cycle, and alterations thereof) was included.

The "trainer pressure" subscale of the Multidimensional Inventory of Perfectionism in Sport, Spanish version (MIPS; Pineda-Espejel, Arrayales, Castro, Morquecho, Trejo, Fernández, 2018) was used to measure the pressure for perfection by the coach (PPE). It consists of six items, which are answered on a six-point Likert scale, ranging from never (1), to always (6).

The subscale “parental pressure” of the Multidimensional Sport Perfectionism Scale-2, Spanish version (S-MPS-2; Pineda-Espejel, Morquecho-Sánchez & Gadea-Cavazos, 2018) was used to measure the pressure for perfection by parents (PPP). It consists of nine items that are answered with a 5-point Likert scale, ranging from totally disagree (1), to totally agree (5).

To measure competitive anxiety, the Competitive State Anxiety Inventory-2 Reviewed, Spanish version was used (CSAI-2R; Pineda-Espejel, López-Walle & Tomás, 2014), which consists of 17 reagents distributed in three factors: somatic anxiety with 7 reagents, cognitive anxiety with 5 reagents, and self-confidence with 5 reagents. They respond with a four-point Likert scale, ranging from nothing (1), to much (4).

For the recording of the physiological variables a digital stress thermometer was used, stress Market, Inc., which measures the skin conductance (SCL); it was placed on the middle finger of the left hand. To measure the heart rate (TD), a Zondan bar oximeter model FAIRY A5 was used, placed on the left index finger. For the collection of saliva, sterile transparent propylene tubes with a cap were used, with a capacity of 2 ml SalivaBio Saliva Collection Aid and Cryovials, Salimetrics.

The approval of the institutional ethics committee was obtained before carrying out the study. First, a presentation was made with the gymnastics and technical teams, so that they would know the general objectives pursued by the study. According to the declaration of Helsinki, the informed consent of parental involvement was obtained. All gymnasts participated voluntarily, and were treated according to the ethical guidelines for human research given by the American Psychological Association (APA).

Then, the dates for the administration of the tests were specified. At first, a semi-structured interview was carried out to collect personal and health data. The instruments that measure pressure for perfection were applied, and from that information, two subsequent visualization sessions (sessions 3 and 4) were carried out.

With the intention of obtaining information on the different variables of the same group of gymnasts, and for subsequent analysis of the changes produced, four sessions of psychophysiological records were performed, taking salivary cortisol measurements, heart rate (TD), and the conductance level of the skin (SCL). In all cases salivary cortisol was collected at the same time of day (16 hours), to eliminate the circadian variation of cortisol. In the case of women, all measurements were programmed in days within the luteal phase, to decrease the noise of SCL associated with the menstrual cycle.

The first session was held on a normal training day, and before starting it in a rest situation. This was considered as baseline.

The second session used guided visualization or mental imagery, applying the technique individually in a reposet chair. The participants were asked to close your eyes to allow to enter a state of comfort and readiness for the visualization technique (Rodríguez & Galán, 2007). They were also asked to concentrate on breathing and the sensation produced by each inhalation and exhalation, as a preamble of generating the optimal state to create the mental images of the place he chose to live the competition (Rodríguez & San Juan, 2005), and thus begin to transform the scenario, and facilitate creating a mental screen as similar to the last one competitive moment, with images of places, things, feelings, sensory experiences and physiological responses that the gymnast experience; this in order to develop direct mental images and the most natural and spontaneous sensory responses possible, as allowed by their mind (Amasiatu, 2013). They were invited, through your creativity, to generate the stage through as clear and real mental images as possible, they was requested to place their self at the time of transfer to the place of competition, observe their arrival and travel to the place (Moreno, Ávila & Damas, 2001), personal belongings, the people who accompany them, the team and the coach; how, through the door, there are several elements and stimuli that attract their attention, how its impact when they notice them, and what sensation it produces until they reach the area that corresponds to they to prepare to be called to compete in the apparatus that represents the most challenge to execute. The athlete was asked to observe what it is like to enter the routine, develop and finish it, as well as waiting for grades.

The duration of the visualization was an approximate time of 35 to 40 min per individual session. At the end of each session, the gymnast is asked to return his attention to breathing, the natural movements of his body, and to feel the chair, his posture and the voice of the guide, until he is aware of the space to slowly open his eyes (De La Cuadra, 2013). TD and SCL were measured once the stimulus started. While salivary cortisol was taken after visualization. Only in this session, each participant answered the CSAI-2R after collecting the saliva.

The third session followed the same procedure mentioned above. Here the purpose is to pay attention to the presence of the coach and what this implies in the gymnast's dynamics; in the participation of its guided visualization, the pressure for perfection on the part of the coach during the arrival, the start of the competition, in the execution, and at the end of the routine is highlighted. The above, according to the individual responses given in the MIPS.

The fourth session performs the same procedure outlined above, we asked to focus attention within their imagination guided to the parents figure; how they perceive the pressure for the perfection of their parents before, during and at the end of the visualization of competition. The above, according to the individual responses given in the S-MPS-2.

The measurement of HPA activation, which measures stress, can be performed non-invasively through the collection of cortisol in saliva using the ELISA method (Mandel, Ozdener & Utemohlen, 2011). The salivary sample of steroid hormones may reflect the amount of free hormones in circulation, which are more desirable than the total circulating levels (Lewis, 2006). This route makes it possible to obtain parental authorization and cooperation of the child without difficulty. Likewise, the saliva sample provides a valid and reliable indicator of cortisol not bound to the plasma (Cadore et al., 2008).

In order to collect saliva samples, the criteria established by the Salimetrics Saliva Collection and Handling Advice (Salimetrics, 2015) were taken into account. Before taking saliva samples, the subjects were asked not to consume food 60 minutes before the sample was collected and not to brush or brush their teeth 3 hours before the sample was to be collected. The passive

expectoration technique was used, which consisted of the subjects having to rinse their mouths with water for 10 seconds and then evacuate the contents, the participants were asked to wait for 10 minutes without speaking, this so that the water they used did not dilute the saliva, the subjects were subsequently told to remain relaxed and sit with their head tilted forward trying to collect as much saliva as possible from the sublingual area of the mouth, this for two minutes without doing any kind of stimulation and performing the minimum possible orofacial movement. At the end of the 2 minutes, the collection tube was provided to the subjects, and they were asked to deposit the saliva into the tube. 0.5 to 1 milliliter of saliva were collected from each subject. Once the sample was collected, it was frozen at 80º C.

The data collection was carried out in the exercise physiology laboratory of the Faculty of Sports, which was found at a temperature of 25°C, with noises as fans. Coaches and parents were not present in the data collection.

RESULTS

Table 1 presents the internal consistency of the instruments (Cronbach's alpha), the means and typical deviations obtained in the measured variables, as well as the correlation between them. The reliability for all the variables measured by the instruments was adequate. From the nominal midpoint of the response scale of the instruments, it is noted that the sample reflected moderate PPP, PPE, moderate high cognitive anxiety and self-confidence, as well as high somatic anxiety. Likewise, PPP correlated significantly with somatic anxiety, and PPE did so with cognitive anxiety.

From the scores of the physiological variables in the different phases of the study (baseline, competition, influence of PPP, and influence of PPE), the values in each variable were analyzed individually. Figure 1 shows salivary cortisol levels in each phase. For these ages, the normal daytime range is <0.25 μg/dL (Salimetrics, 2015). Therefore, only two subjects showed physiological stress response, one before the PPE, and another subject before the PPP.

Figure 2 shows the behavior of the SCL for each subject at different times of taking. Values near or above 90º F indicate absence of anxiety, and values near or below 75.8º F indicate a state of anxiety. Thus, participants 2, 3 and 4 expressed anxiety in the competition, and participants 3 and 4 did so during the PPE and PPP.

Figure 3 shows the change of TD at the different times of shooting. In this case, the increase in TD with respect to the baseline measurement, indicates the challenging perception of the stress situation, while small increases suggest a threatening perception.

Additionally, the minimum appreciable change was analyzed, by Cohen's d, of salivary cortisol, TD and SCL levels, between the competitive situation and the competitive situation emphasizing the pressure for perfection by the coach (Cohen's d = -1.22; r = -0.52), and between the competitive situation and the competitive situation emphasizing the pressure for perfection by the parents (Cohen's d = -1.3; r = -0.54). These results revealed extremely large appreciable changes (> .90; Hopkins, Marshall, Batterham & Hanin, 2009). In contrast, the appreciable changes for TD were moderate (d <.30), and small (d <.10) for SCL between the two comparisons.

To help understand these results, Figure 4 shows the individual levels of pressure perception for perfection by the coach and parents, where participants 2, 4 and 6 clearly present high PPE, and participants 4, 6 and 7 high PPP.

Table 1
Reliability, descriptive statistics, and Pearson's correlation matrix of the study variables.

	Range	*M*	*DT*	1	2	3	4	5
1 PPP	1-5	2.90	0.76	(.83)				
2 PPE	1-6	3.54	1.27	.65	(.91)			
3 Somatic anxiety	1-4	3.02	0.29	.90*	.74	(.90)		
4 Cognitive anxiety	1-4	2.76	0.45	.80	.91*	.81	(.87)	
5 Self-confidence	1-4	2.84	0.49	-.21	-.31	-.50	-.65	(.74)

Note. *$p < 0.05$; PPE: perception of pressure for perfection by the coach; PPP: perception of pressure for perfection by parents; reliability in brackets.

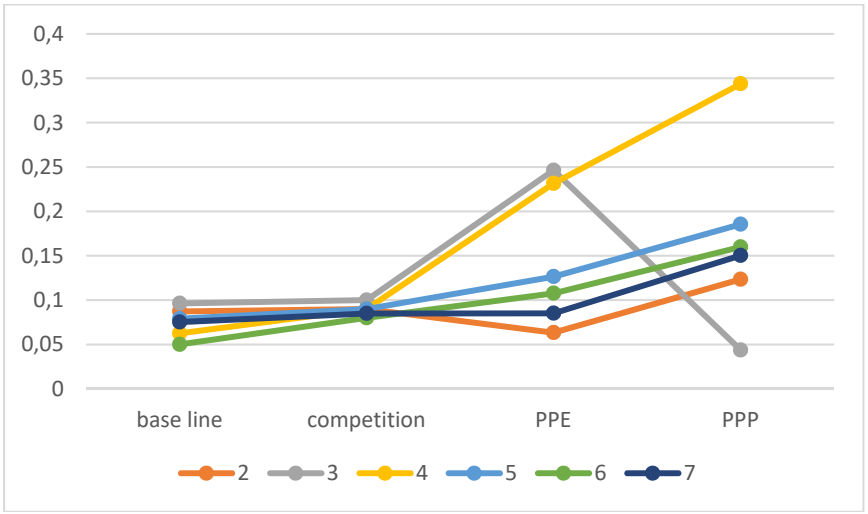

Figure 1. Salivary cortisol concentration in the four different measurement sessions.

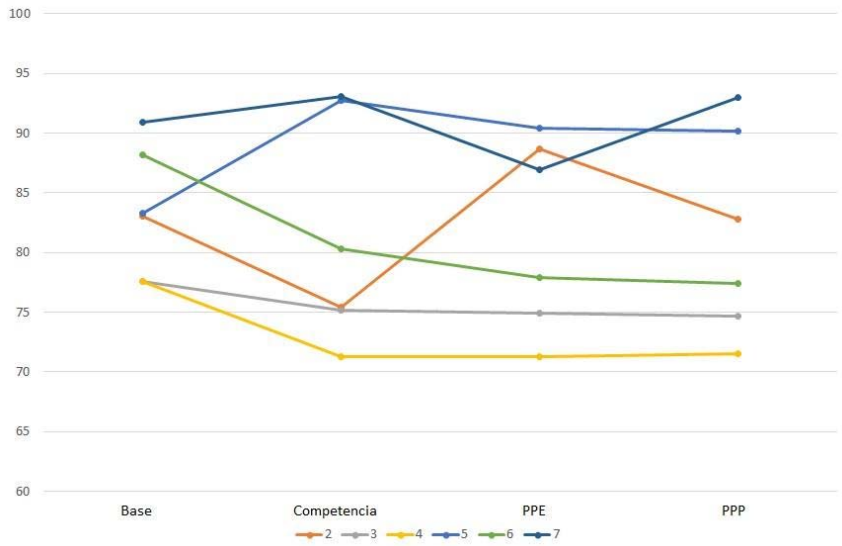

Figure 2. Skin conductance level (SCL) in the four different measurement sessions.

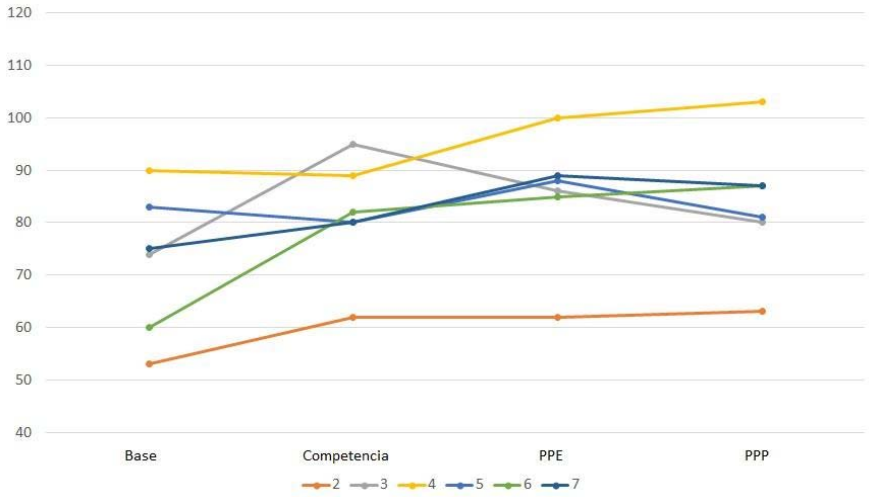

Figure 3. Heart rate (TD) in the four different measurement sessions.

Figure 4. Levels of pressure for perfection perceived by the athlete

DISCUSSION

This case study was carried out in adolescent gymnasts, with the aim of analyzing the psychophysiological responses (anxiety, cortisol, heart rate, skin conductance), before acute psychological stress during a visualization of competition, under the influence of pressure by the perfection exerted by parents, and pressure for perfection exerted by the coach.

The results reflect that, during a visualization of gymnastic competition, anxiety (somatic and cognitive) is present, since the average anxiety score in the sample was above the nominal average value of the test response scale of pencil and paper. On the other hand, salivary cortisol levels increased compared to the baseline, although this increase was not above normal daytime range values. This, more than stress, suggests effort, since it involves little increase in cortisol (Lundberg & Frankenhaeuser, 1980). However, this result should be taken with caution, since Passelergue, Robert and Lac (1995) and

Crewther, Heke and Keogh (2011), showed that salivary cortisol increases are lower in a simulated competition, compared to a real competition.

In this sense, if gymnasts experience anxiety, then they are more likely to be distracted, and to perceive that energy as unpleasant (Vast, Young & Thomas, 2010), which is associated with sports performance (González, Garcés de los Fayos & Ortega, 2014). However, when analyzing the results individually, on par with physiological indicators such as salivary cortisol, TD and SCL, supported by Salvador (2005), Jones et al. (2009) and Seery (2011), it can be inferred that for some gymnasts (subjects 3 and 5) the competition was interpreted as challenging, as it is accompanied by increased heart rate. In this case, emotions help performance, being a functional stress, which appears as an element that facilitates action (Monasterio et al., 2016). While for other gymnasts (subjects 4 and 6) it is interpreted as threatening (decrease in SCL, and tendency to maintain stable TD), suggesting that they perceive that the demands of the competition exceed their resources, or put the status at risk social (Taylor, Papay, Webb & Reeve, 2016).

The fact that the stressful situation can be considered as a challenge rather than a threat may be due to self-confidence (Nicholls & Polman, 2007), as this helps to perceive anxiety symptoms as facilitators (Guillén & Sánchez 2009; Neil, Wilson, Mellalieu, Hanton & Taylor, 2012). Thus, high conviction that the required behavior can be executed successfully and produce a result can reduce psychological stress, evidenced in subjects 3 and 5, whose self-confidence score was above the midpoint of the scale of response.

On the other hand, in those gymnasts who perceive that their coach imposes high perfect unrealistic expectations performance standards on them, which criticize them when they fail, or press them to achieve a certain level of performance, the concentration of salivary cortisol increases in comparison to the competition situation where the influence of the coach was not considered, since the minimum appreciable change was large. This was observed in subjects 2, 3, 4 and 6, which suggests a stressful situation. However, subjects 3, 4 and 6 reflected decrease in SCL and stable TD, alluding to a threatening interpretation; while subject 2 considered it challenging (increase in SCL, although TD remains stable instead of increasing). The minimum appreciable change shows that PPE increases the concentration of salivary cortisol in competition.

For those who perceive that their parents impose perfect performance standards on them, which criticize them when they fail to achieve them or press them to achieve a certain level of performance (subjects 4, 6 and 7), the competition is stressful (increased salivary cortisol), but only some (subjects 4 and 6) interpret it as threatening, since the SCL was lowered and the TD was stable. While for subject 7, this stressful situation was challenging, since the SCL increased and the TD was stable. The minimal appreciable change shows that PPP increases the concentration of salivary cortisol in competition.

The reason that some gymnasts interpret the situation as threatening or challenging can also be attributed to skill levels, since high ability causes the subject to evaluate the situation as challenging rather than threatening; while with poor skills the situation is evaluated in terms of threat, so in future studies this variable should be analyzed.

These results confirm that social evaluation is one of the main stressors, however, in all cases stress is not interpreted as threatening, according to Lazarus (1999) in that situational demands choose whether it is a threatening response or challenging. The above can be associated with the study of Flett and Hewitt (2016), where feelings of anxiety an hour before the competition were more common in the most successful gymnasts, but they at the same time, are

able to transform their anxiety into positive energy, instead of being worried with dreams of personal perfection.

At the correlational level, the pressure for perfection on the part of parents is related to somatic responses of competitive anxiety, such as palpitations, restlessness, or sweating. In sum, the pressure for perfection by the coach hinders visual and mental attention, the memory of the athlete, and favors the formation of catastrophic thoughts, as Dunn et al. (2019). This excessive cognitive anxiety can act as a form of cognitive interference and prevent focusing on the task (Dunn & Causgrove Dunn, 2001), affecting athletic performance. This result is consistent with approximations of previous studies (Dunn et al., 2019; Ivanovic et al., 2015), and is contrary to what was found by Donachie et al. (2018). One of the reasons for this disagreement may be due to the different methodology used; they analyzed precompetitive anxiety over a very wide range of time in anticipation of the competition, while competitive anxiety was analyzed in this study.

Although at the correlational level it is supported that the pressure for perfection is a little adaptive facet of perfectionism (Stumpf & Parker, 2000), because it is related to negative consequences (Stoeber & Childs, 2010) as competitive anxiety, when the data is analyzed individually and are accompanied by physiological variables, the results show that only in some gymnasts the pressure for perfection is not very adaptive (threatening response), while in others it can be adaptive (challenging response). Then socially prescribed perfectionism can also be associated with adaptive responses, as shown in the educational context by Stornelli et al. (2009).

Competitive stress in artistic gymnastics can be accompanied by high pressure for perfection, because the social comparison inherent in sports competition, and the nature of the sport itself, since, in female artistic gymnastics, each routine is evaluated With reference to what is expected of a perfect presentation, then gymnasts must show a perfect technique (FIG, 2017). In male artistic gymnastics, the regulation states that each element is defined by a perfect final position or by a perfect realization; the elements are executed with perfection (FIG, 2017). Under these rules, it is natural for coaches and parents to demand perfect executions, and be very critical of the quality of gymnastic execution.

It should be noted that the sample was treated in general, because Georgopoulos et al. (2011) in gymnasts, they did not find differences in salivary cortisol, with respect to age, body mass, and normorrheic and amenorrheic gymnasts, nor did they obtain significant effects of age, gender or sexual maturation on the activity of the HPA axis.

Limitations are recognized in this study, such as not including personality traits, since competitive stress responses also depend on previous experience, or propensity for specific behaviors (trait anxiety), since athletes with high trait anxiety are more prone to interpret the situation as threatening and exhibit more anxiety symptoms (Cerin & Barnett, 2011; Wolf, Eys & Kleinert, 2014). Another limitation was not having measured the interpretation of anxiety (Jones, 1995), which is also related to performance (Neil, Wilson, Mellalieu, Hanton, & Taylor, 2012), since the cognitive interpretation of competition demand seems be more important for the hormonal response, than the result itself (Jones, 1995). Therefore it is suggested to include these constructs in future studies; as well as controlling antecedents such as skill level, requirement or importance of competition, or competitive level, since these variables condition the level of stress (Ruiz-Juan, Zarauz & Flores-Allende, 2016) or its interpretation (Tsopani, Dallas & Skordilis, 2011).

Another limitation refers to the lack of values of TD ranges for excitation and relaxation in these age groups and athletes.

On the other hand, he inquired about his sports experience, but not about his competitive experience, a variable that can give more information about familiarity and adaptation to these competitive events. The results may be affected by the lack of familiarity for the participants in the visualization technique. In addition, these results should be taken with caution given the small sample size, since the athletes were teenagers, of an individual sport and of a particular performance, therefore it cannot be assumed that similar results occur in athletes of different ages, performance, of other sports or competitive levels.

This study has theoretical and practical contributions. From the theoretical point of view we study artistic gymnastics from an integrative perspective, analyzing the connection between psychological responses (anxiety), and biological variables related to stress, as well as its change through different social agents of pressure for perfection in a visualization of a competition The present results extend knowledge according to the effects of the social environment on biological responses, and their key role on the stress response. It supports that the stress response depends on how events are interpreted (Salvador, 2005), and that parents and coaches play an important role in organizing negative and positive psychosocial experiences in sport (Horn and Weiss, 1991).

This study helps to understand competitive physiological and psychological behavior, and suggests future research in directions that can clarify these ideas. Finally, it is an important study, since to date it had not been published on psychophysiological responses in competition in gymnasts under pressure for the perfection exerted by coach and parents. It is important to consider the practical implications for gymnasts and those who work in the field of sports psychology. This study strengthens the need for the use of more adaptive behaviors, which will impact on better practice and sports competition for those gymnasts who perceive the pressure for perfection as threatening.

We propose that sports psychologists and coaches can explore strategies to help athletes compete or reduce pressure for the perfection of parents and coaches through psychological interventions, since when feelings of excessive pressure by coaches or parents to Get high performance standards are present, gymnasts are vulnerable to experiencing stress, and sometimes consider it as threatening by interfering with sports performance. These results suggest that individualizing psychophysiological training strategies can be implemented to help athletes prepare for the competition or obtain some performance, as Hill (2016) pointed out, because psychophysiological stress factors are related to competition performance (Mckay et al., 1997).

CONCLUSION

This study confirms the hypothesis raised, and indicates that psychophysiological responses to competition in artistic gymnastics are affected by pressure levels by the perfection of parents and coach. This study provides evidence that when male and female gymnasts compete in similar circumstances, their response to competitive stress is different from the pressure for perfection, suggesting that for some gymnasts it is challenging, and for others threatening, so the pressure for perfection integrates a link for the different physiological responses in competition.

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