

PRE-COMPETITIVE ANXIETY AND SELF-CONFIDENCE IN PAN AMERICAN GYMNASTS

Antonio Pineda-Espejel, Jeanette López-Walle, José Tristán Rodríguez, Mireya Medina Villanueva, Oswaldo Ceballos Gurrola

Facultad de Organización Deportiva, Universidad Autónoma de Nuevo León, Mexico

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Abstract

This study aimed to examine the intensity and direction of pre-competitive anxiety indicators (both somatic and cognitive), as well as self-confidence, in gymnasts participating in the 2011 Pan American Games. Sixty male and female artistic gymnasts participated, with ages ranging from 15 to 30 years ($M = 21.04$ years, $SD = 4.016$). The Revised Competitive State Anxiety Inventory-2 (CSAI-2R, Andrade, Lois, & Arce, 2007; Cox, Martens, & Rusell, 2003) and the direction scale by Jones and Swain (1992) were both administered. The results revealed that the intensity and direction of cognitive anxiety were positively correlated with the intensity and direction of somatic anxiety ($r = .55$ and $r = .53$, respectively), while self-confidence was negatively correlated with the intensity of cognitive anxiety ($r = -.305$) and also predicted it ($\beta = -.192$). Women reported significantly higher perceived somatic anxiety levels (2.79) than men (2.48). In conclusion, high levels of self-confidence decreased the perception of cognitive anxiety as being debilitating to gymnasts competing at the Pan American level.

Keywords: *artistic gymnastics, CSAI-2R, intensity and direction*

INTRODUCTION

On some occasions, participating in sport requires intense physical demands and high psychological pressures that some athletes perceive as a struggle to handle, potentially leading to negative consequences (Balaguer, González, Fabra, Castillo, Merce & Duda, 2012). The stressful nature of elite sport, and the competitive environment surrounding it, places many demands on participating athletes (Jones, 1995). In sport psychology many researchers are interested in assessing anxiety responses of athletes to competitive events (Woodman & Hardy, 2001).

The world of high-level gymnastics is characterized by intensive practice demanding competition, the public display

of skills, and evaluation by others. This environment may be overwhelming for gymnasts of all ages but less is known about the nature in elite competitors (Duda & Gano-Overway, 1996a).

Anxiety was defined by Weinberg and Gould (1996) as a negative emotional state that is characterised by nervousness, worry, and apprehension and is associated with activation or *arousal* of the body. Anxiety is triggered by stressful stimuli and manifests itself in an individual's lack of adaptability on physiological, behavioural, and cognitive levels. In this way, it also hinders athletic performance (Tamorri, 2004).

Competitive anxiety is the tendency to assess confrontational situations as

dangerous and respond accordingly with feelings of tension and apprehension (Martens & Bump, 1998). This anxiety quickly escalates immediately before competition and quickly decreases afterwards (Gould, Petlichkoff & Weinberg, 1984). This specific sensation, which typically occurs during the 24 hours leading up to a competition, is known as pre-competitive anxiety. Pre-competitive anxiety has been a major focus of research in the field of sports psychology. Studies have verified that a high level of anxiety prior to competition can hinder athletic performance (Burton, 1988).

In an effort to comprehend this anxious state, the multidimensional theory (Martens, Vealey & Burton, 1990) posits that subjective manifestations of anxiety involve cognitive and somatic components, as well as self-confidence. The somatic element includes the physiological and emotional components of anxiety and stems directly from organismic activation (Martens et al., 1990). It entails a series of physical symptoms (heightened levels of activation of physiological functions) that are automatically produced by the demands of competition (Dosil, 2004); these symptoms are accompanied by nervousness and tension. The cognitive anxiety state, however, refers to the mental component of anxiety and is caused by negative expectations or low levels of confidence in oneself and in one's abilities (Martens et al., 1990). A third component has been termed self-confidence; while it is not a direct measure of anxiety, its absence can lead athletes to experience cognitive anxiety. Woodman and Hardy (2001) suggest that self-confidence is an individual's belief that he or she is able to control his or her environment and self. This theory proposes that cognitive and somatic anxieties are correlated with one another. Additionally, cognitive anxiety correlates negatively with self-confidence. This relationship has been empirically demonstrated by the findings of Craft, Magyar, Becker, and Feltz (2003) and Besharat and Pourbohloul (2011) who found that self-confidence before and during

competition is correlated with low anxiety levels. As for the effect the type of sport has on anxiety, Martens and his collaborators (1990) propose that athletes in individual sports who are subjectively judged in competition exhibit more intense symptoms of cognitive anxiety and lower self-confidence.

With regard to gender, Martens and his collaborators (1990) reported that women exhibit higher cognitive anxiety and lower self-confidence than men. The findings of Vosloo, Ostrow and Watson (2009) support that claim. In a study of 151 young swimmers, they reported that the women exhibited higher levels of somatic anxiety and lower levels of self-confidence than the men. Krane and Williams (1987) found that the same was true in their study, and they ascribed this finding to their participants' low levels of competition and experience. Tabernero and Márquez (1993) argued that women, to a greater extent than men, tend to attribute their competitive anxieties to doubting themselves and their potential, an effect that becomes more pronounced with age.

How such athletes view and respond to stress in some ways will determine their success in gymnastics as well as the quality of their gymnastics experience. At present, it has been proposed that in competitive sports, high levels of stress can negatively affect athletes' cognition, physical state, and, ultimately, their results. Nevertheless, some researchers have corroborated the idea that athletes need not necessarily perceive pre-competitive anxiety as unfavourable; rather, it can encourage positive results. Jones (1995) built his *directional interpretation of anxiety model* on those notions, positing that anxiety's impact on sports performance does not depend on the anxiety's intensity but, rather, upon whether the athlete perceives it as facilitating or debilitating in relation to their performance of a positive outcome. Thus, an increase in anxiety could, for some athletes, be perceived as favouring good performance, while others might interpret it negatively, which has an impact on cognition.

Individual differences in perceiving and interpreting anxiety may attenuate the associations among anxiety's somatic aspects.

Certain studies have found that elite athletes score low on measures of anxiety symptoms' intensity, but high on perceived self-confidence. Those factors increase the tendency to perceive anxiety symptoms as facilitative to competitive performance (Bejek & Hagtvet, 1996; Jones & Hanton, 1996; Jones, Swain & Hardy, 1993; Kais & Raudsepp, 2004; León-Prados, Fuentes & Calvo, 2011; Lundqvist, Kentä & Raglin, 2011; Spink, 1990), downplaying the threatening aspects of anxiety and increasing their own sense of control.

A study conducted by Hanton and Jones (1994) established that high- and low-level athletes do not differ from one another in terms of cognitive and somatic anxiety levels but that high-level athletes interpret their symptoms as more facilitative of their sports performance. Those authors concluded that this may be due to high-level athletes' higher reported self-confidence. In the same vein, Jones (1995) argues that athletes who perceive themselves as capable of achieving the goals they strive towards interpret their anxiety symptoms as facilitative. Meanwhile, athletes with negative expectations about achieving their goals interpret their symptoms as detrimental to performance. Woodman and Hardy (2001), meanwhile, report that people with high anxiety levels (high intensity) usually perceive them as debilitating or as negatively affecting performance.

Raising the issue of gender, Mellalieu, Hanton, and Jones (2003), and Pozo (2007) no observed differences in the intensity and directions of anxiety and self-confidence. Studies of team sports by Ntoumanis and Biddle (1997) and Kais and Raudsepp (2005), as well as studies of players of individual sports (none being elite athletes) by Pozo (2007), related the intensity of anxiety components to their directions found that self-confidence correlated negatively with the intensities of cognitive and somatic anxieties and

correlated positively with their directions. Therefore, high levels of self-confidence were linked to low levels of anxiety intensity and to the perception of cognitive and somatic anxieties as facilitative. The intensity of cognitive anxiety was positively correlated with the intensity of somatic anxiety and negatively correlated with the direction for both types of anxiety. The intensity of somatic anxiety was negatively associated with the direction of cognitive anxiety, while the direction of cognitive anxiety, in turn, was linked to that of somatic anxiety. Ntoumanis and Biddle (1997) added that such subjects seem to direct their feelings of pre-competitive cognitive and somatic anxiety towards improving their performance. However Mellalieu, Hanton, and O'Brien (2004) reported that the type of sport and competitive experience influences how people interpret their symptoms.

However, high-performance artistic gymnasts are required to execute highly difficult tasks with impeccable technique, many of which defy gravity and can trigger emotions such as anxiety and/or worries about failing in competition. The study of Duda and Gano-Overway (1996b) with young gymnasts revealed that the feeling of apprehension was strongly associated with performing skills involving learning new skills, performing a difficult or scary skill or doing skills for the first time in a meet. On the other hand, since the tasks are a artistic performance and are watched and evaluated by any number of individuals such as parents, judges or coaches, these gymnasts mentioned that they feel nervous in a competitive environment (especially those deemed as important) when there are judges. And that is hardest when they try their hardest and their coaches say they are doing bad, or when in a very big meet and they know that their biggest competitor is there. In moderate form the anxiety was generated by falls a lot during warm-ups or for the rushing in timed warm-ups. It should be noted that these same situations are present during podium training.

Jones and his collaborators (1993) conducted a study of gymnasts and suggested that exhibiting sustained, low anxiety levels with a perceived facilitative direction was the best predictor of optimal competitive performance. Lundqvist and her collaborators (2011), however, argued that high levels of self-confidence were also influential.

In the literature there are a few research about psychological parameters on podium training, and in line with recent research on pre-competitive anxiety's intensity and how to interpret its symptoms in high-performance athletes and given that more research is needed to determine the impact of such athletic competition on gymnasts' psychological parameters (Donti, *et al.*, 2012), this study's objective was to determine how the intensity and direction of pre-competitive anxiety behaved in a sample of Pan American gymnasts during podium training.

METHODS

A sample of 60 artistic gymnasts (29 men and 31 women) was gathered through convenience sampling during the XVI Pan American Games in Guadalajara, México. They ranged in age from 15 to 30 years old ($M = 21.04$; $SD = 4.016$). The gymnasts trained from 8 to more than eleven hours; and they train in average for 30 hours a week ($SD = 6.44$). The participants' nationalities were distributed with the following frequencies: Argentina, $n = 8$; Brazil, $n = 7$; Chile, $n = 1$; Colombia, $n = 6$; Costa Rica, $n = 2$; Cuba, $n = 3$; Ecuador, $n = 2$; El Salvador, $n = 1$; Guatemala, $n = 2$; Mexico, $n = 10$; Peru, $n = 3$; Puerto Rico, $n = 6$; Dominican Republic, $n = 2$; Trinidad and Tobago, $n = 1$; and Venezuela, $n = 7$. Together, these different nationalities made up 56% of the total sample of gymnasts participating in the event.

To determine the intensity and direction of pre-competitive anxiety, the Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox *et al.*, 2003)

was utilised. The instrument consists of 17 items distributed across three subscales: somatic anxiety, cognitive anxiety, and self-confidence. The original version's reliability falls between $\alpha = .81$ and $\alpha = .86$ on the three subscales. On the Spanish and Mexican version (Andrade *et al.*, 2007; López-Walle, Ramírez, Tristán, Pérez y Ceballos, 2011), the scales' reliabilities were as follows: $\alpha = .80$ (Sp) - $.89$ (Mx), somatic anxiety; $\alpha = .82$ (Sp) - $.83$ (Mx), cognitive anxiety; and $\alpha = .78$ (Sp) - $.90$ (Mx), self-confidence. Each item began with the question "how do you feel right before podium training?" Answers were given on a four-point Likert-type scale, where "not at all" corresponds to a value of 1 and "very much so" a value of 4. This assessment was accompanied by the direction scale developed by Jones and Swain (1992), which was included with the cognitive anxiety, somatic anxiety, and self-confidence items. The English version has reliability coefficients with values of $\alpha = .87$ for cognitive and somatic anxiety (Jones & Hanton, 1996) and $\alpha = .90$ for self-confidence (Hale & Wittehouse, 1998). On this scale, the athlete assesses to what point their experience of each symptom's intensity is facilitating (beneficial) or debilitating (detrimental) to their athletic performance, using a scale of -3 "very detrimental" to +3 "very encouraging." Therefore, the direction scale can range from -27 to +27. A negative score indicates an unencouraging state and a positive score an encouraging one. A score of zero would indicate that the participant's intensity is unimportant to their performance. The self-confidence scale usually shows high correlations between intensity and direction, such that they can be interpreted as the same state (Jones & Hanton, 2001).

Before administering the questionnaires, we contacted the XVI 2011 Pan American Games General Director and Operations and Sports Management, the presidents of the ODEPA Medical Committee, the Pan American Gymnasts

Union, and the Mexican Federation of A.C. Gymnastics. They were informed of the research project and acquiescence was requested from each one in carrying out the study. The first people personally contacted and informed of the study were government employees in the athletic delegation's mission and vision departments. Next, we contacted the coaches to explain specifics about the study and to ask for their collaboration.

Research findings from Wiggings (1998) and Kais and Raudsepp (2005) convey that while the intensities of self-confidence and cognitive anxiety remain stable before competition, somatic anxiety increases between 24 hours and 1 hour before the event, indicating that once an athlete evaluates his or her anxiety symptoms as either facilitative or debilitating, the symptoms persist during the 24 hours leading up to the competition. Conversely, the direction scale remains stable throughout the 24 hours prior to competition on all three anxiety subscales (Wiggings, 1998). Next, data were gathered during the 23 hours before podium training at the XVI Pan American Games. This training is every bit as demanding as the competition itself. In fact, the podium training schedule follows the exact same rotation of gymnasts and order of passage. The gymnasts wear their competition uniforms and frequently execute similar routines as in competition, and are observed by D-Panel judges present for taking notes of the routines in symbols.

The questionnaires were administered in both English and Spanish before podium training in rooms at the Pan American Villa, which was where the gymnasts were being housed. That way, they could respond in a calm, peaceful environment, free from any potentially distracting stimuli.

Out of respect for research ethics, informed consent forms were read and signed by the participating gymnasts, their coaches, and, in the case of underage participants, their delegates. It was made clear to them that participation was entirely

voluntary and anonymous and that their answers would remain strictly confidential. Questionnaires were administered with authorised personnel present so they could explain how to complete the questionnaires and answer any questions that arose.

RESULTS

Tests of the instruments' reliabilities yielded acceptable values for most subscales, with the exception of the intensity of somatic anxiety (see Table 1).

In addition, descriptive evaluations of the intensity and direction components (facilitative or debilitating, respectively) of pre-competitive anxiety reflected high average self-confidence and moderate somatic anxiety. As for how the participants perceived their symptoms, we found they tended to perceive cognitive and somatic anxieties as non-facilitative and self-confidence as facilitative.

Factor analysis confirmed that each questionnaire is made up of three subscales that together explain 57.62% of total variance in the intensity dimension, with a KMO measure of sampling adequacy of .646; Bartlett's test of sphericity was significant ($p = .000$). The total explained variance in the direction dimension was 51.21%, with a KMO measure of sampling adequacy of .652. Bartlett's test of sphericity was significant ($p = .000$).

Because the Kolmogorov-Smirnov test revealed that the data were normally distributed, to determine the connections between the different components of anxiety, a bivariate correlation analysis was carried out using Pearson's r . This test yielded a significant correlation between the intensities of cognitive and somatic anxieties, as well as a negative correlation between the respective intensities of self-confidence and cognitive anxiety. Furthermore, positive correlations occurred between the intensity and direction of self-confidence and, lastly, between the directions of cognitive and somatic anxiety.

Table 1. *Reliability and Descriptive Statistics.*

	α	M	SD
Somatic Anxiety Intensity	.67	2.64	.93
Cognitive Anxiety Intensity	.77	2.04	.51
Self-confidence Intensity	.70	3.02	.82
Somatic Anxiety Direction	.79	-.58	1.07
Cognitive Anxiety Direction	.80	-.72	1.17
Self-confidence Direction	.82	1.96	1.04

Table 2. *Matrix of Correlations between Intensity and Direction of the Components of Pre-Competitive Anxiety.*

	1	2	3	4	5
1. Cognitive Anxiety Intensity					
2. Somatic Anxiety Intensity	.550**				
3. Self-Confidence Intensity	-.305*	-.126			
4. Cognitive Anxiety Direction	.035	.076	.013		
5. Somatic Anxiety Direction	.044	.135	-.125	.537**	
6. Self-Confidence Direction	-.258	-.167	.564**	-.163	-.161

** Correlation is significant to the level of .01.

* Correlation is significant to the level of .05.

A simple linear regression analysis established that cognitive anxiety's intensity is a useful predictor of somatic anxiety's intensity ($\beta = .306$, $p = .000$) and that cognitive anxiety's direction predicts the somatic component's direction ($\beta = .493$, $p = .000$). Meanwhile, the intensity of self-confidence predicted its direction ($\beta = .705$, $p = .000$) and negatively predicted the intensity of cognitive anxiety ($\beta = -.192$, $p = .019$).

We went on to examine the differences between the men's and women's groups in terms of average somatic anxiety, cognitive anxiety, and self-confidence for both intensity and direction. The Student's t -test only indicated statistically significant differences for the intensity of somatic anxiety ($p = .017$), with women experiencing it more intensely ($M = 2.79$) than men ($M = 2.48$).

DISCUSSION

In the interest of examining the intensities and directions of the indicators of pre-competitive anxiety (somatic and cognitive) and self-confidence in Pan American gymnasts during podium training, the study conducted was grounded in the multidimensional theory of anxiety (Martens et al., 1990) and Jones's control model (1995). The results of correlational analyses are consistent with those published by Notumanis and Biddle (1997), Kais and Raudsepp (2003), Pozo (2007), and Besharat and Pourbohood (2011); however, in our study, self-confidence did not correlate statistically significantly with somatic anxiety. Thus, the present research has upheld those theories' postulates about the relationships among anxiety's components, previously exposed, and their claims that it is not enough to measure

intensity alone; the direction of these components must be included as well. The findings of Jones and Hanton (2001) have also been reiterated, in that self-confidence's intensity and direction can be interpreted as a single state.

Our results also clarify that cognitive anxiety predicts the direction and intensity of somatic anxiety and reiterates the findings of Craft and her collaborators (2003), which suggests that self-confidence is associated with low levels of cognitive anxiety (even predicting them) and lends support to the notion that they are opposing constructs.

In light of the descriptive patterns observed in the study's variables, these results differ from what Martens and his collaborators reported (1990) about this type of sport, in that our participants exhibited higher self-confidence and lower cognitive anxiety in the present competitive situation. However, this sample did not have the features that predict optimal performance according to Jones and her collaborators (1993). On the contrary, the study exhibited that moderate anxiety levels and symptoms were not perceived as facilitative, which had an impact on sports performance during podium training. These data tend more towards what Woodman and Hardy (2001) reported, which is that high anxiety levels are perceived as non-facilitative. In other words, increased arousal was not perceived as harmful overall, considering that average somatic anxiety was moderately high. This perspective may have been influenced by higher self-confidence levels (Lundqvist et al., 2011); therefore, feeling capable of achieving one's objectives and gaining control over oneself and one's environment was high. Other factors that may have contributed to this inconsistency are individual perceptions of the stressful event, as well as perceived ability or competence. According to Ntoumanis and Biddle (1997), perceiving oneself as having little skill cause one to become prone to anxiety symptoms.

Thus, we have partially corroborated what Landers and Bouchard argued (1991).

Our participants reported less tolerance for somatic anxiety by tending to perceive high levels of it as non-facilitative. However, it could be that these athletes' performances were less influenced by anxiety, as noted by Craft and her collaborators (2003). This leads us to reflect on the role of podium training. It has the potential to flush out adverse sensations so that they are better managed by the time the official competition begins. Should be remembered that this situation generates anxiety because it has some features similar to those of a gymnastics competition described by Duda and Gano-Overway (1996b) such as the presence of judges (D-panel judges), being in the company of great competitors, may falling during warm-up, is possible to test new skills, and it was an important event for the area. So that simulated or podium training can have the advantage to help gymnasts to familiar with the demands of a particular competitive situation.

Regarding high self-confidence levels, those are consistent with the findings of other studies conducted in international-level competitive athletes and specifically gymnasts (Bejek & Hagtvét, 1995; Besharat & Pourbohloul, 2011; León-Prados et al., 2011). Comparing signs of anxiety and self-confidence according to gender, the findings were in line with what Vosloo and her collaborators reported (2009). Women exhibited significantly higher somatic anxiety and self-confidence levels than men, although in our study, that last comparison did not produce a statistically significant result. One possible alternate explanation for these differences is that women are more inclined to express their feelings than men, especially unpleasant ones (Briscoe, 1985).

There are certain discrepancies between these findings and those of prior studies; this could be the result of different instruments being utilised, or perhaps due to having used a podium training and not competition, while not an official competence if a simulation of one, and is related to the situations that arouse feelings of anxiety, which were mentioned above. It could also be because the studies above

were conducted using samples of college, national, and mixed-level groups of athletes, with some at the international level; players of team and other sports were included, as well, and the competitions were national. Furthermore, the anxiety was evaluated instead of trait dimension. Some studies also refer to participants' experiences, which is one variable that the present study did not examine; this component will be important to consider in future research. It could be that even though the sample was widespread and comprised of international competitive gymnasts, they did not have enough experience competing in such important tournaments.

So that further research is required to elite athletes in international official competitions and compare psychological parameters of the same athletes during podium training and competition; further to assess also the ability perception, competitive experience and the meaning of competition among athletes from the state dimension to glean better understanding of precompetitive anxiety.

CONCLUSIONS

In light of the above results and considering the particular set of circumstances and conditions under which this study was conducted, we confirmed that moderate anxiety levels are associated with less favourable perceptions of performance outcomes. However, people with high levels of self-confidence, which these international-level gymnasts exhibited, tend to perceive cognitive anxiety as less debilitating but are much less able to handle somatic anxiety.

Furthermore, high levels of self-confidence negatively predict cognitive anxiety levels.

Female gymnasts reported significantly higher somatic anxiety levels than male gymnasts, at least in this competitive situation.

Finally, we recommend that future research be conducted to address these

variables, assess perceived ability, and the meaning of competition among athletes.

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Corresponding author:

Antonio Pineda-Espejel

Universidad Autónoma de Nuevo León,
UANL, Facultad de Organización
Deportiva.

Mailing address: Cd. Universitaria, San
Nicolás de los Garza, Nuevo León, México.

Zip code: 66451

e-mail: bondarenko2@hotmail.com

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