

PRE-PRACTICE AND PRE-COMPETITION STATE ANXIETY AMONG PREADOLESCENT FEMALE GYMNASTS: A PILOT STUDY

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ABSTRACT

An elevated state of cognitive and somatic anxiety may impede optimal sport performance. Identifying scenarios that may cause elevated levels of anxiety are salient such that appropriate anxiety management strategies can be employed. Gymnastics is a sport that may induce anxiety due to the nature of the apparatuses used, the potential for injury, and the competitive environment. The purpose of this study was to compare state anxiety in preadolescent female gymnasts prior to practice as well as a competition. Preadolescent female gymnasts (n=10) completed the Competitive State Anxiety Inventory-2 (CSAI-2) prior to two practice sessions and again prior to a competition. The CSAI-2 is comprised of three subscales (cognitive anxiety, somatic anxiety, and self-confidence). The CSAI-2 subscale scores were averaged for the two pre-practice sessions for comparison with the pre-competition condition. The CSAI-2 subscale scores were compared between the pre-practice and the pre-competition conditions with paired t-tests ($\alpha < 0.05$), Δ -mean% scores, and effect size (ES) calculations. The CSAI-2 subscale score differences between the pre-practice and the pre-competition conditions approached statistical significance (cognitive anxiety $p=0.10$, somatic anxiety $p=0.10$, and self-confidence $p=0.07$). The CSAI-2 subscale score ES differences between the pre-practice and the pre-competition ranged from small to medium (cognitive anxiety $ES=0.22$, somatic anxiety $ES=0.32$, and self-confidence $ES=-0.43$). Within the parameters of this study, it appears that there is a decreased level of self-confidence and an increased level of anxiety prior to a competition when compared to a practice setting. These findings may hold practical value for coaches and gymnasts pursuing optimal performance.

Keywords: Anxiety, gymnasts, competition, practice, self-confidence, Competitive State Anxiety Inventory-2.

1. INTRODUCTION

Anxiety, a widely studied construct within sport psychology, is an emotion that is related to stress or worry and arousal (Chase, Magyar & Drake, 2005; Cottyn, de Clercq, Pannier, Crombez & Lenoir, 2006; Cox, 2012; Ford, Ildefonso, Jones & Arvinen-Barrow, 2017; Hanton, Mellalieu & Hall, 2004; de Pero, Minganti, Pesce, Capranica & Piacentini, 2013). Anxiety is a consequence of self-doubt, perceived stress, or other uncertainties which exceed one's perceived abilities (Chase, Magyar & Drake, 2005; Cottyn, de Clercq, Pannier, Crombez & Lenoir, 2006; Cox, 2012; Ford, Ildefonso, Jones & Arvinen-Barrow, 2017; Hanton, Mellalieu & Hall, 2004; de Pero, Minganti, Pesce, Capranica & Piacentini, 2013). Anxiety is thought to be the most important psychological factor concerning sport performance (Hanin, 2000). Certain situations can be the cause of anxiety, such as an important competition or game, or certain individuals can simply be more predisposed to

experiencing feelings of anxiety. Individuals predisposed to anxiety are said to have higher levels of trait anxiety and tend to feel that coping is not an option, or that his or her coping abilities are not adequate to deal with the situation at hand (Cagle et al., 2017; Donti, Theodorakou, Kambiotis & Donti, 2011; Donti et al., 2012; Ford et al., 2017; Hanton et al., 2004; Horikawa & Yagi, 2012; Woodman & Hardy, 2003). Those who experience trait anxiety are more likely to view a situation as stressful and become anxious in these situations (Anshel & Wells, 2000; Barreto et al., 2016; Besharat & Pourbohloul, 2011; Burton & Raedeke, 2008; Cogan, 2006; Cox, 2012; Craft et al., 2003; Donti et al., 2012; Englert & Betrams, 2012; Fernandes et al., 2013; Ford et al., 2017; Gillham & Gillham, 2014; Hall & Kerr, 1997; Hanin, 2000; Hanton et al., 2004; Horikawa & Yagi, 2012; Jones & Hanton, 2001; Smith et al., 2006; Woodman & Hardy, 2003). Consequently, anxiety is going to be contingent on one's interpretation of the situation as well as one's coping abilities. Furthermore, different situations will cause different levels of anxiety within an individual and the same situation may cause different levels of anxiety between individuals.

A competition or an important game can be a cause of anxiety for many athletes and is more likely to manifest in trait-anxious individuals (Cagle et al., 2017; Donti et al., 2011; Ford et al., 2017; Hanton et al., 2004; Horikawa & Yagi, 2012). Competitive anxiety is the result of a competitive setting and is characterized by cognitive anxiety and somatic anxiety. Cognitive anxiety refers to feelings of incompetency, feeling unable to perform or play up to perceived expectations, and feeling pressures related to performing in front of a crowd (Ariza-Vargas, 2011; Barreto et al., 2016; Cerin, 2003; Cox, 2012; Molina et al., 2018; Pineda-Espejel, 2013; Schmidt & Lee, 2014). Somatic anxiety refers to physiological symptoms such as increased heart rate, sweating, and/or muscle tension (Allie et al., 2018; Besharat & Pourbohloul, 2011; Burton & Raedeke, 2008; Cottyn et al., 2006, 2008; Craft et al., 2003; Ford et al., 2017; Grossbard et al., 2009; Hanton et al., 2004; Jones & Hanton, 2001; Marshall & Gibson, 2017; Martens et al., 1990; Tsopani et al., 2011; Woodman & Hardy, 2003). Some level of sport related performance anxiety is considered to be normal and healthy; however, increased somatic and cognitive levels of anxiety has been shown to decrease balance, negatively affecting performance, and increase injury risk and severity (Tsopani et al., 2011; Kolt and Kirby, 1994). Self-confidence refers to a feeling of trust in one's ability to perform successfully (Barreto et al., 2016; Besharat & Pourbohloul, 2011; Hall & Kerr, 1997; Hanton et al., 2004; Kais & Raudsepp, 2005; León-Prados et al., 2011; Marshall & Gibson, 2017; McCarthy et al., 2013; Pineda-Espejel, 2013; Tsopani et al., 2011). Furthermore, self-confidence, an important determinant of performance, tends to be inversely related to cognitive and somatic anxiety (Barreto et al., 2016; Besharat & Pourbohloul, 2011; Cox, 2012; Craft et al., 2003; Donti et al., 2011; Hanton et al., 2004; Humara, 1999; Kais & Raudsepp, 2005; León-Prados et al., 2011; Marshall & Gibson, 2017; Pineda-Espejel, 2013; Weiss et al., 1989; Tsopani et al., 2011; Woodman & Hardy, 2003). In addition to the competitive environment, the nature of the sport may also be a source of anxiety. For example, in gymnastics, athletes perform on apparatuses that are high off the ground, such as the balance beam or the uneven bars and fear of falling or injury may increase anxiety which ultimately leads to a decrease in performance as well as an increased risk of injury (Cartoni et al., 2005; Caine & Nassar, 2005; Chase et al., 2005; Cottyn et al., 2006, 2008; Martin et al., 2008).

Anxiety can be quantified within an individual and at specific points in time through questionnaires. The Competitive State Anxiety Inventory-2 (CSAI-2) is the most widely used assessment for evaluating state anxiety. The CSAI-2 assesses cognitive anxiety, somatic anxiety, and self-confidence via three subscale scores (Craft et al., 2003; Cottyn et al., 2006, 2008; Cox et al., 2003; Craft et al., 2003; Fernandes et al., 2013; Hanton et al., 2004; Humara, 1999; Jones & Hanton, 2001; Jones & Swain, 1992; Jones et al., 1993; Kais & Raudsepp, 2004; Koehn, 2013; Marshall & Gibson, 2017; Martens et al., 1990; Pineda-

Espejel et al., 2013; Tsopani et al., 2011; Woodman & Hardy, 2003; Zeng, 2003). The CSAI-2 is a revision to the CSAI and was developed by Martens, Vealey, and Burton in 1990. The CSAI-2 has 27 statements that are answered on a Likert-like scale, which ranges from 1 (not at all) to 4 (very much so). Higher scores on the subscales are considered indicate of higher levels of somatic and cognitive anxiety, as well as higher levels of self-confidence. According to Zeng (2003), the CSAI-2 should be completed no more than one hour before the competition in order to obtain accurate results. Jones and Hanton (2001) found high internal reliability for both cognitive ($r=0.82$, $p<0.001$) and somatic ($r=0.86$, $p<0.001$) anxiety. Molina and colleagues (2018) administered the CSAI-2 to 300, competitive, 11 – 18 year-old Chilean athletes in individual (including swimming, rhythmic, gymnastics, tennis, and more) as well as collective sports (including basketball, soccer, rugby, and volleyball) and found the survey to have Cronbach alpha levels of 0.88 and Pineda-Espejel and colleagues (2013) found Cronbach alpha levels of 0.87 on the two anxiety subscales and 0.90 for the self-confidence subscale, and 0.90 for all three subscales when tested in sixty, male and female artistic gymnasts aged 15 to 30 years.

The somatic and cognitive subscales of the CSAI-2 have been found to be positively correlated with threat and challenge, which are commonly involved in athletic competitions (Cerin, 2003). Kais and Raudsepp (2004) administered the CSAI-2 to athletes in several different sports, and found that self-confidence, somatic anxiety, and cognitive anxiety each affect and can predict performance. Hardy and colleagues (1996) found that self-confidence is correlated with higher levels of performance. Hardy (1996) suggested that self-confidence has more effect on performance than cognitive or somatic anxiety levels, thus verifying the need for all three subscales. Besharat and Pourbohloul (2011) confirmed that self-confidence is lower when anxiety levels are high and vice-versa in a study with 246 athletes of varying sports. In a study by Cerin (2003), using the CSAI-2, elevated anxiety levels were found to hinder performance and were associated with negative emotional state, self-defeating thoughts, fear, discouragement, and self-focused attention.

Coaches and sport-performance professionals who regularly work with gymnasts are in a unique position to identify athletes with high levels of trait, state, and/or competition anxiety and provide tools to mitigate performance-impairing thoughts and feelings (Anshel & Wells, 2000; Barreto, de Moraes, de Souza Zanini, Neiva, Vilela Terra, Filho & Lopes Veradi, 2016; Grossbard, Smith, Smoll & Cumming, 2009; Magyar & Chase, 1996; Marshall & Gibson, 2017; Molina, Oriol & Mendoza, 2018; Tzetzis, Votsis & Kourtessis, 2008). In a gymnastics competition, there is an increased pressure to perform well, to attain a higher score, and likely other anxiety-inducing factors that are not experienced during a gymnastics practice however, it is unclear if and how anxiety varies between practice and competition. Therefore, the purpose of the current study was to examine the difference in anxiety between pre-practice and pre-competition scenarios among competitive preadolescent female gymnasts as assessed by the Competitive State Anxiety Inventory-2 (CSAI-2). It was hypothesized that the subscales of the CSAI-2 (cognitive anxiety, somatic anxiety, and self-confidence) would reflect higher levels of anxiety and lower levels of self-confidence to a prior to a competition scenario as compared to a pre-practice scenario.

2. METHODS AND MATERIALS

2.1 Participants

The participants for this study were competitive female gymnasts recruited from local gymnastics teams and volunteered to take part in the study. Only gymnasts who were at a competitive level in gymnastics (at least a level 3) were permitted to participate in this

study. The gymnasts ranged in age from 11-13 years old. The study was conducted in June of 2019, and was temporally close to the participants' yearly State Meet. Each gymnast participated in normal gymnastics team practices and all other activities as she normally would (sleeping, eating, extracurricular activities, etc.). Each gymnast was in in-season training shape.

The University Institutional Review Board (IRB) granted permission to conduct the study prior to participant recruitment. Each volunteer was given a written assent/consent form (IRB approved), which was read and signed by the participant and her parent before engaging in any of the study protocols.

2.2 Instruments and Apparatus

The CSAI-2 was utilized to assess cognitive anxiety, somatic anxiety, and self-confidence via three subscale scores. The CSAI-2 has 27 statements that are answered on a Likert-like scale, which ranges from 1 not at all to 4 very much so. Higher scores on the subscales are considered indicative of higher levels of somatic and cognitive anxiety, as well as higher levels of self-confidence.

In order to assure that the gymnast was in an atmosphere that was comfortable or familiar to her, each gymnast completed the pre-practice questionnaires at her local gym. Pencils and pens were used to fill out the CSAI-2 questionnaires. Somatic anxiety, cognitive anxiety, and self-confidence were all calculated in the same manner, as defined by Martens and colleagues (1990). The researcher was responsible for explaining and distributing each questionnaire. The explanations were given on the same day that the questionnaires were completed to verify that each gymnast fully understood the procedures. The explanations for completion of the questionnaires were given in the same way to every participant, and each participant was treated identically by the researcher.

2.3 Procedures

All participants were together, at the same time of day, and listened to the same instructions given by the researcher concerning how to complete each questionnaire. All participants were educated about the procedures, expectations, and voluntary nature of the study. Participants were informed of the option to withdraw at any time, for whatever reason, with no penalty. Proper protocol for completing the questionnaires was explained, and the principal researcher was present during the completion of the questionnaires and available for any needed clarifications. Participants of the study were encouraged to take however long was needed to complete each questionnaire to the best of their ability and encouraged not to rush through the questions.

Each participant completed a total of three CSAI-2 questionnaires on separate days: once before a competition (pre-competition) and on two different occasions before a practice session (pre-practice). Gymnasts competed in different competitions on different days, but both pre-practice questionnaires were completed before the gymnast completed the pre-competition questionnaire. Pre-practice questionnaires were filled out at least one week prior to the competition in which she was competing. Once the questionnaires were completed, the scores were calculated for each of the three subscales as prescribed by Martens and colleagues (1990). Height, weight, age and gymnastic level were self-reported.

2.4 Reliability

The Competitive State Anxiety Inventory-2 (CSAI-2) is probably the most widely used anxiety assessment (Cox et al., 2003). The reliability of the CSAI-2 has been reported as

follows: $r=0.79-0.90$ for somatic anxiety, $r=0.80-0.90$ for cognitive anxiety, $r= 0.90$ or higher for both somatic and cognitive anxiety, $r=0.86-0.94$ for self-confidence, and Cronbach alpha levels ranging from 0.79-0.94 (Cerin, 2003; Craft et al., 2003; Fernandes et al., 2013; Hall & Kerr, 1997; Jones & Hanton, 2001; Koehn, 2013; Martens et al., 1990; Pineda-Espejel, 2013; Reid & DeBeliso, 2019; Tsopani et al., 2011; Zeng, 2003). The reliability of the CSAI-2 among this cohort was established and reported elsewhere as part of the current study (Reid & DeBeliso, 2019).

2.5 Design

Each participant completed the CSAI-2 three times: two pre-practice sessions, and one pre-competition (or meet) session. The CSAI-2 is comprised of three subscales: cognitive anxiety, somatic anxiety, and self-confidence. The CSAI-2 subscale scores were averaged for the pre-practice sessions and compared to the CSAI-2 subscale scores from the pre-competition session with paired t-tests ($\alpha \leq 0.05$). Cohen's (1988) effect size (ES) and percent change differences for the subscales between the pre-practice and pre-competition were also calculated. Data management and statistical analysis were conducted with MS Excel. The Excel spreadsheet of data was peer reviewed for exactitude as forwarded by AlTarawneh and Thorne (2017).

3. RESULTS

A total of ten gymnasts completed the study. Originally twelve gymnasts began the study, and while there were no injuries or adverse effects related to the study, two volunteers dropped-out. All participants were competitive female gymnasts, aged 11 – 13 years, and level six or higher gymnastics ability. Table 1 shows the descriptive information of the participants.

Table 1: Descriptive data of participants

	N	Age (years)	Level	Height (cm)	Mass (kg)
Participants	10	12.2±0.8	7.7±1.6	146.5±9.2	43.5±7.8

Tables 2 and 3 show the raw individual scores from the CSAI-2 questionnaires along with the group means and standard deviations. Table 4 provides the change in percent mean (Δ mean %), ES, and the p-values for each of the given subscales between pre-practice and pre-competition.

Table 2: Competitive State Anxiety Inventory-2 (CSAI-2) Pre-Practice individual and group scores

Participant	CSAI-2 Cognitive Trial Average	CSAI-2 Somatic Trial Average	CSAI-2 Self-Confidence Trial Average
1	13	23	23
2	28	27	16.5
3	12	18.5	26
4	13	18.5	28.5
5	20.5	19.5	16.5
6	14	19	29.5
7	15.5	13.5	28.5
8	13.5	10	26.5
9	25.5	16	26
10	16.5	11.5	21.5

Mean	17.2	17.7	24.3
SD	5.6	5.2	4.8

Table 3: Competitive State Anxiety Inventory-2 (CSAI-2) Pre-Competition individual and group scores

Participant	CSAI-2 Cognitive Score	CSAI-2 Somatic Score	CSAI-2 Self-Confidence Score
1	12	23	24
2	25	26	17
3	17	20	27
4	14	17	33
5	24	25	14
6	11	15	28
7	17	13	27
8	18	12	19
9	26	24	19
10	20	18	14
Mean	18.4	19.3	22.2
SD	5.3	5.1	6.5

Table 4: Competitive State Anxiety Inventory-2 Subscale change from Pre-Practice to Pre-Competition

	CSAI-2 Cognitive	CSAI-2 Somatic	CSAI-2 Self-Confidence
Δ mean %	7.3	9.3	8.5
ES	0.22	0.32	-0.43
p-value	0.10	0.10	0.07

4. DISCUSSION

The purpose of this study was to examine the difference in cognitive and somatic anxiety as well as self-confidence between pre-practice and pre-competition scenarios among competitive preadolescent female gymnasts as assessed by the Competitive State Anxiety Inventory-2 (CSAI-2). It was hypothesized that the subscale scores of the CSAI-2 for cognitive and somatic anxiety would be higher and self-confidence scores would be lower prior to a pre-competition setting as compared to a pre-practice setting.

The differences between pre-competition and pre-practice subscale scores of the CSAI-2 were compared in several manners to address the emerging issues regarding the interpretation of research results (Amrhein, Korner-Nievergelt, & Roth, 2017; Open Science Collaboration, 2015; Wasserstein & Lazar, 2016; Winter, Abt, & Nevill, 2014). Results from dependent t-tests comparing the pre-competition and pre-practice subscale scores of the CSAI-2 nearly achieved statistical significance (p-values ranged: 0.07↔0.10). The ES between the pre-competition and pre-practice subscale scores of the CSAI-2 ranged from small (0.22 and 0.32 for cognitive and somatic anxiety, respectively) to medium (-0.43 for self-confidence), as characterized by Cohen (1988). The Δ mean % between the pre-competition and pre-practice subscale scores of the CSAI-2 ranged from 7.3↔9.3 %. Our collective interpretation of the three analysis is that the pre-competition setting induces greater anxiety and lower self-confidence when compared to the pre-practice scenario. Arguably, some may consider these less favorable differences in anxiety and self-confidence as trivial. Others may view these relatively small differences in anxiety and self-confidence as having the potential to negatively impact competition performance with rather large ramifications. In our opinion, this point cannot be understated. Often times, placing in a gymnastics meet can be determined by as little as a 1/100th of a point. Top

placement in Regional or National meets may result in placement on a National team or a potential scholarship to an elite high school or University. Additionally, this study had a limited sample size which can lead to erroneous p-values and “not statistically significant results can be practically or clinically meaningful” (Winter, Abt, & Nevill, 2014). Further, there are mounting concerns regarding the reproducibility of research (Open Science Collaboration, 2015) and the overdependence upon p-values as the mechanism of evaluating the outcome of a research effort (Amrhein et al., 2017). As such, the American Statistical Association (Wasserstein & Lazar, 2016) suggests “a variety of numerical and graphical summaries of data.”

Our findings are in agreement with prior research indicating that a competition can be more anxiety-inducing than a practice setting (Allie et al., 2018; Barreto et al., 2016; Cottyn et al., 2006; Duda & Gano-Overway, 1997; Gillham & Gillham, 2014; Hanton et al., 2004; Jones et al., 1993; Kais & Raudsepp, 2005; Marshall & Gibson, 2017; Woodman & Hardy, 2003) and a decrease in self-confidence as anxiety increases (Barreto et al., 2016; Besharat & Pourbohloul, 2011; Craft et al., 2003; Hanton et al., 2004; Hardy, 1996; Jones & Hanton, 2001; León-Prados et al., 2011; Marshall & Gibson, 2017). The present study demonstrated that on average when anxiety scores for cognitive or somatic subscales were higher, then self-confidence scores were lower, and that when cognitive or somatic anxiety subscores were lower that self-confidence scores were higher. Anxiety is a psychological aspect of sports that can, depending on the person or the situation (trait versus state), affect performance (Chase et al., 2005; Cox, 2012; Koehn, 2013; Schmidt & Lee, 2014). Multiple studies have shown that anxiety can decrease the quality of performance, thus presenting a need for determining anxiety levels, and when these levels might be higher or lower, such as pre-competition compared to pre-practice (Allie et al., 2018; Basler et al., 1976; Cagle et al., 2017; Caine & Nassar, 2005; Cartoni et al., 2005; Cerin, 2003; Chase et al., 2005; Cottyn et al., 2006, 2008; Craft et al., 2003; Ford et al., 2017; Hanton et al., 2004; Harringe et al., 2004; Kolt & Kirby, 1994; León-Prados et al., 2011; Magyar & Chase, 1996; McCarthy et al., 2013; de Pero et al., 2013; Pineda-Espejel et al., 2013; Tsopani et al., 2011). To our knowledge, research comparing anxiety and self-confidence levels prior to practice compared to a competition is limited, as is sport psychology research in the pre-adolescent gymnast.

In this study, competition was perceived as more stressful, or anxiety-inducing, than practice situations, which confirms previous research indicating that competitive scenarios can induce anxiety depending on the athlete’s interpretation of the situation, and whether or not he or she perceives himself or herself as ready for the competition (Cartoni et al., 2005; Grossbard et al., 2009; León-Prados et al., 2011; Woodman & Hardy, 2003). There is evidence that suggests a relationship between somatic anxiety, cognitive anxiety, self-confidence, and performance (Bozkus & Kul, 2013; Englert & Bertrams, 2012; Humara, 1999; Kohen, 2013; Zeng, 2013). The results of the current study are in agreement with previous research indicating higher levels of both somatic and cognitive anxiety are associated with lower levels of self-confidence. Specifically, in the current study prior to a competition, the relationship between somatic anxiety and self-confidence and cognitive anxiety and self-confidence was $r=-0.45$ & $r=-0.74$ respectively. Previous research has concluded that high levels of self-confidence can decrease cognitive anxiety and the physiological symptoms of somatic anxiety (Barreto et al., 2016; Besharat & Pourbohloul, 2011; Craft et al., 2003; Hanton et al., 2004; Hardy, 1996; Jones & Hanton, 2001; León-Prados et al., 2011; Marshall & Gibson, 2017). The inverse relationship between anxiety (cognitive and somatic) and self-confidence may provide guidance for coaches and athletes with regards to strategies for the effective management of an athlete’s anxiety levels and optimizing performance (Bozkus & Kul, 2013; Zeng, 2013).

The current study focused on anxiety and self-confidence among a small sample of pre-adolescent female gymnasts, hence extrapolating the results of the current study to other athlete populations is rather limited. Future research might replicate the current study among male and female gymnasts at varying levels of skill development and age. Many gymnasts start competing as young as age six, and will compete throughout high school. Competitive levels in the Junior Olympic Program range from levels 3 to 10, for both males and females. Further, the Excel Program, which is a derivative of the Junior Olympic Program, has levels from Bronze to Platinum, which are similar to level 2/3 for bronze, 3/4 for silver, 4/5 for gold, 5/6 for platinum, and 6 for diamond. Gymnasts may start competing at age 5 in the Excel Program, and are given more liberty to which skills are permitted in their routines. Knowledge of how a gymnast's anxiety and self-confidence may vary in response to a competitive scenario across the aforementioned strata would be valuable to the coach, parent and athlete.

The tool used to measure these constructs in our population of interest, however, may represent a limitation. The CSAI-2 is a valid instrument for assessing somatic anxiety, cognitive anxiety, and self-confidence among 13-16 year olds (Martens, Vealey, & Burton, 1990) while the CSAI-2C has been revised and validated with language age appropriate for children 8-12 years old (Stadulis, MacCracken, Eidson, & Severance, 2002). Finally, the CSAI-2R has been revised and validated in college intramural and intercollegiate athletes (Cox, Martens, & Russell, 2003). The participants in the current study were: 13 (n=4), 12 (n=4) and 11 (n=2) years of age. As such, the participants were not ideally suited for using either the CSAI-2R or the CSAI-2C. The CSAI-2C and the CSAI-2R are derivatives of the CSAI-2, hence it was determined that the most apposite instrument for use in the current study was the CSAI-2. It should be noted that none of the participants in the current study expressed that they did not understand the questions as written on the CSAI-2. Additionally, the internal consistency (Cronbach alpha) of the pre-practice CSAI-2 subscale scores ranged from 0.81-0.86 which compares favorably with that reported by Cox, Martens, & Russell (2003). With that said, the development of an age appropriate version of the CSAI-2 that is suited for youth competitive athletes across a range of ages appears warranted.

Based on our initial findings, future researchers may consider investigating how anxiety and self-confidence directly impact performance scores in a gymnastic competition. As previous research suggests that anxiety affects performance (Cagle et al., 2017; Caine & Nassar, 2005; Cartoni et al., 2005; Cerin, 2003; Chase et al., 2005; Cottyn et al., 2006, 2008; Cox, 2012; Craft et al., 2003; Ford et al., 2017; Hanton et al., 2004; Harringe et al., 2004; Koehn, 2013; Kolt & Kirby, 1994; León-Prados et al., 2011; Magyar & Chase, 1996; McCarthy et al., 2013; de Pero et al., 2013; Pineda-Espejel et al., 2013; Schmidt & Lee, 2014; Tsopani et al., 2011); this information would be beneficial for coaches and athletes to better understand how an individual's anxiety level may affect personal performance. Research should also investigate the effect of different coping strategies (age/level appropriate) on anxiety and self-confidence. Knowledge of validated coping strategies would provide coaches and athletes a mechanism to modulate anxiety and self-confidence in order to enhance performance quality.

5. CONCLUSION

The current study investigated how anxiety and self-confidence vary between a pre-practice and pre-competition setting among pre-adolescent gymnasts. The results suggest that anxiety and self-confidence shift to a less favorable state prior to a competition setting. Insight concerning when an athlete will experience higher or lower anxiety levels may serve to inform coaches and athletes as to when to implement anxiety-management techniques for the purpose of enhancing performance.

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