

## Effects of state anxiety on music performance: Relationship between the Revised Competitive State Anxiety Inventory-2 subscales and piano performance

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### • ABSTRACT

This study investigated the relationship between the Revised Competitive State Anxiety Inventory-2 (CSAI-2R, Cox, Martens, & Russell, 2003; Jones & Swain, 1992; Martens, Vealey, & Burton, 1990) subscales and the quality of music performance to compare the anxiety-performance relationship in pianists with that in athletes and to gain insights into the effective coping strategies for music performance anxiety (MPA). Fifty one students (15 women and 36 men) aged 18-26 years ( $M = 20.6$ ,  $SD = 2.3$ ) completed the CSAI-2R just prior to their individual piano performances in a concert, followed by the self-evaluation of performance quality. The CSAI-2R demonstrated adequate psychometric properties when applied to MPA. Consistent with the previous findings in sport psychology, correlation analyses and multiple regression analyses showed that self-confidence intensity positively predicted global performance ( $p < .001$ ). Cognitive anxiety intensity negatively predicted technical accuracy ( $p < .05$ ), while cognitive anxiety direction positively predicted global performance ( $p < .05$ ). On the other hand, the correlation between somatic anxiety and performance was non-significant. We conclude that acquiring self-confidence, reducing pre-performance cognitive anxiety, and interpreting the symptoms of cognitive anxiety as being facilitative to the subsequent performance will improve performance quality. Based on the present findings, the effectiveness of mental skills training for athletes and some educational methods in treating MPA is discussed.

**Keywords:** music performance anxiety, Revised Competitive State Anxiety Inventory-2, anxiety-performance relationship, piano performance, self-confidence.

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## INTRODUCTION

### SIMILARITIES BETWEEN SPORT AND MUSIC PERFORMANCE

It is obvious that many differences exist between sport and music performance. Clearly, much of the appeal of music lies in its expressiveness. Music is able to express emotions, beauty, motion, expressive form, energy, tension, events, religious faith, personal identity, and social conditions (Juslin, 2001; Juslin & Persson, 2002), allowing performers and listeners to share the feelings and inspirations. While some sports such as figure skating or synchronized swimming may also involve communicating these images, the appeal of most sports seems to lie in other aspects, such as becoming physically fit, feeling excitement, forming friendships, and so on (Sit & Lindner, 2005, 2006). Thus, people's motives for their engagement in these two types of activities appear to be quite different in nature. Moreover, the criteria used to assess music performances are generally not as clear-cut as those of sports. For example, swimmers' performance can be objectively measured by timing them (Martens, Vealey, & Burton, 1990). Music performances, however, are often evaluated subjectively. Musical competencies can be grouped into four types: technique; interpretation; expression; and communication (McPherson & Schubert, 2004), and predictably, the assessments of elements such as interpretation and expression tend to be influenced by evaluators' preferences.

Despite these differences, sport and music performance share certain similarities that are relevant within the context of motor control and learning (Green & Gallwey, 1987). Firstly, since both demand a degree of mastery over the human body (Green & Gallwey, 1987), the training of athletes and the practice of musicians include the process of motor learning, passing from a cognitive through an associative to an autonomous phase (Fitts & Posner, 1967). In the cognitive phase, athletes may learn skills by observing the movements of their coaches and team-mates, while pianists may intend to produce appropriate physical actions after encoding the printed music in terms of its structural and technical properties (Lehmann & McArthur, 2002). After hard practice, the knowledge of both athletes and musicians will become implicit and non-verbalizable, leading to smooth, effortless, and fast performance (Fitts & Posner, 1967). Secondly, since both sport and music are normally performed in front of an audience, they both provide an opportunity for sharing the enjoyment of excellence, as well as the experience of psychological pressures (Green & Gallwey, 1987), which possibly leads to competitive anxiety in athletes and music performance anxiety (MPA) in musicians. Thirdly, the provoked anxiety may prevent athletes or musicians from achieving performance corresponding to their aptitude, training, and level of preparation. Anxiety symptoms such as trembling, irregular breathing, sweating, heightened distractibility, and muscle tension (Kesseling, 2006; Steptoe, 2001) can seriously interfere with fine motor control of both athletes and musicians, leading to impaired performance and even to dropout (Craske & Craig, 1984; Martens *et al.*, 1990; Nagel, Himle, & Papsdorf, 1981;

Pijpers, Oudejans, Holsheimer, & Bakker, 2003; Wesner, Noyes, & Davis, 1990; Wolfe, 1989). Finally, various treatments for competitive anxiety in athletes, including the cognitive behavioural therapy (Holm, Beckwith, Ehde, & Tinius, 1996), cognitive restructuring (Haney, 2004), progressive muscle relaxation (Haney, 2004), and mental skills training (Mamassis & Doganis, 2004; Savoy, 1997), have been shown to be effective in treating MPA as well (Appel, 1976; Buswell, 2006; Clark & Agram, 1991; Connolly & Williamson, 2004; Harris, 1987; Kendrick, Craig, Lawson, & Davidson, 1982; Nagel, Himle, & Papsdorf, 1989; Sweeney & Horan, 1982; Wardle, 1975).

Although the relationship between anxiety and performance in sport has received considerable research attention (*e.g.*, Martens *et al.*, 1990), little has been done on the relationship in music performance. Considering these significant similarities between sport and music performance, however, musicians are likely to benefit from the extensive knowledge of anxiety coping strategies that has been gained from decades of studies in sport psychology through the comparison of the anxiety-performance relationship in musicians with that in athletes.

#### MEASURING MPA BY THE REVISED COMPETITIVE STATE ANXIETY INVENTORY-2

So far, many MPA self-report measures have been developed (Abel & Larkin, 1990; Appel, 1976; Brodsky, Sloboda, & Waterman, 1994; Cox & Kenardy, 1993; Craske & Craig, 1984; Dews & Williams, 1989; Kendrick *et al.*, 1982; Kenny, Davis, & Oates, 2004; Kubzansky & Stewart, 1999; Lehrer, Goldman, & Strommen, 1990; Nagel *et al.*, 1989; Neftel *et al.*, 1982; Osborne & Kenny, 2005; Steptoe & Fidler, 1987; Sweeney & Horan, 1982; Tobacyk & Downs, 1986; Wesner *et al.*, 1990; Wills & Cooper, 1988; Wolfe, 1989), including some psychometrically robust instruments such as the Music Performance Anxiety Inventory for Adolescents (Osborne & Kenny, 2005; Osborne, Kenny, & Holsomback, 2005). In an attempt to compare MPA with competitive anxiety in athletes, however, it is necessary to measure MPA by the same instrument as athletes to prevent different concepts of anxiety being reflected in the scores. From this point of view, we selected the Competitive State Anxiety Inventory-2 (CSAI-2, Martens *et al.*, 1990) as an alternative way of measuring MPA.

The CSAI-2 is an instrument developed to measure competitive state anxiety in athletes, which consists of three subscales (*i.e.*, *cognitive anxiety*, *somatic anxiety*, and *self-confidence*). There are several reasons why this instrument is considered particularly useful in regard to the aim of this study. Firstly, the CSAI-2 is one of the most widely used anxiety scales in sport psychology research (Cox, Martens, & Russell, 2003; Martens *et al.*, 1990). A vast amount of literature on the relationship between its subscales and sport performance enables us to compare our results with those of athletes. Secondly, the CSAI-2 enables us to measure MPA as state anxiety, which is characterized by subjective, consciously perceived concurrent feelings of apprehension and tension evoked in reaction to an external stimulus (Spielberger, 1966). Although

most MPA self-report measures (e.g., Cox & Kenardy, 1993; Kenny *et al.*, 2004; Steptoe & Fidler, 1987) assess MPA as trait anxiety, state anxiety has been indicated to predict performance better than trait anxiety (Martens *et al.*, 1990). Thirdly, the CSAI-2 was developed based on the *multidimensional anxiety theory*, which assumes that two rather independent components of anxiety (*i.e.*, cognitive anxiety and somatic anxiety) affect sport performance differently (Martens *et al.*, 1990). According to the *matching hypothesis*, the most effective approach to the reduction of anxiety and to the enhancement of performance is with a method directed at the type of anxiety being experienced (Martens *et al.*, 1990; Maynard & Cotton, 1993). Since MPA has also been indicated to involve both cognitive and somatic (or physiological) components (Brotons, 1994; Cox & Kenardy, 1993; LeBlanc, Jin, Obert, & Siivola, 1997; Miller & Chesky, 2004; Papageorgi, Hallam, & Welch, 2007; Steptoe, 2001), examining the anxiety-performance relationship using the CSAI-2 will provide some useful guidelines as to which subtype of anxiety should be targeted at in the MPA treatments.

Despite the substantial contribution that the CSAI-2 has made to sport psychology research, measuring MPA using the original version (Martens *et al.*, 1990) may be inappropriate, because studies have demonstrated its shortcomings in the theoretical factor structure (Cox *et al.*, 2003; Lane, Sewell, Terry, Bartram, & Nesti, 1999; Tsorbatzoudis, Barkoukis, Kaissidis-Rodafinos, & Grouios, 1998; Tsorbatzoudis, Barkoukis, Sideridis, & Grouios, 2002). Recently, Cox *et al.* (2003) revised the instrument using more rigorous analytic techniques and larger samples than those used in Martens *et al.*'s (1990) original work. Furthermore, the Revised CSAI-2 (CSAI-2R) has been shown to be psychometrically sounder than the original CSAI-2 in the English (Cox *et al.*, 2003), Swedish (Lundqvist & Hassmen, 2005) and Spanish (Fernandez, Rio, & Fernandez, 2007) versions. In the present study, therefore, we assessed MPA by the CSAI-2R, which possesses considerably better psychometric properties than the original CSAI-2.

Prior to examining the relationship between the CSAI-2R subscales and the quality of music performance, we attempted to verify the validity and reliability of the CSAI-2R when applied to MPA. In terms of the reliability, we calculated Cronbach's alpha coefficients to examine the internal consistency of the three subscales. To verify the criterion validity, we examined the correlations between the CSAI-2R subscales and the state subscale of the State-Trait Anxiety Inventory (STAI, Spielberger, Gorsuch, & Lushene, 1970), which has been used most frequently to assess MPA as state anxiety (Brodsky, 1996; Osborne & Kenny, 2005). The STAI is an instrument to assess state anxiety in general, which is characterized by recognizable emotions and physical symptoms (Spielberger, 1966). The former can be regarded as being equivalent to cognitive anxiety, and the latter to somatic anxiety. Furthermore, self-confidence originally emerged at the opposite end of a cognitive anxiety continuum (Martens *et al.*, 1990). Therefore, we hypothesized that the state subscale of the STAI has positive correlations with the cognitive and somatic anxiety intensity subscales

and a negative correlation with the self-confidence subscale. To confirm the construct validity of the CSAI-2R, we computed the correlations between the CSAI-2R subscales and the Performance Anxiety Questionnaire (PAQ, Cox & Kenardy, 1993), which assesses MPA as trait anxiety. We selected this particular instrument from many MPA measures because it contains the statements describing both cognitive feelings (*e.g.*, I worry about my performance.) and somatic symptoms (*e.g.*, I feel tense in my stomach.), which closely correspond to the cognitive and somatic anxiety subscales of the CSAI-2R, respectively. According to the state-trait theory of anxiety, the higher individuals' trait anxiety is, the higher their state anxiety tends to be when exposed to stressful situations (Spielberger, 1966). Based on this principle, we hypothesized that the PAQ score positively correlates with both cognitive and somatic anxiety intensity subscales.

#### RELATIONSHIP BETWEEN THE CSAI-2 SUBSCALES AND PERFORMANCE QUALITY

The multidimensional anxiety theory (Martens *et al.*, 1990) hypothesized that each component of the CSAI-2 relates to performance differently: (a) cognitive anxiety shows a negative linear relationship; (b) somatic anxiety shows an inverted-U relationship; and (c) self-confidence shows a positive linear relationship. Although some data supported these hypotheses (Burton, 1988; Chamberlain & Hale, 2007), many inconsistent findings have also been reported (Edwards & Hardy, 1996; Eubank, Smith, & Smethurst, 1995; Gould, Petlichkoff, Simons, & Vevera, 1987; Gould, Petlichkoff, & Weinberg, 1984; Hardy, 1996; Jerome & Williams, 2000; Jones, Swain, & Hardy, 1993; Kais & Raudsepp, 2004; Maynard & Cotton, 1993; Perreault & Marisi, 1997; Raudsepp & Kais, 2002; Swain & Jones, 1996). Thus, the results of three meta-analyses (Craft, Magyar, Becker, & Feltz, 2003; Moritz, Feltz, Fahrbach, & Mack, 2000; Woodman & Hardy, 2003) would provide some beneficial views on this equivocal relationship between the CSAI-2 subscales and sport performance.

The most significant finding so far is a positive relationship between self-confidence and performance. Self-confidence has been indicated to influence sport performance most strongly among the three components of the CSAI-2 (Craft *et al.*, 2003; Woodman & Hardy, 2003). In an attempt to explore the potential moderating effect of the type of skill on the relationship between the CSAI-2 subscales and performance, Craft *et al.* (2003) found that the relationship was stronger for open skills (*i.e.*, skills performed in constantly changing environments, *e.g.*, basketball and tennis) than for closed skills (*i.e.*, skills performed in more stable environments that are relatively predictable and often self-paced, *e.g.*, golf and gymnastics). Nevertheless, only the positive effect of self-confidence on performance remained significant across different skill types, indicating the robustness of its effect. It may safely be inferred, therefore, that self-confidence predicts performance quality in musicians even though music performance is generally a kind of closed skill. Additionally, *self-efficacy*, which can be viewed as a situationally specific self-confidence (Feltz, 1988), has been found

to be the most important predictor of achievement in graded music examinations (McCormick & McPherson, 2003; McPherson & McCormick, 2006), suggesting the importance of self-confidence for excellent music performances.

Regarding the relationship between cognitive anxiety and performance, the results have been inconsistent. While some studies successfully demonstrated a negative linear relationship (Burton, 1988; Chamberlain & Hale, 2007; Kleine, 1990; Woodman & Hardy, 2003), some found an unexpected curvilinear relationship (Jerome & Williams, 2000; Swain & Jones, 1996), and others failed to find any significant relationship (Craft *et al.*, 2003; Gould *et al.*, 1987; Kais & Raudsepp, 2004; Maynard & Cotton, 1993; Perreault & Marisi, 1997; Raudsepp & Kais, 2002). The findings about the relationship between somatic anxiety and performance have also been conflicting. Although some pieces of evidence for an inverted-U relationship have been obtained (Burton, 1988; Chamberlain & Hale, 2007; Gould *et al.*, 1987), some studies produced an unexpected positive (Edwards & Hardy, 1996) or negative (Jerome & Williams, 2000) linear relationship, and others failed to find any significant relationship (Craft *et al.*, 2003; Eubank *et al.*, 1995; Kais & Raudsepp, 2004; Maynard & Cotton, 1993; Perreault & Marisi, 1997; Raudsepp & Kais, 2002; Swain & Jones, 1996). These equivocal findings indicate that the effects of cognitive and somatic anxiety upon performance are subtle compared to the effect of self-confidence. However, even if the two types of anxiety do not predict global performance, it is quite possible that they are related to some skill components, as shown by Kais and Raudsepp (2004). In the present study, therefore, we attempted to exploratively examine the effects of cognitive and somatic anxiety on various music-performance skill components.

While the earlier studies on the multidimensional anxiety theory only assessed the *intensity* of anxiety symptoms, Jones and Swain (1992) added the *direction* subscales, which assess the extent to which athletes perceive the experienced intensity of each symptom as either facilitative (positive) or debilitating (negative) to a subsequent performance, to the CSAI-2. When examining the relationship between the direction subscales and performance, self-confidence direction is usually omitted, since measuring both the intensity and direction dimensions of self-confidence is considered redundant due to the strong correlation between them (Jones *et al.*, 1993). The findings obtained so far generally suggest that perceiving anxiety symptoms as being facilitative improves performance. Although some studies failed to find any significant relationship between the direction subscales and sport performance (Edwards & Hardy, 1996; Eubank *et al.*, 1995), most others have consistently shown that the anxiety direction positively predicts performance (Chamberlain & Hale, 2007; Grobbelaar & Coetzee, 2006; Jerome & Williams, 2000; Kais & Raudsepp, 2004; Raudsepp & Kais, 2002; Swain & Jones, 1996). Some even reported that the direction subscales explained a larger portion of performance variance than the intensity subscales (Chamberlain & Hale, 2007; Swain & Jones, 1996). In addition, elite athletes have been found to interpret their anxiety symptoms as being more



facilitative to performance than non-elite athletes (Jones, Hanton, & Swain, 1994; Jones *et al.*, 1993). Furthermore, in learning the *stress inoculation*, which is one of the promising skills to cope with MPA, musicians are instructed to reframe their anxiety symptoms as normal or desirable reactions that contribute to a more lively, exciting musical performance (Meichenbaum, 1985; Salmon, 1991; Wilson, 2002; Wilson & Roland, 2002). Based on these findings, we hypothesized that the direction subscales of cognitive and somatic anxiety positively predict pianists' performance quality.

The purpose of the present study therefore was to examine the relationship between MPA assessed as state anxiety by the CSAI-2R and performance quality in pianists. The hypotheses were the following:

1. The intensity subscale of self-confidence predicts performance quality positively and consistently.
2. The intensity subscales of cognitive and somatic anxiety differently predict the evaluation scores of various skill components.
3. The direction subscales of cognitive and somatic anxiety positively predict performance quality.

## METHOD

### PARTICIPANTS

In total, 51 members of a university piano club (15 women and 36 men) in Tokyo, Japan, aged 18-26 years ( $M = 20.6$ ,  $SD = 2.3$ ), with an average musical experience of 13.5 years ( $SD = 4.3$ ), gave written consent to participate. The participants were a mixture of students at eight different universities. Of the participants investigated, six were music students majoring in piano performance. Although the others were non-music majors, their skill levels were comparable to those of music majors. This club was famous for its elite members, including lots of prize winners of celebrated piano competitions in Japan, such as PTNA (the piano teachers' national association of Japan incorporated by the Japanese government) Piano Competition and Japan Amateur Piano Competition.

### INSTRUMENTATION

#### Pre-performance questionnaire

The pre-performance questionnaire included a modified version of the CSAI-2R (Cox *et al.*, 2003; Martens *et al.*, 1990) and the state subscale of the STAI (Spielberger *et al.*, 1970).

The original CSAI-2R (Cox *et al.*, 2003) comprised 17 items, with five items in the cognitive anxiety subscale (*e.g.*, I am concerned about choking under pressure.), seven items in the somatic anxiety subscale (*e.g.*, My heart is racing.), and five items in the self-confidence subscale (*e.g.*, I am confident about performing well.). As the

CSAI-2R was originally developed to assess anxiety in athletes, some items required slight modifications to make them suitable for music performance situations. Firstly, we replaced the word “competition” in Item 2 with “concert”. Secondly, three experts from the domain of psychology and music pedagogy examined the content validity of the questionnaire. They identified two problematic items: (a) Item 5 from the cognitive anxiety subscale (*i.e.*, I am concerned about losing.); and (b) Item 7 from the self-confidence subscale (*i.e.*, I am confident I can meet the challenge.), on the grounds that these two statements did not properly describe music performers’ feelings. Based on their advice, we added two alternative items after the last item of the CSAI-2R: (a) Item 18 (*i.e.*, I am concerned about failing.) for Item 5; and (b) Item 19 (*i.e.*, I am confident I can meet the audience’s expectations.) for Item 7. Consequently, participants responded to a total of 19 items, enabling us to compare the internal consistency of the original subscales with that of the subscales in which the alternative items were inserted in place of the original Items 5 and 7. The English-Japanese translation was based on Sakuma (1994).

Symptom intensity levels were rated on a scale ranging from 1 (*not at all*) to 4 (*very much so*). According to Cox *et al.* (2003), each subscale score was obtained by summing, dividing by the number of items, and multiplying by 10, leading to the intensity score ranging from 10 to 40. Participants also rated the degree to which symptom intensities were regarded as *facilitative* or *debilitative* to the subsequent performance on the direction scale developed by Jones and Swain (1992). The direction continuum for each item ranged from –3 (*very debilitative*) to +3 (*very facilitative*) with 0 indicating an *unimportant* interpretation. The direction subscores were computed in the same way as for the intensity scores, leading to the direction score ranging from –30 to +30 for each anxiety subscale.

### Post-performance questionnaire

The post-performance questionnaire included the Performance Anxiety Questionnaire (PAQ, Cox & Kenardy, 1993) and a performance self-evaluation measure.

For the purpose of verifying the construct validity of the CSAI-2R, participants’ MPA levels were measured as trait anxiety by the PAQ. They rated the frequency of 20 anxiety symptoms on a scale ranging from 1 (*never*) to 5 (*always*) leading to the total score ranging from 20 to 100. All the items were translated into Japanese by means of back-translation.

Participants also rated the quality of their own performances on ten items (*i.e.*, articulation, tempo, rhythm, technique, dynamics, phrasing, expressiveness, tone quality, tone accuracy, and organization). The scale ranged from –5 (*much worse*) to +5 (*much better*) with 0 indicating the *same level* as the best performance during practice. This method was employed to indicate intraindividual fluctuations in performance quality, which have been suggested to be important in examining the effects of anxiety on performance (Edwards & Hardy, 1996; Maynard & Cotton, 1993).



## PROCEDURE

This investigation was conducted at a piano concert hosted by the university piano club, which was held with great solemnity in a concert hall with a seating capacity of more than 150, lasting for two days. In the concert, all the participants individually gave solo piano performances in front of a large audience. They performed high-level piano pieces of their choice, such as a movement from Beethoven's Sonatas, Chopin's Ballades, and Rachmaninov's "Morceaux de Fantaisie". The mean duration of each participant's performance was 8.8 minutes ( $SD = 5.7$ ).

It has been suggested that performing solo is much more stressful than performing in a group (Cox & Kenardy, 1993; Papageorgi *et al.*, 2007; Wilson, 1997, 2002; Wilson & Roland, 2002). In addition, the presence of an audience can lead to an increase in MPA (Abel & Larkin, 1990; Fredrikson & Gunnarsson, 1992; Hamann, 1982; LeBlanc *et al.*, 1997; Papageorgi *et al.*, 2007; Wilson, 2002; Wilson & Roland, 2002) or a deterioration in performance quality (Craske & Craig, 1984). Therefore, the present performance setting is assumed to have been stressful enough to provoke MPA in participants.

It is also worth remarking that this concert offered an ideal opportunity to examine the effects of pre-performance emotional states on performance quality in pianists. One reason is that a considerable number of pianists gave performances in the same environment, enabling us to statistically analyze the anxiety-performance relationship. Another reason is that all the participants performed solo. Craft *et al.* (2003) found that anxiety and self-confidence predict sport performance better in individual sports than in team sports because in team sports other team-mates can influence the outcome. The same holds for piano performance. Since in piano duets or concertos music is created through the complex interaction with other performers, a pianist's performance quality can significantly be influenced by the way others perform, with the effect of the pianist's emotional state being masked.

All the participants were told to arrive at the concert hall by one hour prior to individual performances. Based on Craft *et al.* (2003), we administered the pre-performance questionnaire to participants from one hour to 30 minutes before their performances. We used the standardized instructional set of Martens *et al.* (1990), emphasizing the need for honesty and for responding to feelings they were experiencing *right now*.

We administered the post-performance questionnaire to participants after their individual performances. The instructions asked them to respond to the PAQ according to how they *usually* feel during performances in public, and to evaluate the quality of their own performance in this concert by comparing it with their best performance during practice.

## RESULTS

### PSYCHOMETRIC PROPERTIES OF THE CSAI-2R

#### Reliability

We first tested the internal consistency of the modified version of the CSAI-2R. The Cronbach's alpha coefficients for the somatic anxiety intensity and direction subscales were .85 and .86, respectively (see Table 1), indicating high levels of internal consistency.

Table 1  
Descriptive statistics for the modified version of the CSAI-2R

Subscale	<i>M</i>	<i>SD</i>	$\alpha$
Cognitive anxiety			
Intensity	21.39	7.71	.84
Direction	-5.84	9.49	.78
Somatic anxiety			
Intensity	18.83	6.72	.85
Direction	-3.12	10.07	.86
Self-confidence			
Intensity	19.67	7.59	.90

*Note.*  $\alpha$  indicates Cronbach's alpha coefficient.

As the cognitive anxiety and self-confidence subscales contained two problematic items, we calculated the alpha coefficients for the original subscales in the first place. The coefficients were .83, .78, and .89 for cognitive anxiety intensity, cognitive anxiety direction, and self-confidence intensity, respectively. When Item 5 was replaced with Item 18 and Item 7 with Item 19, we observed the alpha coefficients of .84, .78, and .90, respectively (see Table 1). The internal consistency of the cognitive anxiety and self-confidence subscales remained unchanged, or rather, appeared to have slightly improved when the modified items, which were suggested to be more appropriate for music performance situations by three experts, were inserted in place of the original items.

Based on these results, we confirmed that these minor changes hardly affected the factor structure of the original CSAI-2R. Therefore, in the subsequent analyses, we

adopted this modified version of the CSAI-2R, with Item 2 modified, Item 5 and 7 replaced with alternative ones. Hereafter, we will simply call the modified version of the questionnaire “the CSAI-2R”. Means and standard deviations for the CSAI-2R subscores are listed in Table 1.

### Criterion and construct validity

To confirm the criterion validity of the CSAI-2R, we computed Pearson’s product-moment correlation coefficients between the CSAI-2R subscales and the state subscale of the STAI (see Table 2). As hypothesized, both the cognitive and somatic anxiety intensity subscales of the CSAI-2R strongly and positively correlated with the state subscale of the STAI ( $ps < .001$ ). On the other hand, self-confidence intensity, cognitive anxiety direction, and somatic anxiety direction were negatively related to the state subscale of the STAI ( $ps < .01$ ).

Table 2  
Correlations between the CSAI-2R subscales and other anxiety scales

Subscale	STAI-S	PAQ
Cognitive anxiety		
Intensity	.76 ***	.59 ***
Direction	-.50 ***	-.17
Somatic anxiety		
Intensity	.70 ***	.59 ***
Direction	-.42 **	-.21
Self-confidence		
Intensity	-.68 ***	-.37 **

Note. “STAI-S” = state subscale of the State-Trait Anxiety Inventory (Spielberger *et al.*, 1970), “PAQ” = Performance Anxiety Questionnaire (Cox & Kenardy, 1993).

\*\*  $p < .01$ , \*\*\*  $p < .001$ .

In terms of the construct validity, we calculated the correlations between the CSAI-2R subscales and the PAQ (see Table 2). The PAQ showed significant positive correlations with the cognitive and somatic anxiety intensity subscales ( $ps < .001$ ) and a negative correlation with the self-confidence subscale ( $p < .01$ ).

**Reliability of the performance self-evaluation measure**

Prior to examining the relationship between the CSAI-2R subscales and global performance, we attempted to confirm the reliability of the performance self-evaluation measure. The alpha coefficient of .92 indicated the high degree of internal consistency for the measure. Thus, in the subsequent analyses, we employed the mean score of the ten evaluation items as an index of global performance.

**Correlation analysis**

We computed correlation coefficients to identify significant associations between anxiety scales and global performance (see Table 3). Self-confidence measured by the CSAI-2R was strongly and positively related to performance quality ( $r = .52$ ,  $df = 45$ ,  $p < .001$ ). On the other hand, both cognitive anxiety intensity and the state subscale of the STAI negatively correlated with global performance ( $r = -.35$ ,  $df = 45$ ,  $p < .05$ ;  $r = -.35$ ,  $df = 44$ ,  $p < .05$ , respectively). Although cognitive anxiety direction showed a significant positive correlation with global performance ( $r = .30$ ,  $df = 45$ ,  $p < .05$ ), somatic anxiety direction failed to reach the significant level. No significant relationship was found between the PAQ score and global performance.

**Multiple regression analysis**

Because of the exploratory nature of this research, we conducted stepwise multiple regression analyses to determine which subscale of the CSAI-2R best predicted global performance. To avoid the problem of multicollinearity, we employed the two separate multiple regression models (one with the intensity subscales and another with the direction subscales), as suggested by Chamberlain and Hale (2007).

Firstly, we performed a multiple regression analysis with the intensity subscales of the CSAI-2R as the independent variables and the mean performance score as the dependent variable (see Figure 1). The intensity subscales accounted for a statistically significant portion of the performance variance,  $F(1, 45) = 16.46$ ,  $p < .001$ . Self-confidence emerged as the only significant predictor (standardized  $\beta = .52$ ,  $p < .001$ ). We also performed a quadratic regression analysis to access the occurrence of an inverted-U relationship between somatic anxiety and performance, which was reported by Burton (1988). Somatic anxiety intensity, however, did not account for a significant portion of the performance variance.

Secondly, we performed a multiple regression analysis with the direction subscales of the CSAI-2R as the independent variables and the mean performance score as the dependent variable (see Figure 2). The direction subscales accounted for a statistically significant portion of the variance,  $F(1, 45) = 4.50$ ,  $p < .05$ . Of the two subscales, only cognitive anxiety direction significantly predicted global performance (standardized  $\beta = .30$ ,  $p < .05$ ).

Table 3  
Correlations between the anxiety scales and performance self-evaluation measure

	Cognitive anxiety		Somatic anxiety		Self-confidence		STAI-S	PAQ
	Intensity	Direction	Intensity	Direction	Intensity	Direction		
Artistic expression	-.30 *	.32 *	-.05	.19	.48 **	-.31 *		-.10
Temporal accuracy	-.15	.07	-.00	.05	.34 *	-.19		-.23
Technical accuracy	-.50 ***	.29 *	-.06	.03	.52 ***	-.45 **		-.29 *
Global performance	-.35 *	.30 *	-.05	.15	.52 ***	-.35 *		-.18

*Note.* "Artistic expression" = mean score for expressiveness, organization, tone quality, articulation, dynamics, and phrasing. "Temporal accuracy" = mean score for tempo and rhythm. "Technical accuracy" = mean score for technique and tone accuracy.  
\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

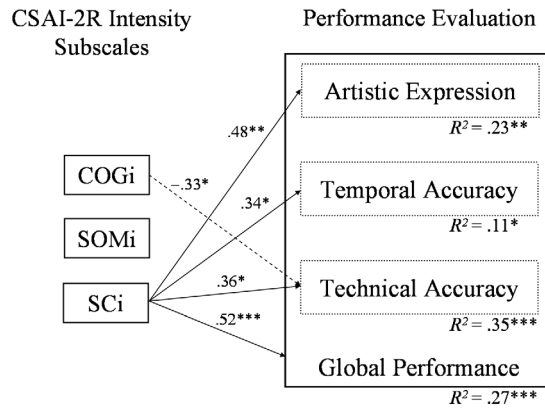


Figure 1

Summary of stepwise multiple regression analyses with the CSAI-2R intensity subscales as the independent variables.

Note. "COGi" = cognitive anxiety intensity, "SOMi" = somatic anxiety intensity, "SCi" = self-confidence intensity.

The values represent standardized  $\beta$  coefficients. The solid lines indicate positive values, and the dashed line indicates a negative value.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

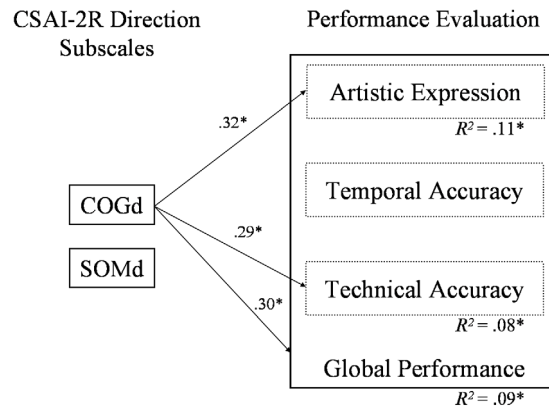


Figure 2

Summary of stepwise multiple regression analyses with the CSAI-2R direction subscales as the independent variables.

Note. "COGd" = cognitive anxiety direction, "SOMd" = somatic anxiety direction.

The values represent standardized  $\beta$  coefficients. The solid lines indicate positive values.

\*  $p < .05$ .



# RELATIONSHIP BETWEEN THE CSAI-2R SUBSCALES AND INDIVIDUAL SKILL COMPONENTS

## Cluster analysis of the performance self-evaluation measure

Although self-confidence intensity and cognitive anxiety direction were found to be the significant predictors of global performance, it is possible that each subscale of the CSAI-2R is related to different skill components, as shown by Kais and Raudsepp (2004). However, it would be redundant to individually examine the relationship between the CSAI-2R subscales and ten evaluation items, since some item scores can be highly intercorrelated. Therefore, prior to the main analysis, we attempted to divide the ten evaluation items into some groups based on the participants' responses. Specifically, we employed a cluster analysis with the average linkage method, using Pearson's product-moment correlation coefficients to determine the number of potential groups. Based on the inspection of a dendrogram and the interpretability of the cluster groups, we identified three groups (see Figure 3), which were named "artistic expression", "temporal accuracy", and "technical accuracy", respectively. In the subsequent analyses, we employed the mean item scores of these cluster groups as the indices of individual skill performance.

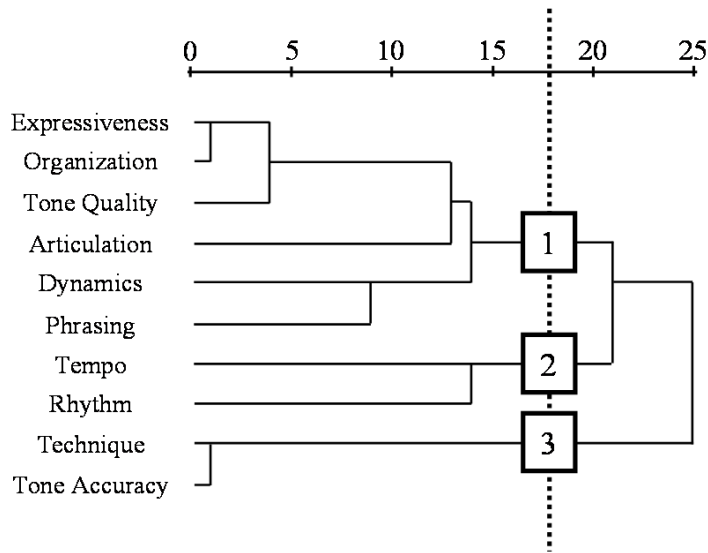


Figure 3

Results of the cluster analysis of performance self-evaluation measure.

Note. "1" = artistic expression, "2" = temporal accuracy, "3" = technical accuracy.

### Correlation analysis

Table 3 shows the correlations between anxiety scales and individual skill components. Self-confidence was again strongly associated with performance quality, showing significant positive correlations with all of the three skill-component scores ( $ps < .05$ ). Both cognitive anxiety intensity and the state subscale of the STAI negatively and significantly correlated with the artistic expression and technical accuracy scores ( $ps < .05$ ), while the PAQ correlated only with the technical accuracy score ( $p < .05$ ). On the other hand, cognitive anxiety direction showed significant positive correlations with the artistic expression and technical accuracy scores ( $ps < .05$ ). In terms of somatic anxiety, neither intensity nor direction subscale was related to any of the three skill components.

### Multiple regression analysis

In order to establish which subscale of the CSAI-2R best predicted individual skill components, we performed stepwise multiple regression analyses.

Firstly, we performed multiple regression analyses with the intensity subscales of the CSAI-2R as the independent variables and individual skill-component scores as the dependent variables (see Figure 1). The intensity subscales of the CSAI-2R accounted for a statistically significant portion of the variances of the artistic expression, temporal accuracy, and technical accuracy scores,  $F(1, 45) = 13.53$ ,  $p < .01$ ,  $F(1, 45) = 5.76$ ,  $p < .05$ , and  $F(2, 44) = 11.77$ ,  $p < .001$ , respectively. Self-confidence was found to be the only significant predictor of the artistic expression (standardized  $\beta = .48$ ,  $p < .01$ ) and temporal accuracy (standardized  $\beta = .34$ ,  $p < .05$ ) scores. Regarding technical accuracy, self-confidence positively predicted the skill-component score (standardized  $\beta = .36$ ,  $p < .05$ ), while cognitive anxiety negatively predicted it (standardized  $\beta = -.33$ ,  $p < .05$ ).

Secondly, we performed multiple regression analyses with the direction subscales of the CSAI-2R as the independent variables and individual skill-component scores as the dependent variables (see Figure 2). The direction subscales accounted for a statistically significant portion of the variances of the artistic expression and technical accuracy scores,  $F(1, 45) = 5.27$ ,  $p < .05$ , and  $F(1, 45) = 4.07$ ,  $p < .05$ , respectively. Of the two anxiety subscales, only cognitive anxiety direction positively and significantly predicted the artistic expression (standardized  $\beta = .32$ ,  $p < .05$ ) and technical accuracy (standardized  $\beta = .29$ ,  $p < .05$ ) scores.

## DISCUSSION

The purpose of the present study was to investigate the relationship between the CSAI-2R subscales and the quality of music performance in order to compare the anxiety-performance relationship in pianists with that in athletes and to gain insights into the effective coping strategies for MPA.

Prior to the main analyses, we attempted to confirm the validity and reliability of

the CSAI-2R when applied to MPA. Overall, the CSAI-2R demonstrated adequate psychometric properties for the participants of this study. We observed the internal consistency coefficients that are comparable to those reported previously for the CSAI-2R (Cox *et al.*, 2003; Lundqvist & Hassmen, 2005) and for the original CSAI-2 (Martens *et al.*, 1990). We have also obtained several pieces of evidence for the validity of the CSAI-2R. As hypothesized, the state subscale of the STAI revealed positive correlations with the cognitive and somatic anxiety intensity subscales and a negative correlation with the self-confidence subscale. These findings confirmed the criterion validity of the CSAI-2R. Moreover, the PAQ score was positively related to both the cognitive and somatic anxiety intensity subscales, corroborating the construct validity of the CSAI-2R. As far as we can tell from the current available data, applying the CSAI-2R and multidimensional anxiety theory to MPA is considered appropriate.

Regarding the relationship between the intensity subscales of the CSAI-2R and performance quality, the first hypothesis was strongly supported. The correlation analyses and multiple regression analyses showed that among the three subscales only self-confidence intensity positively predicted global performance, as well as all the skill components, namely, the artistic expression, temporal accuracy, and technical accuracy. The present results are congruent with the previous findings in sport psychology research (Craft *et al.*, 2003; Moritz *et al.*, 2000; Woodman & Hardy, 2003), in which self-confidence emerged as the significant predictor of sport performance. One possible explanation for this considerable influence of self-confidence upon performance is that self-confidence mediates the relationship between anxiety and performance (Craft *et al.*, 2003; Hardy, 1990; Jones & Hanton, 2001). It has been suggested that self-confidence moderates the effects of cognitive anxiety and physiological arousal on performance by increasing the probability that cognitively anxious performers can tolerate greater arousal before experiencing a decrement in performance (Hardy, 1990), and that athletes' high levels of self-confidence facilitate coping resources (*e.g.*, rationalization of thoughts and feelings) to deal with competitive anxiety, overriding the debilitating interpretations of pre-competitive symptoms (Jones & Hanton, 2001; Jones *et al.*, 1994). Another possible explanation is that self-confidence motivates behaviour that leads to success (McPherson & McCormick, 2006). As individuals with resilient self-efficacy are said to have the ability to rebound quickly from difficulties (Bandura, 1997), even when they make a serious mistake during music performance on stage, they may be able to continue to perform as if nothing had happened.

Surprisingly, self-confidence predicted not only the skill components that are chiefly related to motor control but also artistic expression, which is associated with multiple cognitive functions and is certainly more specific to music performance. To improve tone quality on stage, for example, pianists need to feel the acoustics of the hall by using a keen sense of hearing, to decide whether or not their key-striking movements are appropriate, and then to reflect this physically via motor control of

the fingers, hands, arms, and other parts of the body. Self-confidence has been suggested to be associated with “striving for perfection”, which can be regarded as an adaptive facet of perfectionism if an athlete is not overly concerned about imperfection (Stoeber, Otto, Pescheck, Becker, & Stoll, 2007). Thus, pianists full of self-confidence may be able to optimistically make all possible efforts in pursuit of musical excellence. This might explain why they can efficiently use such multiple cognitive functions to achieve a flawless and impressive music performance.

The second hypothesis was only partially supported. Although cognitive anxiety intensity negatively and significantly predicted technical accuracy, somatic anxiety intensity was related to none of the skill components. Regarding the relationship between cognitive anxiety and performance quality, the present findings are consistent with the original prediction of the multidimensional anxiety theory (Burton, 1988; Chamberlain & Hale, 2007; Martens *et al.*, 1990; Woodman & Hardy, 2003). The results are also congruent with the idea that cognitive anxiety is related to performance more strongly than somatic anxiety (Kleine, 1990; Martens, Burton, Vealey, Bump, & Smith, 1982). The reason why increased cognitive anxiety seemed to have disrupted technical accuracy would be that it misdirected attention from task-relevant cues to task-irrelevant self- or social evaluation cues (Wine, 1980), depriving the pianists of the attention necessary for fine motor control. Masters' (1992) conscious processing hypothesis also offers a possible explanation. High levels of cognitive anxiety may have caused participants to consciously monitor their performance, interfering with normal automatic task processing.

In terms of the relationship between somatic anxiety and performance quality, we found no evidence of a curvilinear relationship (Burton, 1988; Chamberlain & Hale, 2007; Gould *et al.*, 1987) or a linear relationship (Edwards & Hardy, 1996; Jerome & Williams, 2000), supporting some previous findings (Eubank *et al.*, 1995; Kais & Raudsepp, 2004; Maynard & Cotton, 1993; Raudsepp & Kais, 2002; Swain & Jones, 1996). The explanation for the results may be threefold. For one, we might have overlooked an underlying curvilinear relationship between somatic anxiety and performance quality due to the deficiencies in our analytical methods. According to the Zones of Optimal Functioning (ZOF) model, there are considerable individual differences in the optimal levels of anxiety (Hanin, 2000). Therefore, it might have been possible to demonstrate the inverted-U relationship by adopting a more idiographic approach. For another, the CSAI-2R may not have been suitable for the assessment of somatic anxiety. Since many items of the somatic anxiety subscale are related to physiological arousal, the subscore can reflect other emotions such as excitement, which may possibly enhance performance. Finally, pre-performance somatic anxiety may not necessarily be a good predictor of performance in nature. As experienced musicians tend to show their peak levels of anxiety just prior to, rather than during, performance (Salmon, Schrodtt, & Wright, 1989), pre-performance somatic anxiety may not have detrimental effects on performance quality if it is reduced during performance. Therefore, it is possible that indices of

somatic anxiety during performance such as heart rate or retrospective self-ratings may be the better predictors of performance quality. Clearly, future research should continue to investigate how somatic anxiety affects music performance.

Concerning the relationship between the direction subscales and performance quality, only partial support was gained for the third hypothesis. Although cognitive anxiety direction was found to significantly predict global performance, as well as the artistic expression and technical accuracy, somatic anxiety direction appeared to be unrelated to performance quality. The positive linear relationship between cognitive anxiety direction and performance quality is consistent with the previous findings in sport psychology (Chamberlain & Hale, 2007; Grobbelaar & Coetzee, 2006; Jerome & Williams, 2000; Jones *et al.*, 1994; Jones *et al.*, 1993; Kais & Raudsepp, 2004; Raudsepp & Kais, 2002; Swain & Jones, 1996). According to Jones's (1995) model, when athletes possess the positive expectancies of the ability to cope and of goal attainment, they will perceive anxiety symptoms as being facilitative to performance, leading to a state labelled as "anticipatory excitement" or being "psyched-up". Such a motivated state, as reflected in high cognitive anxiety direction scores, might have enhanced participants' performance quality. In terms of the relationship between somatic anxiety direction and performance quality, however, the present results provided no support for the hypothesis, consistent with previous research that also reported a non-significant relationship (Chamberlain & Hale, 2007; Edwards & Hardy, 1996; Jerome & Williams, 2000). The equivocal results might possibly be attributed to the potential flaws in the somatic anxiety subscale of the CSAI-2R.

Some limitations exist in the present study. Firstly, the evaluation of performance quality was restricted to performers' self-ratings, which may be subject to recall or ego-protecting bias (Chamberlain & Hale, 2007). Although external ratings can also be influenced by the evaluators' characteristics such as their mood at the time of the assessment and their overall familiarity with and preferences for the literature being performed (McPherson & Schubert, 2004), combining both types of evaluation methods will lead to a more reliable and objective assessment of performance quality. Secondly, the majority of our participants were amateur pianists performing solo. As the relationship between anxiety and performance has been shown to be stronger in elite athletes than in non-elite athletes and stronger in individual sports than in team sports (Craft *et al.*, 2003), it is possible that the relationship may vary depending on pianists' skill levels or the forms of piano performance (*e.g.*, solo, duet, or concerto). Therefore, future studies should investigate whether the present findings hold across various skill levels of pianists and various forms of performance. Finally, because of the relatively small sample size, it was difficult to reevaluate the factor structure of the CSAI-2R. To establish the CSAI-2R as a useful assessment tool of MPA, validation studies using confirmatory factor analyses are required.

Despite some limitations, the present findings provide important implications for the enhancement of music performance. Firstly, pre-performance self-confidence

was indicated to improve the overall performance quality in pianists. Self-confidence might be gained by applying psychological skills developed in sport psychology. Evidence exists that tennis players achieved the higher levels of self-confidence after participating in mental training sessions to learn skills such as “positive thinking and self talk”, “arousal regulation techniques”, and “imagery” (Mamassis & Doganis, 2004). These skills may help musicians boost their self-confidence as well. Not only performers but also music educators should make all possible efforts to engender self-confidence in their students. In daily lessons, teachers should provide performers with challenging tasks to master, actively support and encourage them along the way, teach in ways that demonstrate that they believe in their students, and convey these impressions in ways aimed at developing a robust sense of self-confidence (McPherson & McCormick, 2006). During the pre-performance phase, teachers should advise their students to start their performance with the piece that they can perform most comfortably (McPherson & McCormick, 2006). During the post-performance phase, it is recommended teachers give their students constructive feedback to foster self-efficacy beliefs in them (Papageorgi *et al.*, 2007). Secondly, elevated cognitive anxiety was found to interfere with technical accuracy. Despite the fact that technique is not necessarily the most important element in piano performance, jury performances are usually required to be technically perfect. A psychological technique called “positive thought control (PTC)” (Suinn, 1987), which involves using negative thoughts in a positive way, controlling negative thoughts, and training positive thoughts, has been found to be effective in reducing athletes’ cognitive anxiety (Maynard & Cotton, 1993). It is highly possible, therefore, that the PTC might benefit pianists as well. In addition, in order to prevent negative thoughts from entering the mind during performance, pianists should train themselves to concentrate on the task of music, focusing on hearing every tone, every phrase, every harmonic change, every rhythmic nuance, and feeling every tactile sense and emotional response (Lee, 2002). Thirdly, our data indicated that the positive interpretation of cognitive anxiety symptoms helps pianists improve their performance quality, offering further support for the effectiveness of some MPA coping strategies such as stress inoculation (Meichenbaum, 1985) and cognitive restructuring (Sweeney & Horan, 1982). Based on the present findings, we recommend that counsellors or educators attempt to make musicians focus particularly on relabeling cognitive anxiety symptoms from negative to positive when applying these psychological techniques to their clients or students. To conclude, we obtained empirical evidence that sport and music performance share some similarities in the anxiety-performance relationship, showing that musicians can benefit, at least partially, from a vast amount of knowledge of anxiety coping strategies accumulated and polished in sport psychology research.



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- **Los efectos del estado de ansiedad sobre la interpretación musical: relaciones entre las subescalas del Inventario-2 del estado de ansiedad competitivo revisado y la interpretación pianística**

Este estudio investigó la relación entre las subescalas del Inventario-2 del estado de ansiedad competitivo revisado (CSAI-2R, Cox, Martens & Russell, 2003; Jones & Swain, 1992; Martens, Vealey & Burton, 1990) y la calidad de la interpretación musical para comparar las relaciones ansiedad-interpretación de los pianistas con la de los atletas y llegar a comprender el funcionamiento de las estrategias efectivas de la ansiedad en la interpretación musical (MPA). Cincuenta y un estudiantes (15 mujeres y 36 hombres), de entre 18 y 26 años de edad ( $M = 20.6$ ,  $SD = 2.3$ ) completaron el CSAI-2R justo antes de sus interpretaciones solistas al piano en un concierto, seguidas por la autoevaluación de la calidad interpretativa. El CSAI-2R demostró propiedades psicométricas adecuadas cuando se aplicó a MPA. Concordando con los hallazgos previos en psicología deportiva, análisis correlativos y análisis de regresión múltiple mostraron que la intensidad de la autoconfianza predecía de forma positiva la interpretación global ( $p < .001$ ). La intensidad negativa de la ansiedad cognitiva predecía precisión técnica ( $p < .05$ ), mientras que la dirección positiva de la ansiedad cognitiva predecía la interpretación global ( $p < .05$ ). Por otro lado, la correlación entre ansiedad somática e interpretación no resultó significativa. Concluimos que adquirir autoconfianza, reducir la ansiedad cognitiva pre-interpretativa, e interpretar los síntomas de la ansiedad cognitiva facilita la posterior interpretación y mejora la cualidad interpretativa de la misma. Basándonos en los hallazgos presentes, discutimos la efectividad del entrenamiento de las cualidades mentales para los atletas y algunos métodos educativos que tratan el MPA.

- **Effetti dello stato d'ansia nell'esecuzione musicale: rapporto tra le subscale del Revised Competitive State Anxiety Inventory-2 e l'esecuzione pianistica**

Questo studio indaga il rapporto tra le subscale del Revised Competitive State Anxiety Inventory-2 (CSAI-2R, Cox, Martens & Russell, 2003; Jones & Swain, 1992; Martens, Vealey & Burton, 1990) e la qualità dell'esecuzione musicale con l'obiettivo di confrontare le diverse manifestazioni del rapporto tra ansia ed esecuzione nei pianisti e negli atleti e di rilevare elementi relativi alle strategie effettive per superare l'ansia dell'esecuzione musicale (MPA). Cinquantuno studenti (quindici donne e trentasei uomini) tra i 18 e i 26 anni ( $M = 20.6$ ,  $SD = 2.3$ ) hanno completato il CSAI-2R immediatamente prima della loro esecuzione pianistica in concerto da solisti, dopodiché è stata loro chiesta un'autovalutazione della qualità della loro esecuzione. Il CSAI-2R applicato all'MPA ha dimostrato proprietà psicometriche adeguate. Coerentemente con le scoperte precedenti nella psicologia sportiva, le analisi di correlazione e di regressione multipla hanno mostrato che l'intensità della fiducia in se stessi ha preluso positivamente l'esecuzione complessiva ( $p < .001$ ). L'intensità dell'ansia cognitiva ha, invece, preluso negativamente l'accuratezza

tecnica ( $p < .05$ ) mentre il controllo dell'ansia cognitiva ha preluso positivamente l'esecuzione complessiva ( $p < .05$ ). Dall'altra, la correlazione tra l'ansia somatica e l'esecuzione non è risultata significativa. Concludendo, riteniamo che l'acquisizione della fiducia in se stessi, la riduzione dell'ansia cognitiva precedente all'esecuzione e l'interpretazione dei sintomi dell'ansia cognitiva come fattori facilitativi dell'esecuzione a venire possano migliorare la qualità dell'esecuzione. Sulla base delle attuali scoperte, discuteremo l'efficacia dell'allenamento delle capacità mentali negli atleti e di alcuni metodi educativi relativi all'MPA.

**• Effets de l'état d'anxiété sur la performance musicale: relations entre les sous-échelles du Revised Competitive State Anxiety Inventory -2 (mesure de l'état d'anxiété) et la performance pianistique**

Cette étude a exploré la relation entre les sous-échelles du Revised Competitive State Anxiety Inventory -2 (CSAI-2R, Cox, Martens, & Russell, 2003 ; Jones & Swain, 1992 ; Martens, Vealey & Burton, 1990) et la qualité de la performance musicale, en vue de comparer la relation anxiété-performance chez les pianistes avec celle des athlètes, et pour augmenter nos connaissances sur les stratégies efficaces utilisées pour surmonter l'anxiété de la performance musicale (*music performance anxiety*, MPA). Cinquante et un étudiants (15 femmes et 36 hommes) âgés de 18 à 26 ans ( $M = 20.6$ ,  $DS = 2.3$ ) ont rempli le CSAI-2R juste avant leur performance au piano lors d'un concert ; ils ont ensuite fait l'auto-évaluation de la qualité de leur performance. Le CSAI-2R a montré des propriétés psychométriques adéquates lorsqu'il est appliqué au MPA. En lien avec les résultats précédents en psychologie du sport, les analyses de corrélation et les analyses de régression multiple ont montré que le degré de confiance en soi laissait prévoir une bonne performance globale ( $p < .001$ ). L'intensité de l'anxiété cognitive permettait de prédire négativement la précision technique ( $p < .05$ ), alors que la direction de l'anxiété cognitive présageait une performance globale positive ( $p < .05$ ). D'un autre côté, la corrélation entre l'anxiété somatique et la performance n'était pas significative. Nous avons conclu qu'acquérir de la confiance en soi, réduire l'anxiété cognitive préalable à la performance, et interpréter les symptômes de l'anxiété cognitive comme facilitant la performance à venir, amélioreront la qualité de celle-ci. Sur base de ces résultats, on discute de l'efficacité de l'entraînement des capacités mentales pour les athlètes et de certaines méthodes éducatives dans la façon d'aborder l'anxiété de la performance musicale (MPA).

**• Effekte der Aufführungsangst auf Musikdarbietungen: Beziehungen zwischen Unterskalen des „Überarbeiteten Wettbewerbsangst-Inventars 2“ bei Klavierdarbietungen**

Diese Studie untersuchte die Beziehung zwischen Unterskalen aus dem „Überarbeiteten Wettbewerbsangst-Inventar 2“ (CSAI-2R, Cox, Martens, & Russell, 2003; Jones & Swain, 1992; Martens, Vealey, & Burton, 1990) und der Qualität von Musik-

darbietungen. Dabei wurde die Beziehung von Angst und Leistung zwischen Pianisten und Sportlern verglichen, um Einblicke in effektive Bewältigungsstrategien bei musikalischer Aufführungsangst (MPA) zu gewinnen. 51 Studenten (15 weiblich und 36 männlich, Alter: zwischen 18-26 Jahre,  $M = 20,6$ ,  $SD = 2,3$ ) beantworteten den CSAI-2R unmittelbar vor ihren individuellen Klavierdarbietungen in einem Konzert, nach welchem sie dann selbst ihre Leistung einschätzten. Das CSAI-2R zeigte adäquate psychometrische Eigenschaften, wenn es bei MPA angewendet wurde. In Übereinstimmung mit früheren sportpsychologischen Befunden zeigten Korrelations- und multiple Regressionsanalysen, dass das Ausmass des Selbstbewusstseins die allgemeine Leistung positiv vorhersagen konnte ( $p < ,001$ ). Kognitive Angstintensität prädizierte negativ die technische Genauigkeit ( $p < ,05$ ), während die kognitive Angstausrichtung positiv die globale Leistung vorhersagte ( $p < ,05$ ). Andererseits war die Korrelation zwischen somatischer Angst und Leistung nicht signifikant. Wir schlussfolgern, dass die Darbietungsqualität verbessert wird, wenn Selbstbewusstsein erworben und kognitive Angst vor dem Auftritt verringert wird. Erleichternd ist ebenso eine Interpretation der Symptome kognitiver Angst als vorteilhaft für den nachfolgenden Auftritt. Vor dem Hintergrund der Ergebnisse wird die Effektivität des mentalen Fertigkeitstrainings für Sportler und für einige pädagogische Methoden der MPA-Behandlung diskutiert.