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What have Sport and Music Performance Taught Us about Test Anxiety?

Ruth Tarrant*
Janet Leathem
Ross Flett
Massey University

* *Ruth Tarrant; School of Psychology; Massey University; P. O. Box 756; Wellington, New Zealand; R.A.Tarrant@massey.ac.nz (email).*

ABSTRACT - Professional athletes and performing artists require peak performance at critical times, as their careers and livelihoods depend on sustained success. Likewise examination candidates aim for high levels of performance in examinations that are important to their particular educational and vocational paths. In many areas of performance where there is something of high value at stake for the performer, anxiety can increase and, at times, compromise the quality of the performance outcome. The present article comments on the four components of performance anxiety: physiological, cognitive, affective, and behavioural, and three major influential factors. The four components describe the nature of performance anxiety, but can also interact to create a spiralling cycle of anxiety with the potential to impact on the performance. Three major influential factors are discussed (personality variables; experience, including preparation and performing; and situational variables). Lessons learned from investigative studies of performance anxiety in sport and music performance are discussed, and parallels drawn with test anxiety.

Professional sports men and women have the capacity to earn millions of dollars for themselves, for their management, and for sponsors. From late in the 20th century, vast amounts of money have been invested in efforts to bring athletes to peak performance at the most critical times in order to maximise earnings of stakeholders. This investment in sport includes research in performance anxiety management for athletes. The effects of test anxiety, described as performance anxiety in athletes, are readily observed in some international, elite athletes whose performances break down at crucial points in competitions. For example, in the 2009 Australian Open Tennis Championship, Dinara Safina lost to Serena Williams 6-0, 6-3. We might ask why Safina with a world ranking of 3rd before the tournament (Reuters UK, 2009), could lose so decisively to Williams ranked 2nd. In an interview following her loss, Safina indicated that the importance of the situation had overwhelmed her, stating: It was the first time for me to play not only for a grand slam, but also for Number One spot." ("Safina Sorry," 2009). On this occasion, Safina was also attempting to win the same title her brother Marat had

earned in 2005 ("Safina Sorry," 2009). Safina's breaking down at such a critical time is an outcome readily observable in many elite sportspersons. So, performance anxiety in sport can cost millions of dollars.

Test anxiety, or performance anxiety, is an individual's reaction to an evaluative situation, and is characterised by cognitive symptoms (e.g., negative self-statements and task-irrelevant thoughts), affective symptoms (emotionality), and physiological symptoms (e.g., increased heart rate, sweating, trembling) (Zeidner, 1998). Behavioural characteristics, for example, physical stumbling and slips, unforced errors, or performing-avoidance may also be considered as symptomatic of test anxiety (Wilson, 1997). Thus it appears that test anxiety has four key component groups: cognitive, affective, physiological, and behavioural. Test anxiety can be influenced by three broad groups of factors: personality variables; experience (including preparation and performing experience); and situational variables (Tarrant & Leathem, 2007). Influential factors are discussed next.

Influential Variables

Personality Variables

Research studies (e.g., Cox & Kenardy, 1993; Kemp, 1981a, 1981b, 1997; Steptoe & Fidler, 1987) suggest that trait-anxiety, neuroticism, and extraversion are the most influential personality factors to consider in relation to performance anxiety in musicians. While extraversion may have more relevance for the performing artist than for the academic examination candidate for example, trait-anxiety and neuroticism appear to be directly associated with the components of test anxiety in academic performance.

Trait-anxiety. Performance anxiety is a type of state-anxiety and may be understood in relation to an individual's level of trait-anxiety (Cox & Kenardy, 1993; Hamann, 1982). For example, music performers with 'high' trait-anxiety scores (i.e., more than 41, based on group median split) were found to have significantly higher levels of performance anxiety than performers rated as having 'low' trait-anxiety scores (i.e., 41 or less, on group median split) (Cox & Kenardy, 1993). Likewise, student pianists with higher A-Trait levels also experienced higher levels of performance anxiety and distress than pianists with lower A-trait levels (Craske & Craig, 1984).

A further study supports the performance implications of the state-trait relationship. Hamann (1982) measured the level of anxiety in comparative situations where anxiety was either enhanced or reduced, in repertory types of performance (audience of peers with expert judge present) and non-repertory types of performance (tape-recorded performance with no audience or judge present). Three groups, each of 30 participants, were divided into high, medium or low A-Trait groups according to their percentile rank A-Trait scores. Those in the high A-Trait group achieved the highest A-State scores (when instructed to answer how they 'felt' while they were performing) in both performance conditions, with scores in the repertory condition higher than in the non-repertory condition. State-anxiety scores reduced consistently for the medium and low A-Trait groups, with these two groups also achieving higher A-State scores in the repertory, than the non-repertory condition. All differences were statistically significant.

In summary, individuals with high trait-anxiety are more susceptible to state-anxiety (Spielberger, 1971). Since test anxiety may be categorised as a particular state-anxiety, it may be necessary for high trait-anxiety individuals to develop a greater range of test anxiety management strategies than those required by low trait-anxiety individuals.

Neuroticism. Individuals high in neuroticism are also likely to experience higher levels of anxiety, as trait-anxiety and neuroticism are correlated (McLeod, 1999; Spielberger, 1983). Individuals who score high on neuroticism tend to be anxious, worrying individuals who experience strong and often prolonged emotional responses to stimuli (Eysenck & Eysenck, 1996). Worry and labile emotionality are characteristics of neuroticism (Eysenck & Eysenck, 1996), and worry appears to be a major component of test anxiety (Putwain, 2007; Zeidner, 1998).

Neuroticism and performance anxiety were related in studies of musicians (Steptoe & Fidler, 1987; Dyce & O'Connor, 1994), as were trait anxiety and performance anxiety (Cox & Kenardy, 1993; Craske & Craig, 1984). In an investigation of the relationship between music performance anxiety and neuroticism in student, amateur and professional musicians (Steptoe & Fidler, 1987), a relationship was found between neuroticism and 'stage fright' for all groups (professionals $r = .702$, $p < 0.01$; amateurs $r = 0.393$, $p < 0.05$; students $r = 0.313$, $p < 0.05$). The highest correlation for the professionals may be explained by there having been more at stake for this group.

Because neuroticism is typified by preoccupation with worry, as well as by concerns that something might go wrong, and by the concomitant strong emotional response to the associated anxiety, the highly neurotic individual may be particularly vulnerable to test anxiety. A study by Lehrer, Goldman, and Strommen (1990) investigated principal components of performance anxiety in musicians. Components included planning to cope with anxiety symptoms, judgemental attitudes, worry, evaluation by others, concern about distractions, facilitating/debilitating test anxiety, and trait-anxiety. Leher et al. found the highest correlation between worry and performance anxiety. This is an important finding, as worrying about evaluation by others, as well as fear of failure, self-judgements about performance, and concern over distractions are cognitive-affective variables that may be mediated by psychological interventions. Neuroticism is a relatively stable personality characteristic, and intervention for test anxiety in the highly neurotic performer is likely to require a particular focus on performers' attention and cognitions (attention and cognitions are discussed below).

Experience: Preparation and Performing Experience

Preparation

Often, test anxiety occurs as a natural consequence of insufficient or inappropriate preparation (Horan, 1980; Wilson, 1997), at times not necessarily recognised as such by the test-taker. Lack of preparation may be a result of low effort, or it may be that the performer has had insufficient prior experience in a particular context. The degree of experience appears to be a factor in Safina's Australian Open loss mentioned in the opening of the present article: it was Safina's (aged 22 years) first experience in a grand slam; Williams (27 years) had already won 20 grand slams, 9 of those in singles matches ("Serena crushes Safina," 2009). Simply, technical skill was not enough; Williams was

better prepared because of her previous exposure to this level of competition. Age and performance anxiety were negatively correlated in studies of performance anxiety in musicians (Steptoe & Fidler, 1987). However, this might be explained by a natural correlation between age and experience, with increasing experience providing greater test-exposure.

Routines and rituals

Many performers have developed routines and rituals that precede performances. The routines and rituals serve to reduce stimulation (internal or external), enhance concentration, and absorb extra energy generated due to the increased physiological arousal that typically develops in a lead-up to performance (Salmon & Meyer, 1992). Going through familiar routines and rituals prior to a performance can be confidence-building for the performer, reassuring him/her that (s)he has been here before and knows exactly what to do at that moment.

Influence of Past Performing Experience on Future Performing

A history of success as a performer can help to build confidence. Conversely, a history of failure or disappointment can undermine performance-confidence. Barbra Streisand, for example, reported being so traumatised by forgetting lyrics of three songs in a New York concert in 1967 that she did not perform live again for 27 years (Seligmann & Namuth, 1994). LeBlanc (1994, p. 66) states that performance feedback "sets the stage for the performer's next music event," and that if feedback is favourable, it will serve to increase confidence, and performance anxiety may correspondingly reduce when the performer next performs publicly. Conversely, negative feedback can increase future levels of performance anxiety. Likewise, a history (even one episode) of memory lapse or examination failure can increase the examination candidate's vulnerability to increased levels of anxiety in subsequent examinations. In such a case it is important to build mastery and confidence through succeeding in low-demand situations and gradually progressing to the more demanding.

Situational Variables

Test anxiety is associated with the nature of the event itself, and particularly with the degree of exposure perceived by the performer (Wilson, 1997). Craske and Craig (1984) reported increased performance anxiety as the performance-situation changed and audience scrutiny increased. Research studies typically report the negative effects of performance anxiety, specifically in terms of performance-quality (e.g., Gabrielsson, 1999; Wesner, Noyes & Davis, 1990). However, a certain level of anxiety or tension is necessary for optimal performance outcomes (e.g., Lehrer et al., 1990). Increased arousal provides the performer with the increased physical sensitivity and strength, and the mental focus to perform well. So how much anxiety or arousal is just right? A number of studies (e.g., Hamann, 1982; Lehrer, et al., 1990; Salmon, Schrodt, & Wright, 1989; Steptoe & Fidler, 1987; Wilson, 1997) assert that optimal performance is achieved at moderate levels of anxiety, suggesting that the relationship between anxiety and performance-quality complies with the Yerkes-Dodson (1908) inverted U-shape. Sport psychologist, Yuri Hanin, proposes a further view of the relationship between anxiety and

performance. Hanin (2000) contends that each person has his/her individual Zone of Optimal Functioning (ZOF), which may vary considerably from that of another individual. That is, a ZOF is an optimal level of anxiety that is individually determined. Based on his investigation of anxiety in elite sports performance, Hanin asserts that some individuals will perform best when their level of anxiety is high, while other performers will perform at their best when their level of anxiety is comparatively lower. That is, performance will deteriorate when the individual's anxiety falls below, or when it exceeds, his/her own ZOF.

Timing of Anxiety

The impact of stress at different times relative to the performance was investigated in a study of 40 undergraduate music students performing in a juried situation (Salmon et al., 1989). Overall, anxiety (according to the Burns Anxiety Inventory) increased daily as the performance drew closer, and peaked during the performance. When divided into two groups of the more- and less-experienced performers, the less experienced had a higher anxiety rating *during* the performance than the more-experienced students. The difference in the timing of anxiety is demonstrated in Haider and Groll-Knapp's (1981) study that demonstrated that professional musicians generally peak just prior to the performance, rather than during it. It is acknowledged that the more highly anxious performers may have abandoned their careers by this stage. However, the critical difference between the timing of anxiety in experienced and less-experienced performers was also demonstrated in the earlier, well known parachute research of Epstein and Fenz (1965). In this study, the more-experienced parachutists reached peak arousal well before the jump, whereas the less-experienced performers peaked just prior to jumping. Overall, anxiety levels were higher in the inexperienced, than in the experienced parachutists. There is a major point of comparison between parachuting and performing on stage or performing in academic examinations: anxiety appears related to the performance consequences, that is, to the outcome. In respect of consequences, the timing of anxiety may be dependent on whether the performer focuses on the process of performing, or whether attention is turned towards the possible outcome. If the performer's attention is focussed on outcome, rather then the task itself, anxiety may continue to rise. Frequent exposure to the particular type of performance may also moderate the timing of peak anxiety (Epstein & Fenz, 1965; Salmon et al., 1989). As performers become more experienced, emotional arousal shifts from a general fearfulness to a more focussed attention and preparation for action (Wilson, 1997).

Social Facilitation and Performance Effort

The social situation itself can facilitate some performers to achieve high levels of performance. Havas (1978, p. 13) states that when the audience acts as a stimulus, the performer can release "inborn anxiety" through playing, facilitating a sparkling and exciting performance. In contrast, exaggerated anxieties in front of an audience can render the performer unable to communicate the music. "As all performers know, nobody plays the same in public as he does alone. One plays much better or much worse" (Havas, 1978, p. 13).Performance is also influenced by the very components of test anxiety itself. These influences are discussed next.

The Influential Role of the Components of Test Anxiety

The components characteristic of test anxiety can interact. For example, cognitive factors such as increased negative self-talk can escalate negative emotions and elevate physiological arousal, which in turn can increase emotionality and further impact on cognitions as a vicious cycle of anxiety develops. Activity of these components of test anxiety can play an influential role in subsequent levels of test anxiety.

While cognitive and affective factors can be identified as separate components of test anxiety, they are closely associated and so are generally discussed together in the literature. Cognitive and affective factors associated with test anxiety can include, for example, fear of making mistakes, worries about performing (e.g., worries about muscle tension or blacking out), concerns about consequences of failure (e.g., loss of status), negative self-talk (e.g., catastrophizing), loss of concentration, and perhaps depersonalization (a feeling of being detached from oneself and the present) (Steptoe & Fidler, 1987). Cognitive and affective factors are discussed next.

Cognitive Factors

Attention. To manage performance anxiety in sport, research in sport psychology has brought a focus to cognitive factors, and importantly, to the role of attention. Specifically, attention is often considered in terms of *process versus outcome* (e.g., Hodge, 2004; Ravissa & Hanson, 1995; Wann, 1997). In sport, to achieve the desired outcome, it is necessary for the player to focus on the *process* of performing or playing, rather than to be distracted by thinking about the outcome. Athletes are encouraged to keep their mind in the present, rather than allowing their attention to move toward the possible *outcome* of the event. If attention is maintained in the present, if it centres on what has to be done *right now*, the athlete becomes involved in the task itself, and is consequently less likely to be distracted by thoughts, often negative and unproductive, concerning the outcome of the performance. Further, if the athlete focuses on the process, the outcome will look after itself.

Performing in academic examinations is no different: the concept of process versus outcome is as relevant for examination candidates as it is in any other performance endeavour. Where attention becomes focussed on the outcome of an event, cognitive capacity is consequently reduced for the task in hand. It does not matter whether attention is directed toward positive or negative thoughts (e.g., I'm going to win; I'm doing badly), attention is nevertheless diverted from the task in hand, and as cognitive capacity to perform is diminished, performance quality is likely to be adversely affected. In cases where the test-taker does find him/herself distracted from the task in hand, the performer can use attentional cue words (i.e., a type of personal slogan that the performer can bring to mind readily) to bring him/herself back to the task in hand (Wann, 1997). Essentially, division of attention appears to underlie impaired concentration and consequent performance decrements. Overall, higher quality performance outcomes will occur where attention is task-focussed, rather than attention being divided among the task and many irrelevant factors. Allocation of attention plays a critical role in performance outcome, and has implications for attentional-focus in relation to performing and associated levels of test anxiety.

Beliefs and cognitions. Beliefs, and cognitions, frequently referred to as thoughts, self-statements, or self-talk are also likely to play a role in test anxiety, and where these are negative the performer can undermine his/her own confidence. In a study of 298 adolescent music students (Osbourne & Kenny, 2008), retrospective self-generated descriptions of the students' worst performance ever were gathered from the participants. Over 60% of the total cognitions relating to the worst performance referred to negative evaluation by the self or others. The presence of negative cognitions improved prediction of performance anxiety.

Cognitive appraisal and physiological arousal. Realistic appraisal and expectations may be among the most adaptive strategies a performer can use in the face of a public music performance (Steptoe & Fidler, 1987), or an examination.

Does cognitive appraisal precede or follow physiological activity? Cognitive appraisal theory proposes that cognitive appraisal of stress and emotion precedes physiological responses (see Lazarus, 1991); peripheralist theory proposes the reverse (see Izard, 1993; Mandler, 1975). Lundberg (1982) states that the cognitive *interpretation* of the physiological response determines the associated emotional response.

The directional relationship of cognitive appraisal and physiological response was studied by experimentally manipulating instructions so situations would be perceived as either threat or challenge situations, and then by manipulating physiological activity in particular situations (Tomaka, Blascovich, Kibler, & Ernst, 1997). Tomaka et al.'s findings support the view that cognitive interpretation of physiological response mediates affective response patterns. This view is supported by a study of individuals with spinal chord injury with differing levels of autonomic feedback (Chwalisz, Diener, & Gallagher, 1988). In Chwalisz et al., perceptions of autonomic arousal appeared independent from cognitive and emotional appraisals, with participants generally reporting more fear following their injuries, compared with the past.

LeDoux (1994; 2000) asserts that sensory input is simultaneously directed along two different pathways, a fast pathway to the amygdala, and a slower pathway to the cortex. If a threat is perceived when information reaches the amygdala, neural activity activates autonomic arousal and associated affect before the cortex has had time to process the information ("failing to respond to danger is more costly than responding inappropriately to a benign stimulus," 1994, p. 38). When information reaches the cortex, cognitive appraisal will result in confirmation of the threat, or in a reduction of perceived threat and the associated affect. Thus, LeDoux's dual system does not necessarily conflict with Chwalisz et al.'s (1988) findings.

Cognition and affect. While "it is widely accepted that emotion is a consequence of a transaction in which thought and motivation play essential causal roles,...emotion contains causal thoughts and motivations" (Lazarus, 1991, p. 15). Against critics who suggest this is a circular argument, Lazarus defends his view that affect can play a casual role in cognitions, by comparing the relationship of cognition and emotion with the germ theory of disease: that is, germs can cause disease, but are also an "integral aspect of the effect, the disease itself." Likewise, affect and cognition can be related. Thus, the

integration of Lazarus's view that emotion can influence cognitions (and vice-versa), and LeDoux's (2000) dual pathway (to the amygdala and cortex) suggests the possibility of affect influencing cognitions just as readily as cognitions can affect emotion.

The directional relationships among physiological, cognitive, and affective responses to stimuli are not conclusively explained however, and it appears that appraisal, reappraisal, and feedback related to the three types of responses can further influence each of these three responses to stimuli.

In summary, negative cognitions, negative affect, and attention to irrelevant stimuli can undermine confidence, potentially resulting in an increase in autonomic activity, loss of concentration, and impaired performance. Conversely, optimal performance outcomes are most likely to be achieved in the context of appropriate preparation, positive cognitions, and focussed attention.

Interventions for Test Anxiety

There remains an important question: Can a highly test-anxious individual be assisted to manage his or her anxiety to achieve peak performance. When we understand the nature of test anxiety and factors influencing levels of test anxiety, various interventions have reported facilitative changes in levels of test anxiety. These interventions have focussed on *cognitive therapy*: examining and modifying beliefs and cognitions (e.g., Barsky, Geringer, & Wool, 1988; Lloyd-Elliott, 1991), mental rehearsal and simulation (Green & Gallwey, 1986), and realistic appraisal (Kendrick, Craig, Lawson, & Davidson, 1982; Pham & Taylor, 1999); *behaviour therapy*: systematic desensitisation and exposure (Allen, Hunter, & Donohue, 1989; Clark & Agras, 1991); and *cognitive behaviour therapy*: combining the benefits of cognitive, and behaviour therapy (Clark & Agras, 1991; Tarrant & Leathem, 2007). Essentially, all of these therapies involve some level of examining thoughts and feelings and making adaptive modifications. Also, graduated exposure to increasingly demanding performance-situations needs to be managed to increase mastery and to build optimal levels of performance-confidence and efficacy.

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Tarrant RA

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