

Competitive State Anxiety and Performance among Malaysian Athletes from the view of Multidimensional Anxiety Theory

Vincent A. Parnabas

Sport Science and Recreation Faculty

Universiti Teknologi MARA, Malaysia

Yahaya Mahamood

College of Art and Science

Universiti Utara Malaysia

Kwame Ampofo-Boateng³

Faculty of Law

University of Calgary, Calgary, Alberta, Canada

Abstract

The Multidimensional Anxiety theory examines the relationship between anxiety and performance. It is the first theory that explains that both cognitive and somatic components play an important role on performance. Cognitive anxiety is the mental component of anxiety and somatic anxiety refers to a person's perceived changes in her or his physiological. The theory hypothesizes a powerful negative linear relationship between cognitive state anxiety and performance and a less powerful, inverted U relationship between somatic anxiety and performance. The theory states that the increases of cognitive and somatic anxiety will deteriorate an athlete's performance. However, previous research had showed inconsistent results. Therefore, this research examines the effect of cognitive and somatic anxiety on performance among Malaysian athletes. The sample consisted of 902 athletes, consisting of national (N=53), state (N=395), district (N=120), university (N=211), and school athletes (N=123). The sample was drawn from among athletes who competed in three big sport events of Malaysia, MASUM (Universities Sports Competition), MSSM (Schools Sport Competition) and Sukan Olimpik Muda (Young Olympic Athletes Competition). The instrument used for the study comprised of a 27-item Competitive State Anxiety Inventory-2, consisting of cognitive and somatic component. The result has received support from the Multidimensional Anxiety theory, that the increased level of cognitive and somatic anxiety deteriorated athletes' performance. Coaches, sport psychologists and counsellors can use this research to reduce the cognitive and somatic anxiety to increase athletes' performance.

Keywords: *Multidimensional, anxiety, cognitive, somatic, inverted U*

Introduction

In sport psychology, the relation between competitive state anxiety and performance has been the subject of many sport psychologist researches (Hardy and Jones 1994). Anxiety was considered one of the main important psychological factors influencing performance (Raglin and Hanin, 2000). Anxiety as a negative emotional state, can affect athletes' performance by displaying cognitive and physiological symptoms (Weinberg and Gould, 2007; Lazarus, 1991; Anshel, 2003).

Even though anxiety was identified in deteriorating athletes' performance, but theories which described the relationship between anxiety and performance are different with each other (Weinberg and Gould, 2007; Raglin, 1992; Gould and Krane, 1992; Cox, 2007). Those anxiety theories are Drive Theory, Inverted U-Hypothesis, Zone of Optimal functioning and Multidimensional, Catastrophe and Reversal Theory.

Considerable evidence has been supported in regard to the relationship between anxiety and performance. Anyway, none of the theory described the relationship between anxiety and performance in detail and specific (Aufenanger, 2005). Psychologists still haven't come to the conclusions as to which of the theories best describes the relationship of anxiety and performance (Ostrow, 1996) because those theories have their own weakness. Among those identified weaknesses are methodology issues associated with an operational definition of anxiety is not very clear (Humara 2001), those theories were developed from a very small sample and enough research has not been done yet in a sport setting (McNally, 2002), and those theories only use athletes from the United States as samples (LeUnes and Nation, 2002). Besides that, most of the theories are based on research on clinical psychology and not on athletes (Jones, 1995). According to Raglin and Hanin (2000), that traditional theory of anxiety and performance was found not suitable to use among athletes. Therefore, anxiety theories should be tested in a sport setting.

The Multi-dimensional Anxiety Theory is based on the distinction between two components of anxiety, cognitive anxiety and somatic anxiety. In this theory, cognitive and somatic subcomponents of anxiety influence performance. Cognitive anxiety is characterized by negative expectations and concerns, and worries about performance, inability to concentrate, disrupted attention, possible consequences of failure (Ampofo-Boateng, 2009; McNally, 2002). These feelings have a tendency to be debilitating of performance. Whereas, the somatic anxiety component are physiological effects, which consists of an individual's perceptions, which are characterized by indications such as sweaty palms, tense muscle, shortness of breath, increased heart rate, butterflies in the stomach, and shakiness (Martens, Vealey and Burton, 1990). The Multi-dimensional Anxiety Theory indicates that these subcomponents affect performance in different ways. Hence, theoretically, the components can be manipulated independently of one another (McNally, 2002).

The theory makes a series of predictions:

1. There will be a negative relationship between cognitive anxiety and performance (Burton, 1988; Martens et al., 1990; Weinberg and Gould, 2007; Hanin, 2000).
2. There will be an inverted U relationship between somatic anxiety and performance (Burton, 1988; Weinberg and Gould, 2007; Hanin, 2000). In other words, the best performance could be achieved with an average level of somatic anxiety. If the level of somatic anxiety were too low or too high, poor performance would ensure. However the inverted U Hypothesis was seen by some as being too simple and a number of researchers began to question its validity (McNally, 2002). This paved the way for a number of new theories and models that endeavoured to address the inadequacies of the Inverted U at measuring and conceptualizing competitive anxiety (McNally, 2002).

There has been a large amount of research concerning the multidimensional aspect of anxiety (Martens et al., 1990). For the past 20 years, many researchers have done research to find the effect of somatic and cognitive anxiety on athletes' performance (Rotella and Lerner, 1993). But the results were inconsistent (Aufenanger, 2005). There were a number of differing conclusions by researchers as to the specific effect that somatic and cognitive anxiety had upon performance (McNally 2002). This lack of concordance between the researchers was considered the greatest shortcoming within the Multi-dimensional Anxiety Theory (McNally 2002). For example, the research done by Gould, Petlichkoff and Weinberg (1984), Gould, Petlichkoff, Simons and Vevera (1987), Burton (1988), Martens et al. (1990), and Hanton, O'Brien and Mellalieu (2003), using CSAI-2, supported this theory. The result showed the existence of a negative relationship between cognitive anxiety and performance. Besides that, their results also confirm an inverted U relationship between somatic anxiety and performance. Contrary, Krane's (1990) research shows a weak relationship between cognitive anxiety and performance. Research Gould et al. (1987), never show any relationship between cognitive anxiety and performance. Besides that, the research of Caruso, Dzewaltowski, Gill and McElroy (1990), Parfitt, Jones and Hardy (1990), and Hammermeister and Burton (1995), never supported the Multi-dimensional Anxiety Theory. Most research testing this theory using CSAI-2, show contrary results (Landers and Arent 2001; Gould, Dieffenbach and Moffet 2002).

The culmination of the recognition of a Multidimensional Theory of Anxiety, in relation to the field of sport psychology, come about through Martens et al.'s (1990) development of the Competitive State Anxiety Inventory-2 (CSAI-2).

Aims

The aim of this research was to investigate the components of the Multidimensional Theory of Anxiety on athletes. The rationale for this study was designed to examine the levels of cognitive and somatic anxiety among athletes. The present study sought to evaluate the performance of athletes with high, medium and low levels of cognitive and somatic anxiety. Specifically, it was hypothesized that there will be a negative relationship between cognitive anxiety and performance, and an inverted U relationship between somatic anxiety and performance.

Methods

The sample of study comprised of 902 athletes consisting of national (N=53), state (N=395), district (N=120), university (N=211), and school level athletes (N= 123). The sample was drawn from athletes who competed in MASUM (Sport between Universities), MSSM (Sport between Schools) and Sukan Olimpik Muda (Young Olympic athletes Sport). In order to assess the level of cognitive and somatic anxiety, athletes responded to the 27-item Competitive State Anxiety Inventory–2 (CSAI-2) (Martens et al., 1990), using a 4-point Likert-type scale ranging from 1 (not at all) to 4 (very much so). CSAI-2 was used to measure athletes’ tendency to respond to competitive sport situations before and during competition.

Result

Cognitive Anxiety and Performance

Table 1: One Way ANOVA: Cognitive Anxiety and Performance

Performance	Before competition (ANOVA)			During Competition (ANOVA)		
	Mean	Value-F	Value-p	Mean	Value-F	Value-p
High	22.2273	17.711**	0.000	22.6405	9.906**	0.000
Medium	23.5918			23.5933		
Low	26.0845			25.7941		

**p<0.01

One way ANOVA showed significant differences on level of performance among athletes who experienced high, medium and low level of cognitive anxiety before, $F(2,844) = 17.711, p<.01$ and during competition, $F(2,811) = 9.906, p<.01$ (Table 1).

The result indicated that athletes:

- i. Who experienced high levels of cognitive anxiety displayed low levels of performance.
- ii. Athletes, who experienced medium levels of cognitive anxiety, had medium levels of performance, and
- iii. Athletes, who experienced low levels of cognitive anxiety, had achieved high levels of performance.

Somatic Anxiety and Performance

Table 2: One Way ANOVA: Somatic Anxiety and Performance

Performance	Before Competition			During Competition		
	Mean	Value-F	Value-p	Mean	Value-F	Value-p
High	18.9755	13.042**	0.000	19.0124	5.687**	0.004
Medium	20.2064			20.0958		
low	21.9296			21.0000		

** p< 0.01

One way ANOVA showed significant differences on level of performance among athletes who experienced high, medium and low levels of somatic anxiety before, $F(2,841) = 13.042, p<.01.$, and during competition, $F(2,809) = 5.687, p<.01.$ (Table 2).

The results indicated that athletes:

- i. Who experienced high levels of somatic anxiety displayed low levels of performance.
- ii. Athletes, who experienced medium levels of somatic anxiety, had medium levels of performance.
- iii. Athletes, who experienced low levels of somatic anxiety, had achieved high levels of performance.

Discussion

Cognitive Anxiety and Performance

The main aim of the study was to test the Multidimensional Theory of Anxiety. The present study hypothesized that those athletes who experienced high levels of cognitive anxiety had a low level of performance and athletes who experienced low levels of cognitive anxiety had high levels of performance. The second hypothesis was that those athletes who experienced low and high levels of somatic anxiety will show low performance.

The first hypothesis that there was a negative correlation between cognitive anxiety and performance supported the Multidimensional Theory of Anxiety. This investigation supported those researches done by Morris and Engle (1981), Motowildo, Packard and Manning (1986), Orlick (1986), Burton (1988), Martens et al. (1990), Ntoumanis and Biddle (1998), Rodrigo, Lusiardo and Pereira (1990), Nideffer (1993), Krane and Williams (1994), Wann (1997), Tsorbatzoudis, Barkoukis, Sideridis and Grouios, (1998), Beilock and Carr (2001) and, Cox (2007). This investigation result showed cognitive anxiety as the main factor due to low performance in sport. However, the result was contradictory with the research done by Hardy and Jackson (1996) that showed that high levels of performance was achieved when the cognitive anxiety level was high.

The main reason of low performance during high levels of anxiety was that the anxiety had an effect on concentration (Nideffer, 1976; Landers, Wang and Courtet, 1985; Jones, 2000). Good concentration is known to help improve sports performance. According to Nideffer and Sagal (2001), concentration is crucial to sports performance and is often the deciding factor in athletic competition. An athlete who is able to maintain his or her concentration for the entire duration of the execution of a skill or performance or competition had a good chance of being successful (Ampofo-Boateng, 2009).

This result had proved that the level of cognitive anxiety is the best predictable factor for performance. In other words, the level of performance could be achieved by an athlete totally depends on his cognitive anxiety level. This result also showed the importance of athletes to control the level of cognitive anxiety by using certain coping strategies, to improve their performance.

Somatic Anxiety and Performance

The present study's second hypothesis was that if the level of somatic anxiety was too low or too high, poor performance would ensure. The result showed that those athletes who experienced high levels of somatic anxiety had a low level of performance and athletes who experienced low levels of somatic anxiety had high levels of performance. The result partially supported the Multidimensional Theory of Anxiety. As suggested by the Multidimensional Theory of Anxiety, there will be an inverted U relationship between somatic anxiety and performance. If the level of somatic anxiety were too low or too high, poor performance would ensure. Furthermore, this research result showed that those athletes who experienced high levels of somatic anxiety had reported a low level of performance, which supports the Multidimensional Theory of Anxiety. However, the results also showed that those athletes who experienced low levels of somatic

anxiety had achieved the highest levels of performance and not low levels, as what was suggested by the Multidimensional Theory of Anxiety. One possible explanation for these unexpected findings is that levels of state anxiety, it doesn't matter whether cognitive or somatic, it affects performance. Athletes are more relaxed physiologically and psychologically to perform well when experiencing low levels of somatic anxiety. A number of researchers have also emphasised the probability that cognitive and somatic anxiety are not entirely the independent sub-components as original thought, rather they correlate to some degree with each other (Petlichkoff and Gound, 1985; Jones, Cale and Kervin, 1988; Krane, 1990). Morris, Davis and Hutchings (1981) have expressed the likelihood of some form of relationship between the two components.

Athletes who experienced high levels of somatic anxiety and as a result had low levels of performance supported research by Martens and Landers (1970), Sonstroem and Bemardo (1982), Martens et al. (1990), Krane and Williams (1994), and Parfitt, Hardy and Pates (1995).

This result also proved that the level of somatic anxiety is the best predictable factor for performance. In other words, the levels of performance which can be achieved by an athlete totally depend on his somatic anxiety level. This result also showed the importance of athletes being able to control levels of somatic anxiety by using certain coping strategies, to improve their performance.

Conclusions

Clearly, anxiety has the capability to threaten a person's well being because it can increase a person's worries and deteriorate athletes' performance. Overall, the results showed a tendency for performance to decrease when competitive anxiety (cognitive and somatic) increased. The result supports totally the Multidimensional Theory of Anxiety, in which a negative relationship exists between cognitive anxiety and performance. But the findings supported partially the Multidimensional Theory of Anxiety, that there will be an inverted U relationship between somatic anxiety and performance. Sport psychologists, sport counsellors or coaches should use this research to recommend coping strategies can be use by athletes, to decrease cognitive and somatic anxieties, to enhance performance.

References

- Ampofo-Boateng, K. 2009. *Understanding sport psychology*. Shah Alam, Selangor, Malaysia: UPENA.
- Anshel, M.H. 2003. *Sport psychology: from theory to practice*. New York: Benjamin Cummings.
- Aufenanger, S. J. 2005. Relationships between mental skills and competitive anxiety interpretation in open skill and close skill athletes. Thesis Master Miami University, Oxford, Ohio.
- Beilock, S.L. & Carr, T.H. 2001. On the fragility of skilled performance: What governs choking under pressure? *Journal of Experimental Psychology: General* 130: 701-725.
- Burton, D. 1988. Do anxious swimmers swim slower? Reexamining the elusive anxiety-performance relationship. *Journal of Sport and Exercise Psychology* 10: 45-61.
- Cox, R. H. 2007. *Sport Psychology, concepts and applications* (6th ed.). New York: McGraw-Hill.
- Caruso, C. M., Dzewaltowski, D. A., Gill, D. L., & McElroy, M. A. 1990. Psychological and physiological changes in competitive state anxiety during noncompetitive and competitive success and failure. *Journal of Sport and Exercise Psychology* 12; 6-20.
- Gould, D. & Krane, V. 1992. The arousal-performance relationship: current status and future directions. In Horn TS (ed.), *Advances in sport psychology*. Champaign IL: Human Kinetics.
- Gould, D., Petlichkoff, L. & Weinberg, R.S. 1984. Antecedents of temporal changes in, and relationships between the CSAI-2 sub components. *Journal of Sport Psychology* 6: 289-304.
- Gould, D., Petlichkoff, L., Simons, J. & Vevera, M. 1987. Relationship between competitive state anxiety inventory-2 subscales scores and pistol shooting performance. *Journal of Sport Psychology* 9: 33-42.
- Hammermeister, J., & Burton, D. 1995. Anxiety and the ironman: Investigating the antecedents and consequence of endurance athletes' state anxiety. *The Sport Psychologist* 9: 29-40.
- Hanin, Y. L. 2000. *Emotions in sport*. Champaign, IL: Human Kinetics.

- Hanton, S., O'Brien, M. & Mellalieu, S.D. 2003. Individual Differences, Perceived Control and Competitive Trait Anxiety. *Journal of Sport Behavior* 26; 39-55.
- Hardy, L. & Jackson, B. 1996. Effect of state anxiety upon effort and performance. *Journal of Sport Sciences* 14: 31-32.
- Hardy, L. & Jones, G. 1994. Future directions for performance related research in sport psychology. *Journal of Sport Sciences* 12: 61-92.
- Humara, M. 2001. The relationship between anxiety and performance: A Cognitive-behavioral perspective. *Athletic Insight* 1(2): *The Online Journal of Sport Psychology*.
- Gould, D., Dieffenbach, K., & Moffet, A. 2002. Psychological characteristics and their development in Olympic champions. *Journal of Applied Sport Psychology* 14: 172-204.
- Jones, G. 1995. More than just a game: Research developments and issues in competitive state anxiety in sport. *British Journal of Psychology* 86: 449-478.
- Jones, G. 2000. Stress and anxiety. In S.J. Bull, *Sport Psychology: A self-help Guide*. Ramsbury, Marlborough: Crowood.
- Jones, G., Cale, A. & Kerwin, D.G. 1988. Multidimensional competitive state anxiety and psychomotor performance. *Australian Journal of Science and Medicine* 20: 3-7.
- Krane, V. 1990. Anxiety and athletic performance : A test for the multidimensional anxiety and catastrophe theories. Unpublished Doctoral Dissertation. University of North Carolina at Greensboro.
- Krane, V., & Williams, J. 1994. Cognitive anxiety, somatic anxiety, and confidence in track and field athletics: The impact of gender, competitive level and task characteristics. *International Journal of Sport Psychology* 25: 203-217.
- Landers, D.M. & Arent, S.M. 2001. Arousal-performance relationship. In J.M. Williams (Ed.), *Applied sport psychology, personal growth to peak performance* (4th ed.). Mountain View, CA: Mayfield Publishing Company.
- Landers, Wang & Courtet, 1985. Peripheral narrowing among experienced and inexperienced rifle shooters under low and high stress condition. *Research Quarterly* 56: 122-130.
- Lazarus, R.S. 1991. *Emotion and adaptation*. New York: Oxford University Press.

- Leunes, A. & Nation, J.R. 2002. *Sport Psychology*. CA, USA: Wadsworth.
- Martens, R. & Landers, D. M. 1970. Motor performance under stress: A test of the inverted-U hypothesis. *Journal of Personality and Social Psychology* 16: 29-37.
- Martens, R., Vealey, R.S., & Burton, D. 1990. *Competitive Anxiety in Sport*. Champaign, Illinois: Human Kinetics.
- McNally, I. M. 2002. Contrasting Concepts of Competitive State-Anxiety in Sport: Multidimensional Anxiety and Catastrophe Theories. *Athletic Journal: On line Journal of Sport Psychology*. (<http://www.Contrasting Concepts of Competitive State-Anxiety in Sport.htm>).
- Morris, L., Davis, D. & Hutchings, C. 1981. Cognitive and emotional components of anxiety: Literature review and revised worry-emotionality scale. *Journal of Educational Psychology* 73: 541-555.
- Morris, L. W & Engle, W. B. 1981. Assessing various coping strategies and their effects on test performance and anxiety. *Journal of Clinical Psychology* 37: 165-171.
- Motowildo, S.J., Packard, J.S., & Manning, M.R. 1986. Occupational stress: Its causes and consequences for job performance. *Journal of Applied Psychology* 71: 618-629.
- Nideffer, R.N. 1993. Attention control training. In R.N. Singer, M. Murphey and L.K. Tennant, *Handbook of research on sport psychology*. New York: Macmillan.
- Nideffer, R. 1976. Test of attentional and interpersonal style. *Journal of Personality and Social Psychology* 34: 394-404.
- Nideffer, R.M. & Sagal, M.S. 2001. Concentration and attention control training. In J.M. Williams (Ed.). *Applied sport psychology: Personal growth to peak performance* (4th edition). Mountain View, CA: Myfield.
- Ntoumanis, N. & Biddle, S. 1998. The relationship between competitive anxiety, achievement goals, and motivational climates. *Research Quarterly for Exercise and Sport* 2: 176-187.
- Orlick, T. 1986. *Psyching for sport: Mental training for athletes*. Champaign, IL: Human Kinetics.
- Ostrow, A.C. 1996. *Directory of psychological tests in the sport and exercise sciences* (2nd ed.). Morgantown, WV: Fitness Information Technology.

- Parfitt, G., Jones, G., & Hardy, L. 1990. *Multidimensional anxiety and performance*. In G. Jones & L. Hardy (Eds.), *Stress and performance in sport*. Chichester, UK: Wiley.
- Parfitt, G., Hardy, L., & Pates, J. 1995. Somatic anxiety and physiological arousal: Their effects upon a high anaerobic, low memory demand task. *International Journal of Sport Psychology* 26: 196-213.
- Petlichkoff, L. & Gould, D. 1985. Interrelationship between pre and mismatch competitive state anxiety measures. Paper presented at the AAHPERD National Conference, Atlanta, Georgia.
- Raglin, J.S. 1992. Anxiety and sport performance. In J.O. Holloszy (Ed.) *Exercise and Sport Sciences Reviews* 20:243-74. Baltimore: Williams & Wilkins.
- Raglin, J.S. & Hanin, Y.L. 2000. Competitive anxiety. In Yuri, L.H., *Emotions in Sport* (pg. 93-111). Champaign, IL: Human Kinetics.
- Rodrigo, G., Lusiardo, M., & Pereira, G. 1990. Relationship between anxiety and performance in soccer players. *International Journal of Sport Psychology* 21: 112-120.
- Rotella, R.J. & Lerner, J.D. 1993. Responding to competitive pressure. In R.N. Singer, M. Murpheydan L.K. Tennant, *Handbook of research on sport psychology*. New York: Macmillan.
- Sonstroem, R.J., & Bemardo, P. 1982. Intraindividual pregame state anxiety and basketball performance; A re-examination of the inverted-U curve. *Journal of Sport Psychology* 4: 235-245.
- Tsorbatzoudis, H., Barkoukis, V., Sideridis, G., & Grouios, G. 2002. Confirmatory factor analysis of the Greek version of the Competitive State Anxiety Inventory-2 (CSAI-2). *International Journal of Sport Psychology* 33: 182-194.
- Wann, D. L. 1997. *Sport Psychology*. New Jersey: Simon and Schuster.
- Weinberg, R.S. & Gould, D. 2007. *Foundations of Sport and Exercise Psychology*, 2nd ed. Champaign, IL: Human Kinetics.