How Trait and State Anxiety Influence Athletic Performance

Grace E. Whiteley

Wittenberg University
Abstract

Trait anxiety is a personality characteristic that describes the tendency to feel anxious across a variety of situations, while state anxiety refers to the anxiety experienced in a specific situation (Cox, 2007). Previous research has suggested that high trait anxious individuals experience more situation-specific state anxiety (Horikawa & Yagi, 2012). Additionally, prior research has indicated that anxiety can have either positive or negative effects on competitive performance, depending on other psychological factors such as self-efficacy, and other variables such as gender (Gallucci, 2008). This study included 96 college athletes and 57 high school athletes, and investigated how trait and state anxiety, self-efficacy, team orientation, age, gender, and experience level affect competitive athletic performance. Results showed that high trait anxious individuals experience more state cognitive and state somatic anxiety and less state self-confidence than low trait anxious athletes. Additionally, high school athletes experienced more somatic state anxiety than did college athletes. High school females experienced more cognitive and somatic state anxiety and less state self-confidence than college females, however this effect did not appear between male high school and college athletes. These results indicate that there is a high level of variation in the anxiety experienced by different athletes that may have implications in the techniques that coaches use to improve an athlete’s performance.

Keywords: Anxiety, athletic performance, gender differences
How Trait and State Anxiety Influence Athletic Performance

Within the world of sport, successful competitive performances can often be attributed to an athlete’s physical abilities. Naturally, those athletes who display greater athletic capacity and talent outperform athletes who are not as physically gifted or skilled in any given sport. However, physical qualities are only one dimension of a complex picture of what makes athletes successful. In addition to skill and talent, successful athletes must learn to approach competitions with a mental framework that allows them to thrive despite potentially aversive environmental or psychological variables. Essentially, there is a psychological component to athletics that can impact athlete performance regardless of the presence of physical ability or skill. This study sought to explain the ways in which psychological variables such as trait and state anxiety, self-efficacy, and team orientation influence athletic performance in high school and university athletes of different genders and experience levels within a given sport.

Anxiety and Personality

Personality is considered a strong predictor of sport performance. For example, research has shown that personality moderates the type of sport in which an athlete participates (Schurr, Ashley, & Joy, 1977). Furthermore, athletes are suggested to be more autonomous and more objective than those who do not participate in sport, and researchers have found that non-athletes tend to be less self-confident and more introverted than athletes (Schurr, Ashley, & Joy, 1977). Additionally, research has yielded differences between the levels of anxiety experienced by athletes as opposed to non-athletes. Although there is much individual variation among athletes, those who participate in sport are generally less anxious and more self-confident than those who are not involved with sport, indicating that anxiety is an important facet of personality that can have meaningful effects on competitive performance (Cox, 2007).
Anxiety is a construct that has consistently been studied in the field of sport psychology, and has become the most heavily researched psychological variable that influences athletic performance (Cox, 2007). This research suggests that anxiety is the most significant psychological construct that influences competitive performance. Anxiety is generally defined as an emotional response to a stimulus or situation that is perceived as dangerous (Raglin & Hanin, 2000). However, such stimuli or situations are subjective, indicating that some individuals may view a given stressor as threatening, while others may see that same stressor as beneficial in some way. Anxiety occurs only when one identifies some danger or threat, regardless of how the situation may appear to others.

Although an important factor within the context of sport, anxiety is not exclusively associated with competitive performance. Instead, a wide variety of cognitive processes including verbal and mathematical skills can be influenced both positively and negatively by anxiety (MacLeod, 1996). Researchers have proposed that the unfavorable effects of anxiety result from narrowed processing capabilities after excessive arousal. As such, one reason why anxiety is more harmful when a task is difficult is because complex tasks require more information intake, which is limited by anxiety (MacLeod, 1996). Similarly, competitive anxiety does not solely concern athletes; research suggests that match officials feel more cognitive anxiety prior to officiating a competition than they do after the competition is complete (Burke, Joyner, Pim, & Czech, 2000).

**Anxiety as a Multidimensional Construct**

Anxiety is multidimensional in that it can be divided into different categories, including trait and state anxiety. Trait anxiety is a personality characteristic that remains relatively stable over time, while state anxiety is activated in response to certain situations, such as an athletic
competition. Trait anxiety is characterized by an inherent inclination to perceive certain stimuli as threatening and in turn to respond with increased state anxiety when a particular stimulus is present. Conversely, state anxiety involves increased levels of physiological arousal, apprehension, fear, and tension (Cox, 2007). Researchers have shown that high trait anxiety levels may lead to an increase in state anxiety in performance-related situations (Horikawa & Yagi, 2012; Martens, Vealey & Burton, 1990).

Anxiety is also multidimensional in that it has both cognitive and somatic components. Cognitive anxiety includes worries about outcome, evaluations, potential failures, and inadequacies while somatic anxiety is characterized by muscle tension, increased heart rate, sweating, and a keyed up feeling. Cognitive anxiety is believed to be especially disruptive to competitive performance (Gallucci, 2008). Both trait and state anxiety have cognitive and somatic elements, creating four distinct types of anxiety: cognitive trait anxiety, cognitive state anxiety, somatic trait anxiety, and somatic state anxiety (Cox, 2007). This is consistent with Martens, Vealey, and Burton’s (1990) proposed multidimensional anxiety theory.

Anxiety is often considered as synonymous with related terms such as affect, emotion, mood, and stress, as there is considerable overlap between these variables and anxiety. Affect is a general term that refers to any type of emotion, feeling, or mood; while emotion describes an instantaneous response to a given environmental situation (Cox, 2007). A mood is a less concentrated emotional state that can last anywhere from several weeks to several months, and is not triggered by a specific event. Stress refers to a broad emotional response that results from demands made on the body, which can be either positive (eustress) or negative (distress) depending on the cause of the stress. Finally, anxiety is more specifically defined as a reaction to facing a potential threat or threatening situation (Cox, 2007).
Theories of Anxiety Performance Relationships

In addition to affect, emotion, mood, and stress, anxiety often occurs in conjunction with arousal. In some instances, anxiety and arousal are considered as one and the same; however the two constructs are not entirely synonymous. Arousal alone is not an emotion, but a physiological state characterized by stimulation and a general excitement or preparedness. Anxiety occurs, however, after a cognitive assessment of arousal (Gill & Williams, 2008). Researchers suggest that competitive state anxiety is a result of arousal that is perceived as worrisome, creating a sense of unease (Gill & Williams, 2008). Appraisals that define a competitive situation as threatening generally include fears of failure, negative evaluation, physical injury, disruption of a familiar routine, and ambiguous situations. Although arousal and anxiety are not one and the same, proponents of some theories find it necessary to consider state anxiety and arousal as the same construct (Cox, 2007). One such theory is the inverted-U hypothesis, which suggests that performance quality increases with arousal levels to a certain point at which performance begins to decrease with excessive arousal (Gallucci, 2008).

Advocates for the inverted-U hypothesis, or the Yerkes-Dodson law, indicate that the effect of anxiety and arousal on sport performance is also dependent on task complexity. Activities that require fine motor skills and little physical effort suffer with increasing anxiety and arousal levels, while this same increase benefits skills that require little motor control and a great deal of physical effort (Raglin & Hanin, 2000). Hence the influence of anxiety and arousal levels is dependent on the nature of the skills needed to complete a task. According to this theory, arousal is defined as a state of general physiological activation that can range from low to high (Raglin & Hanin, 2000). Generally, both physiological measures such as heart rate and psychological self-report measures have been used to assess arousal.
Catastrophe theory goes one step further and proposes that the inverted-U hypothesis holds true for somatic anxiety when cognitive anxiety is low, but that performance degrades more quickly when cognitive and somatic anxiety levels are both high (Gallucci, 2008). Additionally, cognitive anxiety improves performance when physiological arousal is low, but inhibits performance when arousal is high (Gill & Williams, 2008). This theory proposes that once the optimal level of arousal is exceeded, performance decreases rapidly. Furthermore, once an athlete has surpassed the optimal level, he/she must return to very low arousal levels and attempt to rebuild appropriate arousal (Gill & Williams, 2008).

Although some researchers regard the inverted-U hypothesis as more fact than theory, other explanations have emerged to explain the anxiety. First, drive theory seeks not only to explore the relationship between arousal and performance, but also between arousal and learning. Essentially, according to this theory, performance is a function of arousal multiplied by skill level (Hull, 1943 as cited in Raglin & Hanin, 2000). As arousal, or drive, increases, the well learned, or dominant, response is more likely to occur.

Drive theory appears to be a linear relationship, in that as arousal becomes heightened, so too does an individual’s ability to react with the dominant response. However, this does not necessarily indicate that performance improves with increased arousal; instead, only the performance of the dominant response improves (Gill & Williams, 2008). If a task is well learned such that the dominant response is correct in a given situation, then increased arousal is beneficial. At the same time, if the dominant response is not appropriate, then increased arousal impairs performance. As a result, heightened arousal is helpful only when the dominant response is a perfected skill that is suitable for the task at hand (Gill & Williams, 2008).
The individualized zones of functioning model (IZOF) is second explanation of the relationship between arousal, anxiety, and performance. This theory essentially proposes that there is not a precise point at which everyone experiences peak performance with heightened arousal, but rather that each individual athlete has a specific level of anxiety at which his/her performance is best (Raglin & Hanin, 2000). Contrary to the proposal of the inverted-U hypothesis, the IZOF model suggests that neither skill level nor the type of event in which an athlete is participating have an effect on performance.

Some individuals may be able to tolerate a large range of anxiety before performance declines while others are optimally functional only within a narrow range of anxiety (Raglin & Hanin, 2000). In order to assess an individual’s zone of optimal functioning, researchers have continually assessed anxiety before competition until an athlete has a performance that is considered a personal best. The level of anxiety reported before the personal best performance is considered the optimal level, and the range is determined by adding and subtracting a given number of “anxiety units” (Raglin & Hanin, 2000). Davis and Cox (2002) tested the IZOF model with a study of the effects of cognitive and somatic anxiety on swimming performance. The researchers found that cognitive anxiety that fell within an athlete’s IZOF was associated with best swimming performance, supporting the hypothesis of this model.

Finally, reversal theory suggests that an athletic experience is the result of an athlete’s interpretation of a given psychological construct (Shepherd, Lee, & Kerr, 2006). In this case, performance success is dependent on how an athlete cognitively understands his or her own arousal (Gill & Williams, 2008). As arousal increases, it is possible for an athlete to become either anxious or excited. On the contrary, as arousal decreases, an athlete can frame the situation as either boring or relaxing. Those athletes who become either anxious or bored are
negatively affected by states of arousal, while those who become either excited or relaxed benefit from varying levels of arousal (Gill & Williams, 2008).

**Mediators of Anxiety**

Researchers have proposed several different constructs that are considered mediators of both trait and state anxiety. Although a single cause of feelings of anxiousness has not been pinpointed, many associate anxiety with perfectionism. Like anxiety, perfectionism is multidimensional; functional perfectionism is evaluated as innately positive, while dysfunctional perfectionism is considered inherently negative (Cox, 2007). Functional perfectionism is related to superior personal standards, a keen want for organization, aspiring to perfection, and striving for success for oneself and others. On the contrary, dysfunctional perfectionism is characterized largely by concern over perfection and expectations, worry about mistakes and criticism, and self-doubt (Cox, 2007).

General perfectionism has been correlated with heightened levels of both cognitive and somatic anxiety (Stoeber, Otto, Pescheck, Becker, & Stoll, 2007). However, when this construct is divided between functional and dysfunctional perfectionism, results have yielded different correlations. In a study by Stoeber et al. (2007), a sample of both high school and university athletes completed perfectionism scales and competitive anxiety measures prior to an athletic competition. Pushing oneself to achieve perfection was not positively correlated with heightened levels of anxiety; however a negative response to a failure to achieve perfection was correlated with elevated levels of both cognitive and somatic anxiety (Stoeber et al., 2007). As associated with performance, functional perfectionism is largely perceived as beneficial, whereas dysfunctional perfectionism generally has adverse effects on performance (Cox, 2007).
Self-efficacy and Anxiety

Although perfectionism appears to be highly correlated with anxiety, there are several other psychological factors that impact both trait and state anxiety. Self-efficacy, or the belief that one can control his/her own environment and outcomes, is one such variable that can have a significant effect on competitive performance. This concept first emerged as a component of Bandura’s social cognitive theory (SCT; McAuley, White, Mailey, & Wojcicki, 2012). Self-efficacy is the driving force of SCT, and can be interpreted as a type of self-confidence that is specific to a given situation. Past performances, mastery level, social factors, and interpretations of psychological and physiological states are good indicators of how much self-efficacy an individual will feel. These situational factors work to distinguish self-efficacy from the more permanent and general trait of self-confidence, although the two constructs are closely related (McAuley et al., 2012).

While there are other components of the SCT model including outcome expectations, goals, facilitators, and obstacles, self-efficacy is considered the primary influence on behavior. It influences aspects of behavior such as effort, perseverance, and pursued activities both directly and indirectly through the other factors of SCT (McAuley et al., 2012). Individuals with high self-efficacy are likely to have more favorable outcome expectations, set loftier goals, and believe that they are competent to overcome performance impediments. Prior research has indicated that self-efficacy has biological implications, in that high self-efficacy leads to better health status and that health habits influence an individual’s decision to partake in a given activity. The relationship between self-efficacy and physical activity is believed to be reciprocal (McAuley et al., 2012).
Previous research has suggested a link between individual self-efficacy and levels of trait and state anxiety. Those individuals high in self-efficacy are more likely to interpret anxiety as facilitating rather than debilitating (Gallucci, 2008). Research on athletes of various sports, experience levels, and gender has indicated that self-efficacy is positively correlated with self-confidence, but is negatively related to both cognitive and somatic anxiety (Nicholls, Polman, & Levy, 2010). In a study on youth gymnasts with relatively similar levels of experience, high self-confidence led to better scores; and self-confidence was the only significant predictor of performance (Tsopani, Dallas, & Skordilis, 2011). Studies have also shown that individuals with high levels of self-confidence report low anxiety levels, which suggests that self-confidence and anxiety are inversely related (Kais & Raudsepp, 2005). Furthermore, research has yielded a positive relationship between coping self-efficacy, the belief in one’s ability to manage pressure, and performance when performance is subjectively rated by athletes (Nicholls, Polman, & Levy, 2010).

**Team Orientation and Anxiety**

Another factor that has the potential to affect anxiety is the type of sport in which an individual participates. Some research has suggested that participants in team sports are more anxious, dependent, and extraverted than individual sport athletes (Martens, Vealey, & Burton, 1990). Additionally, individual athletes have been identified as less alert and more sensitive and creative than team sport participants (Cox, 2007). Conversely, Nicholls, Polman, and Levy (2010) examined several athletes of varying experience levels that participated in an assortment of different sports and found that individual athletes displayed lower self-confidence and higher somatic anxiety levels than team athletes.
Often, sports such as track, golf, and swimming are perceived as individual sports, while sports such as soccer, football, and basketball are viewed as team sports. However, research has been largely unsuccessful in providing an accurate definition of how the distinction is made between individual and team sport participants. For example, a track athlete could be concerned about performing well because his/her score affects the team, rather than wanting to improve his/her own personal statistics. Similarly, a soccer player could desire to perform well to impress friends, parents, or coaches, rather than contribute to a team effort. Essentially, an athlete’s team orientation is dependent on how he/she defines his/her participation in sport. As such, assessing team orientation, or whether a person prioritizes team or individual performance during an athletic competition, would be a potential predictor of anxiety levels and performance quality.

Age, Experience, and Anxiety

Researchers have also examined the effects of age on anxiety, finding in one study that college athletes experienced significantly less somatic anxiety and more self-efficacy than did high school athletes, although differences in performance quality were not significant (George, 1994). Perhaps, then, college athletes benefited from having more experience within their given sport than high school athletes, or increased in confidence as a result of their experience. Modroño and Guillén (2012) similarly found in a sample of windsurfers that age was inversely related to cognitive anxiety, that is, older athletes experienced less cognitive anxiety than younger athletes. The researchers proposed that this effect likely came as a result of differences in the level of experience between older and younger athletes (Modroño and Guillén, 2012).

These results appear to indicate that age and experience are related to both cognitive and somatic anxiety, although a potential relationship between age, experience, and performance is unclear. Anxiety also plays a role in the attitudes and performance of youth athletes. In a study
of athletes between the ages of nine and thirteen, results indicated that as perceived competence increased, anxiety decreased and vice versa (Wong & Bridges, 1995).

**Gender and Anxiety**

Gender is another factor that can influence anxiety, with females having been shown to experience more cognitive anxiety but fewer concentration issues than their male counterparts (Grossbard, Smith, Smoll, & Cumming, 2009). Additionally, females experience more somatic state anxiety and less state self-confidence than do male athletes (Nicholls, Polman, & Levy, 2010). Research has also suggested that females are more team oriented than males, based on a study involving individuals with various sport experience answering questions regarding a general desire to work effectively with others (Jones, Neuman, Altmann, & Dreschler, 2001). Other studies have yielded non-significant gender effects, with females and males experiencing relatively equal levels of cognitive and somatic anxiety, trait anxiety, and self-confidence (Modroño and Guillén, 2012). These mixed results suggest that the relationship between gender and trait and state anxiety remains unclear.

**Level of Competition and Anxiety**

In a sample of windsurfers, those athletes who experienced less somatic anxiety had higher overall rankings, and that those who were listed as members of the “top five” also had higher self-confidence than lower ranked athletes (Modroño & Guillén, 2012). These results suggest that high caliber athletes who experience success in their sports benefit from reduced anxiety and increased self-confidence. In the same study, however, Modroño and Guillén (2012) also found that differences between the anxiety and self-confidence experienced by professional and amateur windsurfers were non-significant, perhaps indicating that only the most elite athletes experience significantly reduced anxiety as a result of their level of competition.
In a sample of elite and non-elite rugby players, elite performers demonstrated significantly higher trait self-confidence than their non-elite counterparts. Additionally, significant differences were found between the way in which anxiety is interpreted by elite and non-elite athletes, indicating that level of competition may not only have an effect on anxiety intensity, but also on anxiety direction (Neil, Mellalieu, & Hanton, 2006). Elite competitors, who were defined according to their professional status, interpreted worry symptoms as less debilitating and somatic anxiety responses as more facilitative than their non-elite counterparts who competed at semi-professional levels or lower (Neil, Mellalieu, & Hanton, 2006).

**Audience Effects**

Although several aspects of performance and anxiety can be attributed to internal factors such as self-efficacy and team orientation, it is also probable that external factors play an important role in shaping performance. Such factors can include the audience in front of which an athlete competes and the location of the competition. Audiences can largely be categorized as supportive, neutral, or hostile, while competitions are classified as either home or away (Butler & Baumeister, 1998). Prior research assessing a wide variety of performance tasks has yielded mixed conclusions about audience effects, with some studies finding that performance declines with a hostile audience and some indicating that a supportive audience is more detrimental to performance.

Butler and Baumeister (1998) sought to explore these conflicting results by first asking participants to complete a mental arithmetic task while theoretically being observed by either a supportive friend or neutral strangers. Results indicated that those who believed they were carrying out the task in front of friends became more cautious and made more mistakes than those in the stranger condition; however they believed that they had performed well. Butler and
Baumeister’s (1998) overall findings indicated that challenging tasks requiring great skill are adversely affected by a supportive audience. Conversely, Bray and Martin (2003) examined individual alpine skiers and determined that neither performance nor anxiety levels were influenced by whether the competition was held at home or away.

Additionally, research has suggested that athletes report higher self-efficacy and self-confidence and lower cognitive and somatic anxiety prior to home games as opposed to away games (Bray, Jones, & Owen, 2002). However, the researchers are careful to note that there are moderating variables that lead to mixed results when comparing home competitions to away competitions. Athletes in a study by Bray, Jones, & Owen (2002) had extensive playing experience and competed at very high levels, indicating that perhaps these factors impact and moderate the effects of home and away competition on an athlete’s psychological state.

**Current Research**

The current research will examine the relationship between trait anxiety and state anxiety, and the influence that both of these have on performance quality. This study also investigates the influence of self-efficacy, team orientation, age, experience, gender, and level of competition on both anxiety and performance.

Based on previous research, I expect high trait anxiety to predict high state anxiety, and for elevated levels of state anxiety to be negatively correlated with performance. I also hypothesize that high self-efficacy will be negatively correlated with trait anxiety, and therefore state anxiety, thus improving and/or not affecting performance. I expect individually-oriented athletes to report higher trait anxiety and lower self-efficacy, and experience higher state anxiety than team-oriented participants. Additionally, I expect those individually-oriented athletes who experience heightened state anxiety to perform worse than those who are low in state anxiety.
I predict that there will be a negative relationship between age, anxiety, and performance. As an athlete ages, his/her state anxiety levels will decrease, and performance will improve. Thus, high school athletes will experience more state anxiety than college athletes. Within each age group, the performance of those athletes who report high state anxiety will be lower. Additionally, I predict that females will be more trait anxious, and therefore more state anxious, than males. The performance of those females who follow this pattern will be adversely affected. Finally, I predict that elite performers will display high levels of self-efficacy and lower trait anxiety than less elite athletes. As a result, high-level competitors will have a superior ability to cope with state anxiety than less elite athletes, thus the performance of elite athletes will not be as negatively affected by state anxiety (Figure 1).

**Methods**

**Participants**

Participants in this study were college athletes between the ages of 18 and 22 ($M = 19.57$, $SD = 1.16$), and high school athletes between the ages of 14 and 18 ($M = 16.39$, $SD = 1.18$). College athletes ($N = 96$) were recruited from the basketball (15 male, 13 female) swim (18 male, 27 female), softball (9 female), and baseball (14 male) teams at a small Midwestern university. There were 57 high school athletes recruited from wrestling (12 male), swim (3 male, 8 female), bowling (8 male), basketball (8 male, 6 female), and tennis (12 male) teams from schools in multiple suburban areas. Participating individuals did not receive any compensation for their participation.

College participants were recruited through contact with the athletic director, and then through direct contact with the coaches who were interested in participating. Each athlete was able to decide whether or not to participate. High school participants were recruited similarly,
through contact with either the athletic director or the coach at all of the schools involved. Both athletes and parents were able to determine participation in the study.

**Procedure**

All athletes were required to provide written informed consent prior to participation in this study; those athletes over the age of 18 were permitted to sign their own consent form, while younger athletes required parental consent. Both parents and participants had the opportunity to provide contact information if they wished to receive a copy of the results of this study after its completion.

Participants were told that they would be completing two surveys to assess nervousness and excitement in sports. The first survey consisted of three separate questionnaires regarding trait anxiety, sources of self-efficacy, and team orientation. Participants completed this survey during a time period when they were not engaged in athletic competition, either at a practice or several hours before a competition. The second survey was a measure of state anxiety, which participants completed within one hour of the start of an athletic competition either on the bus ride to or at the location of the event. Participants also provided demographic information, regarding whether they were a university or high school athlete, the sport in which the athlete participated, the number of years for which they had played that sport, and the level at which they currently participated in the sport (e.g. varsity, junior varsity, starter, non-starter).

Additionally, coaches were asked to complete a performance assessment for each athlete who participated in the study. The athletes were asked to provide their names on a small tear off sheet on the front of each survey, and coaches were asked to provide the name of the athlete on a
similar paper attached to the performance assessment. After the information for each athlete was gathered, names were removed to ensure anonymity and the surveys were coded by number.

**Measures**

*State Trait Anxiety Inventory.* Trait anxiety was measured using the 40-item *State Trait Anxiety Inventory*, which took roughly ten minutes for athletes to complete (STAI; Spielberger, Gorsuch, Lushene, 1970). This measure assessed trait anxiety, or anxiety that remains relatively stable over time and is not situation specific, with statements such as “I am a steady person,” and “I feel at ease.” Participants rated each statement on scales from 1 (*not at all*) to 4 (*very much so*).

*Sources of Sport Confidence Questionnaire.* Self-efficacy was assessed using the *Sources of Sport Confidence Questionnaire*, which consists of 41 items divided into 9 subscales (SSCQ; Vealey, Hayashi, Garner-Holman, Giacobbi, 1998). The subscales are Mastery, Demonstration of Ability, Mental and Physical Preparation, Physical Self-perception, Support, Vicarious Experience, Environmental Comfort, Situational Favorableness, and Leadership; each contained between 3 and 6 items. Participants reacted to statements related to sources of self-efficacy (e.g. I gain self-confidence in my sport when I: “psych myself up”; “see the breaks are going my way”) by rating them on scales from 1 (*not at all important*) to 7 (*of highest importance*). Most participants completed this questionnaire within five and ten minutes.

*Team Orientation Questionnaire.* In order to evaluate the athletes’ team orientation, the participants completed a newly developed 15-item measure called the *Team Orientation Questionnaire* (Caplan, Bourgeois, LeUnes, Hudson, & Meyers, 2011). Participants rated items
such as “I get along very well with my teammates” and “I think team spirit is very important” on five-point scales from strongly disagree to strongly agree. There were three subscales – Team Orientation, Team Player, and Team Cohesion – which each contained five items. This questionnaire required less than five minutes to complete.

*Competitive State Anxiety Inventory – 2.* Directly prior to competition, participants completed the 27-item *Competitive State Anxiety Inventory – 2* as an assessment of situation specific state anxiety (CSAI-2; Martens, Burton, Vealey, Bump, & Smith, 1990). Participants responded to on scales from 1 (*not at all*) to 4 (*very much so*) to statements such as “I am concerned about this competition” and “I feel comfortable.” There were 3 subscales composed of 9 items each, including Cognitive State Anxiety, Somatic State Anxiety, and State Self-confidence. Athletes took roughly five minutes to complete this questionnaire.

*Performance Assessment.* Additionally, the coaches were required to complete an objective performance assessment of each player who participated in the study following the competition. The assessment consisted of 10 items and took the coaches between one and two minutes to complete for each athlete. The coaches rated items such as the athlete’s overall performance, performance in the target competition compared to typical performances from a given athlete, and the athlete’s contribution to the outcome of the competition (See Appendix).

**Results**

Data from 153 participants were analyzed after this study was complete. High school athletes had participated in their respective sports for between 1 and 8 years (*M* = 4.60, *SD* = 2.22), while college participants had been involved with their sports for between 2 and 10 years (*M* = 6.71, *SD* = 1.84). There were 41 high school participants who competed in traditional individual sports, and 16 who participated in team sports. Of the high school athletes, 38
reported participating as varsity starters, 6 as varsity non-starters, 6 as junior varsity starters, 3 as junior varsity non-starters, and 3 as a combination of two or more of those roles. There was 1 high school athlete who failed to report his/her level of competition. Among the college participants, there were 45 athletes who competed in traditional individual sports, and 51 who participated in team sports. There were 66 participants who reported participating as varsity starters, 17 as varsity non-starters, 3 as junior varsity starters, 2 as junior varsity non-starters, and 8 as a combination of two or more of those roles.

Scales for trait anxiety, cognitive state anxiety, somatic state anxiety, and state self-confidence were all reliable (Cronbach’s alpha = 0.89, 0.81, 0.81, and 0.88, respectively). Similarly, the scales measuring self-efficacy and team orientation were each reliable (Cronbach’s alpha = 0.94 and 0.72, respectively). Within the sample of high school athletes, three independent samples t-tests were carried out; these assessed gender differences, team and individual sport differences, and differences between home and away competitions in trait anxiety, cognitive state anxiety, somatic state anxiety, state self-confidence, self-efficacy, and team orientation.

Females (M = 49.08, SD = 9.44) were significantly more trait anxious than male athletes (M = 36.83, SD = 7.56), t (53) = 4.81, p = 0.001. Additionally, females reported significantly higher levels of cognitive state anxiety (M = 22.38, SD = 5.68) than males (M = 18.33, SD = 5.35), t (54) = 2.36, p = 0.022. Females also experienced significantly higher levels of somatic state anxiety (M = 20.38, SD = 5.61) than did male athletes (M = 15.05, SD = 4.19), t (54) = 3.72, p = 0.001. Males (M = 26.26, SD = 4.94) reported significantly more state self-confidence than females (M = 20.77, SD = 4.55), t (54) = 3.57, p = 0.001 (Table 2). Gender differences between the amount of self-efficacy and level of team orientation were not significant. Athletes who
participated in team sports \( (M = 23.13, SD = 2.36) \) were more team oriented than individual sport participants \( (M = 18.26, SD = 3.18) \), \( t(52) = 5.50, p = 0.001 \). Differences between team and individual sports in trait anxiety, cognitive state anxiety, somatic state anxiety, state self-confidence, and self-efficacy were not significant. There were no significant differences between the variables mentioned above based on whether an athlete was participating in a home or an away competition. However, the difference between the level of state self-confidence experienced at home and away competitions was marginally significant, \( t(45) = 1.87, p = 0.069 \), with athletes at away competitions \( (M = 29.00, SD = 5.61) \) experiencing marginally more state self-confidence than those participating in home competitions \( (M = 25.36, SD = 4.93) \).

Three independent samples \( t \)-tests were performed within the sample of college athletes. Female participants \( (M = 41.82, SD = 9.36) \) were significantly more trait anxious than male athletes \( (M = 36.02, SD = 7.82) \), \( t(92) = 3.24, p = 0.002 \). Additionally, males \( (M = 27.38, SD = 5.57) \) reported significantly more state self-confidence than females \( (M = 23.98, SD = 4.82) \), \( t(92) = 3.17, p = 0.002 \) (Table 2). Gender differences in cognitive state anxiety, somatic state anxiety, self-efficacy, and team orientation were not significant. Those who participated in team sports \( (M = 22.10, SD = 2.12) \) were more team oriented than individual sport athletes \( (M = 18.72, SD = 2.67) \), \( t(86) = 6.63, p = 0.001 \). Additionally, individual sport participants \( (M = 40.93, SD = 9.93) \) were marginally more trait anxious than team sport athletes \( (M = 37.45, SD = 8.07) \), \( t(92) = 1.87, p = 0.064 \). Participants in individual and team sports did not differ significantly on any of the other variables. Whether an athlete was participating in a home or an away competition did not yield any significant effects within the college athlete sample.

Within the high school participants, overall performance was not significantly correlated with cognitive state anxiety, somatic state anxiety, or state self-confidence. Additionally, the
number of years for which an athlete had participated in his/her sport was not significantly
correlated with overall performance. Finally, there was no significant correlation between trait
anxiety, self-efficacy, and team orientation. For college participants, overall performance ($M =
7.22, SD = 1.84$) was positively correlated with state self-confidence ($M = 25.61, SD = 5.44$), $r =
0.27, p = 0.016$. Additionally, the number of years for which an athlete had participated in
his/her sport ($M = 6.71, SD = 1.84$) was positively correlated with overall performance, $r = 0.25,$
$p = 0.027$. There was a marginally significant correlation between years of experience and state
self-confidence, $r = 0.20, p = 0.061$. Team orientation ($M = 20.60, SD = 2.91$) was negatively
correlated with trait anxiety ($M = 39.04, SD = 9.09$), $r = -0.21, p = 0.049$. In addition, team
orientation was positively correlated with self-efficacy ($M = 211.67, SD = 30.03$), $r = 0.39, p =
0.001$. Trait anxiety and self-efficacy were not significantly correlated.

A between-groups one-way ANOVA was carried out to determine whether the amount of
cognitive state anxiety, somatic state anxiety, and state self-confidence one experiences are
dependent upon whether an athlete is in high school or college. High school participants ($M =
16.29, SD = 5.04$) experienced significantly more somatic anxiety than did college athletes ($M =
14.76, SD = 4.31$), $F (1, 151) = 2.54, p = 0.050$. High school female ($M = 22.38, SD = 5.68$)
athletes experienced significantly more cognitive state anxiety than college females ($M = 18.27,$
$SD = 4.35$), $t (59) = 2.83, p = 0.006$. High school females ($M = 20.38, SD = 5.61$) also reported
significantly more somatic anxiety than their college counterparts ($M = 15.29, SD = 4.18$), $t$
(15.72) = 3.06, $p = 0.008$ (equal variances not assumed). Additionally, high school female
athletes ($M = 20.77, SD = 4.55$) were less state self-confident than college females ($M = 23.98,$
$SD = 4.82$), $t (60) = 2.16, p = 0.035$. There were no significant differences in these variables
between high school male and college male athletes.
Across both groups, trait anxiety ($M = 39.29$, $SD = 9.22$) was positively correlated with both cognitive state anxiety ($M = 18.41$, $SD = 5.13$) and somatic state anxiety ($M = 15.32$, $SD = 4.64$), $r = 0.45$, $p = 0.001$ and $r = 0.42$, $p = 0.001$, respectively. Trait anxiety was negatively correlated with state self-confidence ($M = 25.37$, $SD = 5.40$), $r = -0.59$, $p = 0.001$. Self-efficacy was not significantly correlated with the level at which an athlete participated. A simple linear regression was performed to determine whether cognitive state anxiety, somatic state anxiety, state self-confidence, years of experience, or whether a competition was home or away could significantly predict overall performance. Results indicated that none of these factors was a significant determinant of performance across all 153 participants, $p >0.050$.

**Discussion**

Overall, results showed mixed support for the original hypotheses. As predicted, team orientation and trait anxiety shared an inverse relationship within the college sample; athletes who reported lower team orientation were higher in trait anxiety. Perhaps those with high trait anxiety become so preoccupied by focusing on their own performance that it is difficult for them to concentrate on team goals as well. Additionally, more individually-oriented athletes within the college participants reported lower self-efficacy and marginally higher trait anxiety than team-oriented individuals, supporting the finding that individually oriented athletes experience less self-confidence (Nicholls, Polman, & Levy, 2010).

The relationship between gender, age, and anxiety yielded several significant results that were in line with preliminary hypotheses. First, within both the high school and the college samples, females were more trait anxious than males. Second, high school females reported more cognitive and somatic state anxiety and less state self-confidence than male high school athletes (Figure 2). While these results support the original hypotheses, the same cannot be said
of the anxiety differences between genders at the college level. Among college participants, males reported higher state self-confidence, but gender differences in cognitive and somatic state anxiety were non-significant. Furthermore, female high school participants reported significantly more cognitive and somatic state anxiety, and less state self-confidence than did college female athletes (Figure 3). However, differences in these three variables were not significant between high school and college males.

This suggests that while the female athlete undergoes several changes as she progresses in both age and level of competition, the male athlete may experience fewer. When a female athlete moves from high school to college, she experiences lower levels of both cognitive and somatic anxiety, and she gains self-confidence. In terms of state anxiety, she no longer differs from her male counterpart. She still, however, differs from the male athlete in terms of pre-competition self-confidence, which suggests that as a male athlete moves from high school to college, the state anxiety that he experiences does not change, but he gains self-confidence in order to maintain the difference between genders on this variable. This developmental change is further evidenced by the fact that high school athletes as a group experienced significantly more somatic state anxiety than the sample of college athletes.

Contrary to the original hypothesis, trait anxiety and self-efficacy did not exhibit a significant relationship; therefore self-efficacy also neglected to indirectly impact state anxiety. This result could potentially suggest that self-efficacy and trait anxiety are not mutually exclusive; an athlete can be highly trait anxious while still feeling as though he/she is in control of his/her environment and outcomes. However, the measure of self-efficacy employed in this study, the Sources of Sport Confidence Questionnaire (SSCQ; Vealey, Hayashi, Garner-Holman, Giacobbi, 1998), may also have produced misleading results. This measure assesses how an
athlete gains self-confidence within his/her sport, with the assumption that those low in self-efficacy will report low gains in confidence from each of the items, resulting in a low overall score. It is possible; however, that the athletes who were high in trait anxiety rated the items as the amount of confidence they felt they should gain from a given situation, and not how much they actually gained. Thus, differences in self-efficacy in high and low trait anxious individuals could have been washed out by a ceiling effect in which most participants reported relatively high self-efficacy. This same logic could be applied to the lack of association between self-efficacy and the level at which an athlete participated.

Consistent with both previous research and the hypotheses for this study, high trait anxious athletes experienced higher levels of both cognitive and somatic anxiety prior to competition. Therefore, results indicate that individuals who exhibit increased anxiety as an inherent personality characteristic are more likely to interpret specific, performance-related situations, such as an athletic competition, as anxiety inducing. Similarly, high trait anxious athletes reported less state self-confidence, supporting the idea that confidence and anxiety are inversely related (Kais & Raudsepp, 2005).

Increased levels of cognitive and somatic state anxiety did not, however, significantly harm performance, as was expected. It is possible that those athletes who experienced heightened pre-competition anxiety also demonstrated exceptional coping skills such as relaxation, thus anxiety did not affect their performance. It is also possible that the lack of impact of anxiety on performance suggests support for the inverted-U hypothesis. Perhaps as the anxiety experienced by the participants increased, performance level increased, because the slope was merely approaching the critical level at which anxiety begins to cause a decline in performance. If none of the participants exceeded the peak of the curve, then it stands to reason
that performance level would not significantly decrease with heightened anxiety. Similarly, if no athlete had yet reached the peak of the curve, then performance would not have been overwhelmingly facilitated by increased state anxiety. As a result, performance would fail to be significantly affected by state anxiety, as was the case in this study.

Additionally, the environment in which an athlete was competing, either home or away, did not affect performance, and only mildly influenced the amount of state self-confidence that an athlete experienced. The lack of difference in anxiety levels experienced at home and away competitions supports Bray and Martin’s (2003) previous finding that in individual sport athletes, the location of competition did not affect the participant’s psychological state and/or his/her subsequent performance.

Within the sample of college athletes, however, individuals performed better if they had reported higher state self-confidence prior to the competition. This result suggests that, although state anxiety may not always impact performance, the mental state of a pre-competition athlete can have an impact on his/her individual outcome. The only other variable to have a significant effect on performance was the number of years for which a college athlete had participated in his/her sport. With more experience, overall performance scores increased. However, this result was only significant within the college samples. Conceivably, this could mean that only college athletes have enough experience to affect performance – none of the high school athletes, for example, had participated in their sport for more than 15 years. Perhaps the effect on overall performance does not begin to surface until one has competed for more than 15 years.

It is also possible that only those athletes who consistently perform well continue to compete and, thus, build years of experience. In addition, there was no distinction between years of experience in a sport and years of competitive experience within that sport; therefore an
athlete who had competed for seven years at a recreational level was rated as equal to someone who had competed for the same amount of time at a highly elite level. It could be that only those with years of competitive experience would have obtained a high enough level of skill throughout their involvement with sport to perform successfully as a college athlete. Thus performance level and performance quality throughout the years of experience in sport, not only the years of involvement, may drive this correlation.

As evidenced by the fact that the majority of the variables that were expected to affect performance failed to do so, it may be that one of the major limitations of this study was the measure used to assess performance. The assessment asked coaches to give, among other ratings, an overall performance score, as well as an indication of whether an individual and/or team won the competition. As the majority of the individuals who competed did not win, the overall performance rating was used to assess athlete success. Performance scores, however, tended toward the higher end of the scale, creating somewhat of a ceiling effect. As a result, variability in performance was low, thus it was difficult to accurately judge which factors had truly influenced performance. In repeating this study, I would seek a more objective performance measure or use a combination of subjective ratings and competition statistics to determine performance success.

In future studies, I would like to further investigate developmental differences by including younger athletes in the study, and expand the level of competition to include elite or club athletes, as well as college athletes from a higher division. Furthermore, I would like to examine the difference between high state anxiety and a lack of confidence, and the ensuing impact on performance. In this study, trait anxiety was inversely related with self-confidence and positively associated with state anxiety. Thus, it is possible that either low self-confidence
or high state anxiety could affect performance. I would like to explore whether these factors are always correlated in the same way or whether one can experience both heightened state anxiety and high self-confidence at the same time, or a complete lack of self-confidence without increased anxiety; if it is possible for an athlete to be highly anxious but also quite self-confident, how is performance affected? If an athlete can lack self-confidence but not feel performance-related anxiety, can he/she be successful?

For example, if an athlete experiences heightened state anxiety prior to a competition and subsequently performs poorly, he/she may carry negative feelings to the next competition. If so, are these negative feelings manifested as anxiety about performing poorly again, or as a lack of confidence due to performing poorly in the previous competition? Is there a difference between the effects of these variables, or do they produce the same performance outcome? In the world of sport, an athlete is so often referred to as experiencing a “slump,” or a prolonged decline in form, thus I would be interested in investigating whether this stems from heightened anxiety as the slump continues, or decreased confidence as the athlete continually fails to perform well.

Results strongly indicate a developmental difference between high school and college female athletes, in terms of the anxiety experienced prior to competition. The lack of distinction among these factors between high school and college male athletes additionally suggests that there is an inherent gender difference regarding the experience of competitive anxiety prior to competition. Although performance was neither negatively nor positively influenced by increases in anxiety in this study, both the gender and developmental differences yield important implications for the field. For example, somatic state anxiety is not a pleasant feeling, thus even though performance was not affected, those athletes who reported heightened levels were likely uncomfortable directly prior to competition. To prevent discomfort, then, coaches could aim to
lessen somatic anxiety prior to competition by using relaxation or meditation techniques. Based on the current results, these efforts should be specifically aimed at high school females, who reported the highest levels of somatic state anxiety. Perhaps efforts made by professionals toward eradicating this discomfort could lessen the gap in levels of state anxiety experienced by both high school and college athletes, and males and females involved with sport.
References


young athletes: Differentiating somatic anxiety, worry, and concentration disruption. 

*Anxiety, Stress, & Coping* 22(2), 153-166. doi: 10.1080/10615800802020643.


Appendix

Performance Assessment

Did this athlete start the competition?  Yes  No

Roughly how many minutes did this athlete play for during the competition?  ___________

Please rate this athlete’s **overall performance** on a scale from 1 (very poor) to 10 (excellent):

1  2  3  4  5  6  7  8  9  10

Please rate the **involvement** of this athlete in the competition on a scale from 1 (not at all involved) to 10 (incredibly involved):

1  2  3  4  5  6  7  8  9  10

How does this athlete’s performance in this competition **compare to typical performances** from this athlete? Please rate from 1 (far below average) to 10 (far above average)

1  2  3  4  5  6  7  8  9  10

Did the team win this competition?  Yes  No

Please rate the extent to which you feel that the participant contributed to the **outcome of this competition** on a scale from 1 (no contribution) to 10 (the athlete is the primary reason for the result):

1  2  3  4  5  6  7  8  9  10

How does this athlete generally perform at **home competitions**? Please rate from 1 (not very well) to 10 (very well).

1  2  3  4  5  6  7  8  9  10

How does this athlete generally perform at **away competitions**? Please rate from 1 (not very well) to 10 (very well).

1  2  3  4  5  6  7  8  9  10

To what extent do you believe that **nervousness** influences this athlete’s performance? Please rate from 1 (not at all) to 10 (very much so).
To what extent do you believe that this athlete is a team player? Please rate from 1 (not at all) to 10 (very much so).

1 2 3 4 5 6 7 8 9 10
### Table 1

*Number of Participants per Sport by Gender and School Level*

<table>
<thead>
<tr>
<th>Individual Sports</th>
<th>Team Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrestling</td>
<td>Bowling</td>
</tr>
<tr>
<td>Male</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>College</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
</tr>
<tr>
<td>High School</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

Anxiety Levels for College and High School Male and Female Participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Participants</th>
<th>Trait Anxiety ($M$)</th>
<th>Cognitive State Anxiety ($M$)</th>
<th>Somatic State Anxiety ($M$)</th>
<th>State Self-confidence ($M$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>49</td>
<td>41.82</td>
<td>18.27</td>
<td>15.29</td>
<td>23.98</td>
</tr>
<tr>
<td>Male</td>
<td>47</td>
<td>36.02</td>
<td>17.49</td>
<td>14.20</td>
<td>27.38</td>
</tr>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>49.08</td>
<td>22.38</td>
<td>20.38</td>
<td>20.77</td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>36.83</td>
<td>18.33</td>
<td>15.05</td>
<td>26.26</td>
</tr>
</tbody>
</table>
Figure 1. Visual diagram of relationships between psychological factors that influence competitive performance.
Figure 2. High school females reported significantly higher trait, cognitive state, and somatic state anxiety, and significantly less state self-confidence than high school males.
Figure 3. High school females reported significantly higher cognitive and somatic state anxiety, and significantly less state self-confidence than college females.