FACTORS INFLUENCING COMPETITEVE STATE ANXIETY IN SPORT AND EXERCISE:

A RESEARCH SYNTHESIS

A Senior Thesis

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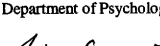

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Abstract

A meta-analysis was conducted across twenty-seven studies using the Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Vealey, and Burton, 1990) administered to participants in both aerobic and anaerobic sports. The CSAI-2 assesses competitive state anxiety across the three component scales of somatic anxiety, cognitive anxiety and self-confidence. The twenty-seven studies provided CSAI-2 data that was compared to population norms, providing 32 effects for combined norms and 94 effects for gender- and performance level-specific norms. Effects of five moderator variables (time, gender, type, level, and intensity) were examined. It was expected that anxiety would be greater the day before a competitive event, that women's anxiety scores would be higher than men's and their self-confidence scores would be lower, that those involved in interactive sports would have lower anxiety scores as a result of social loafing, that high school participants would have higher anxiety scores than their elite counterparts as a result of lack of experience in handling anxiety, and that those involved in anaerobic sports would have greater anxiety scores because of multiple presentations of anxiety-inducing situations. General effects were found for type of exercise (coactive, interactive, mixed), intensity (aerobic versus anaerobic), and timing of data collection (related versus unrelated to performance). Hypotheses were confirmed

through multivariate and univariate analysis conducted on effect sizes calculated with Cohen's d.

Factors Influencing Competitive State Anxiety in Sport and Exercise: A Research Synthesis

The history of anxiety is probably as old as the history of humankind itself. The literature of ancient Egypt, the Old Testament, and Greece and Rome give testament to the idea that fear and anxiety were recognized as a part of the human psyche (Spielberger & Vagg, 1995). In *Expressions of Emotions in Men and Animals*, Darwin (1872/1965) described fear as a characteristic common to both humans and animals (as cited in Spielberger & Vagg, 1995). Fear, according to Darwin's conceptualization, is a product of evolution that has allowed man and beast to respond successfully to dangerous situations. Over a hundred years ago, Darwin labeled what is now called "somatic anxiety" and stimulation of the autonomic nervous system - trembling, "dry mouth", increased perspiration, and "butterflies in the stomach" - as the reactions of the body to fear.

Sigmund Freud (1895/1924, 1936) described anxiety as "something felt", the subjective and unpleasant experience of one who is feeling fear (as cited in Spielberger & Vagg, 1995). Freud divided anxiety into two types, "objective" and "neurotic". In "objective" anxiety, the "emotional response is proportional to a real danger in the external world", as opposed to "neurotic" anxiety, where the "intensity of the emotional response is much greater than the objective danger" (Spielberger & Vagg, 1995). For some time, then,

anxiety has been recognized as a part of the human experience on both academic and cultural terms. There has been interest in defining it, describing it, and combating it that has withstood the test of time and continues to this day. Such continued renewal of interest would indicate that it affects many lives, some to a greater degree than others, and that there are questions about the anxious experience that remain unanswered.

Lazarus & Averill give a general definition of anxiety as a state of depression or agitation accompanied by feelings of distress (as cited in Silva & Weinberg, 1984). Anxiety can then be operationally defined by the measurement of three component responses: cognitive, behavioral, and physiological. Anxiety can be conceptualized as having both negative effects and energizing properties. According to Sonstroem, "arousal actually refers to the entire continuum of an individual's psychological activation whereas anxiety is restricted to higher arousal states that produce feelings of discomfort or excessive concern" (as cited in Silva & Weinberg, 1984). One popular area of research in sport psychology is discerning the relationship between arousal and optimal performance. The inverted-U hypothesis, for instance, proposes that too little arousal is not motivating enough and that too much arousal is debilitative. Somewhere in between too much and too little rests an optimal arousal level (Hackfort & Spielberger, 1989). The focus of the present study is not the continuum of arousal but anxiety.

In a discussion of anxiety, it is important to differentiate between chronic and transitory anxiety. Spielberger defined state anxiety (A-State) as "a transitory emotional state ... that varies in intensity and fluctuates over time" (as cited in Silva & Weinberg, 1984). According to Spielberger, trait anxiety (A-Trait) refers to "relatively stable individual differences in anxiety proneness", the "differences in the disposition to perceive a wide range of stimulus situations as dangerous or threatening, and ... to respond to such threats with A-State reactions" (as cited in Silva & Weinberg, 1984). High A-Trait persons experience a great number of situations as threatening; they respond to threats with A-State reactions disproportionately higher than those of low A-Trait persons. The focus of this study is state anxiety.

Anxiety and arousal have generally been measured by standardized paper and pencil questionnaires. One of the first was the Taylor Manifest Anxiety Scale (Taylor, 1951), which assessed between-subject differences in chronic anxiety (as cited in Silva & Weinberg, 1984). The 1970 State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch & Lushene, 1970)
was the first to measure both A-Trait and A-State levels (as cited in Silva & Weinberg, 1984).

The theoretical underpinnings for research in competitive anxiety have been educational and clinical psychology literatures on anxiety. The three major

conceptual approaches are: general arousal-based, general anxiety-based, and multidimensional anxiety-based approaches. In the late 1960s and early 1970s, when behavior began to be thought of as determined by the reciprocal interaction of personal traits and the characteristics of different situations, it became necessary to consider both the trait anxiety of the athlete and the constraints of the situation. Martens' 1977 Sport Competition Anxiety Test (SCAT) measured Competitive Trait Anxiety (CTA). Martens et. al. (1980) later developed the Competitive State Anxiety Inventory (CSAI), a sport-specific, A-State inventory tailored to competitive settings (as cited in Silva & Weinberg, 1984).

Continued developments in educational and clinical psychology demonstrated that anxiety can be conceptualized as multidimensional in nature, composed of cognitive and somatic components. Morris, Davis & Hutchings (1981) described cognitive anxiety as "the cognitive elements of anxiety, such as negative expectations and cognitive concerns about oneself, the situation at hand and potential consequences" (as cited in Silva & Weinberg, 1984). Morris et. al. defined somatic anxiety as "one's perception of the physiological-affective elements of the anxiety experience, that is, indications of autonomic arousal and unpleasant feeling states such as nervousness and tension" (as cited in Silva & Weinberg, 1984). The culmination of the development of multidimensional conceptualization and

measurement of competitive state anxiety was the Competitive State Anxiety Inventory-2 (CSAI-2), the focus of the current study (Martens, Vealey, & Burton, 1990).

The CSAI-2 was originally designed to measure cognitive and somatic anxiety. However, during validation work a third dimension emerged which was later identified as sport self-confidence. The CSAI-2 has been the "major measuring instrument in competitive state anxiety research since the mid-1980s" (Jones, 1995). It has been employed to test the competitive state anxiety of both men and women athletes of varying skill levels in a variety of sports over a number of years.

The CSAI-2 test manual reports normative information for each of the three subscales of the CSAI-2 for male and female high school, college, and elite athletes. One purpose of the present work was to take CSAI-2 scores and combine them across studies in order to compare them to the reported test norms. One comparison would be made to norms that were combined for both men and women athletes at all levels. A second comparison would be made to norms that were sex- and performance level-specific. It was expected that the CSAI-2 study scores would reflect the test norms and add validity to the CSAI-2.

A second purpose of this study was to examine potential moderator variables when appropriate. The four moderators investigated were 'type of sport', 'performance level', 'sport intensity', 'gender', and 'timing of CSAI-2

measurement'. The 'type of sport' variable was defined categorically on the basis of whether a sport was interactive, coactive, or mixed (Goldman, Stockbauer, & McAuliffe, 1977). Interactive sports are those that require close teamwork for success and show high means interdependence. Examples of interactive sports are basketball, volleyball, soccer, and hockey. Coactive sports require little team interaction for success and show low means interdependence. Examples of coactive sports are golf, skiing, cycling, distance running, and karate. Mixed sports are those that have aspects of both coaction and interaction. In mixed sports, there is a moderate amount of interdependence. Examples of mixed sports are baseball, swimming, tennis, American football, and softball. Martens, Vealey, & Burton (1990) found that those involved in individual sports had significantly higher cognitive and somatic state anxiety scores and lower sport self-confidence levels than those involved in team sports (as cited in Hammermeister & Burton, 1995). Perhaps interactive sports allow team members a certain measure of social loafing. It was expected that those involved in coactive sports would be higher in cognitive and somatic state anxiety levels and lower in sport self-confidence than those involved in interactive sports.

'Performance level' was defined categorically as beginner, intermediate or advanced. The CSAI-2 test norms are given for three performance levels - high school,

college, and elite (Martens, Vealey, & Burton, 1990). Thus, studies reporting on high school subjects were generally categorized as beginner. Studies reporting on college students or "semi-professional" groups were generally categorized as intermediate. Studies reporting on subjects described as "elite", "advanced", "Olympian", "professional", etc. were generally categorized as advanced. As the test norms report the lowest somatic anxiety average and the highest self-confidence average for the elite group, it was expected that the advanced group would have lower somatic anxiety scores and higher self-confidence scores than the high school or college group. Perhaps elite athletes gained confidence over time as they learned to control their anxiety.

'Sport intensity' was defined categorically as aerobic or anaerobic. Aerobic sports are those characterized by sustained muscular activity and muscular endurance. Examples of aerobic sports are running, cycling, and swimming. Anaerobic sports are those characterized by short muscular bursts. Examples of anaerobic sports are volleyball, baseball, and American football. It was expected that those involved in anaerobic sports would be higher in anxiety than those involved in aerobic sports. Anaerobic sports, like golf, can be conceptualized as having multiple presentations of anxiety-inducing situations. The golfer may feel renewed anxiety every time he or she tees off. Aerobic sports, like running, can be conceptualized as

"one shot" or "all or none" opportunities. Once a runner starts, he or she runs until he or she crosses the finish line or passes out.

'Gender' was defined categorically as male or female. According to the CSAI-2 test norms (Martens, Vealey, & Burton, 1990), women have higher average cognitive and somatic anxiety scores and lower average self-confidence scores than men. Jones, Swain, & Cale (1991) reported that women had higher average cognitive and somatic anxiety scores and lower average self-confidence scores than men over a week-long measurement period. It was expected that women would have higher average cognitive and somatic anxiety scores and lower average self-confidence scores than men. According to Benton (1973), House (1974), and Lenney (1977), it was possible that, in general, women report less confidence and lower success expectancies than men (as cited by Jones, Swain, & Cale, 1991).

'Timing of CSAI-2 measurement' was defined categorically as proximal or distal. Proximal timing occurred when studies reported subjects as being tested less than twenty-four hours before a competitive event. Distal timing occurred when studies reported subjects as being tested twenty-four hours or more away from a competitive event. Swain & Jones (1991) and Jones, Swain, & Cale (1991) reported temporal changes in the average somatic anxiety of subjects. The day before an event average somatic anxiety scores were higher than during any other measuring period.

It was expected that proximal somatic anxiety scores would be higher than distal somatic anxiety scores.

Method

The Present Sample

From a collected bibliography of publications relating to the CSAI-2 twenty-seven studies were identified as suitable for the meta-analysis. Studies were excluded from the analysis because they "(a) used statistical procedures for which a transformation into effect sizes was not possible (logistic regression, interaction effects of ANOVAS)(b) due to incomplete statistics no effect sizes could be computed (F values without degrees of freedom, correlations without sample sizes, multiple regressions without F values)(c) contained only theoretical considerations (d) reported results in a global manner ('no significant relationships')" or (e) did not administer the CSAI-2 as dictated by the test manual (Kleine, 1990). In the twenty-seven studies the CSAI-2 was administered to a variety of athletic groups for a number of purposes. Some of the studies using the CSAI-2, for example, were investigating the antecedents of anxiety, the relationship between anxiety and performance, the effects of an anxiety intervention strategy, or the coping styles of an athletic group. Twelve of the twenty-seven studies were used in comparison of the study groups to the test norms combined for gender and performance level. These twelve groups provided 32 effects across the three subscales of the CSAI-

2. The comparison provided a means of CSAI-2 norms validation.

Thirty-two groups from the twenty-seven studies were used in comparison of the study groups to the test norms specified for gender and performance level. These thirty-two groups provided 94 effects across the three subscales of the CSAI-2. The comparison provided a means of CSAI-2 norms validation.

The Competitive State Anxiety Inventory-2 (CSAI-2)

The CSAI-2 (Martens, Vealey, & Burton, 1990) is a multidimensional measure of competitive state anxiety. It has three subscales: somatic anxiety, cognitive anxiety, and sport self-confidence. There are nine questions in each subscale for a total of twenty-seven questions. A subject may respond to a question on a Likert-type scale of one to four, with one signifying 'not at all' and four signifying 'very much so'.

The cognitive anxiety subscale is designed to measure negative expectations and cognitive concerns about oneself and one's performance. Some example statements that subjects respond to on this subscale are "I'm concerned about performing poorly", "I am concerned about choking under pressure", and "I'm concerned that others will be disappointed with my performance".

The somatic anxiety subscale is designed to measure the physiological components of anxiety such as "butterflies in the stomach" and a racing heart. Some example statements

that subjects respond to on this subscale are "My body feels tense", "I feel jittery", and "My heart is racing".

The sport self-confidence subscale is designed to measure a person's confidence in his or her ability to perform a particular activity. Some example statements that subjects respond to on this subscale are "I'm confident I can meet the challenge", "I'm confident about performing well", and "I'm confident of coming through under pressure".

Meta-analysis and Effect Sizes

Meta-analysis attempts to address those inconsistencies of results that arise when studies of the same phenomena are made. Rather than brush these inconsistencies aside or accept the results of one study as truth, meta-analysis seeks to identify the consistencies in similar studies and helps to understand the basis of the variability that appears (Green, 1996). Some of the goals of the process are (a) critical analysis of the research as it relates to relevant theories, (b) identification of key issues for future research, and (c) resolution of conflicts that appear in the literature (Cooper & Hedges, 1994). Meta-analysis provides an objective method of literature review.

Hedges' g, after being corrected for sample size, is the effect estimate to be used in all analyses. This includes overall effects, overall confidence intervals, homogeneity of the sample populations, outlier analyses, and tests of the homogeneity of groups defined by the moderator variables (Green, 1996). Cohen (1977) suggested that an

effect of around .20 be considered small, an effect of around .50 medium, and one of about .80 or larger significant. Hedges' g is calculated using the DSAT software package (Cooper & Hedges, 1994).

Results

Comparison Between Study Groups and Combined Norms

Table 1 details the individual effect sizes for the studies included in the analysis. Negative effects represent a deduction in state anxiety with regard to the Somatic and Cognitive Anxiety scales. Positive effects represent an improvement in confidence with regard to the Self-confidence scale. The gender and level moderators were not included in this analysis as the study groups were compared to norms calculated for both sexes and all three levels.

Somatic Anxiety

Somatic anxiety was lower for the study groups than the combined norms across all but two of the studies in the analysis. The overall effect size was -.16, $p<.00$ with a 95% confidence interval (CI) of -.22/-.11. Subsequent outlier analysis eliminated eight studies before achieving non-significant group heterogeneity at a value of $Q(6)=9.906$, $p=.1287$. After outlier analysis, the overall effect size was -.16, $p<.00$ with a 95% CI of -.23/-.09.

When the total set of data was analyzed for moderator effects, two moderators were found to be significant. One significant effect came from the comparison between groups that were tested less than twenty-four hours before a

competitive event (proximal group) and the groups that were tested more than twenty-four hours away from an event (distal group). The effect for the proximal group was -.12 compared to -.44 for the distal group. This comparison produced a between value of $Q_B(1)=15.49$, $p<.00008$. These effects support the idea that somatic anxiety is highest right before (less than twenty-four hours) an event.

Another significant effect was found for the comparison between groups involved in aerobic sports versus those involved in anaerobic sports. The effect for the aerobic group was -.06 compared to -.21 for the anaerobic group. This comparison produced a between value of $Q_B(1)=4.94$, $p<.03$. The small effect for the anaerobic group indicates that this group is reporting significantly less somatic anxiety when compared to the combined norms.

Cognitive Anxiety

Cognitive anxiety was lower for the study groups than the combined norms across all but two of the studies in the analysis. The overall effect size was -.12, $p<.00$ with a 95% CI of -.18/-.06. Subsequent outlier analysis eliminated four studies before achieving non-significant group heterogeneity at a value of $Q(7)=12.85$, $p=.08$. After outlier analysis, the overall effect size was -.17, $p<.00$ with a 95% CI of -.17/-.02.

When the total set of data was analyzed for moderator effects, two moderators were found to be significant. One significant effect came from the comparison between groups

involved in aerobic sports versus those involved in anaerobic sports. The effect for the aerobic group was -.26 compared to .09 for the anaerobic group. This comparison produced a between value of $Q_B(1)=31.04$, $p<.00$. The small effect for the aerobic group indicates that this group is reporting significantly less cognitive anxiety when compared to the combined norms.

Another significant effect was found for the comparison between groups involved in interactive, coactive, or mixed sports. The effect for the mixed group was .20, compared to -.08 for the interactive group and -.34 for the coactive group. This comparison produced a between value of $Q_B(2)=65.16$, $p<.00$. The effect for the mixed group indicates that this group is reporting significantly more cognitive anxiety when compared to the combined norms. The effect for the coactive group indicates that this group is reporting significantly less cognitive anxiety when compared to the combined norms.

Sport Self-confidence

Sport self-confidence was higher for the study groups than the combined norms across all but two of the studies in the analysis. The overall effect size was .07, $p<.0003$ with a 95% CI of .00/.14. Subsequent outlier analysis eliminated three studies before achieving non-significant group heterogeneity at a value of $Q(4)=7.28$, $p=.12$. After outlier analysis, the overall effect size was .09, $p<.0003$ with a 95% CI of .01/.16.

When the total set of data was analyzed for moderator effects, one moderator was found to be significant. The significant effect came from the comparison between groups involved in interactive, coactive, or mixed sports. The effect for the coactive group was -.22, compared to .11 for the mixed group and .37 for the interactive group. This comparison produced a between value of $Q_B(2)=29.98$, $p<.0000002$. The effect for the coactive group indicates that this group is reporting significantly less self-confidence when compared to the combined norms. The effect for the interactive group indicates that this group is reporting significantly more self-confidence when compared to the combined norms.

Comparison Between Study Groups and Specific Norms

Table 2 details the individual effect sizes for the studies included in the analysis. Norms were performance level- and gender-specific. Negative effects represent a deduction in state anxiety with regard to the Somatic and Cognitive Anxiety scales. Positive effects represent an improvement in confidence with regard to the Self-confidence scale.

Somatic Anxiety

Somatic anxiety was lower for the study groups than the specific norms across twenty of the studies and higher for the study groups than the specific norms across eleven of the studies. The overall effect size was -.16, $p<.00$ with a 95% CI of -.22/-.11. Subsequent outlier analysis eliminated

seventeen studies from the analysis before non-significant heterogeneity was achieved at a value of $Q(13)=17.64$, $p=.17$. After outlier analysis, the effect size was -.38, $p<.00$ with a 95% CI of -.46/-.30.

When the entire set of data was analyzed for moderator effects, four moderators were found to be significant. One significant effect came from the comparison between groups involved in interactive, coactive, or mixed sports. The effect for the interactive group was -.32, compared to -.11 for the mixed group and -.06 for the coactive group. The effect for the undefined group, composed of studies that could not be assigned to either the interactive, coactive, or mixed categories, was -.27. This comparison produced a between value of $QB(3)=17.34$, $p<.0006$. The effect for the interactive group indicates that this group is reporting significantly less somatic anxiety when compared to the specific norms.

Another significant effect came from the comparison between groups at the beginner, intermediate, or advanced level. The effect for the advanced group was .32, compared to -.35 for the beginner group and -.30 for the intermediate group. This comparison produced a between value of $QB(2)=95.67$, $p<.00$. The effects for the beginner and intermediate groups indicate that these groups are reporting significantly less anxiety when compared to the specific norms. The effect for the advanced group indicates that this group is reporting significantly more somatic anxiety

when compared to the specific norms. The specific norms are distinguished for each performance level group.

A third significant effect came from the comparison between groups of male participants and groups of female participants. For males the effect was -.08 compared to -.30 for the female participants. The comparison produced a between value of $Q_B(1)=16.08$, $p<.00006$. The effect for the female group indicates that this group is reporting significantly more somatic anxiety when compared to the specific norms. The specific norms are distinguished for men and women.

A significant effect was also found for the comparison between the proximal and distal groups. The effect for those who tested less than twenty-four hours before a competitive event was -.05, while the effect for those who tested more than twenty-four hours away from an event was -1.25. The comparison produced a between value of $Q_B(1)=170.91$, $p<.00$. The effect for the distal group indicates that this group is reporting significantly less somatic anxiety when compared to the specific norms.

Cognitive Anxiety

Cognitive anxiety was higher for the study groups than the specific norms across nineteen of the studies and lower for the study groups than the specific norms across thirteen of the studies. The overall effect size was .09, $p<.0001$ with a 95% CI of .03/.14. Subsequent outlier analysis eliminated fourteen studies from the analysis before non-

significant heterogeneity was achieved at a value of $Q(17)=23.16$, $p=.14$. After outlier analysis, the effect size was .02, $p<.45$ with a 95% CI of -.05/.09.

When the entire set of data was analyzed for moderator effects, four moderators were found to be significant. One significant effect came from the comparison between groups involved in interactive, coactive, or mixed sports. The effect for the mixed group was .41, compared to .08 for the interactive group and .006 for the coactive group. The effect for the undefined group, composed of studies that could not be assigned to either the interactive, coactive, or mixed categories, was -.12. This comparison produced a between value of $QB(3)=38.83$, $p<.00000001$. The effect for the mixed group indicates that this group is reporting significantly more cognitive anxiety when compared to the specific norms.

Another significant effect came from the comparison between groups participating in aerobic versus anaerobic sports. The effect size for the aerobic group was -.03 compared to .14 for the anaerobic group. The effect for the undefined group, composed of studies that could not be assigned to either the aerobic or anaerobic category, was .01. The comparison produced a between value of $QB(2)=9.63$, $p<.008$.

A third significant effect came from the comparison between groups of male participants and groups of female participants. For males the effect was .19 compared to -.09

for the female participants. The comparison produced a between value of $Q_B(1)=28.20$, $p<.0000002$. When compared to the gender- and performance level-specific norms, males are reporting significantly more cognitive anxiety.

A significant effect was also found for the comparison between the proximal and distal groups. The effect for those who tested less than twenty-four hours before a competitive event was .10, while the effect for those who tested more than twenty-four hours away from an event was -.08. The comparison produced a between value of $Q_B(1)=4.47$, $p<.03$.

Sport Self-confidence

Sport self-confidence was higher for the study groups than the specific norms across seventeen of the studies and lower for the study groups than the specific norms across fourteen of the studies. The overall effect size was -.04, $p<.07$ with a 95% CI of -.09/.01. Subsequent outlier analysis eliminated fifteen studies from the analysis before non-significant heterogeneity was achieved at a value of $Q(15)=23.86$, $p=.07$. After outlier analysis, the effect size was .16, $p<.00$ with a 95% CI of .09/.23.

When the entire set of data was analyzed for moderator effects, five moderators were found to be significant. One significant effect came from the comparison between groups involved in interactive, coactive, or mixed sports. The effect for the coactive group was -.20, compared to .16 for the interactive group and -.08 for the mixed group. The

effect for the undefined group, composed of studies that could not be assigned to either the interactive, coactive, or mixed categories, was .14. This comparison produced a between value of $Q_B(3)=35.79$, $p<.0000002$. The effect for the coactive group indicates that this group is reporting significantly less self-confidence when compared to the specific norms. The effect for the interactive group indicates that this group is reporting significantly more self-confidence when compared to the specific norms.

Another significant effect came from the comparison between groups participating in aerobic versus anaerobic sports. The effect size for the aerobic group was -.24 compared to .05 for the anaerobic group. The comparison produced a between value of $Q_B(1)=21.90$, $p<.000003$. The effect for the aerobic group indicates that this group is reporting significantly less self-confidence when compared to the specific norms.

A third significant effect came from the comparison between groups of male participants and groups of female participants. For males the effect was -.11 compared to .05 for the female participants. The comparison produced a between value of $Q_B(1)=9.24$, $p<.002$.

A significant effect was also found for the comparison between the proximal and distal groups. The effect for those who tested less than twenty-four hours before a competive event was -.09, while the effect for those who tested more than twenty-four hours away from an event was

.42. The comparison produced a between value of $QB(1)=34.26$, $p<.0000001$. The effect for the distal group indicates that this group is reporting significantly more self-confidence when compared to the specific norms.

The final significant effect came from the comparison between groups at the beginner, intermediate, or advanced level. The effect for the beginner group was .31, compared to -.33 for the advanced group and -.02 for the intermediate group. This comparison produced a between value of $QB(2)=53.76$, $p<.00$. The effect for the beginner group indicates that this group is reporting significantly more self-confidence when compared to the specific norms. The effect for the advanced group indicates that this group is reporting significantly less self-confidence when compared to the specific norms. The norms are distinguished for performance level.

Discussion

The analyses indicate that athletic groups test higher for somatic anxiety less than twenty-four hours before an event. There is also an indication that self-confidence is higher in athletic groups twenty-four hours or more away from an event. The hypothesis that somatic anxiety would be higher in proximal groups is supported. Perhaps a conscious awareness that an event is approaching has an effect on the body as well as an athlete's self-confidence.

Analyses of the aerobic and anaerobic groups indicate that anaerobic groups are reporting less somatic anxiety,

while aerobic groups are reporting less cognitive anxiety and less self-confidence when compared to the norms. Perhaps the aerobic group indicated higher somatic anxiety and lower self-confidence because of the nature of the involved sports. Aerobic sports typically require high endurance, and there is concern about just finishing an event. A number of the studies reported on duathletes and triathletes, which were included in the aerobic group.

Analyses of the 'type of sport' variable provided several indications. Analyses indicate that the mixed group is higher in cognitive anxiety, the coactive group is lower in cognitive anxiety and self-confidence, and the interactive group is lower in somatic anxiety and higher in self-confidence when compared to the norms. The hypothesis that interactive groups would lower in somatic anxiety is supported. Perhaps the interactive group reports lower in somatic anxiety and higher in self-confidence because in the interactive sports success and failure can be measured by the efforts of a team rather than an individual. One can blame other team members for failure and claim success for oneself. Perhaps the mixed group is higher in cognitive anxiety because players of a mixed sport must worry about measurement of their own efforts as well as their cooperation with team members.

Analyses of the 'performance level' variable indicate that the beginner group is lower in somatic anxiety and higher in self-confidence when compared to the norms.

Intermediate groups are lower in somatic anxiety when compared to the norms, while the advanced group is higher in somatic anxiety and lower in self-confidence. Because the norms are distinguished by and different for each of the three performance levels, it is difficult at this level to comment on the distinctions between the beginner, intermediate, and advanced groups.

Analyses of the 'gender' variable indicate that men are higher in cognitive anxiety when compared to the norms and that women are higher in somatic anxiety. Because the norms are distinguished by and different for each of the sexes, it is difficult at this level to comment on the distinctions between men and women on the CSAI-2 in broader terms.

A meta-analysis is limited by the available research. In the current analysis, the majority of the studies reported on college-age men. The inclusion of more studies on beginner, advanced, and women athletes could add greater validity to such a meta-analysis. Coverage of a wider range of sports and sporting situations would be another improvement. There were no included studies that reported on athletes in recreational settings or athletes in high-profile, professional American sports like NFL football, NBA basketball, or even minor league baseball. Another limitation of the current work is its reliance on published studies.

One of the fortes of the current work is its use of meta-analysis, one of the more objective methods of

literature review. As the CSAI-2 is one of the most widely used multidimensional tests of competitive state anxiety, it is important that its validity be assured. A strength of the current work is its comparison of study scores to test norms, which serve as a validity check. Another forte is the discussion of type of sport and intensity of sport in connection with the CSAI-2, a sparse research area.

Future improvements would include an updated study search, which could potentially result in the inclusion of some dissertations or other unpublished works. Analyses which compared the study groups to norms for men at all performance levels and women at all performance levels would allow for greater discussion of the differences between men and women on the CSAI-2. Analyses which compared the study groups to beginner norms for both men and women, intermediate norms for both men and women, and advanced norms for both men and women would allow for greater discussion of the differences between athletes of varying skill on the CSAI-2.

The current work seeks to discover which differences, if any, exist between groups on the measurement of competitive state anxiety. These groups can be distinguished by sex, type of sport, intensity of sport, level of performance, and timing of measurement. In a competitive sport situation, a few seconds, or even fractions of a second, can lead to drastic differences in outcome. Time lost to anxiety-focused thoughts or anxiety-

reducing behavior can have costly effects. Efforts to identify anxiety-prone groups can lead to improved intervention strategies and performance.

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Table 1
Effect Sizes for the Comparison Between Study Groups and Combined Norms

Study	Somatic	Cognitive	Self-confidence
4	-.05	-.09	-.46
13a	-.38	-.26	.15
13b	-.07	-.06	-.15
18	-.15	-.03	----
33	-1.12	-.03	.63
39	-.28	.32	.10
42	-.82	-.49	1.00
49	.23	.15	.12
51a	-.19	-.71	----
51b	-.34	-.61	----
51c	-.02	-.45	----
55	.60	-.12	.18

Effect sizes are represented as negative-below the norms; positive-above the norms.

Table 2
Effect Sizes for the Comparison Between Study Groups and Specific Norms

Study	Somatic	Cognitive	Self-Confidence
5	-.02	.38	-.48
7	.08	-.92	-.13
9	-.53	-.36	.31
10	-.18	.14	-.06
11	----	.60	----
12	.03	-.33	-.37
13a	-.59	-.03	.26
13b	.00	.18	-.29
13c	-.03	.01	-.20
13d	.04	.17	-.20
15	.36	.46	-.80
16	-.14	-.61	.64
19a	-.97	-.82	.51
19b	-.42	-.26	-.07
28	-.42	-.35	.13
32	1.10	.75	-.69
33a	-1.37	.19	.70
33b	-.95	.23	.36
36a	-1.51	-.17	.26
36b	-1.57	-.06	.37
39a	-.39	.37	.29
39b	-.38	.04	.22
41	-.57	.79	.68
43	-.27	-.02	.28
44	.48	.70	-.45

45	-.50	.20	-.24
46a	.26	1.10	-.81
46b	.62	.65	-.75
55a	.56	.28	.12
55b	.84	.00	.04
57a	-1.10	-.84	.76
57b	-.25	-.18	.33

Effect sizes are represented as negative-below the norms; positive-above the norms.

Table 3
Overall Effect Sizes with 95% Confidence Intervals for the Two Models Examined in the Meta-analysis

	Study vs Combined Norms		Study vs Specific Norms	
	Overall/Minus Outliers		Overall/Minus Outliers	
Somatic	-.16 -.22/-.11	-.16 -.23/-.09	-.16 -.22/-.11	-.38 -.46/-.30
Cognitive	-.12 -.18/-.06	-.10 -.17/-.02	.09 .03/.14	.02 .05/.09
Self-Confidence	.07 .00/.14	.09 .01/.16	-.04 -.09/.01	.16 .09/.23

Effect sizes are reported such that negative values indicate lower somatic and cognitive anxiety in the study groups when compared to the norms. Positive values indicate higher self-confidence in the study groups when compared to the norms. Confidence intervals are below the effect sizes.