

EFFECTS OF PRE-COMPETITION COGNITIVE ANXIETY AND SOMATIC ANXIETY ON ADULT ICE HOCKEY PLAYERS PERFORMANCE

by

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Effects of Pre-Competition Cognitive Anxiety and Somatic Anxiety on Adult Ice Hockey  
Players Performance

A Project submitted in partial fulfillment of the requirements for the degree of Master of  
Science at George Mason University

by

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## **DEDICATION**

This project is dedicated to my loving mother, Karen, father, Tom, brother, Robert, and lovely girlfriend, Meghan. Thank you all for everything you have done for me and the unconditional support.

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## **ABSTRACT**

### **EFFECTS OF PRE-COMPETITION COGNITIVE ANXIETY AND SOMATIC ANXIETY ON ADULT ICE HOCKEY PLAYERS PERFORMANCE**

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Anxiety can affect people in a variety of different ways depending on their makeup and where they are currently in their lives. Anxiety is a psychological and physiological state exemplified by somatic, emotional, cognitive, and behavioral components. It is the displeasing feeling of fear and concern and can create feelings of worry, uneasiness, and dread. Anxiety can help a person deal with a challenging situation by helping them to cope with it. Athletes may be susceptible to anxiety more so than others due to the immense amount of pressure placed on them. That pressure can be placed on athletes by parents and coaches to perform at a high level. In many instances, the most pressure can come from the athletes themselves to score a lot of points, hit the most home runs, catch the most touchdowns, or score the most goals. There are three factors that may affect an athlete's performance before a game begins: cognitive anxiety, somatic anxiety, and self-confidence. This pilot study was conducted to look at pre-competition anxiety and its effects, if any, on the athletic performance of adult ice-hockey players. The pilot study



will hopefully be used to help coaches better track which athletes need help in managing their anxiety and help the athletes themselves understand how uncontrolled pre-competition anxiety can lead to decreased performance. Sport psychologists could then be brought in by teams to help track and maintain each athlete's anxiety on a case by case basis to identify ways in which they can positively use their anxiety before it goes past a certain point and affects performance. Some athletes naturally have more anxiety than others and that is acceptable if used in a positive manner, but the effects of being too anxious before a game cannot be overlooked. This pilot study answered questions on pre-competition anxiety and if it affects performance any differently before a regular season ice-hockey game and an even more pressure-filled playoff game. The pilot study may lead to more advanced future research on anxiety to further help these athletes, coaches, and sport psychologists.

## **CHAPTER 1: INTRODUCTION**

Anxiety is vital for sports psychologists to study and understand because if not treated properly it can greatly affect an athlete's performance. It is important because "an athlete might not achieve the desired result because of excessive nervousness, anxiety, and tension" (Bridle, 1995, p. 34). In addition to this, "the inability to cope with the pressure in competitive sport can lead not only to decreased performance, but also to physical illness and mental distress" (Weinberg & Gould, 1995, p. 54). There is little research in regards to how hockey players are affected by anxiety in hockey games where winning is all that matters. This pilot study was conducted to examine if there are any significant differences in the levels of cognitive anxiety, somatic anxiety, and self confidence for ice hockey players in the regular season compared to the playoffs where the pressure to win is at its highest.

### **Problem Statement**

Some athletes choose to reach out to their coaches for help in dealing with their anxiety. For other athletes who do not get help for their anxiety problems, anxiety exists through their expressions and behaviors on and off the ice. It is important to note that "brave-acting athletes, taking part in sports that require courage are not always free from high levels of anxiety. Such athletes may be, whistling in the dark, and may have selected a brave-appearing activity to prove to themselves and to others that they are not

the fearful individuals they may feel to be” (Cratty, 1973, p. 21). No matter the type of athlete, those who have no problem reaching out to others, or those who prefer not to, may need to be approached cautiously and tactfully with counseling techniques that will help to reduce their anxiety.

Throughout the pilot study, there are several key concepts that need to be clearly defined. They are as follows:

### **Definitions**

*Anxiety* is defined as a “diffuse apprehension of some vague threat that is characterized by feelings of uncertainty and helplessness” (Willis & Campbell, 1992, p. 62).

*Cognitive anxiety* is defined as the “mental component of anxiety caused by negative expectations about success or by negative self-evaluation” (Martens, Vealey, & Burton, 1990, p. 41).

*Somatic anxiety* is defined as the “physiological and affective elements of the anxiety experience that develop directly from automatic arousal” (Martens, Vealey, & Burton, 1990, p. 41).

*Self-confidence* refers to “the belief that one can successfully perform a behavior” (Weinberg & Gould, 1995, p. 54).

*Self-Efficacy* is defined as “people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such

beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes” (Bandura, 1994, p. 71).

### **Theoretical Lens**

This pilot study was conducted using the “framework of the Multidimensional Anxiety Theory” (Martens, Vealey, & Burton, 1990, p. 41). This theory places competitive anxiety into three categories: cognitive anxiety, somatic anxiety, and self-confidence. Cognitive anxiety is described as negative feelings, lack of focus, and short attention span. Somatic anxiety is a person’s understanding of their physiological arousal such as increased heart rate, tense muscles, nervousness and butterflies in one’s stomach. Somatic anxiety is different from physiological arousal in that “arousal is measured through actual physiological indices, while somatic anxiety reflects one’s perceptions of the physiological arousal” (Gould & Krane, 1992, p. 123).

Cognitive and somatic anxiety and self-confidence levels strongly correlate to athletic performance. This is important to be aware of because cognitive anxiety “is expected to negatively affect athletic performance while somatic anxiety will have a curvilinear relationship with performance” (Martens et al., 1990, p. 88). The Multidimensional Anxiety Theory states that increased levels of cognitive anxiety will lead to decreased athletic performance. It also states that somatic anxiety, which is physiologically created, is linked to performance in an inverted-U. The Inverted-U Theory maintains that “performance increases as anxiety increases up to a certain point, after an athlete’s anxiety goes past this point, performance will decrease” (Yerkes & Dodson, p. 13).

The Catastrophe Theory by Fazy and Hardy (1988) states “that physiological arousal follows the Inverted-U hypothesis in relation to performance. However, that will only occur when the individual is exhibiting low cognitive state anxiety, meaning an athlete is not worried about their upcoming performance. On the other hand, a catastrophe will occur if the athlete is exhibiting high cognitive anxiety, concern over their immediate performance” (Fazy & Hardy, p. 26). In other words, this theory of arousal predicts a rapid decline in performance resulting from the combination of high cognitive anxiety and increasing somatic anxiety.

The third theory considered for this study is Clark Hull’s (1935) Drive Theory, “a reinforcement system, which means that in learning, habits are initially formed by reinforcing certain behaviors. Reinforcement of a response to a behavior supplies an effect that satisfies a need. In other words, this satisfaction of needs helps create habits out of behaviors” (Hull, p. 491). Specifically, Hull’s theory states that behaviors that satisfy needs reduce cravings and that the more arousal and anxiety an individual experiences, the higher their performance. He called this concept *drive-reduction*, or a *drive-stimulus reduction*.

### **Purpose of Study**

This pilot study’s purpose was to better understand sport anxiety and find ways in which athletes can control their anxiety and, as a result, increase their performance. The research gathered in this pilot study will help parents, coaches, psychologists, and perhaps teachers to counsel athletes on a more individual basis. All of these individuals will be able to help those athletes that need their arousal and state anxiety enhanced,

maintained, or reduced. This pilot study will also allow coaches to identify which anxiety levels fluctuate the most for a player between a regular season game and a big-time playoff game, so that anxiety reduction strategies can be performed.

The athletes themselves will also be able to benefit from this pilot study. If they know that their anxiety levels increase during certain games, actions can be taken to help them reduce their anxiety and improve performance during such a crucial game. These athletes will also benefit off the ice, as they will be able to better control anxiety in their everyday lives. The main purpose of this pilot study was to examine if there is any noteworthy differences in the level of cognitive anxiety, somatic anxiety, and self-confidence of adult ice-hockey players as the pressure increases from a regular season game to a playoff game.

### **Research Questions and Hypotheses**

Hockey players may be susceptible to experiencing certain levels of pre-competition sport anxiety: “Sports that place a high level of intense physical demands on an athlete’s mind and body can lead to a decrease in performance due to this extreme anxiety” (Gould & Krane, 1992, p. 124). Therefore, this pilot study was guided by the following research questions and hypotheses:

**RQ 1:** Are the cognitive and somatic anxiety levels lower and the self-confidence levels higher for ice hockey players during a regular season game when compared with a playoff game?

**H1:** If adult ice hockey players are tested for any significant difference in the levels of

cognitive anxiety, somatic anxiety, and self-confidence during a regular season game and playoff game, there will be more significant differences in a playoff game compared to a regular season game.

**RQ 2:** Is there a correlation among somatic anxiety, cognitive anxiety and self-confidence levels and do these levels correlate with an athlete's performance and his/her team winning or losing?

**H2:** If there is a direct correlation among somatic anxiety, cognitive anxiety and self-confidence levels, than these levels will correlate with an athlete's performance and his/her team winning or losing.

## **CHAPTER 2: LITERATURE REVIEW**

The purpose of the literature review is to examine past studies that deal with pre-competition anxiety- specifically in the areas of cognitive anxiety, somatic anxiety, and self-confidence- and how they have affected athletes. Pre-competition anxiety in ice hockey players is an area that has a limited amount of research. The identified studies helped guide the research on how pre-competition anxiety affects ice hockey players and the data analysis implemented. This researcher has used the Competitive State Anxiety Theory scale with different types of athletes and the results will be discussed below.

### **Search Strategy**

The George Mason University library database, Lexis Nexus, texts, and suggested studies by faculty and through coursework were used to collect studies from psychology, sport, and recreation journals for the literature review. Two main themes helped sort the literature review, cognitive and somatic anxiety, and all of the studies dealt with self-confidence. However, the research lacked enough studies that dealt specifically with self-confidence to make it a theme and was, therefore, a limitation of the literature review. Also, not enough of the studies specifically talked about how self-confidence correlates directly with somatic and cognitive anxiety. Five were identified within cognitive anxiety theme and five were placed within the somatic anxiety theme.



## **Themes**

### **Cognitive Anxiety**

Originally, it was widely believed that the connection between performance and arousal was an uncomplicated Inverted-U Theory by Yerkes and Dodson (2007). Optimal performance could be achieved with an average level of arousal. Moreover, if the level of arousal was too low (or too high), poor performance would ensue. However, the Inverted-U hypothesis was seen by some as being far too simplistic, and a number of researchers began to question its validity. In addition, Fazy and Hardy's (1988) Catastrophe Theory has yet to evolve from its conceptual framework stage to a fully established and accepted theory. From this researcher's outcomes, there is still limited current research involving the model to adequately authenticate its offered explanation of A-state competitive anxiety. Lastly, Clark Hull's (1935) Drive Theory was disproven and its biggest downfall was his emphasis on quantifying his variables in such a narrowly defined way, thus making it lack generalization. It did not take into account how secondary reinforcers reduce drive and why people engage in behaviors that do not reduce drives. These are some reasons as to why these theories were not chosen as a basis for the pilot study.

The Multidimensional Theory of Anxiety (Martens et. al., 1990) has emerged in recent years, based on the assumption that competitive anxiety is comprised of two distinct parts, a cognitive element, and a somatic element. Cognitive anxiety can affect an athlete in a variety of ways including, indecision, feelings of confusion, feeling heavy and weak, negative thoughts, lack of focus, fear, images of failure, defeatist self-talk, and

constant dissatisfaction. The finalization of the Multidimensional Anxiety Theory resulted with Martens and colleagues' development of the Competitive State Anxiety Inventory-2 (CSAI-2), a multidimensional state-anxiety measure specific for sport (Cox, Martens, & Russell, 2003).

This study by Cox, Martens, and Russell (2003) went into depth about the revised Competitive State Anxiety Inventory scale on which the study was based. The revised factor structure of the CSAI-2 used one data set, and then used confirmatory factor analysis to validate the revised structure using a second-data set. The first data set included 503 college-aged intramural athletes and the second set consisted of 331 Division I interscholastic athletes. They found the original confirmatory factor analysis results on the calibration sample resulted in a poor fit to the data. In the end, they eliminated CSAI-2 questions that focused on more than one factor. The end scale was a 17 question revised CSAI-2 scale that, upon re-testing, resulted in a good fit for the model. This updated four point Likert scale will be implemented to figure out the varying levels of cognitive and somatic anxiety, and self-confidence in adult ice-hockey players before both a regular season game and a playoff game.

The study completed by Krane and William (1987) compared the changes in cognitive anxiety, somatic anxiety, and self-confidence prior to competition by high school gymnasts and collegiate golfers. A version of the Competitive State Anxiety Inventory (CSAI-2) was administered 24 hours, one hour, and ten minutes prior to competition. Results of ANOVAs showed the golfers and gymnasts to have different models of change in the CSAI-2 subcomponents. The gymnasts displayed an increase in

cognitive and somatic anxiety and a decrease in self-confidence while the golfers showed a decrease in cognitive anxiety, an increase in self-confidence and no change in somatic anxiety. Overall, the golfers had lower cognitive and somatic anxiety and higher self-confidence than the gymnasts.

Taylor's (1987) study dealt with the ability of certain psychological characteristics to calculate performance in six National Collegiate Athletic Association Division I (NCAA) collegiate sports. Eighty-four athletes from the varsity sports teams of cross country running, alpine and Nordic skiing, tennis, basketball, and track and field at the University of Colorado completed a questionnaire adapted from Martens 1990 study that measured their trait levels of self-confidence, somatic anxiety and cognitive anxiety. The data suggested that all three psychological characteristics were significant factors of performance in both fine motor anaerobic sports and gross motor, aerobic sports.

The study completed by Jones and Swain (1992) examined the relationship among sport achievement orientation and cognitive anxiety, somatic anxiety, and self-confidence in sixty male track and field athletes. The participants responded to the Competitive State Anxiety Inventory-2 (CSAI-2) on five occasions during the pre-competition period and also filled out the Sport Orientation Questionnaire (SOQ). The multiple-regression analysis was used to figure out whether any of the SOQ subscales resulted as important indicators of the CSAI-2 subscale scores. The dominant indicator to emerge for each anxiety subcomponent was the competitiveness subscale.

Burton's (1988) study used a Competitive State Anxiety Inventory (CSAI) created by Martens in 1990 and a more sensitive intra-individual performance measure to examine the relationship between anxiety and performance in ninety-eight swimmers. Three hypotheses were tested: (1) cognitive anxiety is more consistently and strongly related to performance than is somatic anxiety; (2) somatic anxiety demonstrates an inverted-U relationship with performance, whereas self-confidence and performance demonstrate a positive linear relationship and cognitive anxiety and performance show a negative one; and (3) short duration and high and low complexity events show stronger relationships between somatic anxiety and performance than do long duration or moderate complexity events. Results supported the hypotheses and provide additional construct validity for the CSAI.

### **Somatic Anxiety**

Somatic anxiety can also affect an athlete in a combination of ways that could greatly reduce athletic performance. Characteristics of somatic anxiety include, but are not limited to, increased blood pressure, sweating, clammy hands and feet, butterflies in the stomach, trembling, pacing up and down, twitching, yawning, nausea, vomiting, and loss of appetite. In somatic anxiety, there is a curvilinear relationship with performance (Yerkes & Dodson, 2007). Somatic arousal is necessary in athletics because it enhances reaction speed of decision making as well as physical reactions.

Jones and Swain's (1992) study was designed to use the multidimensional anxiety framework and to examine "intensity" (i.e., level) and "direction" (i.e., interpretation of level as either debilitating or facilitative) of anxiety symptoms in the context of sports

(motor) performance. The individual difference variable of skill level was investigated as an arbitrator of these responses. Ninety-seven elite swimmers and one-hundred-fourteen non-elite swimmers completed a modified version of the Competitive State Anxiety Inventory-2 during the period before a significant race. The findings showed that there was no difference between the two groups on the intensity of cognitive and somatic anxiety indicators, but that elite performers interpreted both anxiety states as being more facilitative to performance than the non-elite performers. In addition, self-confidence was higher in the elite swimmers group.

The study by Hemmings, Maynard, and Warwick (1995) was intended to examine the effect of a somatic intervention technique. Seventeen soccer players completed a modified version of the Competitive State Anxiety Inventory 2 (CSAI-2), which looked at both intensity and direction of state anxiety within one hour of a soccer league match. During the match, player performances were evaluated using intra-individual criteria. Subjects were then allocated to a control group ( $n = 8$ ) and an experimental group ( $n = 9$ ) on the basis of their somatic anxiety intensity and direction scores. Following an eight week period, subjects were again observed during a second soccer match. A series of two-way analyses of variance with one repeated measure revealed significant interactions for cognitive anxiety intensity, somatic anxiety intensity, and somatic anxiety direction. This study provided further support for the “matching hypotheses” in that a well-suited treatment proved most effective in reducing anxiety.

Patterson, Ptacek, and Smith (2000) examined how anxiety can cause injuries. In a prospective study of ballet injuries, a version of the Multidimensional Sport Anxiety

Scale (SAS) was used to measure somatic and cognitive ballet performance anxiety. Relations among recent stressful events, trait anxiety, and consequent injuries were studied in a professional ballet company. In moderated multiple regression analyses, the Somatic Anxiety, Worry, and Concentration Disruption scales of the SAS all showed noteworthy moderator effects, enhancing a positive relation between minor stressors, and ensuing time lost to injury. Results were constant with current cognitive-affective models of stress and with the hypothesis that cognitive and somatic trait anxiety both can result in injury due to stress.

Bray, Martin, and Widmeyer (2000) studied thirty-four competitive youth skiers (mean age = 13.74 years). Consistent with past research, regression analyses showed that cognitive anxiety was related to performance-specific evaluative concerns. However, contrary to current beliefs of sport competition anxiety, somatic anxiety was associated with concerns about evaluation of other non-performance aspects of ski racing. Competitive skiers were most concerned about their parents and friends evaluations of their performance than other competitors and friends evaluations of their skiing in general.

The last study to note is by Tsopani, Dallas and Skordilis (2011) who examined the competitive state anxiety and self-confidence of rhythmic gymnasts participating in the Greek national competition. Eighty-six participants, ages eleven to twelve years old completed the Competitive State Anxiety Inventory-2, one hour before competition. The athletes, classified by high and low performance, and participation in the finals, finalists and non-finalists, responded to the three subscales: cognitive and somatic anxiety, and

self-confidence. Analyses indicated differences in self-confidence between high versus low performance groups and finalists versus non-finalists. No significant differences were found on cognitive and somatic anxiety. In a regression analysis, self-confidence was the only significant predictor of performance for this sample.

### **Summary**

All of the mentioned studies affirm the belief that pre-competition anxiety does exist and can greatly affect an athlete's performance, no matter what the sport might be. These studies, if utilized correctly, may be very useful for teachers, coaches, athletes, sport psychologists, and parents to help them better understand how cognitive and somatic anxiety can lead to a decrease in self confidence and thus performance. These studies in the literature review will be used to help shape the methodology of the research study and how it will be carried out. References will also help refine the project based on researchers past studies including the CSAI-2 Inventory Scale and exactly how it is used and scored. Trends and similarities in the data that those authors used to come up with an answer to the hypotheses has shaped this project. The studies suggested that the hypotheses would be supported and backed by significant data. With greater knowledge of how pre-competition sport anxiety affects athletes of different skill levels, it is reasonable to believe that athletes and sport psychologists in my pilot study will be able to benefit from this research and not have their athletic performance negatively affected by pre-competition anxiety.

### **Gaps/Limitations of the Literature Review**

A weakness is that there are not enough studies specifically on hockey or on self-confidence and its effects. Details about how pre-competition anxiety may affect adults differently than it does children, is also lacking. Conversely, there is not a great distinction on whether pre-competition anxiety affects males differently than females. Some of these studies are also outdated and new research would greatly help future research in this field.

### **Filling the Gaps**

Suggestions for improvement would be to have age and gender-specific studies on pre-competition anxiety and studies where the sole focus is on the effects of self-confidence on athletic performance. More in-depth studies need to be created that specifically deal with each different sport in order to have more comparison research. This allows for the ability to see if there are commonalities that can be made based on each sport and type of athletes. This pilot study may hopefully be used to help further develop research on how pre-competition anxiety affects ice hockey players and specifically how athletes react differently to anxiety during a regular season game and a pressure filled playoff game.



## **CHAPTER 3: METHODOLOGY**

### **Participants**

The participants of this pilot study were players from an A-League adult ice-hockey team at Prince William Skatequest in Woodbridge, Virginia. There was no formation of separate groups as each respondent was responsible for completing the questionnaire given to them. There were 15 male respondents for the survey, all 18 years of age or older. There were no females on the team and this was a limitation of the pilot study. The researcher knew most of the players who have agreed to complete the survey, and as a result, this was a convenience sample. There were no benefits to the respondents participating, other than the knowledge they were assisting the researcher in completing his graduate degree requirements and being part of a pilot study that will shed light on the effects of pre-competition anxiety on performance.

### **Setting**

The questionnaire was administered and supervised where the team played their games, at the Prince William Skatequest, in Woodbridge, Virginia. Each respondent was called in to a meeting room and provided the questionnaire to complete. Before beginning the questionnaire, participants signed a consent form. This was done an hour before the teams' fifth regular season and first playoff game. The reason for picking the fifth regular season game, the season's midpoint, was for the athletes to have gotten a

routine going and when they are less likely to feel more anxiety than they would perhaps before the first or last regular season game. Also, the first playoff game was chosen because this researcher did not want to chance the team losing that first playoff game, thus ending the team's season. This also shortens the gap between the completion of the regular season and playoff game survey. Upon completion, athletes submitted the questionnaire in a box inside the room to ensure confidentiality. Each player wrote down the last four digits of their cell phones at the top of the questionnaire so that the regular season and playoff data were matched by respondent. The questionnaire included demographic information such as: age, number of years played, and position. Post game, the participants were asked to answer two open-ended questions: "How do you feel you played?" and "On a 1-4 scale with 4 being the best, rate your performance today." The answers to these questions were written on the back of each respondent's survey.

### **Data Collection and Instruments Used**

The level of pre-competition sport anxiety was measured with the revised Competition Sport Anxiety Inventory-2 (CSAI-2) developed by Cox, Martens, and Russell (2003). This test measures the existing states of cognitive anxiety, somatic anxiety, and self-confidence before a regular season hockey game and playoff game. The data collected was based on the questionnaire and a four point Likert scale. Certain questions deal with cognitive anxiety, while others deal with somatic anxiety and self-confidence so the results can be measured and analyzed (see Appendix A). The results were examined to determine how much pre-competition anxiety affected these ice hockey players during a regular season and playoff game. This was an ideal scale to use because

it is short and to the point. It did not take a long time to complete because, if it did, it might cause the respondent to lose focus on the questionnaire and start circling random answers. The CSAI-2 scale is a valid scale based on accuracy and significance by the Cox, Martens, and Russell (2003) study. There were no ethical issues. Approval was granted by the Human Subjects Research Board through George Mason University (see Appendix D).

The data collected from the CSAI-2 scale was entered into an Excel spreadsheet. The data were analyzed based on three categories: somatic anxiety, cognitive anxiety, and self-confidence, as each question specifically dealt with one of these. Somatic anxiety, for example, was represented in questions 1, 4, 6, 9, 12, 15, and 17. Each question was based on a four point Likert scale. The averages for questions 1, 4, 6, 9, 12, 15, and 17 for each participant, for example, were calculated, then the averages of all the athletes combined were calculated to arrive at a score for somatic anxiety for a regular season and playoff game. This was calculated for the other identified and related questions to cognitive anxiety. The higher the scores for somatic and cognitive anxiety, the more an athlete was experiencing pre-competition anxiety. The self-confidence questions were reversed so the lower the scores, the lower the athlete's self-confidence was prior to that game. In addition, the average age, playing experience, standard deviation, and variance were considered. The standard deviation is the average distance that a randomly picked sample will deviate from the average. Variance is the distance a random single sample tends to differ from the mean or average.

## CHAPTER 4: ANALYSIS OF DATA

The respondents who completed the survey (n=15) were all male and on average 25 years old and had 11 years of playing experience. The youngest athlete was 19 years of age and the oldest was 38 years of age. The respondent with the most playing experience was 17 years and the respondent with the least amount of playing experience was six years. In Table 1 below, the F represents a Forward, the D represents a Defenseman, and G represents a Goalie.

**Table 1- Participant Demographics**

<b>Data Collected Participant</b>	<b>Age</b>	<b>Position</b>	<b>Yrs Playing</b>
1	25	F	10
2	29	F	9
3	23	D	7
4	38	D	17
5	33	D	15
6	27	F	14
7	22	F	10
8	19	F	9
9	20	F	7
10	21	D	8
11	21	D	11
12	26	F	12
13	24	F	10
14	30	G	14
15	19	G	6
<b>Averages</b>	<b>25.13</b>		<b>10.60</b>

The averages, standard deviation, and variance for the regular season and playoff game were as follows:

### **Regular Season Game Averages**

- Somatic Anxiety= 1.37, standard deviation= 0.23, variance= 0.05
- Cognitive Anxiety= 1.53, standard deviation= 0.25, variance= 0.06
- Self- Confidence= 3.31, standard deviation= 0.38, variance = 0.14

### **Playoff Game Averages**

- Somatic Anxiety= 2.19, standard deviation= 0.28, variance= 0.08
- Cognitive Anxiety= 2.75, standard deviation= 0.36, variance= 0.13
- Self- Confidence = 3.03, standard deviation= 0.30, variance= 0.09

Table 2 below shows the results from the questions on the survey that dealt specifically with somatic anxiety, first from the regular season game and then the playoff game. The specific questions that dealt with somatic anxiety were as follows: I feel jittery, my body feels tense, I feel tense in my stomach, my heart is racing, I feel my stomach sinking, my hands are clammy, and my body feels tight. The highest respondent somatic anxiety score for the regular season game was 1.86 and the lowest was 1.00. The highest respondent somatic anxiety score for the playoff game was 2.71 and the lowest was 1.86.

**Table 2- Somatic Anxiety Data for Regular Season/Playoff Game**

**Regular Season Game**

Data Collected Participant	q1-a	q4-a	q6-a	q9-a	q12-a	q15-a	q17-a	Somatic Anxiety
	1	1	1	1	1	1	1	1
2	1	1	1	2	1	1	2	1.29
3	2	1	2	1	2	2	2	1.71
4	2	2	2	1	1	1	2	1.57
5	2	2	2	1	2	1	3	1.86
6	1	1	1	1	1	1	2	1.14
7	1	1	1	2	1	2	1	1.29
8	1	1	2	2	1	1	1	1.29
9	1	1	2	1	2	1	2	1.43
10	1	2	1	1	1	1	1	1.14
11	2	2	1	2	1	2	1	1.57
12	2	1	1	2	1	1	1	1.29
13	1	1	2	1	2	1	1	1.29
14	1	2	2	1	1	1	2	1.43
15	1	1	2	1	1	1	2	1.29
<b>Average</b>								1.37
<b>Standard Deviation</b>								0.23
<b>Variance</b>								0.05

**Playoff Game**

Data Collected Participant	q1-b	q4-b	q6-b	q9-b	q12-b	q15-b	q17-b	Somatic Anxiety
	1	2	3	2	3	1	1	1

2	2	2	2	3	2	2	2	2.14
3	3	3	3	2	2	2	2	2.43
4	2	3	3	2	2	2	2	2.29
5	2	4	2	2	3	2	2	2.43
6	2	3	3	3	1	3	3	2.57
7	3	2	1	3	1	2	1	1.86
8	3	1	2	3	2	2	2	2.14
9	3	2	2	4	3	2	3	2.71
10	3	2	1	3	2	2	2	2.14
11	2	3	2	3	3	3	1	2.43
12	2	2	3	2	2	1	1	1.86
13	3	1	3	2	2	1	2	2.00
14	3	2	3	3	1	1	2	2.14
15	2	1	3	3	1	1	2	1.86
<b>Average</b>								2.19
<b>Standard Deviation</b>								0.28
<b>Variance</b>								0.08

Table 3 below shows the results from the questions on the survey that dealt specifically with cognitive anxiety, first from the regular season game and then the playoff game. The specific questions that dealt with cognitive anxiety were as follows: I am concerned that I may not do as well in this competition as I could, I am concerned about losing, I am concerned about choking under pressure, I am concerned about performing poorly, and I am concerned others will be disappointed in my performance. The highest respondent cognitive anxiety score for the regular season game was 2.00 and the lowest was 1.00. The highest respondent cognitive anxiety score for the playoff game was 3.40 and the lowest was 2.20.

**Table 3- Cognitive Anxiety Data for Regular Season/Playoff Game**

**Regular Season**

Data Collected Participant	q2-a	q5-a	q8-a	q11-a	q14-a	Cognitive Anxiety
	1	1	2	1	2	1
2	1	2	2	1	1	1.40
3	1	3	2	1	1	1.60
4	1	3	1	1	2	1.60
5	2	1	1	1	1	1.20
6	2	1	2	1	1	1.40
7	2	2	2	2	1	1.80
8	2	1	1	2	1	1.40
9	1	1	2	2	2	1.60
10	1	2	1	2	2	1.60
11	3	1	1	1	2	1.60
12	1	3	2	1	2	1.80
13	1	2	2	1	2	1.60
14	2	3	2	2	1	2.00
15	1	1	1	1	1	1.00
<b>Average</b>						1.53
<b>Standard Deviation</b>						0.25
<b>Variance</b>						0.06

**Playoff Game**

Data Collected Participant	q2-b	q5-b	q8-b	q11-b	q14-b	Cognitive Anxiety
	1	2	3	2	2	2
2	2	3	4	2	2	2.60
3	3	4	2	3	2	2.80
4	2	4	2	2	3	2.60



5	3	4	2	3	1	2.60
6	3	3	3	2	1	2.40
7	3	4	4	3	3	3.40
8	3	3	2	4	2	2.80
9	2	4	3	3	3	3.00
10	3	4	3	3	3	3.20
11	4	3	2	2	2	2.60
12	2	3	2	2	2	2.20
13	3	3	2	2	3	2.60
14	3	4	3	3	3	3.20
15	2	4	3	3	3	3.00
<b>Average</b>						2.75
<b>Standard Deviation</b>						0.36
<b>Variance</b>						0.13

Table 4 below shows the results from the questions on the survey that dealt specifically with self-confidence, first from the regular season game and then the playoff game. The specific questions that dealt with self-confidence were as follows: I feel self-confident, I am confident I can meet the challenge, I am confident about performing well, I am confident because I mentally picture myself reaching my goal, and I am confident of coming though under pressure. The highest respondent self-confidence score for the regular season game was 4.00 and the lowest was 2.80. The highest respondent self-confidence score for the playoff game was 3.60 and the lowest was 2.60.

**Table 4- Self-Confidence Data for Regular Season/Playoff Game**

**Regular Season**

<b>Data Collected Participant</b>	q3-a	q7-a	q10-a	q13-a	q16-a	Self-Confidence
1	4	3	3	3	3	3.20
2	3	3	4	3	3	3.20
3	3	3	4	3	4	3.40
4	4	4	3	4	4	3.80
5	4	4	4	4	4	4.00
6	2	3	3	2	4	2.80
7	4	4	2	2	4	3.20
8	3	4	2	3	3	3.00
9	3	4	3	3	3	3.20
10	4	3	3	2	4	3.20
11	3	4	4	4	4	3.80
12	3	4	4	4	4	3.80
13	2	3	3	4	3	3.00
14	3	3	3	3	4	3.20
15	3	4	2	2	3	2.80
<b>Average</b>						3.31
<b>Standard Deviation</b>						0.38
<b>Variance</b>						0.14

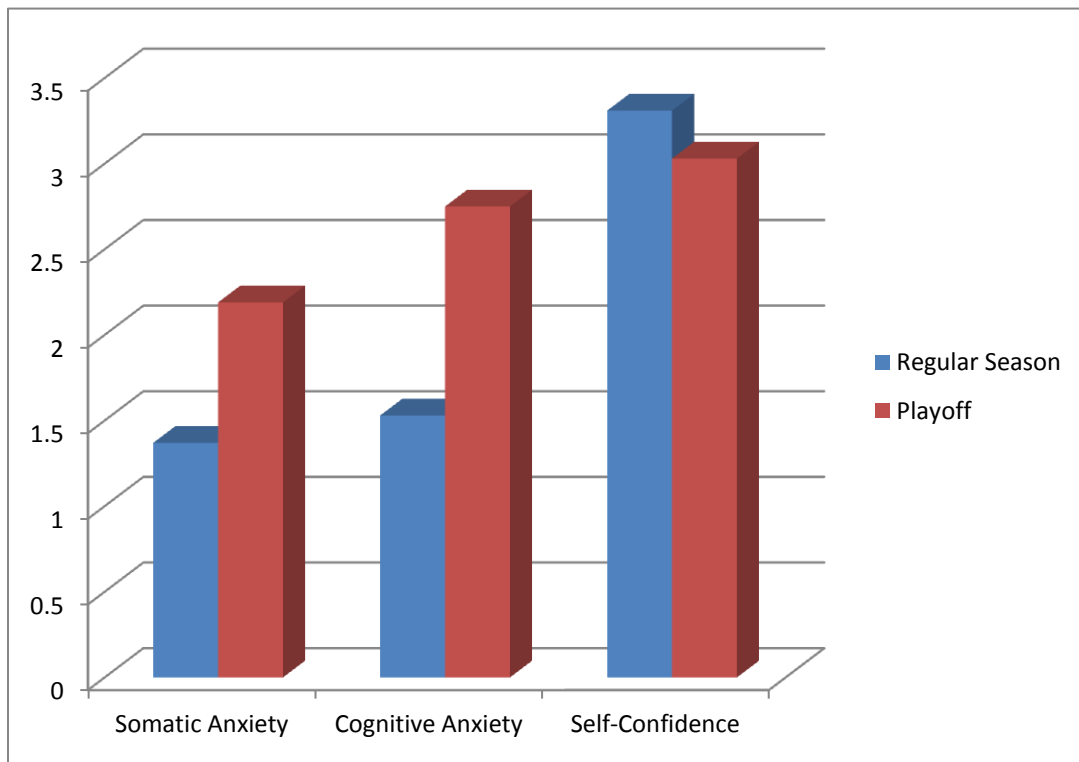
**Playoff Game**

<b>Data Collected Participant</b>	q3-b	q7-b	q10-b	q13-b	q16-b	Self-Confidence
1	3	3	3	3	3	3.00
2	2	3	3	3	2	2.60
3	3	3	3	2	3	2.80
4	3	2	3	3	4	3.00
5	3	3	4	4	4	3.60

6	2	3	3	3	3	2.80
7	3	4	3	2	4	3.20
8	2	2	3	3	3	2.60
9	3	3	2	3	3	2.80
10	4	2	2	3	4	3.00
11	2	3	3	3	3	2.80
12	3	4	3	3	4	3.40
13	3	3	3	4	3	3.20
14	3	4	3	3	4	3.40
15	3	4	3	3	3	3.20
<b>Average</b>						3.03
<b>Standard Deviation</b>						0.30
<b>Variance</b>						0.09

Figure 1 reflects the differences in the averages among somatic anxiety, cognitive anxiety, and self-confidence between the regular season and playoff game. It reveals that both types of anxiety increased from a regular season game to a playoff game and self-confidence decreased from the regular season game to the playoff game.

**Figure 1- Comparison of Regular Season/Playoff Game Averages**



Due to the small sample size of this study, any significant findings were not generalizable, but this researcher was curious regarding these respondents. A two tailed t-test was run because of the data's normal distribution to determine if there was a significant difference among the averages of somatic anxiety, cognitive anxiety, and self-confidence for a regular season and playoff game and if they were significant. The values for all three were greater than 0.05 therefore the results were not significant enough to definitely confirm for this pilot study only that the averages of somatic anxiety, cognitive anxiety, and self-confidence differed significantly to reject the null hypothesis.

In addition, there was not a large enough sample size to determine if somatic anxiety, cognitive anxiety, and self-confidence directly correlated to the team having won or lost.

Table 5 below shows the results from the independent sample two tailed t-test.

**Table 5- Independent Samples T-Test**

	Levene's Test for Equality of Variances		T-Test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Diff	95% Confidence Interval of the difference	
								Lower	Upper
Equal Variance	3.725	0.235	-0.168	16	0.06	3.104E-06	0.365	-0.4971	0.4276
Unequal Variance			-0.193	12.632	0.13	3.104 E-06	0.167	-0.4164	0.3872

In addition to the data collected from the pilot study, respondents were asked two open-ended questions after the game and they were “How do you feel you played?” and “On a 1-4 scale with 4 being the best, rate your performance today?” These qualitative questions provided interesting correlations by using game scores. The majority of the respondents generally felt they played better and rated their performance higher for the regular season game as opposed to the playoff game. This was anticipated because they won the regular season game and lost the playoff game.

## **CHAPTER 5: DISCUSSION OF RESULTS AND RECOMMENDATIONS**

The data and results were expected to be significant and therefore both hypotheses to be supported. The results clearly show that somatic and cognitive anxiety levels increased and self-confidence decreased a substantial amount from the regular season game to the playoff game. The self-confidence levels of the respondents also as expected were higher for the regular season game as opposed to the playoff game where they were lower, supporting the first research question and hypothesis. The p-value was greater than 0.05 and as a result the data was not significant enough to reject the hypothesis. The data was a normal distribution with a bell shaped curve as each set of individual data did not stray far from the average or mean. This was easily apparent by looking at the standard deviations and variances of each set of data. There were not any significant outliers for standard deviation and variance to directly support the claim that playoffs are more stressful than regular season games because the data as mentioned was close to the averages.

However, the second research question and hypothesis could be rejected, which states that cognitive anxiety, somatic anxiety and self-confidence levels correlate with one another and with an athlete's performance or their team winning or losing. The team I analyzed won the regular season game where the anxiety levels were lower and lost the playoff game where they were higher. That alone is not enough to determine if these

levels correlated with an athlete's performance or their team winning or losing. There simply was not enough evidence to support the hypothesis due to the small sample size.

In addition to the data collected from the pilot study, respondents were asked two open-ended questions after the game and they were "How do you feel you played?" and "On a 1-4 scale with 4 being the best, rate your performance today?" These qualitative questions provided interesting correlations by using game scores. Most of the athletes overall felt they played better and rated their performance higher for the regular season game compared to the playoff game. This was expected because they won the regular season game and lost the playoff game. There was one outlier for the playoff game that stood out by using game statistics. One athlete, perhaps the best player on his team, scored two goals and had two assists in the playoff game and ranked his performance as a four. He felt he played well even though his team lost. This athlete had some of his team's highest anxiety and lowest self-confidence levels for the playoff game but still had good game statistics, with two goals and two assists. However, in the regular season game, he had some of the highest self-confidence levels and lowest anxiety levels; yet he only had one assist and ranked his performance a two and did not give himself a glowing performance review when his team won. So in this one case, higher somatic and cognitive anxiety levels and lower self-confidence levels did not correlate with decreased performance and vice versa.

There were several other examples. For instance, one athlete had the highest self-confidence level and lowest anxiety levels for the regular season game but did not record a point and rated his performance a two, another not giving himself a positive review on

his performance. Having a high self-confidence level and low anxiety levels did not correlate to increased performance by this respondent. Another athlete had the lowest self-confidence level for the regular season game and fairly high anxiety levels but recorded a goal and three assists and graded himself a four and an outstanding performance review. In several instances, an athlete would have high somatic anxiety but low cognitive anxiety and low self-confidence and therefore no correlation among the three and an athlete's performance. Just because an athlete had a high self-confidence level and low anxiety levels did not mean it correlated to increased performance and vice versa for each athlete.

Through my experiences of playing highly competitive hockey for many years, I knew exactly the types of feelings these athletes were going through before a regular season game and a playoff game. I would be more anxious and experience a lot more traits for cognitive and somatic anxiety before a playoff game as opposed to one regular season game over the course of a long season. My self-confidence would also not be as high before a playoff game because I knew that if we lost our season was over and we would not be able to win a championship. These results go hand in hand with Fazey and Hardy's (1988) study identified in the literature review. Fazey and Hardy's Catastrophe Theory stated "physiological arousal follows the Inverted-U hypothesis in relation to performance. However, that will only take place when that athlete is experiencing low cognitive state anxiety, meaning an athlete is not worried about his or her pending performance. Conversely, a catastrophe will take place if the athlete is experiencing high cognitive anxiety and concern over their upcoming performance" (Hardy & Fazey, 1988).



Most of those studies concluded that there was an increase in cognitive and somatic anxiety and a decrease in self-confidence due to anxiety prior to a competition. My analysis and results show that, because no matter the type of athlete, all athletes can be greatly affected by pre-competition anxiety if they do not prepare themselves mentally no matter what the situation is. Some athletes have certain routines they follow such as listening to music, stretching, warming up with a soccer ball, taping their sticks, to help deal with anxiety and pre-game jitters in their own unique way. Mental imagery for me, such as visualizing in my head scoring a big goal, making a great pass, or dishing out a big hit, was important in dealing with my anxiety. Each athlete is different and each finds out what prepares them the best for a game and what method helps them use anxiety and anxiousness in a positive manner fairly early on in their careers.

### **Limitations of Study**

The research was limited to one adult A-League ice hockey team as opposed to an entire league so the sample size was small. Due to the small sample size and no females, there was a lack of more sophisticated and advanced data that could have been compared to help support or reject the hypotheses. This was a pilot study with a continuum of some players that have played at high levels before in college and on junior travel teams and athletes that have not played at very high levels and fairly new to the sport. An adult league is not under pressure to win other than for personal satisfaction. In the future, I would like to look at higher levels of competitive hockey, such as the George Mason University team I was a captain for or the junior travel team that I currently coach where athletes have played for a number of years. Such teams may yield more significant data

because athletes on the A-League team could have been affected by anxiety more so than hockey players that have an ample amount of experience playing in high pressure hockey games. The results may have been skewed as a result of the convenience sample.

Another limitation is that I relied on respondents' authenticity and honesty; and even though I knew them, there is no way to determine if someone was telling the truth or not. In addition, having the athletes fill out a questionnaire before the game may be considered a disruption of their routine and perhaps lead to increased anxiety that otherwise might not have been there. The results in this pilot study also might not have been very reliable due to the methodological limitations. The researcher used demographics, one instrument, (the CSAI-2 scale), and some open ended questions for data analysis. Further researchers may desire to incorporate interviews, observations, and additional survey designs to tie it in and as a result provide richer data and outcomes.

### **Future Research**

For future research, I would like to recreate this study, focusing on the junior A travel hockey team that I coach. This would be a perfect population to base my study on because they are highly skilled players with pressure to perform at a high level. It would consist of hockey players between 16 to 20 years of age that are playing highly competitive ice hockey. We travel up north to Boston, down south to Florida, and across the U.S. border to play in places like Oshawa, Ontario in Canada. A lot of these players go on to play junior hockey in Canada or move on to NCAA Division I or III hockey programs. Some even make it all the way to the top to the National Hockey League playing under the bright lights in front of 20,000 people.

My research could be conducted over several different points during the long season where I could analyze exactly what factors lead to an athlete having an increase in pre-competition anxiety. I am interested in investigating how these athletes manage their anxiety and hopefully provide them additional alternatives to help them cope with their anxiety. Research could be done to see whether goalies are more susceptible to pre-competition anxiety than defensemen and forwards or the other way around. It would be interesting to analyze true veterans on the team with more playing experience and whether they have lower levels of pre-competition anxiety than the less experienced players do. As a coach, I am curious as to which type of anxiety affects an athlete's performance more, cognitive or somatic, and if athletes with high levels of pre-competition sport anxiety are more susceptible to injuries. I would also like to follow up with these adult league team respondents and conduct more research to see if I can find some correlations and patterns that I was unable to discover with just one set of data.

## **Conclusion**

The main purpose of this pilot study was to examine whether there were any significant differences in the level of cognitive anxiety, somatic anxiety, and self-confidence of ice hockey players as the pressure increased from a regular season game to a playoff game. In addition, I wanted to see if there was a correlation among somatic anxiety, cognitive anxiety and self-confidence levels and if these levels correlated with an athlete's performance and his team winning or losing. The research confirmed my first question as the cognitive and somatic anxiety levels were lower and the self-confidence levels were higher for ice hockey players during a regular season game when compared

to a playoff game. The first hypothesis of this study was supported since ice hockey players did show a significant difference in the levels of cognitive anxiety, somatic anxiety, and self-confidence during a regular season game when compared with a playoff game.

However, I was able to reject my second research question and hypothesis as I was unable to find a correlation among somatic anxiety, cognitive anxiety, and self-confidence. Due to the sample size, I was unable to determine if they correlated with one another. This initial research allowed me to reject the second part of that question, high somatic or cognitive anxiety and low self-confidence levels does not necessarily correlate to decreased performance and vice versa. In several instances, this was proven false by using the data from the questionnaire, open-ended questions, and game statistics. In some instances, athletes have a great deal of anxiety and low self-confidence; but it does not necessarily lead to a decrease in performance for some athletes. This study will help sport psychologists, coaches like myself, parents, and athletes begin to better understand sport anxiety and help towards finding ways in which athletes can better control their anxiety and, as a result, maintain or increase their performance.

## APPENDICES

### Appendix A- Instrument- CSAI-2 Scale

#### Pressures of Pre-Competition Anxiety on Ice Hockey Players

Thank you for taking the time to fill out this questionnaire. You have been selected to participate due to your current status as an ice hockey player. Your answers will provide great insight to a current study on pre-competition anxiety. All answers will remain anonymous, please place the last four digits of your cell phone in the top right corner to ensure this. Please answer the questions below before reading the directions. After the game I will ask you two open-ended questions and they are, "How do you feel you played?" and "On a 1-4 scale with 4 being the best rate your performance today."

Age: \_\_\_\_\_

Position: \_\_\_\_\_

Years Playing \_\_\_\_\_

Hockey: \_\_\_\_\_

Directions: A number of statements that athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number below the statement to indicate how you feel right now – at this moment. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer which describes your feelings right now, as if you are about to compete in your specific sporting event (i.e., game, tournament, championship).

#### Scale

1 – Not at all    2 – Somewhat    3 – Moderately so    4 – Very much so

1. I feel jittery.

1       2       3       4

2. I am concerned that I may not do as well in this competition as I could.

1       2       3       4

3. I feel self-confident.

1       2       3       4

4. My body feels tense.

1       2       3       4

5. I am concerned about losing.

1      2      3      4

6. I feel tense in my stomach.

1      2      3      4

7. I'm confident I can meet the challenge.

1      2      3      4

8. I am concerned about choking under pressure.

1      2      3      4

9. My heart is racing.

1      2      3      4

10. I'm confident about performing well.

1      2      3      4

11. I'm concerned about performing poorly.

1      2      3      4

12. I feel my stomach sinking.

1      2      3      4

13. I'm confident because I mentally picture myself reaching my goal.

1      2      3      4

14. I'm concerned that others will be disappointed with my performance.

1      2      3      4

15. My hands are clammy.

1      2      3      4

16. I'm confident of coming through under pressure.

1      2      3      4

17. My body feels tight.

1      2      3      4

Post game questions:

18. On a 1-4 scale with 4 being the best rate your performance today.

1      2      3      4

19. How do you feel you played? This is an open-ended question feel free to answer freely.

## Appendix B- Raw Excel Data Table



Research Data On  
Anxiety.xlsx

## **Appendix C- Consent Form**

### **Hockey Players: The Effects of Pre-Competition Anxiety on Athletic Performance Informed Consent Form for ice hockey players participating in this study**

#### **RESEARCH PROCEDURES**

This research is being conducted to look at the effects of pre-competition anxiety on ice hockey players during a regular season game and a pressure filled playoff game. If you agree to participate, you will be asked to complete a questionnaire that asks questions pertaining to anxiety before a regular season game and a playoff game. The survey will take approximately 5 minutes to complete.

#### **RISKS**

There are no foreseeable risks for participating in this research.

#### **BENEFITS**

There are no benefits to you as a participant other than to further research on how pre-competition anxiety affects athletes. This research may help parents, coaches, teachers, and the athletes themselves in discovering new ways to help control their anxiety, thus increasing one's athletic performance.

#### **CONFIDENTIALITY**

The data in this study will be confidential. No names will be asked for and the questionnaires will be dropped into a box after completion to ensure confidentiality.

#### **PARTICIPATION**

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no consequence or loss of benefits to which you are otherwise entitled. There are no costs to you or any other party.

#### **CONTACT**

This research is being conducted by Matt McVay, Student Athlete at George Mason University, and a graduate student in Sport and Recreation Studies. He may be reached on his cell phone at (703) 201-8704 for questions or to report a research-related problem. This research has been reviewed according to George Mason University procedures governing your participation in this research. The research is being conducted under the supervision of Dr. Brenda Wiggins and she may be reached at (703) 993-2068. You may contact the George Mason University Office of Research Integrity & Assurance at (703) 993-4121 if you have any questions or comments regarding your rights as a participant in the research.

#### **CONSENT**

I have read this form and agree to participate in this study.

\_\_\_\_\_

Name

\_\_\_\_\_

Signature and Date



## **Appendix D- Human Subjects Research Board Approval-Confirmation Email**

IRBNet Board Action

Karen Motsinger <no-reply@irbnet.org>

Thu 2/27/2014 2:50 PM

Inbox

To:

Matt McVay <mmcvay@gmu.edu>;

Please note that George Mason University IRB has taken the following action on IRBNet and approved the following project:

Project Title: [488916-1] Effects of Pre-Competition Cognitive Anxiety, Somatic Anxiety, and Self-Confidence on Ice Hockey Players Performance  
Principal Investigator: Brenda Wiggins

Submission Type: New Project

Date Submitted: October 25, 2013

**Action: EXEMPT**

**Effective Date: February 27, 2014**

**Review Type: Exempt Review**

Should you have any questions you may contact Karen Motsinger at kmotsing@gmu.edu.

Thank you,  
The IRBNet Support Team

[www.irbnet.org](http://www.irbnet.org)

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## **CIRRICULUM VITAE**

Matthew McVay graduated from Robinson High School, Fairfax, Virginia, in 2005. He received his Bachelor of Science in Sport Management and Business Management, with a Minor in Criminal Justice from George Mason University in 2011. He will receive his Master of Science in Sport and Recreation Studies with a concentration in Sport Management from George Mason University in 2014.