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SELF-EFFICACY IN COLLEGIATE ATHLETES DURING A MAXIMUM STRENGTH TEST

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By

Chelsea Marie Kelly

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The thesis of Chelsea Kelly is approved:

Dr. Nick Galli	Date
Dr. Kim Henige	Date
Dr. Ashley Samson, Chair	Date

California State University, Northridge

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ABSTRACT

SELF-EFFICACY IN COLLEGIATE ATHLETES DURING A MAXIMUM STRENGTH TEST

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The purpose of the present research study was to explore self-efficacy and its relationship to performance outcomes in a maximum strength test in a weight room setting. The secondary purpose was to determine which source of self-efficacy information contributes most to efficacy beliefs. Thirty-six collegiate soccer players filled out a self-efficacy scale prior to their one repetition maximum back squat strength test. The self-efficacy scale asked the participants how confident they were in beating their predicted max (rating scale). A qualitative approach was also used asking what influenced their self-efficacy ratings the most. Results revealed that athletes who had high self-efficacy did not necessarily perform better on their maximum strength test. Therefore, there was no significant relationship between self-efficacy and performance. The qualitative results revealed that physiological states were the most influential source of self-efficacy information. In addition gender differences were discovered. Implications of the study, as well as directions for future research are discussed.

Chapter 1: Introduction

Albert Bandura's self-efficacy theory is arguably the most recognized sub-theories within his social cognitive theory. Social cognitive theory suggests behavior that is due to personal, behavioral, and environmental influences and self-efficacy is one of the personal influences (Glanz, Rimer, & Viswanath, 2008). As stated by Bandura (1997), self-efficacy beliefs are, "people's judgments of their capabilities to organize and execute courses of action required to attain a desired outcome" (p.3). According to the theory, self-efficacy is present in every individual and focuses on an individual's perceptions of their ability to succeed in a particular situation (Bandura, 1994).

Self-efficacy acts as a key element in determining how challenges and goals are approached. Research has shown that when athletes perceive themselves as highly efficacious they will give more effort, try new activities, and view a challenging problem as a task that they can master (Wise, 1999). When athletes perceive themselves as having low efficacy; they avoid difficult tasks, focus on the negative outcomes, and lose confidence in their personal abilities (Wise, 1999). For example, an athlete may be physically capable of lifting a seventy pound dumbbell, but if the athlete does not believe that they can lift it, then they are unlikely to attempt to lift the weight at all.

Self-efficacy beliefs differ on three dimensions: level, strength, and generality (Feltz, Short & Sullivan, 2008). According to Feltz (2008), "level" of self-efficacy refers to an individual's anticipated performance accomplishments at different levels of difficulty. For example, a basketball player judges how many successful free-throws he/she believes they could make out of two attempts (e.g., 0 out of 2 up to 2 out of 2). "Strength" of self-efficacy is an individual's belief that they can achieve different levels of performance, from being absolutely certain to

uncertain (Feltz et al., 2008). For example, two basketball players may believe they can make 1 out of 2 free-throws, but one player may be more certain in his belief than his teammate. The last dimension of self-efficacy beliefs is “generality” which is when beliefs of an individual’s self-efficacy can transfer across various tasks (Feltz, et al., 2008).

Chapter 2: Review of Literature

Self-efficacy and Sport Performance

In a competitive environment there are multiple factors that influence an individual's perception on whether or not they will succeed or fail. Self-efficacy theory suggests that perceptions before/during competition can be a reliable predictor of performance outcomes (Bandura, 1997). Weinberg and colleagues (1979) researched the relationship between self-efficacy and persistence in college students competing against one another in a muscular endurance task. The results of the study indicated that the low self-efficacy group was less confident, and did not try as hard on the second trial while the high efficacy group was more confident and persisted longer (Weinberg, et al., 1979). Furthermore, performance increased on the second trial for the high efficacy group while the low efficacy group did worse on the second trial. Weinberg's (1979) study was the first to show self-efficacy affects persistence in the face of failure on a motor task (Feltz, 2008).

In later studies Weinberg, Gould, Yukelson, and Jackson (1980; 1981) further supported these findings by demonstrating that an individual who has high self-efficacy will respond to failure by giving more effort, while a low self-efficacy individual will give less effort. In a real world example, if a beginning or novice basketball player was shooting free throws and missed the first attempt there is a strong probability that he will miss the second free throw. On the other hand, if a confident veteran basketball player was in the same scenario, he would shake off the negative thoughts and has a better chance to succeed. Furthermore, they discovered that face to face competitions will have higher self-efficacy and performance relationships when compared to non-face to face competitive situations. These findings have helped pioneer future research on

interventions designed to affect self-efficacy beliefs during sport performances (Weinberg et al., 1981).

One way that self-efficacy can influence performance is through its effect on effort. George (1994) researched this relationship with collegiate baseball players during competition. All participants completed hitting self-efficacy questionnaires during nine different competitions. Results from George (1994) revealed self-efficacy to be the strongest and most consistent predictor of effort and also a predictor of hitting performance. Conversely, an athlete who perceives competition as threatening will negatively influence performance outcomes. Results indicated that past performance experiences were a significant predictor of their self-efficacy ratings (George, 1994). For example, an athlete who hits a homerun and carries the team to a win will remember the experience and end on a good note. Alternatively, if the athlete strikes out with the bases loaded and fails to win the game, the athlete will remember the situation and will have a negative effect on their self-efficacy in future performances.

In addition to effort; perceptions of competitive situations can also be influenced by self-efficacy and subsequently affect performance. Treasure, Monson and Lox (1996) investigated self-efficacy prior to competition and its effect on performance. Their research concluded that high school wrestlers who have high self-efficacy perceive competitive wrestling situations as less threatening than those athletes with low levels of self-efficacy. Additionally, they discovered that high levels of self-efficacy were related to increased levels of points earned and self-efficacy did in fact predict performance (Treasure et. al., 1996).

Self-efficacy of Athletes and Weight Training

Competitive athletes train all year around in the weight room to become bigger, faster, and stronger. Although research proves that weight lifting improves physical skills, there are few

studies that examine the relationship between an athlete's self-efficacy and weight training performance. Most research studies on this topic take place in one or a few weight lifting sessions, Gilson (2012) was the first to be over the course of a full training cycle. Its purpose was to investigate collegiate athlete's self-efficacy beliefs and strength training efforts during an entire off-season. Significant relationships between self-efficacy and effort were found throughout all four time points in the training cycle (Gilson et. al., 2012). These results were not unexpected due to several other research studies that found similar relations between self-efficacy and effort (Feltz & Lirgg, 1998; George, 1994; Kane et al., 1996; Vancouver et al., 2001; Yeo &Neal, 2006).

Maximum strength tests play a significant role in assessing how an athlete has improved in strength over time. Based on research from Gilson, Chow and Feltz (2012), when an athlete performs a maximum squat test there is not a significant relationship between self-efficacy and performance. These results contradict previous research by Feltz & Lirgg, 1998; George, 1994; Kane et al., 1996; Vancouver et al., 2001; Yeo & Neal, 2006; which suggested that self-efficacy and performance are related. Researchers attributed the results of Gilson's (2012) study to the self-efficacy scale, which had the athletes compare their past performances to what they believed they could currently do.

When measuring self-efficacy during a maximum strength test there are two questions that should be answered; do self-efficacy beliefs predict performance and what influences these beliefs. In order to test this, researchers have designed studies to manipulate participant's expectations on how much weight they actually lift during a maximum strength test (Fitzsimmons et al., 1991). Results confirmed that perceptions of past performance based on positive and negative feedback accounted for nearly all of the variance in future performances.

The studies also confirmed that providing false positive feedback increased a participant's self-efficacy and maximum strength test performance (Fitzsimmons et al. 1991). These same results are also supported by other past research findings about deception and performance (Ness & Patton, 1977; Nelson & Furst, 1972; Feltz & Doyle, 1981). Researchers comment that while performance deception is an effective method for increasing performance with plateauing athletes, they caution that these methods be kept within safe ranges to avoid injuries (Fitzsimmons et al., 1991).

In summary several research studies; Gilson, Reyes, & Curnock, 2012; Fitzsimmons, Landers, Thomas, & Mars, 1991; all have demonstrated convincing evidence that there is a strong relationship between an athlete's weight room self-efficacy and positive performance outcomes. In addition to these findings, a meta-analytic review led by Mortiz, Feltz, Fahrbach and Mack (2000) supported that self-efficacy is a reliable predictor of sport performance.

Sources of Self-efficacy Beliefs for Athletes

Bandura (1997) theorizes that efficacy beliefs are formed through four diverse sources of self-efficacy information; past performance accomplishments, vicarious experiences, verbal persuasion, and physiological states. Information gained from these four sources will influence and shape self-efficacy beliefs. Research to date has provided valuable information on the four sources of efficacy information; however researchers need to investigate how these four sources influence efficacy beliefs.

Past performance accomplishments/Mastery Experiences

The most powerful source of self-efficacy for athletes comes from past performance accomplishments, according to Bandura (1997). Past successes or failures let athletes form their own judgments upon future tasks they will encounter. If an athlete perceives past experiences as

successful then self-efficacy beliefs will increase, while if past experiences are perceived as failures then efficacy beliefs will likely decrease (Feltz, 2008).

Research on past experiences and self-efficacy beliefs have been documented and reported in athletes. Practice is critical in developing confidence as athletes try to advance their athletic accomplishments. Previous research by Chase, Feltz and Lirgg (2003) demonstrated that past experiences such as practice was the most relevant source of self-efficacy utilized. Similarly, Slobounov, Yukelson, and O'Brien (1997), discovered that a diver's self-efficacy enhanced as the number of competition dives were performed. Athletes who do continuous routines in practice and competition will help increase self-efficacy beliefs for that particular task. This is a result of the athlete mastering the skill they are performing, while at the same time raising their confidence levels. Therefore, past experiences during practice and competition will affect overall self-efficacy beliefs.

In addition to past experiences, such as practice and competition routines; the difficulty level of a task can also affect an athlete's confidence during a performance. Some athletes have the ability to master a certain skill with high confidence while others end up failing because of decreased efficacy. An athlete's efficacy beliefs can become heightened after performing a difficult skill multiple times (e.g. previous experiences). This concept was discovered by Slobounov and colleagues (1997) and proved to be accurate with their study on divers. They found that self-efficacy ratings changed as previous dive difficulty occurred, which signified efficacy beliefs can be raised after performing a difficult task.

In a competitive environment failure is likely to change perceptions of self-efficacy and consequently have an effect on future performance outcomes. Results from Lane, Jones, and Stevens (2002) witnessed self-efficacy decrease after 59 tennis players were defeated in a tie-

breaker match. Similar results by Gernigon, Fleurance, and Reine (2000) uncovered that failure was associated with less persistence in doing the task (gun-shooting-video game) and perceptions of failure provoked perceptions of learned helplessness.

Although perceptions of failure can be caused by competition outcomes an athlete's perceptions regarding success or failure can also be manipulated by a coach especially during practice. Coaches may try to motivate an athlete to work harder or try to convince them to try a difficult skill. Escarti and Guzman (1999) manipulated track athletes successes and failures during a hurdling task where they gave the athletes false feedback after their performance. Results revealed that athletes who were told their past performances were a success had higher self-efficacy scores, performed better on the next task, and chose a more difficult task for their next attempt then the athletes who were told they failed (Escarti et al., 1999). Athlete's perceptions of past experiences have an overwhelming effect on self-efficacy beliefs for future performance outcomes.

Bandura (1997) advises that the learning process is a critical time to help athletes increase confidence in their athletic abilities, but having an athlete try to master a difficult skill is not advised in the beginning stages of learning. Failure is more than likely to occur in the beginning stages thus, Bandura (1997) suggests optimizing performance successes as frequent as possible. Success is crucial in attaining overall confidence for a particular skill, while performance failures will lower efficacy beliefs. As a result it seems justifiable to have future scholars direct their attention to discovering additional research concerning past performance experiences and its effect on self-efficacy beliefs in competitive athletes. These findings will help strengthen the argument that past performance experiences are the most powerful source of self-efficacy.

Vicarious Experiences

In addition to past performance accomplishments, vicarious experiences/modeling is the second source of self-efficacy information. Vicarious experiences are when an athlete learns from watching someone else perform a particular skill (Feltz et al., 2008). Having an athlete watch another individual (observational learning) will enhance self-efficacy beliefs, and help increase the likelihood of a successful performance (Lirgg & Feltz, 1991). Although a majority of the research on vicarious experiences has not been as prominent as past performances, researchers have discovered vicarious experiences having an impact on self-efficacy perceptions. Coaches who provide instructional information to athletes will help enhance efficacy information about how to correctly perform a desired skill. A proficient model such as a strength coach can demonstrate the correct mechanics of a back squat exercise, while providing instructional information for the athlete to follow.

Though watching a proficient model can influence efficacy beliefs, vicarious experiences are also enhanced through social comparison of others (Feltz, 2008). This source of efficacy information is apparent throughout sport competition where athletes view the physical structure of their opponent and self-efficacy perceptions are then developed (Weinberg et al., 1979). Influences of media on social comparisons such as females in recent decades have started to dominate the sports world. This visual influence can raise self-efficacy in female athletes about their athletic abilities in sport (Feltz, 2008). Bandura (1986) proclaimed that the closer the similarity between the model and the individual, the greater the influence the model has on the individual's perception (Feltz, 2008). On the other hand, researchers have found this statement to not always be true. Landers (1973) researched the effect of model competence and model similarity and concluded that when learning a "new" skill, model competence was more

important for performance. Conversely, Gould and Weiss (1981) found in a muscular endurance task when an individual is unsure of their abilities, the model similarity of the performer (age, sex, or status) creates higher self-efficacy and better performance outcomes.

In addition to social comparison, self-modeling is another type of vicarious experience that influences self-efficacy beliefs. This type of practice involves an athlete whom watches themself perform a particular skill. Self-modeling through videotaping has been shown to help athletes increase their performances because they get a visual cue of themself performing the skill (Feltz et al., 2008). Singleton and Feltz (1999) had collegiate college hockey players be video-taped while they practiced their shooting accuracy. Results showed that after the 10 weeks of self-modeling the experimental group had greater shooting accuracy, which increased self-efficacy beliefs for game time performance (Singleton et al., 1999). Similarly, Hall and Erffmeyer (1983) video-taped 10 female basketball players for foul shooting and similar results were uncovered to support the concept that self-modeling increases self-efficacy beliefs and performance outcomes. Although research has been established with vicarious experiences, more viable research must be discovered to help strengthen the relationship of vicarious experiences and performance outcomes among athletes.

Verbal Persuasion

Verbal persuasion from coaches, teachers, parents, or peers can influence how self-efficacy beliefs are formed. Coaches use various techniques such as; feedback, speeches, and self-talk to impact their athlete's perceptions of efficacy. Researchers have found feedback to be the most used form of verbal persuasion and Bandura has argued that the feedback given can weaken or improve self-efficacy beliefs. Studies such as Ness and Patton (1979) have supported these statements. The study involved participants completing weightlifting tasks where they

found a positive relationship between positive feedback and performance outcomes (Ness et al., 1979) In spite of these findings Wells, Collins, and Hale (1993) discovered that although participants lifted more weight from the false positive feedback, their efficacy beliefs in fact decreased. Bandura (1997) does not advise methods of false feedback to enhance self-efficacy. Although these methods have been used to understand the relationship of verbal persuasion and self-efficacy, they are not suggested.

One way verbal persuasion can help raise self-efficacy in athletes is by coaches and teammates supporting one another. Coaches believe verbal persuasion through pre-game speeches to be an important method of raising confidence in their athletes prior to competition (Feltz, 2008). Research in this particular area is consistent with finings of Vargas-Tonsing and Bartholomew (2006). Their findings confirmed that emotional/persuasive speeches prior to competition raised self-efficacy beliefs in teams and enhanced overall confidence to win the game (Vargus-Tonsing, 2009; Vargus-Tonsing & Bartholomew, 2006; Vargus-Tonsing & Guan, 2007; Vargus-Tonsing, Myers, & Feltz, 2004).

In more recent decades, sport psychologists have started to have their athlete's use self-talk strategies as a form of verbal persuasion. Athletes who use this form of verbal persuasion can help convince themselves that they can accomplish a particular skill or goal. When athletes learn to regulate their thoughts in a positive manner it can eventually lead to better performance outcomes (Feltz, 2008). Though research is limited, Thelwell and Greenlees (2003) had 4 triathletes use self-talk strategies to help increase confidence during competition and discovered that they led to greater performances of the participants. Similar results were found with during a sit-up task where self-talk increased efficacy beliefs as well as predicted performance (Hardy, Hall, Gibbs, & Greenslade, 2005). Although some research has been established, further findings

are needed to help sport psychologists and coaches to enhance performance among competitive athletes.

Physiological States

Physiological states include information about one's level of fitness, fatigue, pain, and strength (Feltz, 2008). Athletes can be influenced by these physiological symptoms when judging if they can successfully complete a particular skill. The interpretation of efficacy beliefs can influence future successes or be influenced by previous efficacy beliefs. Physiological states have been shown to be a more important source of efficacy information when physical activities and sports occur, when compared to non-physical activity tasks (Chase, Feltz, & Lirgg, 2003). Although, physiological states are a source of efficacy information, only a limited amount of research has studied physiological states as a predictor of self-efficacy beliefs. Feltz and Mugno (1983) studied the effects of 80 female divers on the relationship of self-efficacy, performance, and perceived physiological arousal. The results unveiled that the diver's perceived arousal was the strongest predictor of efficacy when compared to actual arousal (Feltz et al., 1983). As a result, physiological arousal perceptions are a more influential source of efficacy information than past performances.

Furthermore, fatigue has been found to be negatively correlated to efficacy beliefs (Rudolph & Butkil, 1998). For example, when athlete's experience negative emotions during competition, it can affect their confidence in a negative way for that particular task. Athletes use physiological symptoms as different methods of information throughout competition. For example, one track athlete may view their high heart rate as a sign of nervousness and fear, while the other track athlete next to him will view their high heart rate as a signal of them being "psyched up" and ready to compete. Every individual will develop efficacy beliefs during

competition, but it is how they interpret the physiological information that will influence performance outcomes.

Purpose

The literature reveals that there is much research on self-efficacy beliefs and sport performance outcomes in competition settings (Feltz, 1988b). However, there is little to no empirical research on self-efficacy for a task almost all competitive athletes participate in: strength training. Strength training is a method to gradually increase the development of an athlete's muscular strength, power, hypertrophy, and endurance (NSCA). This specific type of training is used in order for athletes to reach their maximum physical abilities and is usually supervised by a certified strength and conditioning coach. One common method strength coaches use to assess athlete performance/improvement is maximum strength tests. These physically demanding tests require athletes to not only be physically prepared, but mentally as well. Self-efficacy perceptions on this specific physical task are present, before, during, and after performance and as a result, it seems justifiable to have these strength coaches familiarized with self-efficacy and eventually use self-efficacy interventions as a foundation for developing motivation for weight room routines. With new and improved knowledge of this gap in the research, athletes will have the opportunity to enhance their performance and compete at a higher level than their peers. Therefore the primary purpose of this research study was to explore self-efficacy and its relationship to performance outcomes in a maximum strength test in a weight room setting. The secondary purpose was to determine which source of self-efficacy information contributes most to efficacy beliefs.

The research questions are:

(1) How does self-efficacy influence performance?

(2) What sources of self-efficacy influence athletes' self-beliefs?

Hypothesis

It was hypothesized that higher perceptions of self-efficacy will be related to better performance outcomes during a maximum strength test. Additionally, the self-efficacy perceptions of athletes during a maximum strength test will be largely attributed to the self-efficacy source of previous mastery experiences.

Chapter 3: Methods

Participants

The participants in this study were current student athletes who attend California State University Northridge (CSUN). More specifically, participants who were currently on the active rosters for CSUN's men's and women's division 1 soccer teams were be asked to participate in the study. The participants included were 17 males and 19 females ranging from 18 to 24 years old. All participants were recruited through the strength and conditioning department at CSUN. The department keeps the student athletes highly active throughout the entire year with strength training and conditioning routines completed several days a week. A certified athletic trainer authorized who was to be included and excluded based off an injury report. Any injured athlete who cannot physically complete a maximum strength test was excluded from this study. Additionally, participation in this research study was completely voluntary and those willing to participate had to fill out an informed consent prior to any testing procedures that were performed.

Procedures

The maximum strength test took place over the student athletes' off-season training program, in which participants were participating in weight room and conditioning activities throughout the spring semester. Both male and female soccer teams at the time were required to train an hour each day, five days a week, with their assigned strength coach. Participants' strength trained three days a week in the weight room, while two days a week were focused on conditioning. Throughout the training program participants completed several maximum strength tests to demonstrate their athletic improvement over the course of their off-season training program. Strength tests are considered part of standard training procedures for being a competitive student athlete at the division one level.

Upon volunteering for the study, participants were briefed on the study's purposes and informed that they were going to perform a one-repetition maximum for back squat the next week. In addition, they were told that they were going to participate in a research study for their graduate assistant strength coach's thesis. Participants who were willing to participate signed an informed consent and bill of rights form (see Appendix A) as well as filled out a demographic questionnaire (see Appendix B) a week prior to any of the testing procedures.

Participants began a 10 to 15 minute dynamic warm-up led by the strength coach. This warm-up was familiar to the student athletes because they perform it several times a week. Once completed, the participants received a testing sheet which included the repetitions, sets, and amount of weight for each participant to follow. Most importantly, this document had the participant's predicted 1RM on the testing sheet (Appendix C).

Once the participant observed their predicted 1RM they began filling out the first section of the self-efficacy questionnaire (Appendix D) and shortly after began the max testing warm-up procedures. When the participant was close to their one- repetition max, the strength coach was informed and the test began. During the test, the strength coach supervised the performance, while spotters assisted the athlete to ensure safety. The strength coach, graduate assistant, or interns advised the participants on how much weight to add to their next attempt. Weight was continually added until failure to find the participant's accurate 1RM. These procedures were performed regularly as part of standard strength test routines. Immediately after finding the participant's new 1RM, the second section of the self-efficacy questionnaire (Appendix B) was completed.

Instruments

Demographic questionnaire (Appendix B) Participants were asked to complete a demographic questionnaire which included items as; age, gender, height, weight, racial/ethnic background, and undergraduate year. In addition, there were questions relating to the participant's sport demographics such as; number of years played the sport, position, scholarship status, and past injuries and age of occurrence. The demographic questionnaire had specific questions relating to the participant's weight room experiences, as well as an estimated number of times they attempted a maximum back squat.

Maximum testing sheet (Appendix C) This instrument was created by the teams assigned strength coach. As part of standard testing procedures, the strength coach chose the repetitions and the sets the participants used for warm-up. The amount of weight each athlete warmed up with was based on the participant's previous testing results. The maximum testing sheet was then given to the athletes *before* they started the testing warm-up procedures. At this time the participants looked at their predicted 1RM weight and began filling out the next instrument.

Self-efficacy questionnaire for athletes. (Appendix D) This instrument measured participants' self-efficacy perceptions before completing a 1RM back squat strength test. The questionnaire began by asking the participant how confident they were with squatting their predicted max. The questions were rated on a scale from 1 to 10, with 1 being not at all confident, and 10 being absolutely confident. The questions then continued by increasing the participant's predicted 1RM back squat in 5 pound increments. During each 5 pound increment increase, the participant was again asked their level of confidence at that particular weight. The questionnaire had a total of 6 questions measuring the athlete's level of confidence starting with; at this moment how confident are you that you can squat *5* lbs. more than your predicted max and with the 6th question ending

with *25* lbs. The survey also includes an open ended question asking the participant what influenced their level of confidence the most from the ratings they answered above. This open ended question was asked to measure which source of self-efficacy information contributes most to their efficacy beliefs during a maximum strength test. The second section of the self-efficacy questionnaire asked the participant if they gave their best effort during the test, and if not explain why. Lastly the survey ended by asking the athlete whether they felt their max test performance was a success, and why or why not.

Statistical Analyses

There were two research questions that were addressed for this study; (1) how does self-efficacy influence performance and (2) what source of self-efficacy influences athletes' self-beliefs? These two research questions were answered by having participants fill out a self-efficacy questionnaire and then perform a 1RM strength test. For the first research question, correlations were used to test if there was a significant relationship between self-efficacy and performance during a max strength test. For the second research question deductive coding was used in which responses were coded into pre-selected categories, based on the four sources of information developed by Bandura: previous mastery experiences, verbal persuasion, vicarious experiences, and physiological states. This statistical analysis helped guide researchers to identify which source most influenced self-beliefs in athletes during a max strength test.

Chapter 4: Results

The participants *(n = 36)* in this research study had an age range of 18 to 23, with a mean age of 19.78. In addition to age, the average number of years played soccer for the group was 14.19 (2.48), and number of years lifted weights was 2.11 (1.55) years. For a full list of descriptives for participant variables see Table 1 (Appendix E).

Self-efficacy and Performance

The first research question examined whether having high self-efficacy would lead to better performance outcomes during a maximum strength test. Results indicated that perceptions of self-efficacy going into the strength test displayed a mean score of 8.2 out of 10. This self-efficacy rating revealed that the male and female participants were very confident in making *any improvement* on their max strength test. When analyzing individual self-efficacy scores, results revealed correlations were found on how athletes completed the self-efficacy scale. For example, an individual who was more confident in beating their predicted max by 5 pounds was more likely to say they were confident in beating it by 25 pounds (r = .766, p = .000). Whereas, individuals who said they could meet their predicted max were less likely to say they could beat their predicted max by 25 pounds.

Although gender differences were not the primary research question, they were explored. Results of independent samples t-tests revealed the items which asked if participants felt confident about any improvement or 5 pounds improvement showed no gender differences. However, the remaining four items (10, 15, 20, 25 pounds) did reveal gender differences. Results revealed that males were significantly higher in their self-efficacy beliefs at 10 lbs (t (34) = 2.42, p = .021), 15 lbs. (t (34) = 3.04, p = .005), 20 lbs. (t (34) =3.13, p = .004), and 25 lbs. (t (34) = 2.28, p =.029). Despite the gender differences in perceptions of self-efficacy before performance

the results indicated there was no significant relationships found between self-efficacy ratings and performance for males or females, indicating that athletes who had high self-efficacy did not necessarily perform better on their maximum strength test.

Sources of Self-efficacy

The second research question focused on which source of self-efficacy would most likely influence athletes' self-beliefs during a maximum strength test. Sources of self-efficacy were coded into categories based on Bandura's four sources of self-efficacy information. As a whole, the participants mentioned physiological states as the most cited source (22 responses) of self-efficacy that influenced their responses. While the original research question again was not to address gender differences, gender differences began to appear and were worth noting.

In regard to the female participants *(n =19)* physiological states were cited most frequently with fifteen responses mentioned. Past performances were named eight different times, verbal persuasion five times, while vicarious experiences were not mentioned at all.

Female participants indicated that physiological states played the most significant role in influencing their self-efficacy perceptions. Female athletes cited "I am injured and not confident" and "I don't feel like I am as strong as I could be" as physiological sources that helped form their self-efficacy ratings. One female athlete spoke of her injury stating, "Knowing that my knee may or may not be 100% yet." While another participant referred to her fatigue level as a source of information that decreased her efficacy beliefs by responding, "My level of fatigue after practice influenced my confidence rating."

Following physiological states, past performances were the next most cited source of self-efficacy for female participants. Responses included statements of "done before" and

“consistency with the last sets I have been doing” as knowledge that helped increase self-efficacy beliefs for their maximum strength test.

Verbal persuasion statements were the third most mentioned source (five responses) of self-efficacy that female athletes used to influence their self-efficacy ratings. For example athletes responded by stating, “Outside people cheering me on” and “the support of my teammates.” Lastly, female athletes revealed that vicarious experiences (0 responses) did not influence their self-efficacy ratings at all.

Gender differences revealed that the male participants *(n =17)* cited past experiences to be the most frequently cited source of self-efficacy with eleven responses mentioned. Verbal persuasion was named eight different times, physiological states seven times, while a vicarious experience response was mentioned only twice.

Male participants indicated that past experiences played the most significant role in influencing their self-efficacy perceptions. Male athletes cited, “based on last year’s performance” and “used to squatting” as past experiences that helped form their self-efficacy ratings. A male athlete spoke specifically of, “Due to previous experiences and how much I have progressed since the beginning I know I am stronger.”

The next most cited source of self-efficacy for male participants was verbal persuasion (8 responses). Verbal persuasion responses were statements such as, “I am motivated to do well in my sport” and “teammates to support me to do more.”

Physiological states were found to be the third stated source with seven different responses mentioned. Participants for this source typically would have responses relating to injuries. For example, one athlete cited, “I hurt my foot yesterday in practice and I am really not

sure if I will be able to lift a lot." Others included, "How fresh my body is feeling today and it finally being injury free."

The least mentioned source of self-efficacy for male athletes was vicarious experiences with only two responses being stated. These statements were, "motivation from my teammates" as well as, "observed weight of my teammates." For a complete table of the numerical totals for both female and male participants please refer to Table 1 (see Appendix F).

Chapter 5: Discussion

There is much research on self-efficacy beliefs and sport performance outcomes in competition settings (Feltz, 1988b). However, there is little to no empirical research on self-efficacy for a task almost all competitive athletes participate in: strength training. Therefore, the primary purpose of this study was to explore self-efficacy and its relationship to performance outcomes during a maximum strength test in the weight room setting. The secondary purpose was to determine which source of self-efficacy information contributed most to efficacy beliefs. This study provides further knowledge of the self-efficacy and performance relationship, and how self-efficacy perceptions are formed. In addition, the study contributes to the limited amount of research by examining collegiate athletes and maximum testing procedures. With new and improved knowledge of this gap in the research, athletes will have the opportunity to enhance their performance and compete at a higher level than their peers.

In regard to the first research question, it was hypothesized that an athlete who has a higher perception of self-efficacy would achieve better performance outcomes during their maximum strength test. On the contrary, an athlete who has lower self-efficacy perceptions would not perform well on their maximum strength test. Results of research question one illustrated that the hypothesis was not supported; thus, higher self-efficacy did not lead to better performance outcomes. These results are consistent with previous research by Gilson (2012) which discovered that there was not a significant relationship between self-efficacy and performance during a maximum strength test. However, a majority of the research has supported that self-efficacy perceptions and performance were related (Feltz & Lirgg, 1998; George, 1994; Kane et al., 1996; Treasure, 1996; Vancouver et al., 2001; Yeo & Neal, 2006). The results vary due to the different procedures and populations that were used in each study. For example, participants may have

been feeling overwhelmed with completing a one-repetition maximum strength test. Usually strength tests are performed during off-season training and athletes perform three and five repetition max strength tests. Performing a one repetition max is considered to be unsafe because it is the max weight an athlete can lift. Although a one max rep is seen as unsafe, athletes are more likely to meet their "predicted max weight" because they have been training the entire off-season to get stronger. The predicted max is calculated based on their previous three and five repetition max tests. Although the relationship between self-efficacy and performance was not found in this study, it is speculated that there may have been some intimidation based on that number (predicted max) which could of been influencing their ratings which could of influenced the overall relationship. In addition, perhaps the 1 RM formula was not the best predictor which could have also then influenced their perceptions and influence the fact that there was not a significant relationship between self-efficacy and performance. Although this can make logical sense and is only speculation these results suggest that future replications of this study are warranted to validate these claims.

Individual self-efficacy scores revealed that there were correlations on how athletes filled out the self-efficacy scale. It was found that athletes who were more likely to rate high at beating their max by 5 pounds were also more likely to say they could beat it by 25 lbs. However, athletes who said they could only meet their predicted max were less likely to say they could beat their max by 25 pounds. These findings make logical sense because the further along the rating scale an individual rates their confidence, there is a higher likelihood they will be confident in reaching their goal.

As mentioned above in the results section, gender differences was not the primary research question but as the data was analyzed differences became evident. The male athletes

rated higher in self-efficacy perceptions when compared to the female athletes (Lirgg, 1991). These findings may be attributed to males having pressure to perform up to gender role expectations. Male athletes tend to have a persona of being confident in completing physical tasks. The “macho” male image can sometimes give males an increased sense of confidence because physical tasks are thought to be “male” tasks (Lirgg, 1991).

When examining the sources of self-efficacy beliefs that influence perceptions it was hypothesized that self-efficacy perceptions during a maximum strength test would be largely attributed to the source of past performance. This was hypothesized due to the large number of research that says that past performances are the most influential (Bandura, 1997; Chase et al., 2003). When the athletes were asked what influenced their self-efficacy ratings for the maximum strength test, the thirty-six soccer players mentioned multiple sources of self-efficacy. This finding of using multiple sources is consistent with previous research explored by Chase, Feltz and Lirgg (2003) which investigated collegiate basketball players.

Physiological states was the most frequently cited source for all athletes combined. This finding supports previous research that has suggested physiological states to be significant when the task is physical (Chase, Feltz & Lirgg, 2003). Some of the athletes responded with positive emotions on how good physically they felt, which raised confidence for success. On the other hand, some participants mentioned negative emotions of pain and injuries that played a factor in their confidence and ultimately their success. The finding that physiological states to be the most mentioned source is not surprising. This result is likely attributed to the fact that a maximum strength test is physically demanding and people will likely draw upon how they physically feel before, during, and after that task. Furthermore, additional research is needed to fully understand

these claims on how the interpretation of physiological information influences performance outcomes.

Past performances was the second most frequently mentioned source of self-efficacy information for all participants' and most mentioned for males. These results are consistent with past research which states that past performances are the most powerful source of self-efficacy (Bandura, 1997). Reasons for past performances being the second most cited source can be attributed to the frequency of the number of times they squat throughout their training program. Past research has revealed that athletes who do continuous routines will help increase self-efficacy beliefs for that particular task (Slobounov et al., 1997). Male athletes cited past performances the most, which might be due to the fact that they tend to always remember their previous achievements when compared to females (Corbin, Feltz, Landers, Senior, 1983). This makes logical sense because you can ask a male athlete their previous maximum squat weight and they know it off the top of their head. This speculation warrants future research to be conducted to validate these claims.

The third most cited source of self-efficacy was verbal persuasion for all participants involved. This finding is consistent with previous research justifying that the source of verbal persuasion is not as common to be cited as physiological states or past performances (Bandura, 1997). This could perhaps be attributed to the fact that they draw upon and believe their own perceptions instead of someone else trying to convince them otherwise. The last cited source of self-efficacy information was vicarious experiences. Male athletes only mentioned two different statements, while female athletes did not reference to it at all. This finding is not surprising and is congruent throughout the research (Bandura, 1997).

Limitations

Although this thesis adds to the limited amount of research involving self-efficacy and weight room routines, limitations of this study should be stated. Having a larger pool of participants may have revealed that higher self-efficacy leads to better performance, but given the nature that this was a master's thesis with a qualitative section this was a reasonable sample size. In the future, expanding the population to participants other than college athletes, such as high school, professional, or recreational teams could reveal informative data to fill gaps in the field. Furthermore, researching various sport teams other than soccer could be useful as well. In addition to having a larger sample size, different population, and various sports; a possible limitation of the study was the self-efficacy scale. Having participants fill out the open-ended question required them to be detailed in their answers; however some participants were vague and non-descriptive in their responses. Future researchers may benefit from giving participants examples and descriptions to choose from, when asking which source of self-efficacy influenced them the most (past performance, vicarious experiences, verbal persuasion, physiological states). A final limitation may lie within the actual lift itself (back squat). Future researchers should replicate this same study using an Olympic lift instead of the back squat exercise. Perhaps doing a maximum strength test with a different lift may reveal different results. This study assisted in the continuous effort to try and close the gap between self-efficacy and performance during a maximum strength test. The only way to better understand this relationship is for future research to be acquired.

Practical Implications

Although this study did not find a significant relationship, most of the previous research has found that there is a relationship, so it does seem to be an important factor in performance.

With that theoretical position in mind this study provides implications for strength and conditioning coaches, as well as coaches in general. These coaches can begin to help motivate their athletes to achieve maximum performance. If strength coaches can identify which of the four sources of self-efficacy an athlete looks to when forming self-perceptions, they can begin to structure maximum testing procedures around enhancing self-efficacy beliefs.

An additional implication that can be derived from this study relates to the gender differences that were found among athletes. For instance, as mentioned in the results females stated that physiological states most influenced their self-efficacy perceptions before a maximum strength test. On the other hand, males revealed that past performances prompted their perceptions. Coaches need to recognize they may have to make alterations in their coaching styles by using the different sources for each gender. For instance, coaches could remind athletes about the last time they were in the weight room and that they performed well (past performances). Besides reminding athletes of past experiences strength coaches can use the self-efficacy source of verbal persuasion. Coaches need to understand the importance of verbal persuasion, the use of positive feedback, and encouragement for all weight room routines. For example, if a maximum test is being conducted all coaches and athletes should support and cheer on their teammates. Besides teammate support, strength coaches should reassure their athletes that they have confidence in them and that improvement will transpire. Lastly, a practical implication ought to be coaches educating their athletes to understand that physiological/emotional sensations will arise with maximum testing. For example, a week before the max test coaches should attempt to have athletes understand that they will be uncomfortable during the test, but it is important for them learn the difference between good and bad pain. Once they realize the difference, athletes can begin to interpret these physiological feelings in a

positive manner. Additionally, coaches can use the source of vicarious experiences by pairing up athletes with a partner who has similar abilities, so when they watch their partner complete a task it can help increase the other athlete's self-efficacy. In return, the athlete's self-efficacy beliefs may become heightened to translate to better overall performance.

Conclusion

In closing, this thesis is a vital step in attaining more knowledge of self-efficacy perceptions during a maximum strength test. Although the prediction that higher self-efficacy leads to better performance was not supported, gender differences in sources of self-efficacy amongst collegiate soccer players were found. Researchers can build upon these results by replicating these findings amongst other populations and various sports so that other outcomes will arise. While this study provides a promising start, more research needs to be done in the future so we may continue to understand the concepts between self-efficacy and performance during a maximum strength test.

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Appendix A

California State University, Northridge
CONSENT TO ACT AS A HUMAN RESEARCH PARTICIPANT
Self-efficacy in Athletes during a Maximum Strength Test

You are being asked to participate in a research study. Participation in this study is completely voluntary. Please read the information below and ask questions about anything that you do not understand before deciding if you want to participate. A researcher listed below will be available to answer your questions.

RESEARCH TEAM

Researcher:
Chelsea Kelly, Graduate Student
Kinesiology Department
(661) 917-9525
coachchels.kelly@gmail.com

Faculty Advisor:
Dr. Ashley Samson, Assistant Professor
Kinesiology Department
18111 Nordhoff St.
Northridge, CA 91330-8287
677-5815
ashley.samson@csun.edu

PURPOSE OF STUDY
The purpose of this research study is to explore self-efficacy performance relationships and the self-efficacy source that contributes during a strength test.

SUBJECTS
Inclusion Requirements
You are eligible to participate in this study if you:

1) Currently on CSUN's men and women's soccer team
2) Between the ages 18-24
3) Have been training in the weight room for over four months
4) Medically cleared by a certified athletic trainer to do the max test
5) Have completed the informed consent form.

Time Commitment
This study will involve approximately 1-1.5 hours of your time.

PROCEDURES
You will be asked to complete a questionnaire about your confidence in performing a max test before and after your test.

RISKS AND DISCOMFORTS
This study involves no more than minimal risk. There are no known harms or discomforts associated with this study beyond those encountered in normal daily life.

BENEFITS

Subject Benefits

You will not directly benefit from participation in this study

Benefits to Others or Society

This research project can benefit you long-term by providing knowledge of the relationship between self-efficacy and performance outcomes in competitive athletes during a maximum strength test. This information will assist strength and conditioning professionals to structure exercise program interventions around enhancing self-confidence in weight room activities.

ALTERNATIVES TO PARTICIPATION

The only alternative to participation in this study is not to participate.

COMPENSATION, COSTS AND REIMBURSEMENT

Compensation for Participation

You will not be paid for your participation in this research study.

WITHDRAWAL OR TERMINATION FROM THE STUDY AND CONSEQUENCES

You are free to withdraw from this study at any time. **If you decide to withdraw from this study you should notify the research team immediately**. The research team may also end your participation in this study if you do not follow instructions, miss scheduled visits, or if your safety and welfare are at risk.

CONFIDENTIALITY

Subject Identifiable Data

All identifiable information that will be collected about you will be removed and replaced with a code. A list linking the code and your identifiable information will be kept separate from the research data.

Data Storage

Personal records will be stored and kept under the supervision of Graduate student's advisor Dr. Samson. All questionnaires will be kept inside a file cabinet and locked in Dr. Samson's office. The file cabinet will only be assessable to Dr. Samson or graduate student. All research data will be stored on a laptop and computer that is password protected.

Data Access

The researcher and faculty advisor named on the first page of this form will have access to your study records. Any information derived from this research project that personally identifies you will not be voluntarily released or disclosed without your separate consent, except as specifically required by law. Publications and/or presentations that result from this study will not include identifiable information about you.

Data Retention

- The researchers intend to keep the research data for approximately _3_ years and then it will be destroyed.

IF YOU HAVE QUESTIONS

If you have any comments, concerns, or questions regarding the conduct of this research please contact the research team listed on the first page of this form.

If you have concerns or complaints about the research study, research team, or questions about your rights as a research participant, please contact Research and Sponsored Projects, 18111 Nordhoff Street, California State University, Northridge, Northridge, CA 91330-8232, or phone 818-677-2901.

VOLUNTARY PARTICIPATION STATEMENT

You should not sign this form unless you have read it and been given a copy of it to keep. **Participation in this study is voluntary.** You may refuse to answer any question or discontinue your involvement at any time without penalty or loss of benefits to which you might otherwise be entitled. Your decision will not affect your relationship with California State University, Northridge. Your signature below indicates that you have read the information in this consent form and have had a chance to ask any questions that you have about the study.

I agree to participate in the study.

_____ _____

Participant Signature **Date**

_____

Printed Name of Participant

_____ _____

Researcher Signature **Date**

_____

Printed Name of Researcher

Appendix B

Demographic Questionnaire

Age: _____

Weight: _____

Height: _____

Gender: Male Female

Year: Freshmen Sophomore Junior Senior

Number of Years played Soccer: _____

Number of years/months lifted weights: _____

What Ethnicity do you **most** identify yourself as? (Circle one)

- American Indian or Alaska Native
- Hawaiian or Other Pacific Islander
- East Asian or Asian American
- South Asian or Indian American
- Black or African American
- Middle Eastern or Arab American
- Hispanic or Latino
- Caucasian European descent
- Other

Estimated Number of Times Attempted a Maximum Back Squat (1RM, 3RM, 5RM)

(Circle one)

< 5 5-10 11-15 16-20 > 20

Scholarship Status: (circle) Full-Scholarship Partial-Scholarship Walk-on

Primary Position: (circle one) Goalie Defender Mid-fielder Forward

Have you had any injuries that have greatly affected your play in the past? (Circle)

Yes No

If Yes, please describe injury and age of occurrence:

_____

_____

_____

Appendix C

MAXIMUM TESTING SHEET

CSUN WOMENS SOCCER TEAM

Squat 1RM	Predicted 1RM	x5	x5	x3	x3	x1	New 1RM	
Corryn	189	104	122	139	157	174		
Chee	165	91	106	122	137	152		
Cori	141	78	91	104	117	130		
Tabatha	165	91	106	122	137	152		
Briana*	143	79	92	106	119	132		
Hayley	INJ	0	0	0	0	0		Back/Hamstring injury
Taylor	154	85	99	114	128	142		
Kourtney*	141	78	91	104	117	130		
Melissa*	141	78	91	104	117	130		
Chloe	189	104	122	139	157	174		
Kendall	154	85	99	114	128	142		
Lyndsey	154	85	99	114	128	142		
Brittanie	176	97	113	130	146	162		
Nicolette	141	78	91	104	117	130		
Amanda*	154	85	99	114	128	142		
Amilee*	96	53	62	70	79	88		ACL Recovery
Cynthia	206	113	132	151	170	189		
Nicole	INJ	0	0	0	0	0		Torn ACL
Sylvia*	165	91	106	122	137	152		
LeAndra	215	119	139	158	178	198		
Wendy	215	119	139	158	178	198		
Rachel	INJ	0	0	0	0	0		Broken foot
Hannah	INJ	0	0	0	0	0		Quad Injury
Soraya*	96	53	62	70	79	88		ACL Recovery
Tara*	112	62	72	82	93	103		

*No Chains

CSUN MENS SOCCER TEAM

Squat 1RM	Predicted 1RM	x5	x5	x5	x3	x3	x1	New 1RM	
Luis A	210	99	119	139	158	178	198		
Kevin*	206	95	113	132	151	170	189		
Tanner	200	0	0	0	0	0	0		Hamstring Injury
Patrick	261	120	144	168	192	216	240		
Shane	259	110	132	154	176	198	220		
Mynor	261	120	144	168	192	216	240		
Trevor	259	0	0	0	0	0	0		Hip Flexor Injury
Yarden	INJ	0	0	0	0	0	0		Hernia injury
Nick**	221	102	122	142	162	183	203		
Chris	283	130	156	182	208	234	260		
David	215	99	119	139	158	178	198		
Beto	239	110	132	154	176	198	220		
Edwin	271	125	150	175	200	225	250		
Christian	206	95	113	132	151	170	189		
Carlos G	239	110	132	154	176	198	220		
Brian	248	114	137	160	182	205	228		
Sagi	220	101	121	141	161	182	202		Recover Quad
Carlos B	215	99	119	139	158	178	198		
Steven	260	120	144	168	192	216	240		
Greg**	239	110	132	154	176	198	220		
Pol	220	101	121	141	161	182	202		Recover Hamstring

* No Chains
** 1RM Chain

Appendix D

Instructions: Please read each of the statements listed below and circle your response indicating how much you agree with each statement right now

Section 1

At this moment how confident are you that you can . . .

1. Squat your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

2. Squat **5 lbs.** more than your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

3. Squat **10 lbs.** more than your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

4. Squat **15 lbs**. more than your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

5. Squat **20 lbs**. more than your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

6. Squat **25 lbs**. more than your predicted max?

1 2 3 4 5 6 7 8 9 10

Not at all confident Somewhat confident Absolutely confident

❖ Looking at the confidence ratings above, what influenced those ratings the **most**?

_____

_____

Section 2 (wait to fill out after completing max test)

❖ Did you give your best effort during the max test? If no, explain.

_____

_____

❖ Do you feel your max test performance was a success? Why or why not?

_____

Appendix E

Table E.1

Descriptive Statistics	Mean (SD)
Age	19.78 (1.17)
Gender	M = 17; F = 19
Year	F= 13; So= 13; J= 6; S= 4
# of Years Played Soccer	14.19 (2.48)
# of Years Lifted Weights	2.11 (1.55)
SE Scores	8.19 (1.82)
Any Improvement	
5 pounds or more	6.67 (1.96)
10 pounds or more	5.19 (2.16)
15 pounds or more	3.56 (2.14)
20 pounds or more	2.72 (1.99)
25 pounds or more	2.19 (1.97)
	Max = 10 = High SE
	Min = 0 = Low SE

Appendix F

Table F.1

Banduras 4 Self-Efficacy Sources	Males	Females	Totals
Past Performances	**11***	8	19
Vicarious Experiences	2	0	2
Verbal Persuasion	8	5	13
Physiological States	7	**15***	**22***

*Most Cited

Appendix G

Table G1: Male & Female Performance Scores

Subject	Gender	Performance Score
1	M	-3
2	M	6
3	M	14
4	M	-14
5	M	9
6	M	16
7	M	30
8	M	-12
9	M	38
10	M	34
11	M	1
12	M	2
13	M	20
14	M	-17
15	M	-20
16	M	1
17	M	20
18	F	10
19	F	-1
20	F	11
21	F	-1
22	F	15
23	F	20
24	F	21
25	F	-2
26	F	9
27	F	15
28	F	20
29	F	8
30	F	5
31	F	7
32	F	2
33	F	9
34	F	5
35	F	7
36	F	0
Average Male Performance Score		7.35
Average Female Performance Score		8.42

Note:
A positive # = participant went above their predicted max
A negative # = participant went below their predicted max

Appendix H

Table H1: Male and Female Differences in SE Scores

	Any	5	10	15	20	25
Male	8.24 (1.95)	7.18 (2.19)	6.06 (2.16)	4.59 (2.09)	3.71 (2.17)	2.94 (2.22)
Female	8.16 (1.74)	6.21 (1.65)	4.42 (1.90)	2.63 (1.77)	1.84 (1.344)	1.53 (1.47)

Note: Mean Scores and SD

Appendix I

Table I 1: SE Ratings and Performance Correlations

	Any	5	10	15	20	25
Any	X					
5	0.766	X				
10	0.572	0.894	X			
15	0.477	0.808	0.900	X		
20	0.378	0.700	0.815	0.946	X	
25	0.324	0.588	0.709	0.860	0.924	X

Note: Numbers equal Pearson's correlation, R values
A number closer to -1 or +1 = stronger relationship