

2014

Effects of a short term mental skills training program on mental toughness

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EFFECTS OF A SHORT TERM MENTAL SKILLS TRAINING PROGRAM
ON MENTAL TOUGHNESS

An Abstract of a Thesis
Submitted
in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Mitchell Edward Mleziva
University of Northern Iowa
August 2014

ABSTRACT

Context: Mental toughness is considered to be one of the most important psychosocial skills an athlete can attain to be successful in sports competition. Mental toughness has also been acknowledged as one of the most popular terms used in sport psychology and is the least understood. The majority of mental toughness research focuses on how mental toughness should be defined, is developed, and the key aspects of mental toughness. Minimal research has examined whether an athlete's mental toughness can change or improve due to the use of a mental skills training program. Objective: To determine if mental toughness can change over a short period of time with the utilization of a 42 day individualized electronic mental skills training program among a Division 1 collegiate women's swimming team. Design: Single subject Quasi-Experimental design.

Participants: A homogeneous sample of 18 Division 1 collegiate swimmers. Methods: All swimmers were invited to participate in the mental skills training program. Mental toughness was assessed using the MeBTough©. The mental skills training program was administered via the MeBTough© website. Following the 42 day mental skills training program, mental toughness was reassessed. Measures: Mean MeBTough© scores were compared from pre-test to post-test. Results: A paired-samples *t*-test was conducted to compare mean mental toughness scores from pre-test to post-test after implementation of a mental skills training program. There was a significant increase ($t(17) = -5.14, p < .001$) from pre-test mental toughness scores ($M = 407.2, SD = 57.18$) to post-test mental toughness scores ($M = 459.2, SD = 61.18$). A similar paired-samples *t*-test was conducted to compare perceived confidence scores from pre-test to post-test after an

implementation of a mental skills training program. There was a significant increase ($t(17) = -3.432, p < .003$) from pre-test perceived confidence scores ($M = 6.72, SD = 1.601$) to post-test perceived confidence scores ($M = 7.78, SD = 1.39$). Conclusion: In conclusion, the 6 week individualized mental skills training program used in this study appears to be beneficial. Participants seemed to enjoy the intervention, felt it was easy to navigate through the website, and felt the intervention improved mental toughness and confidence. For this study, the mental skills training program increased mental toughness in collegiate swimmers.

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A Thesis
Submitted
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University of Northern Iowa
August 2014

This study by: Mitchell E. Mleziva

Entitled: EFFECTS OF A SHORT TERM MENTAL SKILLS

TRAINING PROGRAM ON MENTAL TOUGHNESS

Has been approved as meeting the thesis requirement for the

Degree of Master of Science in Athletic Training

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DEDICATION

I would like to dedicate this thesis to my parents, Rod and Karen Mleziva. You are amazing parents and have taught me the importance of hard work and determination to succeed. My siblings Matt, Mark, and Mariah, you three have been a great source of energy for me. Thank you for always keeping an interest in my academic career. Lastly, my Grandpa Eddie, you will be missed but never forgotten. Thank you for always being there for me. Your love and motivation carried me throughout my graduate school career. Thank you.

ACKNOWLEDGEMENTS

Thank you to Dr. Mack and Dr. Weiss for serving as my committee chairs. I am forever grateful for the time and effort you made to help me accomplish my thesis. I would also like to especially thank Dr. Weiss and Coach Pat Bloom for sparking my interest in sport psychology, specifically mental toughness for a thesis topic. I would like to thank Dr. Neibert for being a great mentor and friend to me during my career at the University of Northern Iowa. I want to thank Dr. Ragan for your help with setting up the program and your guidance throughout the intervention. I would also like to thank the University of Northern Iowa Graduate Athletic Training Program for giving me a chance to continue my education. I truly appreciate everything you have done for me.

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INTRODUCTION

Mental toughness is considered to be one of the most important psychosocial skills an athlete can attain to be successful in sports competition (Goldberg 1998; Thelwell, Weston, & Greenlees, 2005). Mental toughness has also been acknowledged as one of the most popular terms used in sport psychology, but is the least understood (Jones, Hanton, & Connaughton, 2007). Gould, Hodge, Peterson, and Petlichkoff (1987), surveyed intercollegiate wrestling coaches to examine characteristics that coaches felt were important to athletic success. The coaches in the study (82%) felt that mental toughness was the most important psychological attribute for achieving athletic success, but yet offered no clear definition.

Mental toughness was popularized by James Loehr (Loehr, 1986). He states that being mentally tough is the ability to handle various stresses to become an effective competitor whether it was physical, mental, or emotional (Loehr, 1994). Since then various researchers have attempted to build on Loehr's ideas and create their own definition of mental toughness, but still focus on the same concepts. The most commonly used definition for mental toughness was developed by Jones, Hanton, and Connaughton (2002). Mental toughness is, "having the natural or developed psychological edge that enables you to generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure" (pg. 213). Researchers have also analyzed and deciphered key variables that contribute to the development of mental toughness. (Bull, Shambrook,

James, & Brooks, 2005; Thelwell, Such, Weston, Such, & Greenlees, 2010) Loehr (1994) believed that individuals were born with a set amount of mental toughness but also believed that mental toughness was a skill that could be learned. Bull et al., (2005) believed that mental toughness could be developed. They found that English cricketers' mental toughness was influenced by four main constructs: the environment, tough character, tough attitude, and tough thinking.

Connaughton, Wadey, Hanton, and Jones (2008) also believed that mental toughness was a psychological aspect of sports that needed to be developed and maintained to be successful. Development and maintenance of mental toughness was a long term process and influenced by multiple characteristics and mechanisms. Although defining and examining the development of mental toughness is essential for the advancement of research, minimal attention is given to objective measures of mental toughness and whether mental toughness could be changed or improved (Crust & Azadi, 2010; Gucciardi, Gordan, & Dimmock, 2009; Kaiseler, Polman, & Nicholls, 2009; Mamassis & Doganis, 2004).

Although the majority of mental skills training literature pertains to its relationship to athletic performance, there is a limited amount of literature that has examined if mental skills training programs can change mental toughness (Crust & Azadi, 2010; Gucciardi et al., 2009; Kaiseler et al., 2009; Mamassis & Doganis, 2004). Crust and Azadi (2010) found a positive relationship between using a psychological skills training program and mental toughness. Skills used in their psychological skills training program included self-talk, emotional control, and relaxation. Researchers also noted

that the use of multiple skills in a mental skills training program was more beneficial to the athlete than the use of one skill or no skills. (Crust & Azadi, 2010; Nicholls, Polman, Levy, & Backhouse, 2008).

Gucciardi et al. (2009) performed a quantitative analysis of mental toughness using two different types of mental skill training programs; one was specific to mental toughness training, and the other was a general psychological skills training program. The aim of the study was to determine if one program was more effective than the other. The researchers found that both the mental toughness training and psychological skills training programs had positive increases in mental toughness compared to a control group.

Previous research has also linked confidence as a subcategory of mental toughness (Mamassis & Doganis, 2004). A 25 week mental skills training program was implemented among elite tennis players to examine its relationship with anxiety and self-confidence. At the completion of the mental skills training program the tennis players had increases in self-confidence. Thus, if self-confidence is one part of mental toughness, then a mental skills training program designed to enhance self-confidence would probably enhance mental toughness as well.

There are various delivery methods of a mental skills training program in which most of the prior research utilized pencil and paper based journals (Crust & Azadi, 2010; Gucciardi et al., 2009; Kaiseler et al., 2009; Mamassis & Doganis, 2004). Due to the advancements in technology, electronic-based mental skills training programs have been proposed (Stodel & Farres, 2002). The electronic mental skills training program have

been proposed for two main reasons (a) the internet is convenient and acceptable for most individuals to access various educational tools, and (b) learning opportunities are made more meaningful to the individual because they can personalize the experience.

Therefore the purpose of this study was to determine if mental toughness can be changed over a short period of time with the utilization of a 42 day individualized electronic mental skills training program among a Division 1 collegiate women's swimming team.

METHODS

Research Design

For the purpose of this study, the researchers were interested in individual changes in mental toughness; therefore a single-subject quasi-experimental design was used (Thomas, Nelson & Silverman, 2011). Repeated measures of mental toughness were assessed via pre and post-tests of the MeBTough©. This study also utilized quantitative descriptive statistics upon collection of raw data from the MeBTough©. The independent variable of the study was the use of a 42 day individualized, electronic mental skills training program. The dependent variable of the study was the change in mental toughness scores.

Research Participants

Twenty-six swimmers from a Midwestern Division 1 University collegiate women's team were recruited to participate in this study. Eighteen participants completed the mental skills training program and thus, were included in the study. Eight participants' data were dropped from the study due to lack of compliance or failure to complete documents necessary for the data collection. Participants' ages ranged from 18 to 21 years ($M = 19.77$, $SD = 1.11$). All years in school were equally represented: freshman (22.2%), sophomores (22.2%), juniors (27.8%), and seniors (27.8%). Participants for this study primarily swam the freestyle event ($n = 12$). Other events that were represented included backstroke ($n = 1$), the butterfly ($n = 1$), individual medley ($n = 1$), and breaststroke ($n = 3$). Swimmers also self-identified themselves as sprinters

(33.3%), middle distance (55.6%), and long distance (11.1%). Participants began competitive swimming between the ages of 3-12 years ($M = 6.50$, $SD = 2.12$).

Instruments

Demographic Questionnaire:

A demographic questionnaire was administered. Questions assessed the age of the participants, year in school, years of swimming experience, which events the athlete participates in, hours of training during a week, and past success and awards received. All participant materials can be seen in Appendix C.

Mental, Emotional, and Bodily Toughness Inventory (MeBTough©):

The Mental, Emotional, and Bodily Toughness Inventory (MeBTough©) is a self-report measure of mental toughness based on a 43-item scale (Mack & Ragan, 2008). Toughness is assessed using a one-dimensional scale which includes mental (15 questions), emotional (19 questions), and physical aspects (9 questions). Each item is scored on the premise of a 4-point Likert scale which ranges from 1 (“*almost never*”) to 4 (“*almost always*”). Raw scores are based on summing the participant’s responses which can range from 43 to 172. A sample item from the MeBTough© Inventory includes, “I am emotionally responsive and engaged under pressure”. Participants with higher scores are considered to have higher mental toughness.

The MeBTough©’s 43 items showed good model-data fit with acceptable infit and outfit statistics as described by the Rasch calibration results. The MeBTough© also showed good variability of difficulty within each item which is important to provide greater separation and differences among each responder (Mack & Ragan, 2008). The

internal consistency of the MeBTough© has also been demonstrated ($\alpha = .93-.95$) (Drees & Mack, 2012).

Mental Skills Training Program:

The mental skills training program that was used in this study is an electronic, individualized 42 day program that is based on the participant's responses to the MeBTough©. The premise of the mental skills training program is based on four main themes which include: (a) developing an awareness of the participants' strengths and weaknesses, (b) creating a plan of action through the use of a personal journal, (c) learning how to capitalize on strengths, and (d) attacking weaknesses. Each day participants received an email with a certain task to complete based on their strengths and weaknesses identified through their MeBTough© scores. Some of the tasks that the participants completed were: (a) develop a performance journal which keeps a record of strengths and weakness, (b) create a personal plan of action to complete certain goals to assure participant accountability, and (c) construct positive affirmation statements to repeat throughout the day. Participant's completed daily tasks were recorded and saved via the MeBTough© website.

Follow-up Questionnaire:

A follow-up questionnaire was used to determine how participants' felt about the program. For instance, "Did you enjoy the mental skills training program?" and "Did you feel like this mental skills training program helped you?"

Procedures

The first step in the study's procedure was receiving approval from the Institutional Review Board to conduct this study. Next, the primary researcher contacted the head coach of the women's swimming team via a face-to-face meeting to discuss the nature of the study and to gain cooperation and support to recruit his team. Upon granted cooperation to invite the swimmers to participate in the study, an informational meeting was held to give an overview of how the study was conducted and what was expected of the participants. The swimmers who volunteered received a packet containing multiple items. The first item in the packet was the informed consent form which states the purpose of the study and the participants' rights. At the end of the consent form participants recorded the email address that they view most frequently. The email address they wrote down, was the email address that was entered into the MeBTough© website. The next item of the packet was the demographic questionnaire. After the two documents were completed, participants were notified by email that their information had been entered into the MeBTough© website.

Once participants had been notified that their information was entered into the website, participants were granted access to enter the website where they were instructed to complete the pre-test measure of the MeBTough© inventory. Participant's mental skills training program was individualized based on MeBTough© pre-test scores. Each participant's relative strengths and weaknesses were identified using the subcategories: emotional strength, emotional responsiveness, well-prepared, acting tough, emotional flexibility, optimal state, emotional resiliency, coping, and empowering emotions. The

administration of the program was “in season” and administered 6 weeks prior to the conference meet. After the successful completion of the 42 day mental skills training program, the post-test measure of the MeBTough© was completed on the MeBTough© website. Following the completion of the post-test measure of the MeBTough© inventory, a final meeting was arranged with the participants to administer the follow-up questionnaire.

Data Analysis

Using SPSS, preliminary analyses were conducted: mean scores, frequencies, and descriptives. A paired-samples *t*-test was conducted to compare mean mental toughness scores from pre-test to post-test after implementation of a mental skills training program. A similar paired-samples *t*-test was conducted to compare perceived confidence scores from pre-test to post-test after an implementation of a mental skills training program. All analyses were conducted using a significance level of $p \leq .05$.

RESULTS

This sample of collegiate swimmers scored between 302 and 570 on the MeBTough out of a possible 810. The average pre-test MeBTough score for the swimmers was 407.2 ($SD = 57.18$) while the average post-test MeBTough score was 459.2 ($SD = 61.18$). Thirteen of the eighteen participants (72.2%) indicated on their post-test survey that their mental toughness had increased. Fourteen of the 18 participants (77.8%) also indicated that they enjoyed the mental skills training program. On a scale that ranged from 1 (easy) to 10 (difficult), participants indicated that the mental skills training program was easy to use in terms of navigation with a mean of 3.00 ($SD = 2.33$). Using a scale that ranged from 1 (“*least confident*”) to 10 (“*most confident*”), the overall pre-test confidence score was 6.72 ($SD = 1.60$) and the average post-test confidence score was 7.78 ($SD = 1.39$).

Nearly half of the swimmers ($n = 8$) completed the post-test mental toughness prior to the conference championship meet, however the rest completed this assessment following the competition. Thus, two preliminary analyses were performed to ensure that the groups were similar. A t -test was performed to compare pre-test mental toughness assessment scores of those who completed the assessment prior to the conference swim meet (day 26) and those who completed the post-test following the conference meet (day 37). There was no significant difference in the pre-test scores for those completing the assessment prior to the conference meet and those who completed after ($t(16) = -.305, p = .764$). Similarly, a t -test was performed comparing post-test mental toughness assessment scores. There was also no significant difference between post-test scores (t

(16) = $-.812$, $p = .429$). Thus, it can be assumed that both groups started and finished with similar mental toughness assessment scores.

Therefore, all participants were combined into one group for the remaining analyses. A paired-samples t -test was conducted to compare mean mental toughness scores from pre-test to post-test after implementation of a mental skills training program. There was a significant increase ($t(17) = -5.14$, $p < .001$) from pre-test mental toughness scores ($M = 407.2$, $SD = 57.18$) to post-test mental toughness scores ($M = 459.2$, $SD = 61.18$). A similar paired-samples t -test was conducted to compare perceived confidence scores from pre-test to post-test after an implementation of a mental skills training program. There was a significant increase ($t(17) = -3.432$, $p < .003$) from pre-test perceived confidence scores ($M = 6.72$, $SD = 1.601$) to post-test perceived confidence scores ($M = 7.78$, $SD = 1.39$).

DISCUSSION

The purpose of this study was to determine if mental toughness can change over a short period of time with the utilization of a 42 day individualized, electronic mental skills training program among a Midwestern Division 1 collegiate women's swimming team. It was hypothesized that through successful completion of the 42 day mental skills training program, improvements in mental toughness scores on the MeBTough© inventory would occur from pre-test to post-test. Results indicated that participants' mental toughness increased significantly from pre-test to post-test after completing the mental skills training program.

According to Gucciardi et al. (2009), mental skills training programs provide athletes with strategies and techniques to help facilitate performance and develop a positive psychological state. The mental skills training program used for this study very closely aligned the recommendation in which the participants were given daily tasks to be completed. These tasks were then documented in the participants' journals. This particular training program focused on developing awareness of participants' mental toughness strengths and weaknesses, creating a plan of action through the use of a personal journal, learning how to capitalize on identified strengths, and attacking identified weaknesses.

Findings in the current study are similar to previous research (Crust & Azadi, 2010; Gucciardi et al., 2009; Kaiseler et al., 2009; Mamassis & Doganis, 2004; Nicholls et al., 2008; Sheard & Golby, 2006). Crust and Azadi (2010) found that self-talk, emotional control, and relaxation showed strong and positive relationships with mental

toughness in both practice and competition. Many of the daily tasks in the mental skills training program of the current study involved self-talk and the use of positive affirmation statements. Thinking humorously, in which participants were to think of a funny movie scene or their favorite joke, was also used as a relaxation technique during stressful situations. In addition, Crust and Azadi found a negative relationship between negative thinking during competition and mental toughness, in that the more mentally tough an individual, the less negative talk they engaged in during competition. In this mental skills training program, skills like thought stoppage were used as a cue to interrupt negative thoughts during practice and competition.

Gucciardi et al. (2009) also suggested that increased awareness of strengths and weaknesses coupled with training in methods for monitoring one's thoughts and behaviors enables one to become self-directive in using learned skills and techniques to manage and facilitate performance. The awareness of strengths and weaknesses is an essential component of the mental skills training program used in this study. Various researchers have also made similar conclusions that the use of multiple psychological skills would benefit athletes during practice and competition while increasing overall mental toughness (Crust & Azadi, 2010; Gucciardi et al., 2009; Nicholls et al., 2008). Utilizing various relaxation techniques, thought stoppage, countering techniques, positive affirmation statements, goal setting, and mental rehearsal seemed to increase participants' mental toughness and confidence.

Although the results of this study revealed a significant increase in mental toughness scores from pre-test to post-test, various factors may have also contributed to

this increase other than the mental skills training program. As initially stated by Loehr (1994), mental toughness is not only mental, but also emotional and physical. The physical training of the swim season may have contributed to the increase in mental toughness among the participants. The administration of the mental skills training program began during “two-a-days” of the swim season. The increase in training volume could have played a part in the increase in mental toughness scores. Another factor that could have played a part in the increase of mental toughness is the team’s increased success compared to the previous season. Personal best performance times were also attained throughout the season. During the conference meet five personal bests were achieved, along with one participant breaking the school record in her respected event. Although we cannot fully give credit to the mental skills training program for the increase in mental toughness among the participants, a survey was administered to ask the participants if they felt the mental skills training program helped to increase their mental toughness. A total of 72.2% of the participants attributed the increase in mental toughness scores to the mental skills training program. Future studies should examine the effectiveness of a mental skills training program while controlling for the time of season and success during the competitive season.

The results of this study provide beneficial information for multiple individuals including coaches, athletes, athletic trainers, and rehabilitation patients. Results indicate that a mental skills training program can be administered to athletes to increase mental toughness in the sport of swimming. Previous studies have been conducted in a similar fashion among a Division I tennis team, and Division III field hockey and soccer teams

(Visram, 2012). Similar increases in mental toughness were found among those three sports after the administration of the 6 week mental skills training program.

This mental skills training program may also be helpful for athletes or patients who need physical therapy. First, a mental skills training program could be beneficial for athletes who struggle to cope with their injury or lose confidence. Levy, Polman, Clough, Marchant, and Earle, (2006) suggested that mentally tough individuals who perceive injury as less stressful were less likely to be injured again. Thus, this program could have a role in injury prevention, which would be critical for athletic trainers to utilize in the athletic training room. Levy et al. (2006) also found that individuals who were more mentally tough were better able to cope with pain during the rehabilitation process. This could benefit post-surgical patients who need to increase range of motion. Compliance and adherence is also an issue that many athletic trainers deal with on a daily basis. Individuals who are more mentally tough attend more rehabilitation sessions compared to those of lesser mental toughness (Levy et al., 2006). Perhaps a similar program could be initiated early in an injured patients' rehabilitation. This study found that a mental skills training program increased mental toughness among the participants, similar to that of previous studies (Crust & Azadi, 2010; Gucciardi et al., 2009; Kaiseler et al., 2009; Mamassis & Doganis, 2004; Nicholls et al., 2008; Sheard & Golby, 2006). Therefore, one can argue that a mental skills training program could provide benefits for rehabilitation patients.

Limitations

Similar to all studies, this study may have some limitations. First, compliance to the mental skills training program was an issue. Some participants failed to complete the daily tasks and assessments on time. Lack of compliance could be attributed to multiple reasons. The participants seemed to be compliant with working on strengths, but once the program switched to working on weaknesses, the participants' effort and compliance began to taper off, and some participants stopped adding journal entries. Another reason for loss of compliance could be the time in which the program was administered. Athletes were more compliant in the beginning of the study compared to the later portions. The mental skills training program was administered over winter break in which the participants were not in school and only had swimming during the day. As the mental skills program progressed, the second semester of school also began, in which academic course work may have contributed to the decrease in adherence to the program which coincided with the beginning of the weakness tasks. A simpler reason could be that the participants did not enjoy working on their weaknesses, and therefore stopped completing the daily tasks. A sub-limitation of compliance was related to effort. Effort was hard to address throughout the study. Participants may have completed daily tasks, but it is difficult to measure if participants' put forth high effort and attention for each task.

Another limitation was the number and type of participants. Only swimming and diving athletes from one university were recruited. A loss of participants was also seen throughout the study. All 33 members of the swimming and diving team were recruited.

Unfortunately, the five divers were not present at the recruitment meeting, therefore an invitation to participate was sent via email in which no one showed interest. Two swimmers who were not present at the meeting also declined to participate via email. Of the twenty-six participants who started the mental skills training program, eight did not complete the mental toughness post-test assessment so were excluded from the study, leaving only 18 participants. Also, with only utilizing one team for this study, it would have been very difficult to have a control group. Therefore, not having a control group prevented the researcher from seeing improvements comparing the mental skills training program to no program/time (e.g., competitive season, changes in mental toughness).

Recommendations and Future Research

Given the findings of this study, future research should focus on various recommendations. First, a way to increase compliance and effort of the participants during administration of the mental skills training program should be developed. One way to accomplish that would be to have coaches set aside five to ten minutes before practice for athletes to do the daily task. The team could then hold each other accountable for completing the task. The program could also alternate working on strengths and weaknesses, instead of working on strengths then weaknesses, which may increase compliance throughout the whole program. Administration of the mental skills training program during the off-season may also increase compliance throughout the program. Future studies should include more participants from several sports teams. More participants may help offset those who drop out or are excluded. Also, utilizing multiple sports will increase participant numbers and allow researchers to make

comparisons among different sports. More intervention-based studies with a control group should be conducted. Thus, the significance of the increases in mental toughness will be easier to attribute to the mental skills training program rather than other variables, such as training, timing of the competitive season, or maturation.

Conclusion

In conclusion, the 6 week individualized mental skills training program used in this study appears to be beneficial for increasing mental toughness. Those who were willing to participate in the intervention seemed to enjoy the intervention, felt it was easy to navigate through the website, and believed the intervention improved their mental toughness and confidence. Future research should further examine intervention-based studies regarding an increase of mental toughness among athletes. Compliance and effort are two issues that researchers will continue to contend with. However, it does appear that the mental skills training programs can enhance mental toughness.

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APPENDIX A
EXTENDED RATIONALE AND PURPOSE

In today's society, organized competitive sports are as popular as they have ever been due to increased youth participation. Athletes participate in competitive sports for a magnitude of reasons: to follow in their parent's footsteps, for love of the game, and/or possession of natural talent. There are a plethora of the reasons why athletes play competitive sports, but a common reason that is frequently agreed upon is success.

Mental toughness is a psychological aspect of sports that is accredited as one of the most significant attributes in achieving athletic success (Thelwell, Such, Weston, Such, & Greenlees, 2010). According to Jones, Hanton, and Connaughton (2002) mental toughness is not only one of the most used terms in sport psychology, but also the least understood. Although many mental toughness definitions used throughout research have the same premise, there is not one single universally accepted definition (Jones et al., 2002; 2007; Loehr 1994). Mental toughness is often characterized as having the natural or developed psychological edge that allows an athlete to be able to cope with athletic demands, and to consistently be better with determination, focus, confidence, and control than their opponents (Jones et al., 2002; 2007).

The main focus of mental toughness research has been on defining and identifying the key aspects that make up mental toughness. Connaughton, Wadey, Hanton, and Jones (2008) found that mental toughness development is a long term process built using specific mechanisms for maintenance: (a) desire and motivation to succeed, (b) support network from sport and non-sport personnel, and (c) effective use of basic and advanced psychological skills. Recommendations have been made that future research needs to explore ways to integrate mental skills training into overall training regimens, rather than

mental toughness training to be a standalone concept (Bull, Shambrook, James, & Brooks, 2005; Connaughton et al., 2008). Jones et al. (2007) also suggests that future research needs to find ways to counter weaknesses and enhance the strengths of an athlete's mindset. It is essential to determine if mental toughness training programs will be beneficial to the maintenance or improvement of mental toughness to potentially enhance athletic success of all athletes.

Statement of the Problem

The purpose of this study was to determine if mental toughness can change over a short period of time with the utilization of a 42 day individualized electronic mental skills training program among a Division 1 collegiate women's swimming team.

Research Question

Can positive mental toughness changes be achieved with the use of a mental skills training intervention?

Hypothesis

The hypothesis of the current study was that through successful completion of the 42 day mental skills training program, improvements in mental toughness scores on the MeBTough© inventory will occur.

Significance of the Study

This present study is significant for several reasons. First, the majority of the mental toughness literature is focused on the defining and development of mental toughness and little attention is given to the changing or the improvement of mental toughness (Bull et al., 2005; Connaughton et al., 2008; Crust & Keegan, 2010; Jones et

al., 2002; Thelwell et al., 2010). Another reason of significance of this study is that most of the mental skills training programs are geared towards performance improvements among athletes, where little attention is given towards gaining insight of athlete's mindset and mental toughness (Blakeslee & Goff, 2007; Crust & Azadi, 2010; Gucciardi, Gordon, & Dimmock, 2009; Thelwell & Greenlees, 2001, 2003). Also, research literature has not explored electronic based mental skills training programs yet, even though advancements in technology have shown great progress throughout the past decades (Stodel & Farres, 2002).

Delimitations

The delimitations of this study are:

Participants, ranging from 18-21 years of age, participating in collegiate swimming at a Midwestern Division 1 university.

Limitations

The limitations of this study are:

1. Full compliance of the mental skills training program may not be achieved.
2. Honest answers of questions asked in the MeBTough© inventory to get true measure of mental toughness.

Assumptions

The assumptions of this study are:

1. Athlete's levels of mental toughness can be changed over the course of six weeks.
2. The mental skills training program is sufficient enough to elicit changes in mental toughness.

3. The MeBTough© is a valid and reliable measure of mental toughness.
4. Participants have access to a computer and are familiar with the MeBTough© website.
5. Full completion of the mental skills training program's daily tasks will be attained.
6. Athletes want to improve their mental toughness.
7. Mental toughness can lead to improvement in athletic performance.

Definition of Terms

- Mental Toughness: “Mental toughness is having the natural or developed psychological edge that enables you to: generally, cope better than your opponents with the many demands (competition, training, and lifestyle) that sport places on a performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure” (Jones et al., 2002, p. 213).
- Mental Skills Training Program: “Programs endeavor to educate and equip athletes with techniques and strategies that can be used to assess, monitor, and adjust their thoughts and feeling to produce psychological states that both facilitate performance and foster positive personality characteristics” (Gucciardi, et al., 2009, p. 309).
- Mental, Emotional, and Bodily Toughness Inventory (MeBTough©): A 43-item self-report measure of toughness. Subscales assess the physical, mental, and emotional dimensions of toughness based on the work of James Loehr. Responses

are based on a 4-point Likert Scale and can be anywhere from 43-172, with the higher scores indicating higher toughness (Mack & Ragan, 2008).

APPENDIX B
EXTENDED LITERATURE REVIEW

Introduction

The purpose of this study was to determine if mental toughness can change over a short period of time with the utilization of a 42 day individualized electronic mental skills training program among a Division 1 collegiate women's swimming team. It was hypothesized that mental toughness scores will improve after the completion of a 42 day mental skills training program. Therefore, the following literature review will examine how mental toughness has been defined, and is thought to be developed and maintained. Finally, research examining mental skills training programs and how they influence athlete's performance and mindset will be reviewed.

Defining Mental Toughness

In the past, sports have primarily focused on skill development, making friends, and having fun. However, as organized competitive youth sport continues to rise, more emphasis is being placed on developing skills and being successful rather than the other attributes. It is now a multi-billion dollar business where becoming successful is a top priority (Golby & Sheard, 2004). One of the key attributes often accredited for achieving athletic success is mental toughness (Thelwell et al., 2010).

While mental toughness is considered to be one of the most important psychological skills an athlete can attain to be successful during competition (Goldberg, 1998; Thelwell, Weston, & Greenlees, 2005), there is still little consensus on what mental toughness actually means (Crust & Keegan, 2010; Thelwell et al., 2010). Jones et al., (2007) has even stated that mental toughness is one of the most popular terms in sport psychology and is also the least understood. This often creates confusion because

researchers state how important mental toughness is without clearly defining what it is (Jones et al., 2002). For instance, Gould, Hodge, Peterson, and Petlichkoff (1987) administered surveys to intercollegiate wrestling coaches in an attempt to examine the characteristics thought to be most important to athletic success. The vast majority of the wrestling coaches (82%) stated that mental toughness was the most important psychological attribute for achieving athletic success, but no clear definition of mental toughness was provided in the study.

Although the concept has been around for a while, mental toughness has only recently gained much attention in the sport psychology field (Crust & Azadi, 2010). Various researchers will often give different definitions although the same premise will be used. The term *mental toughness* was popularized by James Loehr in 1986 (Loehr, 1986). According to Loehr (1994), being mentally tough is the increased ability to handle all kinds of stress whether it be physical, mental, or emotional to become a more effective competitor. To be an effective competitor, the athlete also needs to be in an ideal performance state. In order for an athlete to be in that ideal performance state, various skills need to be attained. For instance, confident, relaxed and calm, energized with positive emotions, challenged, focused, alert, automatic and instinctive, and ready for fun and enjoyment are all ideal emotional states (Loehr, 1994).

Loehr (1994) thought that toughness was achieved through a 3-dimensional concept of a physical dimension, a mental dimension, and an emotional dimension. The 3-dimension concept could be further broken down into nine additional constructs. The physical dimension included (a) being well prepared, and (b) acting tough. The mental

dimension included (a) achieving optimal performance state, (b) empowering emotions, and (c) coping. Finally the emotional dimension includes four main indicators, which are (a) flexibility, (b) responsiveness, (c) strength, and (d) resiliency.

In 2002, Jones et al. advanced Loehr's concept and created their own mental toughness definition based on twelve distinct attributes from questionnaires completed by ten international elite performers. Their study involved three stages: (a) focus groups, (b) individual interviews, and (c) individual rankings of mental toughness attributes and rating the definitions. Based on their findings, mental toughness was defined as, "having the natural or developed psychological edge that enables you to generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure" (Jones et al., 2002, pg. 213). This definition suggests that athletes can be both born with a natural form of mental toughness or mental toughness can be developed where outside factors may be major contributors. The twelve most commonly agreed upon attributes fell into the constructs of self-belief, desire/motivation, dealing with pressure and anxiety, focus, and pain/hardship factors (Jones et al., 2002).

In 2007, Jones et al. performed a follow-up study to their previous 2002 research to further investigate the lack of clarity of what mental toughness is and what attributes make up mental toughness. Eight Olympic athletes were interviewed for this study because the researchers wanted to understand mental toughness from athletes who have achieved the ultimate success in sports. Similar qualitative measures were used again

including (a) focus groups, (b) individual interviews, and (c) rating mental toughness definition, confirm proposed framework, and the ranked mental toughness attributes. Jones et al. (2007) found that mental toughness could be broken down into four main components of attitude/mindset, training, competition, and post competition. The first component of attitude and mindset incorporates the athlete's belief in oneself and complete focus. The second component of training involves using long term goals as the source of motivation, controlling the environment, and pushing oneself to the limit. The third component of competition is the most in-depth of the four. This component involves belief in oneself, staying focused, regulating performance, handling pressure, having awareness and control of thoughts and feelings, and controlling the environment. Lastly, the fourth component of post-competition deals with handling imposed failure, and how to handle success.

The framework of the Jones et al., (2007) study offers a clearer framework of skills that coaches and athletes may utilize in order to become as successful as possible. For example, key attributes that make up mental toughness were identified. However, there are still gaps in the research. For instance, the Jones et al. (2002) study of international athletes found only 12 attributes that were important for an athlete to be mentally tough, whereas in the 2007 study, 30 attributes were discovered among Olympic athletes. This research may imply that as athletes progress to the next competitive level of their careers, more skills and attributes need to be learned in order to continue their success. Thus, perhaps level of competition needs to be taken into account as a factor.

Finally, Crust and Keegan (2010) found that mental toughness among various competitive level athletes was a multidimensional term based around the important attributes of effectively coping with adversity and pressure, being able to recover from set-backs and failures, refusing to quit when pressure rises, having a belief in one self that their destiny lies in their control, and lastly, thriving on pressure and possessing high mental skills. Interestingly, these 12 to 30 attributes are very similar to Loehr's nine constructs of overall toughness (Jones et al., 2002, 2007; Loehr, 1994). Thus, while much progress has been made, there is no gold standard definition of mental toughness, which leads researchers and sport psychologists to use various definitions based on similar premises and variables (Crust & Keegan, 2010; Jones et al., 2002, 2007; Loehr, 1994).

Mental Toughness Development and Maintenance

In addition to defining mental toughness, researchers have analyzed and deciphered key variables that contribute to the development of mental toughness. As stated previously, sport psychologist James Loehr was the first to popularize the term mental toughness. His work and research throughout his career was dedicated to working with a multitude of athletes in the development of mental toughness (Loehr, 1994). He stated that in order to be able to fully understand the concept of mental toughness, a person must first understand the meaning of talent and skill (Loehr, 1994). He believed that talent is a genetic factor that everyone is born with, some have more than others but all are born with a set amount. As talent is thought of as genetic potential, skills are learned through hard work and practice. Loehr uses a computer's hardware/software as

an analogy to further emphasize his thought process. Software (skills) are all the programs that a computer can use, whereas hardware (talent) are the mechanical tools to process those programs. A computer can have the greatest software programs, but it needs to have a comparable hardware system to be able to process those programs. In order to efficiently process the software, the hardware needs to be properly maintained and the connection between hardware and software needs to be strong.

In terms of the human body, skills can be learned and developed to the highest potential if our bodies are properly taken care of. The mental toughness aspect of this analogy, lies as the link that encompasses all the factors between the hardware and software (Loehr, 1994). If mental toughness is a skill that can be learned, we should be able to improve collegiate athletes' mental toughness through a mental skills training intervention program.

Bull et al. (2005) interviewed English cricketers to examine how mental toughness was developed during their competitive career. Each participant was interviewed via telephone and was asked various questions pertaining to mental toughness. For instance, their personal view of mental toughness and winning, how they developed a mentally tough mindset, and characteristics of winning and losing. Results found that mental toughness was developed among the English cricketers through four main constructs of an environmental influence, tough character, tough attitude, and tough thinking (Bull et al., 2005).

Environmental influence was shown to be the most important outcome of the study. The athletes credited the development of their mental toughness was a result of

parental influence and childhood background, exposure to foreign cricket (i.e., feeling like an outsider among other athletes), opportunities to survive early setbacks, and needing to “earn” success. Tough character focused on the athlete and internal components. Key components included independence, self-reflection, competitiveness with self as well as others, and resilient confidence. Tough attitude was a building block category for tough character to build on, and the combination of tough character and attitude work together to develop the winning mindset. Tough attitude’s key components include: exploit learning opportunities, belief in quality preparation, self-set challenging targets, never-say-die mindset, belief in making the difference, thrive on competition, and willing to take risks. The last construct, tough thinking, was defined as staying fully focused throughout the whole competition, remaining in control of thoughts and actions, and not letting adversity alter an athlete’s performance. Key variables for tough thinking included self-confidence, overcoming self-doubt, feeding off physical condition, maintain self-focus, and thinking clearly (Bull et al., 2005).

In a similar study done by Connaughton et al., (2008) who re-interviewed participants from the Jones et al. study done in 2002, mental toughness was examined to determine how it was acquired and if mental toughness needed to be maintained. Connaughton et al., (2008) re-interviewed seven of the ten original international elite performers on the stages of mental toughness development. Their research found that during their early years, participants developed a foundation for mental toughness from self-belief in accomplishing goals, possessing qualities that athletes are better than their opponents, and having motivation to succeed. The common mechanism of development

during the early years was found to be the coach's leadership. During the middle years of development, participants began to have setbacks, but were taught the skill of being resilient and being able to cope with those setbacks. The common mechanism of development of mental toughness during the middle years was having an effective social support system. During the later years, participants developed additional skills, and mastered all skills that were previously developed in the early and middle years. The common mechanism of development during the later years was competitive experiences. In regards to the maintenance of mental toughness, researchers found that mental toughness should be maintained in order to continue to compete at a high level. Common mechanisms that were essential for maintenance was to have an insatiable desire and internal motivation to succeed, have an effective social support, and use a combination of basic and advanced mental skills. Connaughton et al. (2008) emphasized that development and maintenance of mental toughness is a long process and requires multiple mechanisms to work together to be most effective.

Thelwell et al. (2010) also interviewed ten female international level gymnasts to gain insight on their views of how mental toughness is developed. They found that the development of mental toughness is based on four main dimensions; sport process (compiling of training goals, competition, and club sports), sporting personnel (compiling of coaches, teammates, competitors, and sport psychologists), non-sporting personnel (compiling of parents, siblings, and significant others), and finally environmental influences (training environment, family, country).

Previous research has spent much of its focus on the development of mental toughness through qualitative analysis. This research has been retroactive in the sense that the focus is centered on successful athletes and what they think mental toughness is, as well as how it is developed (Bull et al., 2005; Connaughton et al., 2008; Loehr, 1994; Thelwell et al., 2010). Although this was an essential first step for the mental toughness literature, minimal research has focused on objective measures of mental toughness and if mental toughness can be changed or improved. That is the basis of our research, the assessment and development of mental toughness among collegiate swimmers, through a mental skills training intervention program.

Mental Toughness and Athletic Training

Along with the increase in organized sport participation, an increase in sports related injuries will occur. For those individuals who sought out medical attention, typically are referred to physical therapy and rehabilitation. The rehabilitation process is essential for athletes to go through in order to return to play safely (Belza, Topolski, Kinne, Patrick, & Ramsey, 2002). Mental toughness is a personal factor of sports injury rehabilitation that has received little attention in research. This is true for a few reasons, (a) there may be a lack of clarity of its concepts and (b) there is a lack of general consensus of its definition as described earlier (Levy, Polman, Clough, Marchant, & Earle, 2006). Clough, Earle, and Sewell (2002) also believed mental toughness as a personal factor in which they proposed a 4C approach to mental toughness which includes, control, commitment, challenge, and confidence. Control is the tendency to feel and act as if one is influential. Commitment is a tendency to involve oneself in rather

than experience alienation and encounter. Challenge is the belief that life is changeable and view setbacks as an opportunity rather than a threat. Lastly, confidence is a high sense of self-belief and unshakable faith concerning one's ability to achieve success. Therefore purpose of the Levy et al., (2006) study was to examine whether mental toughness is interrelated with sports injury beliefs, pain, and rehabilitation adherence.

Participants included 70 competitive and recreational athletes from four physiotherapy clinics. Participants suffered from various tendonitis related injuries and were about to begin rehabilitation which ranged from 8 to 10 weeks. In the beginning of the rehabilitation process, participants completed the Sport Injury Rehabilitation Belief Survey (SIRBS), the mental toughness 18 item questionnaire (MT18), and the Sport Inventory for Pain 15 item (SIP-15). SIRBS is a 19 question assessment of injury severity, susceptibility, treatment efficacy, and self-efficacy. The MT18 is an 18 question assessment of mental toughness based on a 5-point Likert scale. The SIP-15 is an assessment of athletes psychological responses to pain based on direct coping, catastrophizing, and somatic awareness. For the measurement of rehabilitation adherence, attendance was recorded by clinicians, self-reports of home therapy were recorded and lastly the Sport Injury Rehabilitation Attendance Survey (SIRAS) was completed. The SIRAS is a clinician's assessment of patient's behavior during rehabilitation sessions on a 5-point Likert scale of intensity of completed exercises, frequency of patient's ability to follow instructions, and receptiveness to adjustment of the program.

There are multiple findings from this study that are beneficial to athletic trainers. Mentally tough individuals perceived their injury as less stressful and they were less likely to be injured again. Second, mentally tough individuals were better able to cope with pain during the rehabilitation process. Third, mentally tough individuals showed greater attendance to their rehabilitation appointments. Finally, mentally tough individuals used more direct coping strategies to deal with their pain. Therefore, based on the findings for this study, increasing mental toughness among rehabilitation patients may be beneficial in for increasing rehabilitation attendance among patients who struggle to deal with their pain. This previous study aids in the support of our current study, because if the mental skills training program improves mental toughness among our participants, then assumptions that rehabilitation patients would benefit from our mental skills training program can be made (Levy et al., 2006).

Mental Training Programs Focusing on Single Skills

Although minimal mental toughness training research has been performed, research on the development of mental skills has occurred. Mental skills training programs have been a main focus of sport psychology for the past decade, with most of the research focusing on whether one skill or the use of a package approach was effective to improve athletic performance and success (Blakeslee & Goff, 2007; Johnson, Hrycaiko, Johnson, & Halas, 2004; Peluso, Ross, Gfeller, & LaVoie, 2005; Seif-Barghi, Kordi, Memari, Mansournia, & Jalali-Ghomi, 2012; Thelwell & Greenlees, 2001, 2003). Some of the more commonly examined mental skills are self-talk and imagery.

Self-talk is a mental skill that an athlete uses to gain cognitive control and is beneficial for skill acquisition, changing bad habits, attentional focus, creating or changing mood, controlling effort, and/or building self-efficacy/confidence (Johnson et al., 2004). Johnson et al. (2004) found that the implementation of a self-talk training program among female youth soccer players showed an improvement in shooting performance as well as an increase in self-confidence and attentional focus. Based on their results, it was concluded that theoretically, athletes that are able to focus more efficiently and have higher self-confidence should also show an improvement in mental toughness.

Imagery is defined as using mental practice, visualization, and mental rehearsal without physical motion (Peluso et al., 2005). Mental imagery is beneficial for learning new skills or strategies, practicing familiar skills, problem solving, improving concentration, controlling emotion, practicing strategy, and coping with pain. Seif-Barghi et al. (2012) found that an imagery intervention implemented with elite soccer players improved ball passing skills compared to a control group. Peluso et al. (2005) conducted a similar performance experiment to compare imagery and self-talk skills with golf putting skills. They compared different combinations of verbalized self-talk or imagery (external, delayed external, internal, and delayed internal), and of the eight skills that were observed, seven showed improvement in performance. Internal imagery and self-talk exhibited the most difference in pre-test and post-test scores throughout the study. These findings suggest that self-talk is best implemented with athletes

participating in individual activities, and that mental skills training programs need to be somewhat individualized to show the most improvements (Peluso et al., 2005).

Mental Skills Training Packages

Instead of using one or two skills to implement with interventions, researchers have also implemented packages that include as many as four mental training skills (Blakeslee & Goff, 2007; Thelwell & Greenlees, 2001, 2003). These mental training skills intervention most commonly incorporate four main skills which includes: self-talk, imagery, goal-setting, and relaxation (Blakeslee & Goff, 2007; Peluso et al., 2005; Thelwell & Greenlees, 2001, 2003). Each pair of researchers implemented similar mental skills training programs among various athletes (e.g. equestrians, recreational athletes, gymnasium triathletes). Blakeslee and Goff (2007) did not observe any performance improvements among the equestrians following the implementation of a relaxation, mental imagery, self-talk, and goal setting mental skills training package program. The researchers thought that the mental skills training program may not have been effective among the equestrians due to the lack of skill proficiency, although this does not rule out the benefits of mental skills training.

Conversely, Thelwell and Greenlees (2001, 2003) observed improvements among both the gymnasium triathletes and recreational athletes. In their 2001 study, results indicated that the triathletes improved their race times after completing a mental skills training package. Thelwell and Greenlees (2003) also found that mental skills training improved performance times among four recreational athletes. Another finding was the imagery portion of the program was noted as being beneficial in helping the athletes cope

with pain. Research has shown that mentally tough athletes are better able to cope with stress, therefore if mentally tough athletes implement imagery skills into their daily training, improvements may be noticed (Nicholls, Polman, Levy, & Backhouse, 2008; Thelwell & Greenlees, 2003). The previous studies have shown that mental skills training programs are beneficial to athletes in terms of performance, but it can also be hypothesized that there are some benefits that the programs are providing to the athlete's mindset (Blakeslee & Goff, 2007, Thelwell & Greenlees, 2001, 2003). Therefore more research is warranted.

Mental Skills Training Programs and Mental Toughness

Because the majority of the mental skills training literature has focused on how it relates to performance, there is a limited amount of literature that has examined whether mental skills training programs can change mental toughness levels (Blakeslee & Goff, 2007; Crust & Azadi, 2010; Gucciardi et al., 2009; Peluso et al., 2005; Thelwell & Greenlees, 2001, 2003). Crust and Azadi (2010) examined the relationship between using a psychological skills training program and mental toughness both in the practice setting and competitions. Results indicated that self-talk, emotional control, and relaxation showed strong and positive correlations with mental toughness among both practice and competitions. Practice and competition also showed individual relationships with the psychological skills training. In regards to the practice setting, automaticity was shown to have the strongest relationships. Automaticity is being able to perform a task without actively thinking about it, for instance dribbling a basketball. This is a reasonable finding due to the fact that during practice, athletes are constantly working on

skills and technique in order to be fundamentally sound. In regards to competition, activation and goal setting showed the strongest relationship with mental toughness. This seems logical because during competition, the team goal to win the game as well as individuals want to have personal best performances. Interestingly the researchers found a significant negative correlation among negative thinking during competition in that the more mentally tough an individual is the less negative talk they used during competition. The researchers concluded that mental toughness was significantly associated with the use of multiple psychological skills in the practice setting and in competition (Crust & Azadi, 2010).

Gucciardi et al. (2009) performed a quantitative analysis of youth-aged Australian footballers to evaluate mental toughness and see if it could be enhanced due to the implementation of two different psychological skills training packages. Participants were assigned to one of three groups, a control group, a traditional psychological skills training group (PST), or a mental toughness training group (MTT; Gucciardi et al., 2009). The PST group participated in a once a week, two hour session for six weeks that focused on self-regulation, arousal regulation, mental rehearsal, attentional control, self-efficacy, and ideal performance state. The MTT group participated in a similar once a week, two hour session for six weeks focused on personal team values, work ethic, tough attitude, self-motivation, self-belief, concentration and focus, resilience, emotional control, intelligence, sport intelligence, and physical toughness. The researchers found that the MTT and PST groups both showed positive changes in mental toughness, resiliency, and flow as compared to the control group overall, although there were no significant

differences comparing the two groups. In regards to resiliency, the MTT group showed more positive changes than the PST group and the control group, and in regards to flow, the MTT and PST group showed more positive changes than the control group. Although this study did not show many significant changes in mental toughness through the use of mental skills training programs, it did present some promising evidence. The fact that the overall mental toughness changed among the intervention groups suggests that the use of psychological skills may be beneficial to athletes; but, more research is needed to find which ones are most beneficial (Gucciardi et al., 2009).

In a similar study, Mamassis and Doganis (2004) implemented a 25 week long mental training program aimed to influence elite tennis player's anxiety and self-confidence. The researchers found that of the tennis players that adhered to the mental skills training program, five exhibited improvements in perceived performance and self-confidence. Although this article does not examine mental toughness directly, practical implications can be drawn. The improvements in self-confidence were attributed to the mental skills training program. Since self-confidence has been identified as an important construct of the mental toughness make up, a theoretical improvement in mental toughness might also be anticipated (Gucciardi et al., 2009; Kaiseler, Polman, & Nicholls, 2009; Mamassis & Doganis, 2004).

Finally, Nicholls et al. (2008) found that mentally tough athletes are more often optimistic when coping with difficulties. The athletes in the study who were considered to exhibit higher levels of mental toughness were linked to the use of approach coping strategies rather than avoidance coping strategies. The approach coping strategies

included mental imagery, effort expenditure, thought control, and logical analysis. Thus, it was concluded that the use of multiple psychological skills was more beneficial than the use of a single psychological skill or none at all (Nicholls et al., 2008). This provides additional support for the implementation of mental skills training programs that include multiple skills.

Electronic Based Mental Skills Training Programs

The majority of mental skills training programs (MST) have been in the form of hard copied documents or in a class room setting (Blakeslee & Goff, 2007; Crust & Azadi, 2010; Gucciardi et al., 2009; Johnson et al., 2004; Peluso et al., 2005; Seif-Barghi, et al., 2012; Thelwell & Greenlees, 2001, 2003). Results of most studies have shown these types of MST programs to be effective for the improvement of performance or an athlete's mindset (Johnson et al., 2004; Peluso et al., 2005; Seif-Barghi et al., 2012; Thelwell & Greenlees, 2001, 2003). With the rising age of technology, many new devices have been invented and are readily available for use. For instance, mp3 players, handheld tablets, and advanced computers are currently being used by athletes. Even online classes have been become increasingly popular. The popularity of the World Wide Web has led to the curiosity of implementing electronic mental skills training programs (Stodel & Farres, 2002). The two main reasons that electronic mental skills training programs have become the topic of conversation is that (a) the internet is convenient and acceptable for most individuals to access various educational tools, and (b) learning opportunities are made more meaningful to the individual because they can personalize the experience. Additionally, athletes can become more familiar with what a

mental skills training program is and how they can benefit from it due to the web as a great medium. Stodel and Farres (2002) concluded that athletes are more likely to have a beneficial mental skills training experience if they are participating in the program online. This study provides support for the effectiveness of online MST programs as hypothesized in the present study.

Measuring Mental Toughness

Along with the difficulties of defining mental toughness, the study of mental toughness has also been hindered by the lack of effective methods for assessment. One of the first attempts to measure mental toughness was the Psychological Performance Inventory (PPI) created by Loehr in 1986. The PPI was designed to assess what Loehr originally thought were the most important qualities of mental toughness: self-confidence, attentional control, negative energy, motivation, attitude control, positive energy, and visual and imagery control (Gucciardi, 2012). Unfortunately, since its development researchers have failed to provide much validity or reliability support for the PPI. Golby, Sheard, and Lavellee (2003) utilized the PPI among elite rugby players and found no significant differences in any of the factors that assessed mental toughness. Thus, they concluded that the psychometric properties of the PPI were not strong. In a study of 263 elite high school athletes, the psychometric properties of the PPI were again tested and questioned (Middleton et al., 2004). Results indicated that the psychometric properties were not a good model fit. Therefore, they concluded that there was currently no valid or reliable measure of mental toughness.

In 2008, Mack and Ragan created the Mental, Emotional, and Bodily Toughness Inventory (MeBTough©). The MeBTough© is a self-report measure of mental toughness based on the work of James Loehr who developed a three dimensional model of mental toughness which includes a physical dimension (effective preparation, acting tough), a mental dimension (optimal performance state, empowering emotions, and ability to cope), and an emotional dimension (flexible, responsive, strong, and resilient) (Mack & Ragan, 2008). Overall toughness is assessed through a 43 item scale in which each item is scored on a 4-point Likert scale which ranges from 1 (“*almost never*”) to 4 (“*almost always*”). Scores are based on summing the participant’s responses which range from 43 to 172; higher scores indicating higher levels of mental toughness. A sample item from the MeBTough© Inventory includes, “I am emotionally responsive and engaged under pressure.”

The MeBTough© was implemented among 261 undergraduate students from a Midwestern university consisting of 75 student athletes and 186 non-athletes (Mack & Ragan, 2008). The MeBTough© was effective in assessing mental toughness, in which 43 of the original 45 items showed good statistical and psychometric properties. The items of the MeBTough© proved to have good variability with a .98 separation reliability statistic as well as showing difficulty across the entire measurement scale. Thus, initial results supported the validity and reliability of the MeBTough©, but future support is still warranted.

Additional support for the validity of the MeBTough© has been provided by Drees and Mack (2012) who used the MeBTough© to examine mental toughness among

various high school wrestling teams. Results indicated that wrestlers with higher mental toughness scores were more successful and seniors were more mentally tough than freshman.

Conclusion

Mental toughness has been acknowledged as one of the most important psychological characteristics an athlete can possess in order to achieve athletic success (Thelwell et al., 2010). Therefore numerous attempts have been made to try and define mental toughness. Although there are some differences among definitions, the concepts are typically very similar (Mack & Ragan, 2008) and refer to the general ability to cope with the many demands of sport better than your opponents (Jones et al., 2002; Loehr, 1994). A review of the research literature has also revealed support for the belief that mental toughness can be developed (Crust & Azadi, 2010; Thelwell et al., 2010). Finally, a valid and reliable measurement of mental toughness has been created via the MeBTough©. Thus, based on a review of the literature, it is hypothesized that a mental skills training program should lead to increased levels of mental toughness among a Division 1 collegiate women's swimming team.

APPENDIX C
EXTENDED PARTICIPANT MATERIALS

**UNIVERSITY OF NORTHERN IOWA
HUMAN PARTICIPANTS REVIEW
INFORMED CONSENT**

Project Title: Effects of a Short Term Mental Skills Training Program on Mental Toughness

Name of Investigator(s): Mitchell Mleziva

Invitation to Participate: You are invited to participate in a research project conducted through the University of Northern Iowa. The University requires that you give your signed agreement to participate in this project. The following information is provided to help you make an informed decision about whether or not to participate.

Nature and Purpose: The purpose of this study is to determine if mental toughness can change over a short period of time with the utilization of a forty-two day individualized electronic mental skills training program. The program and subsequent questionnaires are part of the Measuremental© program.

Explanation of Procedures: Your participation will include:

1. You will be asked to complete a brief questionnaire about your demographics (age, swimming experience etc.)
2. You will then be notified by email to enter the Measuremental© website to complete the baseline MeBTough©. The MeBTough is a self-report measure of overall toughness.
3. Your mental skills training program will be individualized based on feedback from your MeBTough© pre-test.
4. You will then be asked to complete a daily online training session on the Measuremental© website each day for 42 consecutive days. After you finish the mental skills training program over 42 days, then you will complete the MeBTough© again to see potential changes.
5. At the end of the 42 days you will be given a follow-up questionnaire.

Discomfort and Risks: Risks are minimal; you may experience slight anxiety or psychological discomfort when addressing mental toughness weaknesses or when you receive your feedback.

Benefits and Compensation: Although there may be no direct benefits to you for participating, your participation might lead to improved mental toughness and/or performance due to the mental skill training program.

Confidentiality: Information obtained during this study which could identify you, will be kept confidential. The summarized findings with no identifying information may be published in academic journals or presented at scholarly conferences.

Right to Refuse or Withdraw: Your participation is completely voluntary. You are free to withdraw from participation at any time or to choose not to participate at all, and by doing so, you will not be penalized or lose benefits to which you are otherwise entitled.

Questions: If you have questions about the study you may contact or desire information in the future regarding your participation or the study generally, you can contact (Mitchell Mleziva) at (920)-536-0647 or (if appropriate) the project investigator's faculty advisor Mick Mack at the Department of HPELS, University of Northern Iowa 319-273-6129 you can also contact the office of the IRB Administrator, University of Northern Iowa, at 319-273-6148, for answers to questions about rights of research participants and the participant review process.

Agreement: Include the following statement:

I am fully aware of the nature and extent of my participation in this project as stated above and the possible risks arising from it. I hereby agree to participate in this project. I acknowledge that I have received a copy of this consent statement. I am 18 years of age or older.

(Signature of participant)

(Date)

(Printed name of participant)

(Email most frequently view, UNI email is recommended)

(Signature of investigator)

(Date)

(Signature of instructor/advisor)

(Date)

DEMOGRAPHIC QUESTIONNAIRE

1. Do you wish to participate in this study?

Yes No

2. How old are you?

18 19 20 21 22 23 24

3. What year in school are you?

Freshman Sophomore Junior Senior 5th Year Senior

4. What year of eligibility are you in your sport?

Freshman Sophomore Junior Senior 5th Year Senior

5. Are you a swimmer or diver?

Swimmer Diver

6. Which event do you specialize in (choose one)?

Freestyle Backstroke Butterfly

Individual Medley Breaststroke Diving

7. If you were to swim your specialized event, what distance would you participate in?

Sprint Mid-Distance Distance Not Applicable

8. What is your personal record for your specialized event? _____

9. How many hours a week do you practice (pool work, team lifting etc.)?

10. How many hours do you participate in exercise on your own (not including team work)? _____

11. What age did you begin swimming and/or diving competitively?

12. What awards have you won in the past? (I.e. First Team All-Conference) (If none write none)

13. How confident are you in your swimming/diving abilities (1-not very confident, 10-very confident)?

1 2 3 4 5 6 7 8 9 10

Based on the email address you have given on the consent form, I will contact you within the next few days to let you know when you have clearance to enter the Measuremental© website. Then you will be able to take the baseline MeBTough© and start your individualized mental skills training program. Thank you for your time.

MENTAL SKILLS TRAINING PROGRAM FLOW CHART

<u>Action</u>	<u>Day of</u>
<u>Event</u>	
Confirmation Letter	Day 0
Step 1: Develop Awareness	
Performance Journal: What are my Strengths and Weaknesses?	Day 1
Step 2: Creating a Personal Plan of Action	
Performance Journal: In My Own Words	Day 2
Performance Journal: Using an Affirmation Statement	Day 3
Step 3: Capitalizing on Your Strengths	
Performance Journal: My Action Steps	Day 4
Performance Journal: More Actions Steps	Day 9
Performance Journal: Mental Rehearsal	Day 13
Step 4: Attacking Your Weaknesses	
Performance Journal: In My Own Words	Day 14
Performance Journal: A New Affirmation Statement	Day 15
Developing New Skills: Action Steps	Day 16
Performance Journal: Maintenance	Day 21
Performance Journal: Tracking My Progress	Day 22
More Skills: Action Steps	Day 24
Performance Journal: Maintenance	Day 31
Even More Skills: Final Action Steps	Day 32
Performance Journal: Mental Rehearsal	Day 38
Culminating Activities	
Performance Journal: Summarize Improvements	Day 39
Performance Journal: Long-Term Maintenance Ideas	Day 40
Performance Journal: A More Confident Me	Day 41
Just for Today	Day 42

MENTAL SKILLS TRAINING PROGRAM CALENDAR

(1) Create Performance Journal/Develop Awareness	(2) Strength Plan of Action	(3) Strength Affirmation Statement	(4) Capitalize on Your Strengths	(5) Strength Activities (continued)	(6) Strength Activities (continued)	(7) Strength Activities (continued)
(8) Strength Activities (continued)	(9) New Strength Activities	(10) Strength Activities (continued)	(11) Strength Activities (continued)	(12) Strength Activities (continued)	(13) Review and Rehearsal	(14) Weakness Performance Journal
(15) Weakness Affirmation Statement	(16) Weakness Action Steps	(17) Weakness Action (continued)	(18) Weakness Action (continued)	(19) Weakness Action (continued)	(20) Weakness Action (continued)	(21) Maintenance
(22) Weakness Action (continued)	(23) Weakness Action (continued)	(24) More Weakness Action Steps	(25) Weakness Action (continued)	(26) Weakness Action (continued)	(27) Weakness Action (continued)	(28) Weakness Action (continued)
(29) Weakness Action (continued)	(30) Weakness Action (continued)	(31) Maintenance	(32) Final Weakness Action Steps	(33) Weakness Action (continued)	(34) Weakness Action (continued)	(35) Weakness Action (continued)
(36) Weakness Action (continued)	(37) Weakness Action (continued)	(38) Review and Rehearsal	(39) Summarize Improvements	(40) Long-Term Maintenance	(41) A More Confident Me	(42) Just for Today

FOLLOW-UP QUESTIONNAIRE

1. Did you enjoy the mental skills training program?

Yes No

2. How difficult was the MeBTough© website to navigate? (1-not difficult, 10 very difficult)

1 2 3 4 5 6 7 8 9 10

3. Do you feel the mental skills training program helped to increase your mental toughness?

Yes No

4. How dedicated to the mental skills training program were you? (1-not very dedicated, 10-very dedicated)

1 2 3 4 5 6 7 8 9 10

5. How confident are you in your swimming abilities (1-not very confident, 10-very confident)?

1 2 3 4 5 6 7 8 9 10

APPENDIX D
ADDITIONAL MATERIAL

RECRUITMENT SCRIPT

Hello thank you for all coming, my name is Mitchell Mleziva. I am currently a graduate student at the University of Northern Iowa pursuing my Master's Degree in Athletic Training. I would greatly appreciate your help in a study I am conducting this year.

The purpose of this study is to determine if mental toughness can change over a short period of time with the utilization of a 42 day individualized electronic mental skills training program. "Mental toughness is the natural or developed psychological edge, which allows you to cope better than your opponents with athletic demands (competition, training, life). Specifically, be more consistent than opponents in focus, determination, confidence, and control under pressure." (Jones et al., 2002). Mental Skills Training Programs are "programs endeavor to educate and equip athletes with techniques and strategies that can be used to assess, monitor, and adjust their thoughts and feelings to produce psychological states that both facilitate performance and foster positive personality characteristics" There is supporting research that mental skills training programs improve performance and aid in athletic success but minimal attention is given to their effects on mental toughness.

(Bring up the Measuremental© website, and navigate to show them how it looks.)

For this study, participants will take a pre-test measure of their current mental toughness levels using the MeBTough©. The MeBTough pre-test will take no more than 15 minutes. When the MeBTough© is completed, the participants will receive a computer output of their strengths and weaknesses based on their answers. The participant will then be ready to begin their individualized mental skills training program. Daily activities will take no more than 10 minutes a day. Progress will be saved on the Measuremental© website. When the mental skills training program is completed, participants will then complete the post-test MeBTough©, which is the exact same as the pre-test. Then finally, you will be given a follow-up questionnaire which will take about 5 minutes. This just lets me know if you enjoyed the program or not. Your participation is completely voluntary, and you are free to quit at any time. (Distribute Packet)

I am giving you each a packet containing two items. The first item is a consent form that must be read and signed in order to participate in this study. The next item is a demographic questionnaire. The demographic questionnaire will ask questions related to your age, years of swimming experience, and your specialized event. The first question will ask you if you wish to further continue in this study. If you do not wish to continue you may leave or sit quietly and complete the questionnaire. The information you provide will not be used in the study if you choose not to participate. I will collect these two items all at once in about 10 minutes. Please answer the questions to the best of your ability; complete confidentiality is assured. If you volunteer to participate in this study, I will contact you via email for further instructions. Does anyone have any questions? (After 10 minutes, the researcher collects the packets.) Thank you all for coming and thank you for your time.

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