Mental Training: A Study Concerning the Effects of Mental Training on NCAA Division III Swimmers at Goucher College

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Abstract

This purpose of this research was to determine the effectiveness of mental training on 9 Division II swimmers ages 19-22. A one group pretest-post test design was used and found that racing time was not improved by mental training. A self-evaluation questionnaire that measured positive or negative mental states did reveal that positive item responses were correlated modestly with swimming performance and did increase after mental training. A swimmer's feeling of security and confidence become stronger following mental training. There was a similar pattern of relationships among negative item responses on the questionnaire indicating that swimmers' performance became less tied to their negative feelings after they received mental training.

CHAPTER I

INTRODUCTION

Athletes have been known to underperform in high-pressure situations. This terminology refers to athletes neglecting to perform at their highest ability in a competitive situation due to a mental hindrance. Often, this inability to perform comes from internal stressors. In college athletes, this could be the knowledge of an impending exam or the sudden memory of a paper due the next day. Although athletes may practice at a high level, when it comes to competitions, they may falter. Despite being in peak performance condition, athletes will still fail to succeed when placed in a stressful competitive environment. Many times, this can be attributed to stress, anxiety, or other mental preclusions.

Overview

In athletics, this problem pervades throughout nearly all sports. Some athletes might try to inhibit the tendency to underperform by distracting themselves with music. Others might attempt meditate or relax themselves through a variation of methods. Coaches often try to reduce their athletes' external distractions by giving motivating speeches, as seen in game-day huddles and team meetings. However, it seems that to date there is no universal method for ensuring that athletes do not collapse under the pressure of competition. This study explores how coaches might be able to improve the mental performance of their athletes and potentially improve their physical performance.

Statement of Problem

The purpose of the study is to determine the effects of mental training – involving visualization and relaxation – on the performance of NCAA Division III swimmers in simulated competitive environments.

Hypothesis

If swimmers perform mental training prior to competition, then their performance will improve. Swimmers who receive mental training will demonstrate improved performance during a simulated competitive environment.

Operational Definitions

The independent variable for this study is mental training. For the purposes of this study, mental training is defined as a series of visualization methods and body relaxation sequences created from an amalgamation of concepts outlined by the literature. In the literature, mental training, visualization, meditation, and mental picturing are used interchangeably and synonymously. The independent variable in this study is mental training. However, for this study, mental training refers specifically to a ten-minute relaxation period followed by a ten-minute visualization period. During the visualization period, the swimmers will be recreating a race experience in their minds. The dependent variable for this study is the swimmers' performance.

CHAPTER II

REVIEW OF THE LITERATURE

Athletics offer a diverse range of mental preparation techniques. While it is assumed that physical prowess is the sole contributor to athletic success, research indicates that the mental aspect of athletics can have a rather notable impact on performance. Meditation, self-talk, visualization, and superstition are among the numerous variations on psychological preparation used in sports. For example, it is not uncommon to see a gymnast, eyes closed, visualizing her floor routine. A soccer player might listen to music before their games, repeating the positive or uplifting lyrics that get them excited to perform. Baseball players carry out a frequently excessive amount of superstitions such as jumping over foul lines and turning hats inside out. Despite the diversity of these actions, these techniques all serve a similar purpose. Whether conscious or not, these methods support the concept of mind over matter. They are all means of using the mind to enhance the body (Howland, 2006).

Mental Training in Sports

In their most simplified form, these types of mental preparation have a common goal. Each strategy attempts to prepare athletes for their competition by harnessing or suppressing nerves that are created by external and uncontrollable stress inducers. Uncontrollables are quite simply stressors that extend beyond the athletes' control such as the weather, the size of their competition, or their muscles are sore. Many times, athletes fixate on these inconsequential details and convince themselves that they are incapable of competing in said competition. It is self-sabotaging at the mental level. The reciprocal can be said for positive mental interventions.

By eliminating these uncontrollables, athletes are able to encourage self-confidence and enhance performance. These routines and preparations allow athletes to prepare their brain in a similar fashion to how the body is prepared. It is the psychological warm-up that compliments the body's pre-game jog and scrimmage or pre-meet swim (Behncke, 2004; Mamassis & Doganis, 2010).

The majority of literature indicates that athletes who partake in some sort of pre-competition mental preparation tend to perform at a higher level than athletes who do not. Perhaps this is because of their ability to raze the uncontrollable stressors that deter other athletes (Gregg & Hall, 2006; Mahoney & Averner, 1977).

Meditation and/or relaxation are arguably the most important and underused aspects of game/meet preparation. Like in any sort of testing situation, humans often exhibit signs of stress and anxiety such as sweaty palms, headaches, and the proverbial stomach butterflies. These are physical expressions of mental anxiety. Relaxation inhibits, or greatly reduces, the body's release of these mental stressors thereby allowing the body to function as close to normally as is circumstantially possible (Folkins & Sime, 1981).

Visualization is another strategy used in mental training. This tactic enforces mental imagery to prepare a swimmer for his/her future race. "Mental imagery refers to imagining successful performance of the task before it is actually completed… [it] facilitates successful performance" (Neck & Manz, 1992, pg. 684). Often, athletes who employ visualization tactics recall instances of success and emulate them in an entirely mental state. By recollecting the

thoughts and feelings of a successful performance athletes are more capable of emulating these emotions during future competitions.

Mental Training in Swimming

Success in athletics is relative. If a baseball player only manages to hit the ball thirty-percent of his at bats he is considered an elite athlete. Thirty-percent is considered a high rate of success in that sport. A baseball player must be prepared to fail the other seventy-percent. Swimming is slightly more grueling in terms of its success to failure rater. If a swimmer goes a best time once a season, it is considered an accomplishment. This is a successes rate of approximately one-percent. Of course, a best time means as little as a .01 second improvement. Each sport requires a unique mental toughness in order to maintain the mental edge to succeed. Having the ability to mentally enhance a performance can not only increase the amount of success that athletes experience, but also provide them a barrier for the failures that are inevitable in athletics (Gregg & Hall, 2006; Mahoney & Averner, 1977).

Swimming is an inherently more individual sport. The communication and personal interaction that is required of other sports is absent from swimming. Mental training is actually facilitated by the individual nature of swimming. It becomes less fallible than in sports that involve unexpected factors like the opposing team's plays or unforeseeable injuries to a teammate. A swimmer can focus solely on his/her race rather than the potential errors created by teammates or opponents. Like gymnastics or running, swimming effectively simplifies the mental training process, in turn, resulting in better performance (Nicholls, Polman, Levy, &

Blackhouse, 2008). In other words, swimming lends itself to the concept of psychological intervention better than quintessentially team oriented sports.

Swimming requires a unique mental toughness in order to be successful and competitive. As an aerobic sport, swimming forces its participants to extend their bodies past the point of comfort. This involves a certain amount of mental toughness that is both a preparatory method as well as a coping mechanism (Sheard & Golby, 2006). To endure the physical strain that swimming requires, athletes must possess a certain ability to comprehend a pain threshold and disregard it for the sake of success (Cumming & Hall, 2002).

The inclusion of metal imagery in swimming has become extremely popular over the last decade. Swim programs now include mental training or into their daily workout routines, alongside water workouts and dryland circuits.

The majority of the literature that was uncovered discussed the effects of mental training on younger swimmers. While the findings were still significant, there is a distinction between age group swimmers and college swimmers that extends beyond merely age. Age group refers to swimmers under the age of 14 (Sheard & Golby, 2006).

To explain mental training again, the goal is to reduce or eliminated the presence of external stressors on athletes by using psychological techniques. Age group swimmers often live in very controlled environments. This is to say that college athletes must cope with many more stress factors than younger athletes. Being in college, therefore, complicates and occasionally inhibits the mental training process (Bar-Eli & Blumerstein, 2002; Bar-Eli, Dreshman, & Blumerstein, 2004; Mamassis & Doganis, 2010). The impediments of college life make

psychological intervention much more difficult. The atmosphere that a college provides increases the amount of stresses in athletes' lives. Especially at the division III level, academics are the most important aspect of life, athletics coming in towards the bottom of the list of importance. Division III athletes, despite this mantra, are still dedicated to their sports and want to perform to the best of their ability. When finals and papers and other distractions make their way to the field, pool, or court, performance is inhibited. Mental training aims to eliminate these distractions, at least temporarily, for the sake of athletic performance.

The Teaching of Mental Training

It is clear that mental training is what separates elite and amateur athletes. In a study concerning male gymnasts, the distinction between Olympic caliber athletes and amateur was the presence of a psychological aspect to training. The Olympic level gymnasts almost unanimously used mental training techniques to enhance their performances. "Specifically, dream frequency, self-verbalizations, and certain forms of mental imagery seemed to differentiate the best gymnasts from those who failed to make the Olympic team" (Mahoney & Avener, 1977). Mental training is what gave these athletes the competitive edge to beat their competition.

Mental training is not a method of learning, but rather a method of retention and enrichment. "Athletes use imagery more for performance enhancement and skill execution than skill learning…" (Jedlic, Hall, Munroe-Chandler, & Hall, *et al.* 2007, pg 351). The benefits of mental training are innumerable. Aside from reducing external stressors, mental training creates a positive feedback loop. Athletes who gain confidence form their mental training techniques are more likely to perform better and increase their confidence further.

Summary

The benefits of mental training are seen clearly through the research performed by Mahoney and Avener and their Olympic gymnasts. Mental training increases the confidence of athletes and allows them to perform better. “Studies have found that elite athletes are better able to concentrate, have more commitment and self-confidence and are more motivated to do well” (Cumming & Hall, 2002, pg. 138). These benefits could be the key to preventing the anxiety-like attacks that many athletes experience prior to competition.

CHAPTER III

METHODS

The purpose of this study was to determine the effectiveness of mental training on swimmers.

Design

A quasi-experimental one group pretest-posttest design was used to investigate the effects of mental training on the swimming performance of members of a collegiate swim team. A pre-test posttest design was used to investigate the effects of mental training on the performance of college swimmers. The average time for session including relaxation and visualization was compared to the average time for the same swimmers to swim six one hundred yard races.

Participants

The participants for this study included 10 division III college swimmers. The 10 swimmers were all members of the Goucher College swim team. Each swimmer participated voluntarily in the study. The ages of the participants ranged from 19 to 22. Of the 10 participants, 6 were male and 4 were female. The subjects were selected by the researcher because they are members of the Goucher College swim team which the researcher coaches.

Instrument

The data was collected using stopwatches and preexisting self-evaluation surveys. These surveys were chosen because of their ability to determine positive or negative mental states. The questions were ranked on a scale from 1 to 4. Each question pertained to a specific aspect of the athletes' mental health and could be added to determine overall mood.

The Self-Evaluation Questionnaire was adapted from the State-Trait Anxiety Inventory (STAI), developed by Spielgerger et al in collaboration with R. L. Gorsuch, R. Lushene, P.R.

Vagg, and G. A. Jacobs (Gros, Antony, Simms, & McCabe, 2007). The original form included items describing how the individual feels "right now" as opposed to how he/she feels "generally." The Self-Evaluation Questionnaire items were selected by the investigator for their relevance and appropriateness to this study. The original STAI has been widely used and has demonstrated good reliability. The reliability of the Self Evaluation Questionnaire, however, has not been calculated. The 20 items included on the Self-Evaluation questionnaire include brief statements about how "I feel."

The stopwatches recorded the times of the athletes to determine if there was a physical improvement after the mental training was administered. The self-evaluations was administered prior to swimming, but after the mental training was completed.

Procedure

The research included three different testing periods. Each session included the same amount of swimming. The participants completed an eight hundred yard warm-up – a standard warm-up for these swimmers. Then the swimmers prepared to race six one hundred yard sprints. During the first testing period, the swimmers performed without any mental training. Before the six one hundreds, the swimmers were asked to complete a survey about their mental state addressing both positive and negative qualities. These times and surveys were used as a baseline or pre-test to determine any changes. The second and third testing periods began with the same eight hundred yard warm-up, followed by the mental training. After the mental training was completed the athletes answered their self-evaluation survey and then raced their six one hundred yard sprints. The times for the athletes were recorded. Since swimming's success is based on times, the results were much easier to read than with other sports. The survey was included to determine if the swimmer's mental state changed during the process of mental training.

CHAPTER IV

RESULTS

The hypothesis that swimmers who receive mental training will improve their racing time was not supported by the research, but the study did have some interesting results. The intention of this study was to test how mental training affects the performance of college swimmers at a NCAA Division III program. The swimmers were tested through a set of six, one-hundred yard races. The swimmers were tested three times, once without mental training and twice with mental training. The swimmers responded to the Self-Evaluation Questionnaire prior to their swims in order to gauge their mental readiness. The survey was administered after the mental training, but before the swimming during the second two testing periods. Table 1 describes the swimming performance of the swimmers before and after treatment.

Table 1 – Comparison of the Time Before and After Receiving Mental Training

	Pretest	Posttest 1	Posttest 2
Participant	9	9	9
Mean	68.68	67.93	67.17
Standard Deviation	2.70	2.49	4.41
Range	64.78-72.45	64.44-71.88	57.60-71.64

As Table 1 describes, the mean number of seconds required by the swimmers to complete the 100-yard swim decresed slightly but not significantly from pretest to posttest. Participants also completed the self-evaluation questionnaire immediately after the mental training.

The self-evaluation questionnaire was comprised of twenty items describing the swimmers' feelings of comfort and confidence. Ten of the items were designated as "positive" such as "feeling calm," "secure," "self-confident," "relaxed," and "content." Ten are designated

as “negative” such as “feeling tense,” “strain,” “upset,” “worry,” and “fright.” The participants were asked to respond to each item using a four-point scale. The scale read 4 = “very much so” and 1 = “not at all.” The positive items were reverse scored so that a low score is always positive. Table 3 below describes pretest and posttest Total scores.

Table 2 - Pretest and Posttest Data

	Mean	**SD**
Pretest	49.10	3.47
Posttest 1	46.30	2.94
Posttest 2	48.1	9.43

Participants’ responses to the positive and negative items were analyzed separately for each self-evaluation administration. Table 3 describes the results. As it indicates, there was little change in participants’ responses to the items from the second posttest. None of the differences between mean scores was statistically significant. The pretest occurred prior to the mental training. Posttests 1 and 2 administered after the first and second administrations of the mental training, shown as Posttest 1 and Posttest 2.

Table 3 – Self-Evaluation Questionnaire Comparison

	Pretest	**Posttest 1**	**Posttest 2**
Positive Items			
Number of items	10	10	10
Maximum possible score	40	40	40
Mean Score	27.00	26.20	26.30
Standard deviation	2.62	1.75	3.62
Negative Items			
Number of items	10	10	10
Maximum possible score	40	40	40
Mean score	24.2	21.8	21.8
Standard deviation	2.22	2.57	4.80

Mean scores for both positive and negative items remained fairly constant from pretest to posttest although the score for the negative items fell slightly, suggesting that participants may have felt less "negative" as training proceeded. Pretest and Posttest 1 Positive scores were correlated modestly ($r = .502$, n s.) and Posttest 1and Posttest 2 scores were correlated significantly ($r = 0.678$, $p<.03$). Pretest and Posttest 1 Negative scores were also correlated modestly ($r = 0.527$, n. s.) and Posttest 1 and Posttest 2 scores were correlated significantly ($r= 0.823$, $p<.03$). Positive and Negative total scores were negatively correlated but none of the correlations reached statistical significance. This finding suggests that the self-evaluation questionnaire may be measuring two largely independent constructs: in terms of these items, this finding suggests that students may exhibit both positive and negative attributes during the same session.

The relationships among swimming performance and positive and negative perceptions were examined separately for each administration of the self-evaluation questionnaire. Positive item responses were correlated modestly with swimming performances. The correlations were modest but increased successively, rising from -0.21 initially (Pretest and Time 1) to -0.42 (Posttest 1 and Time 2) and to -.53 (Posttest 2 and Time 3). This result suggests that as swimmers' feelings of security and confidence become stronger following mental training, their performances are likely to improve. The pattern of relationships among negative item responses and performances also supports expectations. The correlations decreased successively as the swimmers' performances became less tied to their negative feelings after they received mental training. The correlation between performances and negative items on the pretest was 0.613 ($p<.07$). That correlation was reduced to 0.460 (Posttest 1 and negative items) and to 0.21 (Posttest 2 and negative items).

CHAPTER V

DISCUSSION

The results of the study did not support the hypothesis, however, they did strongly suggest the value of further research. Although the results were not conclusive, the swimmers did show improvement in both mental state and athletic performance after mental training was administered.

There are some external factors that affected the results of this study. Swimmers were injured and unable to complete the six one hundreds to the best of their ability. For example, one swimmer was injured between the time of the first and second experiment dates. The swimmer's shoulder was hurt and, hence, she could not complete all six one hundreds. Therefore, the times did not improve.

Validity of the Study

The study was an interesting start to learning more about the ability of the mind to affect the performance of the body. Although the results were inconclusive, the findings still showed some improvement in mental state and athletic performance after mental training was administered.

Some of the problems concerning this study include the limited amount of participants. Since the participants were limited to athletes at a Division III college, the caliber of athlete was nearly identical. This means that the study does not necessarily apply to younger swimmers or Olympic level athletes. Furthermore, the majority of the participants were voluntary. My main concern when beginning the study was that my research would adversely affect the swimmers participating. Although some swimmers received the treatment and others did not, the fact that all participants were voluntary also reduced the diversity of the group. This meant that all the swimmers were at least interested in receiving mental training.

Another issue that could be addressed is the rhetoric of the self-evaluation. For example, self-evaluation #9 stated, “I feel frightened.” Very few of the participants ranked higher than a 1 on this question. It seems as though fear was rarely an emotion with which the participants could identify, so it may not have been the best question to ask when perceiving their mental state.

Conversely, swimmers had a much higher response to questions 3 and 4. These questions stated, “I feel tense,” and “I feel strained,” respectively. For a swimmer, tenseness and strain, is most likely perceived as physical. Although the self-evaluation was supposed to determine mental state, the swimmers may have answered about their current physical state instead. As the results indicate, most of the swimmers felt extremely tense at the time of the testing periods.

Another external variable that may have affected results was the swimmers’ competition schedule. The last testing period occurred the night before a swim meet. Although the results are not overtly different, it is clear that some swimmers exhibited signs of increased stress and tension despite the efforts of the mental training. Perhaps the increased stress was due to the impending swim meet.

Conclusions and Suggestions for Future Research

If this experiment were tried again, it would behoove the researcher to pick three testing dates that limit external distractions. Although the mental training is supposed to limit the amount of stressors that affect performance, the research would be more reliable if the testing dates had similar level of stress for the athletes. This problem could also be solved by administering a self-evaluation prior to the mental training as well as post-mental training. This way, the researcher can determine if the mental training improved the swimmers’ mental state.

For future research, I would attempt the same type of mental training regiment with younger candidates. Middle school and high school aged swimmers have a strong foundation for the sport, but are still willing to try new strategies to improve their times. Once swimmers reach

college, they have found what they are comfortable with in terms of meet preparation. To teach mental training to younger swimmers would potentially create a habit in their swimming performance that could improve their success in the sport of swimming.

APPENDIX A

Questionnaire

On the Self-Evaluation Questionnaire, questions #1, 2, 5, 8, 10, 11, 15, 16, 19, 20 are considered "positive" attributes, questions # 3, 4, 6, 7, 9, 12, 13, 14, 17, 18 are considered negative questions. Questions are listed on a scale of 1(not at all) to 4 (very much so). When determining results, the added total of the positive questions and negative questions are considered against each other. Whichever total is larger indicates the swimmer's mental state.

Self-Evaluation Questionnaire: Adapted from State Trait Anxiety Inventory developed by Charles D. Spielberger in collaboration with R. L. Gorsuch, R. Lushene, P.R. Vagg, and G. A. Jacobs.

Name: _____ Date:_____

Age:_____ Sex: ___M / F__

Directions: A number of statements which people have used to described themselves are given below. Read each statement and then check the appropriate box to the ride of the statement to indicate how you fell right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe you present feeling best.	**1**	**2**	**3**	**4**
	Not at all	Some-what	Modera-tely so	Very much so
1) I feel calm				
2) I feel secure				
3) I am tense				
4) I feel strained				
5) I feel at ease				

6) I feel upset				
7) I am presently worrying over possible misfortunes				
8) I feel satisfied				
9) I feel frightened				
10) I feel comfortable				
11) I feel self-confident				
12) I feel nervous				
13) I am jittery				
14) I feel indecisive				
15) I am relaxed				
16) I feel content				
17) I am worried				
18) I feel confused				
19) I feel steady				
20) I feel pleasant				

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