PSYCHOLOGICAL TECHNIQUES FOR ENHANCING ATHLETIC PERFORMANCE

by

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PSYCHOLOGICAL TECHNIQUES FOR ENHANCING ATHLETIC PERFORMANCE

Both coaches and athletes are becoming increasingly aware of the importance psychological factors play in the acquisition and performance of athletic skills. The United States Olympic Committee, for example, has recently established guidelines concerning the use of psychological techniques in training Olympic athletes (1983), while professional sports teams such as the Philadelphia Eagles (Sprague, 1981) and Philadelphia Flyers (New York Times, 1983) are using psychological techniques to enhance performance. While coaches and athletes have recognized the importance of psychological skills for a number of years (Griffth, 1925), their popularity has greatly increased in the last decade and no slow down in their use is evident. Thus, an understanding of these techniques is essential if future coaches and athletes are to use them efficiently and effectively.

Three of the most popular techniques thought to enhance athletic performance are Visual Motor Behavior Rehearsal (VMBR), relaxation training and mental practice. As can be seen in Figure 1, each of these techniques has been defined differently. However, further inspection of this figure reveals that while distinctions can be made between these techniques, they are not mutually exclusive. Relaxation training, for example, is at times used as a preporatory condition for mental practice, while VMBR involves the systematic use of deep muscle relaxation and mental practice in the form of imagery. It can also be argued that mental practice and relaxation training are interrelated since deep muscle relaxation is often achieved through the continued practice of self-suggestive thoughts (mental practice). Because of the

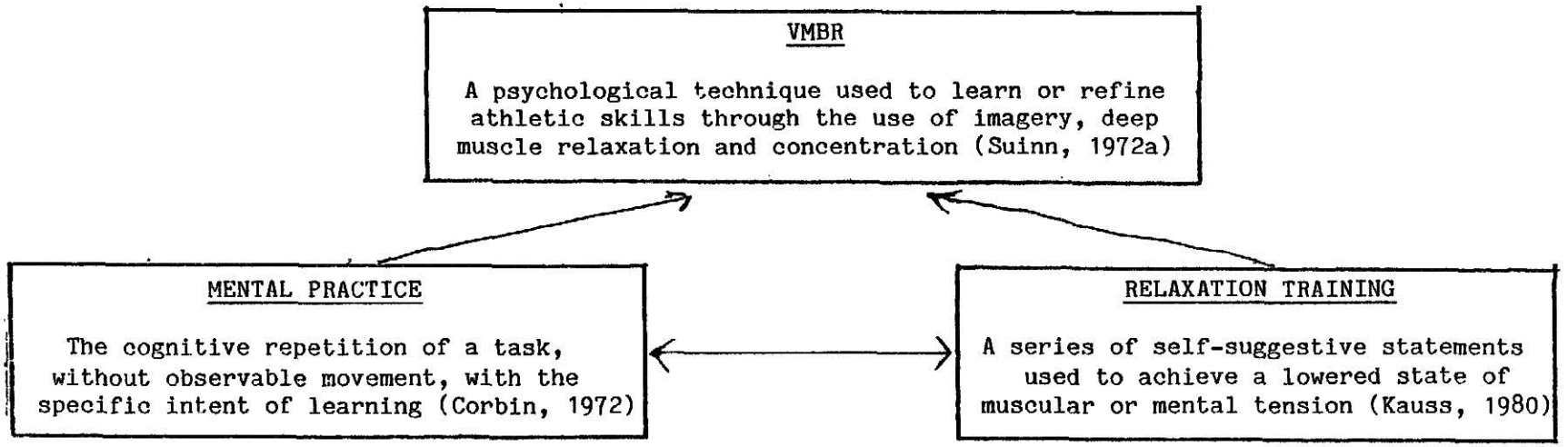

Figure 1. The Interrelationships Between VMBR, Relaxation Training and Mental Practice

interrelationships between these techniques, an understanding of all three techniques is helpful to the coach or athlete interested in using them to enhance performance.

It is unfortuante that while VMBR, relaxation training and mental practice are three of the most popular psychological techniques thought to influence athletic performance, empirical evidence is seldom cited to support their effectiveness. Rather, anecdotal evidence, personal testimonies or general statements about supporting research are used (You Learned, 1978; A Psychologists, 1978; Powers, 1979; Titley, 1980; and Suinn, 1980). A need therefore exists to empirically examine the utility of these approaches in enhancing the acquisition and performance of athletic skills.

This report will present a review of the existing research literature in the areas of VMBR, relaxation training and mental practice, with specific emphasis placed on the effectiveness of these techniques. The effectiveness of these techniques in enhancing performance will be determined by examining the number of studies demonstrating statistically significant results, and by the direction of those results. Not only will the effectiveness of each technique be examined, but an attempt will be made to identify potential variables of influence that may be related to their effectiveness. Specific potential variables of interest will include: (1) subject gender; (2) subject age; (3) skill type; and (4) duration and frequency of mental practice.

Finally, based on the findings of this review, a practical psychological technique program for enhancing athletic performance will be presented. A specific example of how to use the program will also be outlined.

Visual Motor Behavior Rehearsal

In recent years, one of the most popular techniques thought to improve athletic performance has been VMBR (Suinn, 1972a, 1972b). Developed by clinical psychologist, Richard M. Suinn, VMBR is a psychological technique used to learn or refine athletic skills, through an intervention combining imagery, deep muscle relaxation and concentration. Specifically, VMBR is comprised of three components: (1) initial relaxation; (2) performance visualization or imagery; and (3) simultaneous relaxation and performance visualization used during a simulated stressful situation. For example, a skier is first taught to relax, then instructed to visualize him or herself skiing, and finally asked to relax and visualize him or herself successfully performing under the stress of competition.

In the past, few studies have been conducted to empirically assess the effectiveness of VMBR in enhancing athletic performance. Rather, the majority of reports discussing its application and effectiveness have been anecdotal or case report in nature (Suinn, 1972a and 1976). Recently, however, several controlled empirical field investigations have been conducted in an effort to assess the effectiveness of VMBR as a performance enhancement technique (Noel, 1980; Weinberg, Seabourne, Jackson, 1981; Weinberg, Seabourne, Jackson, 1982; Weinberg, Seabourne, Jackson, 1983; and Hall and Erffmeyer, 1983).

Table 1 contains a description and summary of the findings of the eight studies that have employed VMBR in athletic settings. Inspection of this table reveals that VMBR was reported to have some influence on performance in all eight studies. However, only five of these studies

Table 1

Studies Examining the VMBR - Performance Relationship

Study	Task and Task Type	n	Sex	Age Group	Experienced or Novice	Independent Variables	VMBR Training Characteristics
Suinn (1972a)	Ski racing Motor/reactive	6	-	-	Experienced	VMBR Control	--
Suinn (1977)	Skiing-cross country Motor/reactive	10	M&F	-	Experienced	VMBR for ski team	D - 30 minutes
Noel (1980)	Tennis serve Motor/self-paced	14	M	Coll Adt	Experienced	VBMR-high ability VMBR-low ability Control	F - 10 days D - 30 minutes
Weinberg, Seabourne & Jackson (1981)	Karate performance Motor/reactive, self-paced	32	M	Coll	Novice	Relaxation Imagery VMBR Control	F - every day for 6 weeks D - 20 minutes D - 10 minutes for imagery
Lane (1980)	Foul shooting Motor/self-paced	-	M	HS	Experienced	VMBR Control	--
Weinberg, Seabourne & Jackson (1982)	Karate performance Motor/reative, self-paced	44	M&F	Coll	Novice	VMBR Placebo	F - twice a week for 10 weeks
Weinberg, Seabourne & Jackson (1983)	Karate performance Motor/reactive, self-paced	77	M&F	Coll	Novice	VMBR-individual practice VMBR-guided practice Placebo	F - 3 times a week for 10 weeks D - 10 minutes All taught cognitive strategies
Hall & Erffmeyer (1983)	Foul shooting Motor/self-paced	10	F	Coll	Experienced	VMBR-videotaped modeling Progressive relaxation and visual imagery-no modeling	F - everyday for 2 weeks D - 20 to 30 minutes

Table 1

(continued)

Study	Dependent Variables	Test Stat.	Results
Suinn (1972a)	Performance - number of trophies team won	--	+ = VMBR
Suinn (1977)	Improving althletic performance at winter Olympics	Correlation	+ = VMBR
Noel (1980)	Performance - percent of good first and second serves	ANOVA	+ = VMBR-high ability - = VMBR-low ability - declined in accuracy
Weinberg, Seabourne & Jackson (1981)	Performance - skill, combination sparing Trait & State Anxiety	ANOVA	+ = VMBR performance (sparring) + = Trait anxiety all subjects + = State anxiety for VMBR and relaxation
Lane (1980)	Performance - percent of foul shots, home vs. away games	--	+ = Overall VMBR + = VMBR better at away games
Weinberg, Seabourne & Jackson (1982)	Performance - skill, combination sparing Psychological Measures - trait & state anxiety, Thayer's Scale	ANOVA	+ = VMBR better performance + = Trait anxiety reduction all subjects + = VMBR reduction in state anxiety and activation scale
Weinberg, Seabourne & Jackson (1983)	Performance - skill, combination sparing Psychological Measures - state anxiety, Thayes Check-list	ANOVA	+ = Guided VMBR better performance + = Guided VMBR greater levels of state anxiety
Hall & Erffmeyer (1983)	Performance - percent of foul shots	ANCOVA	+ = VMBR (videotaped modeling) significant improvement in foul shooting performance

Note: M = male; F = female; Coll = college; HS = high school; Adt = adults; F = frequency; D = duration

+ = facilitated performance/influenced affective state in predicted direction

- = decline in performance/did not influence affective state in predicted direction

0 = had no effect on performance or affective state

used inferential statistics when examining their results (Noel, 1980; Weinberg, Seabourne, Jackson, 1981; Weinberg et al., 1982; Weinberg et al., 1983; and Hall and Erffmeyer, 1983), while the others were case report and/or anecdotal in nature (Suinn, 1972a; Suinn, 1977; and Lane, 1980).

Of the five studies using inferential statistics, all reported significant performance enhancement effects, although in three of the five studies only partial support was generated. For example, Noel (1980) studied experienced male tennis players during a tournament and found no differences between VMBR and control subjects in performance. However, when the 14 players were divided into high and low ability groups, the high as compared to low ability VMBR subjects demonstrated an improvement in percentage of good serves.

In another study finding partial support for the effectiveness of VMBR, Weinberg et al. (1981) examined the effects of VMBR on karate performance. Subjects were assigned to either a VMBR group, a relaxation group, an imagery group or an attention-placebo control group. Each group was individually provided with an explanation of how to practice their assigned cognitive strategy daily for a six-week period. In addition, three performance tests were administered at the end of the testing period. The results revealed that when the sparring or competitive aspect of karate dependent variable was employed, the VMBR group displayed a significant increase in performance over all of the other groups. However, the VMBR group did not differ from the other three groups when skill and skill combinations were used as performance measures. It is also of interest to note that the VMBR and relaxation groups exhibited significantly less state anxiety than did the imagery or placebo control groups.

Finally, Weinberg et al. (1983) found only partial support for the effectiveness of VMBR in a study designed to determine if "individual" practice and training by VMBR subjects was more beneficial to karate performance than "instructor" guided VMBR practicing and training. The results revealed that the instructor guided VMBR group performed significantly better than the individual guided VMBR or placebo-control training groups.

Clear support for the performance enhancement effects of VMBR were found in two studies. For example, Weinberg et al. (1982) examined whether practice and training in VMBR is more effective in improving karate performance than a placebo-control practice condition of memorizing Chinese proverbs and writings. Each subject was individually provided with a detailed description of their specific cognitive strategy, including handouts, and practiced for a ten-week period. In addition, subjects were provided with individual training during class periods. Manipulation checks verified that the subjects' practiced their techniques. Moreover, the VMBR group displayed greater levels of improvement than the placebo-control group for all three performance measures (skill, combination and sparring) used. State anxiety and activation scale measurements also showed that the VMBR group exhibited significantly greater decreases in these states, as compared to the placebo-control group.

Hall and Erffmeyer (1983) also demonstrated support for the performance enhancement effects of VMBR. In this study, subjects were 10 highly skilled female members of an intercollegiate basketball team, and each subject was assigned to either a VMBR (videotaped modeling) group or a progressive relaxation and visual imagery (no modeling)

group. Pre- and post-test assessments were peformed using the percentage of successful foul shots made by each group. The results revealed significant improvement in foul shooting performance for the VMBR (videotaped modeling) group. Thus, videotaped modeling was found to further enhance the effectiveness of VMBR training, although the effectiveness of the traditional VMBR group could not be assessed since a no VMBR control group was not utilized.

Gender Differences

Of the eight studies contained in Table 1, four reported the sex of the subject. Three studies utilized male subjects, one used female subjects, and the other three studies used both males and females in a combined sample. In all cases VMBR was found to facilitate performance. Thus, VMBR has been found to be effective when both male and female subjects have been used, although no direct between sex comparisons have been made. It should be noted, however, that in the three studies using combined samples of males and females the investigators made no reference to any sex linked differences in VMBR effectiveness. VMBR, therefore, appears to have been effective when both males and females have been used as subjects, although additional research is needed to directly test for sex related differences.

Age Differences

Of the eight VMBR studies contained in Table 1, four of the eight studies used college aged subjects, while one study (Noel, 1980) used noncollege adults ranging in age from 17 to 45 with a mean age of 29 years. Thus, the effectiveness of this technique has, for the most

part, only been demonstrated with a limited age range of individuals. In an encouraging recent development, however, Lane (1980) generalized the utility of using VMBR to younger age group when he found it significantly facilitated the performance of experienced high school basketball players.

Type of Task Differences

The nature of the task may be a factor influencing the extent VMBR effects performance. Both Corbin (1972) and Feltz and Landers (1983), for example, indicate that varying mental training and practice performance results can be found if the criterion skill is gross muscle as contrasted with fine muscle, open as contrasted with closed, or cognitive as contrasted with motor. For this reason the task type (cognitive, motor, strength; open versus closed) used in the eight studies contained in Table 1 were examined to determine if the effectiveness of VMBR is task dependent.

Unfortunately, a cognitive-motor-strength task type comparison was not possible since all of the eight studies contained in Table 1 were classified as motor tasks. Thus, while it seems clear VBMR enhances performance on motor tasks, further research needs to be performed on cognitive and strength tasks to determine their relationship to VMBR effectiveness.

When examining those studies employing self-paced (closed-skill) versus reactive (open-skill) tasks, two studies were found to employ reactive tasks (Suinn, 1972a and Suinn, 1977) and three studies were found to employ self-paced tasks (Lane, 1980; Noel, 1980; and Hall and Erffmeyer, 1983). In addition, three other studies (Weinberg et al.,

1981; Weinberg et al., 1982; and Weinberg et al., 1983) employed both reactive and self-paced tasks, but the investigators made no between task comparisons. Regardless of the task type employed, VMBR was effective in enhancing athletic performance. Therefore, preliminary evidence reveals that VMBR appears to be effective for both reactive and self-paced tasks.

Duration and Frequency of VMBR Practice Differences

Of the eight studies contained in Table 1, five recorded the duration of VMBR practice (Suinn, 1977; Noel, 1980; Weinberg et al., 1981; Weinberg et al., 1983; and Hall et al., 1983). For example, Hall et al. (1983) found a modified VMBR procedure to be effective in enhancing foul shooting performance when the duration of the training sessions ranged from 20 to 30 minutes. In the four remaining studies partial support for VMBR was found, with practice durations ranging from 10 to 30 minutes. It is unfortuante, however, that no direct comparison of practice durations were made and that in three of the original eight studies, information about practice duration was not even recorded.

As for frequency of VMBR practice, five studies (Noel, 1980; Weinberg et al., 1981; Weinberg et al., 1982; Weinberg et al., 1983; and Hall et al., 1983) recorded how often the subjects practiced VMBR. In two of those studies (Weinberg et al., 1982 and Weinberg et al., 1983) , subjects practiced for 10 weeks using VMBR two or three times a week. In two other studies (Noel, 1980 and Hall et al., 1983) , subjects met for 10 or 20 days, and in one study (Weinberg et al., 1981) the subjects met every day for a six-week period. In all cases, at least partially improved performance effects were evident. It is unfortuanate, however,

that as with duration, frequency has not been well defined or examined. Consequently, little evidence exists concerning the optimal duration and frequency of VMBR practice needed to produce optimal performance.

Summary

VMBR appears to be effective in facilitating athletic performance since all eight studies reviewed demonstrated at least partial performance effects. Thus, it appears to be a valuable technique to use with athletes. Moreover, although additional evidence is needed, VMBR seems to be equally effective for males or females and should be practiced between 20 and 30 minutes daily.

While these initial findings are encouraging, scant evidence exists concerning the optimal duration and frequency of VMBR training needed, whether VMBR is effective with athletes of varying ages, whether it is equally effective for both males and females and whether it is more effective when certain types of tasks are being performed. Consequently, researchers need to further examine VMBR under conditions where these potential variables of influence are more highly controlled and/or manipulated.

Relaxation Training

Relaxation is a state of lowered muscular or mental tension which can be achieved through a series of self-suggestive statements (Kauss, 1980). It is important because research has shown that increased levels of stress and tension have negative effects on both health and performance (Nideffer and Deckner, 1970; and Jacobson, 1934). Reducing

stress and tension through relaxation training, then, is a primary concern of many individuals in all walks of life.

In recent years physical educators and coaches have been especially interested in using relaxation techniques to help students and athletes reduce stress and, in turn, learn and perform more efficiently and effectively. For example, a number of practical books and articles (Bernstein and Borkovec, 1973; Firth, 1978; and Powers, 1979) have emphasized the utility of using relaxation and have outlined specific recommendations for achieving this state. As with VMBR, however, a need exists to empirically determine if relaxation training enhances performance, to examine what relaxation techniques are most effective, and to identify what variables moderate the relaxation - performance relationship. Additionally, psychologists (Luiselli, Marholin II, Steinman and Steinman, 1979; Lader and Mathews, 1970; and Mathews and Gelder, 1969) and sport psychologists (Nideffer and Deckner, 1970; Bennett and Stothart, 1978; and Borkovec, 1982) alike have emphasized the importance of developing theoretical explanations for identifying how and why relaxation modalities influence performance.

If the effects of relaxation training on motor performance are to be examined, an important variable which must be considered is the type of relaxation technique used. For example, relaxation techniques may range from simple cognitive based strategies where the subject learns to relax through self-suggestive thoughts and coping strategies, to primarily physical based techniques where the subject is instructed to relax specific muscle groups throughout the body. Many current techniques, however, employ a combination of both cognitive and physical elements. A brief description of some of the more popularly used techniques are contained in Table 2.

Table 2

Major Relaxation Training Techniques

Technique Classification and Specific Techniques	Description
I. Muscle Relaxation A. Jacobson Progressive Relaxation B. Progressive Relaxation C. Relaxation-Cognitive D. Standard Relaxation E. Use of 16 muscle groups F. Use of 4 muscle groups G. Relaxation only H. Trained in relaxation I. Untrained in relaxation J. Relaxation instruction	Muscle relaxation consists of the athlete being taught to recognize the presence of muscular contractions. After the athlete recognizes contraction in a muscle group, he/she will tense and release various muscle groups throughout the body. In essence, the athlete learns how to release tension from specific muscle groups.
II. Coping Skills A. Applied Relaxation B. Self-control Relaxation C. Stress-Inoculation Training	Coping skills consists of learning how to relax by using a mental skill or strategy. For example, the athlete would employ a coping skill (i.e., self-statements) which he/she could actively employ in relaxing away tension in a variety of anxiety-provoking situations.
III. Instructor Guided A. Taped relaxation B. Live demonstration C. Modified version of Jacobson's progressive relaxation	Instructor guided relaxation methods consists of either the instructor presenting the relaxation procedures or tapes of instructors guiding relaxation procedures.
IV. Relaxation Exercises A. Walking B. Aerobic conditioning	Relaxation exercises consists of performing any type of physical activity (walking or running) that would produce relaxation.

In this paper 22 studies employing the use of various relaxation training techniques were examined. Five studies used athletic performance as the dependent variable and are contained in Table 3, while 17 studies examined the effects of relaxation on related physiological and psychological dependent variables and are contained in Table 4.

The Relaxation - Performance Relationship

When the five studies (See Table 3) using athletic performance as the dependent variable are examined, the results revealed that in three of the five investigations the systematic use of relaxation techniques improved performance. For example, a study that reported direct support for the use of relaxation training for *improving performance* was conducted by Nideffer and Deckner (1970). In this case study a shot putter learned progressive relaxation and employed it twice a day and prior to performing. It was reported that substantial improvements in performance were found with the advent of progressive relaxation. The reported effectiveness of relaxation in this study was weakened, however, because statistical analyses was not employed.

In a second study, partial support for the effectiveness of relaxation was found when Russell (1931) compared how differing degrees of muscular tension influenced performance on a ball toss target task. The 30 subjects used in this study tossed balls at a target when they were tensed, natural or relaxed. It was revealed that the relaxation condition was better than the tensed condition in improving performance, but no difference was found between the natural and relaxation conditions.

Table 3

Studies Examining the Relaxation - Performance Relationship

Study	Task and Task Type	n	Sex	Age Group	Experienced or Novice	Independent Variables	Relaxation Practice Characteristics
Russell (1931)	Underhand ball toss at a target Motor/self-paced	30	M&F	Coll	Novice	Three groups of subjects under three conditions of tension (tensed, natural, and relaxed	F - 6 trials D - 50 tosses 4 per minute
Nideffer & Deckner (1970)	Shot putting Motor/self-paced	1	M	Coll	Experienced	Progressive Relaxation - MR Trained	F - twice a day (weeks not given) and prior to competition D - 10 minutes
Bennett & Stothart (1978)	Badminton, Archery Gymnastics, Wrestling Motor/self-paced	44	M&F	Coll	Experienced	Relaxation - cognitive - MR Control	F - 7 sessions D - 20 minutes Taped instructions
Huddleston (1982)	Peg board Cognitive/self-paced	30	F	Coll	Novice	Applied Abbreviated Progressive Relaxation - CS Attention-placebo Control	-
Sime & Vokolek (1983)	Competitive Stress Management course	40	M&F	Coll	Experienced	Competitive Stress Management class	15 hours of instructions & practice

Table 3

(continued)

Study	Dependent Variables	Test Stat.	Results
Russell (1931)	Performance - Accuracy	χ	0 = No difference between the natural and relax conditions + = Relax condition better than tensed
Nideffer & Deckner (1970)	Performance	-	+ = Improved performance
Bennett & Stothart (1978)	State Anxiety Performance	ANOVA	+ = Relaxation - cognitive best for state anxiety 0 = No difference for performance
Huddleston (1982)	Physiological Measures Performance	ANOVA	0 = No difference between relaxation and placebo group concerning performance + = relaxation better on physiological measures
Sime & Vokolek (1983)	Physiological & Psychological Measures	Correlation	+ = Competitive anxiety relates to physiological changes and level of performance

Note: M = male; F = female; Coll = college; MR = muscle relaxation; CS = coping skills; F = frequency; D = duration

+ = facilitated performance/influenced affective state in predicted direction

- = decline in performance/did not influence affective state in predicted direction

0 = had no effect on performance or affective state

Table 4

Studies Examining the Relaxation - Physiological/Psychological Relationship

Study	Task and task type	n	Sex	Age Group	Experienced or Novice	Independent Variables	Relaxation Training Characteristics
Jacobson (1934)	Contraction of muscles	10	M	Coll	Novice	Trained to relax - MR Untrained	4 or 5 tests examining reaction times
Mathews & Gelder (1969a)	Physiological Measures EMG, blood flow, skin conductance, manifest anxiety scale, Eysenck personality inventory	10	M&F	Adt	Novice	Jacobson Relaxation - MR Control	F - 6 weekly sessions D - 1 hour
Mathews & Gelder (1969b)	Physiological Measures EMG, heart rate, mood scales	14	M&F	Adt	Novice	Tapped Relaxation - IG Control	F - 2 weeks D - 1 hour
Lader & Mathews (1970)	Physiological Measures blood flow, pulse rate, EMG, skin conductance	18	M&F	HS Coll Adt	Novice	Jacobson Taped Relaxation - MR Control	Relaxation group instructed F - 10 pre-treatment readings D - 5 minutes
Davidson & Hiebert (1971)	Watching a film Cognitive/reactive	27	F	Coll	Novice	Taped Abbreviated Progressive Relaxation - MR Relaxation Instruction Control	TAPR - trained 2 sessions F - 10 times shown film 2 minutes elapsing between showings D - 1 session
Paul (1973a)	Physiological Measures muscle tension, heart rate, skin conductance, respiration rate	60	F	Coll	Novice	Progressive Relaxation trained - MR Direct hypnotic suggestion Control	F - 2 days D - 1/2 hour seven days apart
Paul (1973b)	Physiological Measures muscle tension, heart rate, skin conductance, respiration rate	60	F	Coll	Novice	Progressive Relaxation trained - MR Direct hypnotic suggestion Control	F - 2 days D - 1/2 hour seven days apart

Table 4

(continued)

Study	Dependent Variables	Test Stat.	Results
Jacobson (1934)	Mechanical devices to measure reactions, time of muscle contraction	-	+ = relax group best + = trained to relax best
Mathews & Gelder (1969a)	Physiological & Psychological Measures	ANOVA	0 = No difference between groups + = Significant effects between testing
Mathews & Gelder (1969b)	Physiological & Psychological Measures	ANOVA	+ = Physiological measures for relaxation group 0 = Psychological measures no difference
Lader & Mathews (1970)	Physiological Measures	ANOVA Correlation	0 = No difference between groups
Davidson & Hiebert (1971)	Physiological Measures & Stressor Film	ANOVA	+ = Subjective anxiety decreased for all 3 groups + = Autonomic arousal decreased for the two relaxation groups 0 = No difference between the two relaxation groups
Paul (1973a)	Pre-Post Self-reported Anxiety, Physiological Measures	-	+ = Overall progressive relaxation is better
Paul (1973b)	Relaxation performance & various personality characteristics	-	0 = No differences between the three groups

Table 4

(Continued)

Study	Task and task type	n	Sex	Age Group	Experienced or Novice	Independent Variables	Relaxation Training Characteristics
Paul (1973c)	Physiological Measures muscle tension, heart rate, skin conductance respiration rate	60	F	Coll	Novice	Progressive Relaxation trained - MR Direct hypnotic suggestion Control	F - 2 days D - 1/2 hour seven days apart
Paul (1973d)	Physiological Measures muscle tension, heart rate, skin conductance respiration rate	30	F	Coll	Novice	Progressive Relaxation - MR Hypnotically induced relaxation Self-relaxation control	F - 2 days D - 1/2 hour
Goldfried & Trier (1974)	Public speaking Cognitive/reactive	27	M&F	Coll	Novice	Standard relaxation - MR Self-control relaxation - CS Placebo	F - 5 weeks D - 1 hour per week
Chang-Liang & Denney (1976)	Anxiety measures Test Anxiety Questionnaire, State & Trait Inventory	81	-	Coll	Novice	Applied Relaxation - CS Systematic Desensitization Relaxation only - MR Control	F - 3 weeks D - 45 minutes
Russell, Sipich & Knipe (1976)	Physiological Measures EMG, Anxiety differential	34	F	Coll	Novice	16 muscle group - live 16 muscle group - taped - MR 4 muscle group - live Control	F - 2 sessions D - 25 minutes one week apart
Bahrke & Morgan (1978)	State anxiety heart rate exercise (walking)	75	M	Coll	Novice	Exercise group - RE Meditation group Control	Walking Taped Relaxation Response D - 20 minutes
Hamberger & Lahr (1980)	Physiological Measure EMG	40	M&F	Coll	Novice	Modified version of Jacobson's for progressive relaxation - IG Control	Taped instructions F - 5 sessions D - 40 minutes over 1 week
Lehrer, Schoicket, Corrington & Woolfolk (1980)	Physiological Measure Skin conductance Heart rate EEG-EMG	36	-	-	-	Progressive Relaxation - MR Clinically Standardized Meditation Control	F - 5 week period 2 treatment groups received 4 weekly sessions of group training D - 1 to 1-1/2 hour

Table 4

(continued)

Study	Dependent Variables	Test Stat.	Results
Paul (1973c)	Physiological response to stressful imagery	-	+ = Progressive and Hypnotic does produce inhibition of physiological resonses to stressful visualizations
Paul (1973d)	Tape recorded versus live relaxation training	-	+ = Progressive relaxation best - live 0 = No differences between taped and live for hypnosis or control
Goldfried & Trier (1974)	Behavioral Measures Subjective Indicators of anxiety Questionnaire Battery	Pre-Post Pearson product	+ = Self-control best
Chang-Liang & Denney (1976)	Test anxiety General anxiety	ANOVA	+ = Applied relaxation best for both anxiety measures and systematic densensitization was second best
Russell, Sipich & Knipe (1976)	Measure EMG & Anxiety differential	-	+ = 16 muscle group - live - = 16 muscle group - taped 0 = No significance in 4 muscle group - live
Bahrke & Morgan (1978)	Physiological Measure - State Anxiety	ANOVA	0 = All equally effective in reducing state anxiety
Hamberger & Lahr (1980)	Physiological Measures concerning Imagery - Gordon test	ANOVA	+ = Physiological measures for relaxation group 0 = Imagery both groups
Lehrer, Schoicket, Corrington & Woolfolk (1980)	Physiological Measures Loud tones	ANOVA	+ = Meditation best 0 = No significance between relaxation and control

Table 4

(Continued)

Study	Task and Task Type	n	Sex	Age Group	Experienced or Novice	Independent Variables	Relaxation Training Characteristics
Borkovec (1982)	12 year study	-	-	-	-	Relaxation - MR Insomnia Anxiety Worry	-
Long (1983)	State and Trait Anxiety Inventory	73	M&F	Coll Adt	Novice	Aerobic Conditioning - RE Stress Inoculation - CS Control	F - 10 weeks D - 1-1/2 hours per week

Table 4

(continued)

Study	Dependent Variables	Test Stat.	Results
Borkovec (1982)	Attention and control - ability of cognitive activity	-	+ = Relaxation - = Insomnia - = Anxiety 0 = Worry
Long (1983)	Psychological Measures Fitness measure	ANOVA	+ = Both groups were equally effective on psychological measures + = Aerobic conditioning better fitness

Note: M = male; F = female; Coll = college; HS = high school; Adt = adults; F = frequency; D = duration; MR = muscle relaxation; CS = coping skills; IG = instructor guided; RE = relaxation exercises

+ = facilitated performance/influenced affective state in predicted direction

- = decline in performance/did not influence affective state in predicted direction

0 = had no effect on performance or affective state

Another study showing partial support for the effectiveness of relaxation techniques was conducted by Sime and Vokolek (1983). These investigators taught a Competitive Stress Management course to a group of 40 university athletes and assessed how this course influenced physiological changes (SCAT scores and skin temperature) and level of performance. When findings of all athletes were considered, these investigators reported that although individual differences occur, competitive anxiety is related to physiological and psychological changes (SCAT score and skin temperature) and to the level of performance. As with much of the relaxation research, however, the results are weakened by the lack of experimental control and the failure to employ detailed statistical analyses.

The two studies that did not demonstrate support for the effectiveness of relaxation training were conducted by Bennett and Stothart (1978) and Huddleston (1982). The study by Bennett and Stothart examined the effect of using a relaxation-based cognitive technique as an aid in controlling excess arousal levels for intercollegiate athletes. These athletes represented the sports of badminton, archery, gymnastics and wrestling. Subjects were placed in either an experimental group which used the relaxation-cognitive treatment or in a control group which used a placebo-treatment, and each subject performed a task selected by their respective coaches. The gymnasts, for example, had to execute a turn, a leap and tumbling move on the balance beam while the badminton players task was the short-serve. The results revealed that no significant performance differences occurred between the relaxation-cognitive treatment group and the placebo-treatment group for any of the athletes, although some of the predicted differences in state anxiety did take place.

A second study not supporting the effectiveness of relaxation training was conducted by Huddleston (1982) and examined the effects of an abbreviated progressive relaxation training treatment on precompetition state anxiety and peg-board task performance. Subjects were assigned to one of three groups: (1) abbreviated progressive relaxation; (2) attention placebo-control; and (3) no-treatment control. Results of the study revealed that performance times for the peg-board task were faster after training than before training for subjects in the abbreviated progressive relaxation group, but did not significantly differ from the times of the attention-placebo control group. However, the results did reveal that the abbreviated progressive relaxation subjects had statistically significant lower pulse rates and precompetition state anxiety scores after training then before training, while no differences were found for the attention-placebo control or the no-treatment control groups.

Based on these five studies it appears that relaxation training can influence athletic performance, although the relationship between relaxation and performance has not been consistently demonstrated. Thus, more research is needed before it can be concluded that relaxation training has consistent enhancement effects on performance. A special need also exists for more highly controlled studies using statistical analysis as compared to subjectively based performance evaluation techniques.

The Relationship Between Relaxation Training and Physiological and Psychological States

While the number of studies directly examining the relaxation motor performance relationship are few, more research has been conducted where

the effects that various relaxation techniques have on selected psychological and physiological variables are examined. For example, Davidson and Hiebert (1971) investigated the relative effectiveness of two relaxation procedures for reducing physiological stress and anxiety as measured by stress reactions in a situation of repeated exposures to a stressor film. Subjects were assigned to one of three groups: (1) taped abbreviated progressive relaxation training; (2) relaxation instruction; and a (3) control group. Dependent variables in the study were skin conductance, galvanic skin response and self-report anxiety scales. The results were statistically significant and demonstrated that arousal decreased for both relaxation groups (taped abbreviated progressive relaxation training and relaxation instruction), but not the control. Thus, relaxation training was shown to influence both physiological and psychological states.

In this review 17 studies were identified which examined how various relaxation techniques influenced selected physiological and psychological variables in motor behavior contexts. A summary of the results of these 17 studies is contained in Table 4. Inspection of this table reveals that eight studies found direct support for the use of relaxation training, six studies found partial support, and three studies found no support for its use. Thus, an analysis of the studies contained in Table 4 reveals that relaxation training does influence various physiological and psychological variables.

While these results revealed that relaxation training does influence various physiological and psychological variables, clear support for the benefits of relaxation training was not found in all cases. This may result from the fact that, unlike the VMBR literature,

differing relaxation techniques were used in the various studies. Thus, it is possible that the effectiveness of relaxation training in enhancing performance is task dependent.

To determine if specific relaxation techniques vary in their effectiveness, the techniques used in each study were recorded and comparisons of their effectiveness were made. These comparisons are contained in Table 5 and revealed that relaxation exercises and coping skills were found to be the most effective major techniques. It should also be recognized, however, that the specific muscle relaxation technique of progressive relaxation also appeared to be effective. Unfortunately, these findings can only be viewed as speculative because of the small number of investigations using each technique and the lack of technique standardization between studies.

Gender Differences

Of the 22 studies contained in Tables 3 and 4, four studies utilized males, seven studies utilized females, nine studies utilized a combined sample of males and females, and in three studies the sex of the subjects was not reported. Of the four studies utilizing male subjects (Jacobson, 1934; Nideffer and Deckner, 1970; and Bahrke and Morgan, 1978) all found that relaxation training facilitated performance. Similarly, for the seven studies utilizing females (Russell, 1931; Davidson and Hiebert, 1971; Paul, 1973a, 1973b, 1973c, 1973d; Russell, Sipich and Knipe, 1976; and Huddleston, 1982), all found that relaxation training facilitated performance. When the nine studies utilizing a combined sample of males and females were examined, only two studies were found to have made gender comparison. It is interesting to

Table 5

A Comparison of the Effectiveness of Relaxation Techniques

	Technique Classification and Specific Technique	Achieving Statistical Significance	Partial Statistical Significance	Not Achieving Statistical Significance
I.	Muscle Relaxation (totals)	8	2	8
	A. Jacobson Progressive Relaxation	(0)	(1)	(1)
	B. Progressive Relaxation	(5)	(0)	(2)
	C. Relaxation-Cognitive	(0)	(1)	(0)
	D. Standard Relaxation	(0)	(0)	(1)
	E. Use of 16 muscle groups	(1)	(0)	(0)
	F. Use of 4 muscle groups	(0)	(0)	(1)
	G. Relaxation only	(1)	(0)	(1)
	H. Trained in relaxation	(1)	(0)	(0)
	I. Untrained in relaxation	(0)	(0)	(1)
	J. Relaxation Instruction	(0)	(0)	(1)
II.	Coping Skills (totals)	2	2	1
	A. Applied Relaxation	(1)	(1)	(1)
	B. Self-control relaxation	(1)	(0)	(0)
	C. Stress-Inoculation Training	(0)	(1)	(0)
III.	Instructor Guided (totals)	1	4	2
	A. Taped relaxation	(0)	(2)	(2)
	B. Live demonstration	(1)	(1)	(0)
	C. Modified version of Jacobson's progressive relaxation	(0)	(1)	(0)
IV.	Relaxation Exercises (totals)	0	2	0
	A. Walking	(0)	(1)	(0)
	B. Aerobic conditioning	(0)	(1)	(0)

note, however, that in both these studies sex related differences in relaxation utility are reported. For example, the Bennett and Stothart (1978) study found an interesting interaction between the sex of the subject, the effectiveness of relaxation training and state anxiety level. Specifically, these investigators found that relaxation training was more effective in reducing state anxiety with males than females, although no between group performance differences emerged. In an earlier study, Russell (1931) also found sex differences in task performance (underhand ball toss at a target) under varying levels of relaxation and tension. In this study men performed relatively better than women under relaxation training. Unfortunately, both of these studies are confounded with one or more methodological and data analysis problems (e.g., unequal between group pretest differencies, inappropriate statistical tests) which weakens their conclusions.

In summary, the research reveals that relaxation training has been shown to influence psychological and physiological states, as well as performance in both males and females. It should be noted, however, that two studies (Russell, 1931; and Bennett and Stothart, 1978) have reported differences in the effectiveness of relaxation training favoring males, although methodological problems in these studies and the lack of between sex comparisons in other studies prohibits the identification of subject sex as an important moderator variable until additional studies are conducted.

Age Differences

Sixteen of the 22 relaxation studies appearing in Tables 3 and 4 used college age subjects. In 14 of the 16 studies, relaxation training

was found to be effective. Thus, a considerable amount of evidence exists to show that relaxation training is effective for use with college age subjects. Of the remaining studies appearing in Tables 3 and 4, two studies (Mathews and Gelder, 1969a and 1969b) employed older adults, two studies (Lehrer, Schoicket, Corrington, and Woolfolk, 1980; and Borkovec, 1982) did not report the age of the subjects being examined and two studies (Lader and Mathews, 1970; and Long, 1983) used a combined sample of high school aged, college aged and older adults. Unfortunately, of the studies using samples of differing ages, between age comparisons were not made. Thus, few conclusions can be made regarding the effectiveness of relaxation training on non college age samples.

Type of Task Differences

Of the 22 studies contained in Tables 3 and 4, three studies examined motor tasks (Russell, 1931; Nideffer and Deckner, 1970; and Bennett and Stothart, 1978) and three studies (Davidson and Hiebert, 1971; Goldfried and Trier, 1974; and Huddleston, 1982) examined cognitive tasks. In all six studies partial support was found for the effectiveness of relaxation training. The other 16 studies used various physiological and psychological performance measures which could not be classified as motor, cognitive or strength tasks. Thus, while it seems clear relaxation training enhances performance on motor and cognitive tasks, further research needs to be performed on strength tasks to determine if performance is influenced by relaxation training.

Six studies were found to employ self-paced (closed-skill) tasks, and all performance was found to be partially effected by relaxation

training in all six studies. Unfortunately, no studies were found to have used reactive (open-skill) tasks. Thus, while it seems clear relaxation training enhances performance on self-paced tasks, further research needs to be performed on reactive (open-skill) tasks to determine their effect on relaxation training.

Duration and Frequency of Relaxation Training Practice Differences

Of the 22 studies in Tables 3 and 4, 18 contained specific information about frequency and duration of relaxation training practice. Duration periods were found to range from 5 minutes to 90 minutes with the median being 60 to 90 minutes. As for frequency of relaxation training sessions, 18 of the 22 studies reported frequencies ranging from 1 day to 10 weeks. When comparing significant studies versus studies not attaining significance, no consistent differences were evident using varying duration and frequency periods. Thus, little evidence exists concerning the optimal duration and frequency of relaxation training needed.

Summary

Relaxation training appears to have some effect on changing physiological and psychological measures as well as performance. Unfortunately, controversy exists concerning the type of relaxation techniques that are most effective, the training procedures being needed and other potential variables of influence. It is evident that researchers must investigate these controversial issues in more controlled studies using athletic tasks before the effectiveness of relaxation training can be fully understood.

Mental Practice

Mental practice must also be included in a review of psychological techniques for enhancing athletic performance since this technique often incorporates aspects of both imagery and relaxation. Mental practice has also been one of the most extensively studied areas in sport psychology, with over 100 research investigations being conducted since the early 1930s. Finally, interest in studying mental practice has been intensified in recent years with the increasing emphasis sport psychologists have placed on understanding how various psychological states influence athletic performance.

Mental practice can be defined as the cognitive repetition of a task, without observable movement, with the specific intent of learning (Corbin, 1972). For example, a basketball player imagines him or herself performing the required movements of the perfect foul shot, hitting just over the rim. The basketball player then cognitively rehearses the imaginery foul shot for a given frequency and duration of time.

Since a number of extensive reviews (Richardson, 1967a, 1967b; Corbin, 1972; and Feltz and Landers, 1983) of the mental practice literature have been conducted it would be redundant to review each individual mental practice study in this manuscript. Therefore, an examination of the conclusions of three previous reviews will be examined.

Richardson (1967a, 1967b) conducted the first reviews of the mental practice literature, examining the research dating back to the early 1930s. Two review articles were presented. In his first article

(Richardson, 1976a), Richardson examined those studies testing the effects of mental practice on motor performance and individual differences in the amount of performance improvement obtained. He concluded that mental practice procedures could be correlated with improved performance. Factors influencing the mental practice-performance relationship identified included bilateral transfer, the degree of subject familiarity with the physical performance of a task and the ratio of mental to physical practice. Richardson also concluded that individual factors may facilitate or inhibit the amount of improvement to be obtained from mental practice. Those factors that showed a significant relation to amount of improvement from mental practice were games ability, motor ability, imaging ability and the capacity for selective attention.

In his second article Richardson (1967b) outlined the main hypotheses explaining how mental practice improved performance. In addition, the main methodological issues associated with mental practice research and suggestions for future basic and applied mental practice research were discussed. It was also concluded that more controlled investigations are needed to confirm the mental practice findings and to extend the knowledge of mental practice.

Five years after Richardson's efforts, Corbin (1972) also examined the mental practice literature. Based on a review of 74 studies, he concluded that mental practice can positively affect skilled motor performance when practice conditions are controlled. However, Corbin found that mental practice is not always an aid to performance because factors such as the type of practice, the type of task and the nature of the performer influence the extent of behavior change resulting from

mental practice. Corbin concluded that while a great deal is known about mental practice, investigators still need to examine mental practice directly rather than using indirect assessments. That is, researchers have investigated behavior changes that accompany periods of mental practice but have not demonstrated whether these behavior changes are a result of the mental practice or other treatment conditions.

The most recent review of mental practice literature was conducted by Feltz and Landers (1983). For several reasons, particular emphasis will be placed on the conclusions of this review in the present investigation. First, it is the most recent and comprehensive review conducted to date. Second, it includes those studies cited by Richardson (1967a, 1967b) and Corbin (1972), as well as new, previously unexamined studies. And third, it is a statistical review which employs the method of meta-analysis and in so doing reduces possible biases evident in nonstatistical reviews (Glass, 1977).

A meta-analysis is a statistical technique used to combine the results of independent studies related through a common conceptual hypothesis or common operational definitions of independent or dependent variables (Glass, 1977). Simply stated, it is a way of statistically summarizing results across many individual studies. Once the results are summarized, statistical tests can then be conducted to determine whether specific hypotheses or predicted relationships between common variables in the studies are significant when the findings of all studies are considered.

In their review, Feltz and Landers (1983) cited 98 mental practice studies, although only 60 studies were included in the actual meta-analysis since 38 investigations did not meet necessary statistical

requirements. Using these 60 studies, various effect sizes (differences between treatment and control group means divided by within group standard deviations) were calculated and significance tests conducted. It is also important to recognize that because many of the 60 studies employed measured the effect of mental practice on more than one task or under more than one condition, the number of effect-size measure often exceeded the number of studies reviewed.

From the 60 studies included in the review, 146 effect sizes were calculated using the formulas outlined by Glass (1977). These 60 studies and 146 effect sizes are contained in Table 6.

Using the 146 effect sizes contained in Table 6, an overall average mental practice versus no practice effect size of .48 was calculated and found to be significant at the .01 level. Thus, Feltz and Landers (1983) findings revealed that mentally practicing a motor skill influences performance to a greater degree than no practice at all.

Gender Differences

Of the 60 studies contained in Table 6, all reported the sex of the subject. Twenty-nine studies utilized males, 22 studies utilized females and nine studies utilized both males and females. When Feltz and Landers (1983) compared effect sizes for studies using males and those using females, no significant gender differences emerged. Thus, they concluded that mental practice is effective for both males and females.

Age Differences

Forty-seven of the studies contained in Table 6 used college age subjects, six studies utilized high school age subjects and six studies

Table 6

Summary of Characteristics and Effect Sizes for Mental Practice Studies

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Arnold (1965)	Dart throwing Motor/self-paced	18	F	Coll	Novice	9	50 trials	Pre/post	No	.330
Bagg (1966)	Baseball Motor/reactive	10	M	Coll	Experienced	9	9 trials	Simple	No	.258
Beckow (1967)	Badminton short serve Motor/self-paced	15	M	Coll	Novice	6	6 min	Motivation	No	.553
	Badminton long serve Motor/self-paced	15	M	Coll	Novice	6	6 min	Motivation	No	.341
Bissonette (1965)	Speed skating Motor/neither	10	M	Elem	Experienced	10	10 min	Pre/post	No	1.780
Browning (1972)	Tap dance skill Motor/self-paced	12	F	Coll	Novice	6	15 min	Motivation	No	.079
Burns (1962)	Dart throw Motor/self-paced	62	F	High school	Novice	14	30 trials	Simple	No	.521
Clark (1960)*	Foul shooting Motor/self-paced	72	M	High school	Novice	14	30 trials	Pre/post	No	.908
Corbin (1967a)*	Wand juggling Motor/reactive	10	M	High school	Novice Intermediate Experienced	21	10 min and 30 trials	Simple	No	-.032 .133 .132
Corbin (1967b)*	Wand juggling Motor/reactive	10	M	Coll	Novice	13	30 trials	Pre/post	No	1.711
Cronk (1967)	Cable tensiometer Strength	6	F	Coll	Novice	24	10 trials	Simple	No	-.547
Egstrom (1964)*	Novel ball-striking task Motor/reactive	20	M	Coll	Novice Experienced	5	5 min	Simple	Yes	.068 .882

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Eideness (1965)	Basketball free throw Motor/self-paced	11	M	Coll	Novice	16	25 trials	Pre/post	No	1.595
Epstein (1980)*	Dart throw Motor/self-paced	12	F	Coll	Novice	1	3 min	Motivation	Yes	-.796
		15								-.384
		18	M							-.135
		14								-.306
Gondola (1966)	Base test of dynamic balance Motor/reactive	35	F	Coll	Novice	5	5 min	Simple	No	.419
Hall (in press)	Basketball free throw Motor/self-paced	4	F	Coll	Experienced	5	20 min	Pre/post	No	2.565
Hammerslough (1971)	Softball pitch Motor/self-paced	33	M	Coll	Novice	10	5 min	Pre/post	No	.726
			F							.487
	Golf chip shot Motor/self-paced	33	M	Coll	Novice	10	5 min	Pre/post	No	.645
			F							.459
	Soccer dribble	33	M	Coll	Novice	10	5 min	Pre/post	No	.619
			F							.742
Harby (1952)*	Underhand free throw Motor/self-paced	15	M	Coll	Novice	7	Not given	Simple	No	-.364
						14				.380
						20				-.178
Howe (1967)	Ball juggling Motor/reactive	24	M&F	Coll	Novice	6	10 min	Pre/post	No	.425
										.359
									Yes	.180
										.345
Johnson (1967)	One-wall handball serve Motor/reactive	133	M&F	Elem	Novice	5	5 min	Simple	No	.185

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Kelly (1965)	Overhand volleyball serve	26	F	High school	Novice	10	7-9 min and 20 trials	Motivation	No	.365 .205
Kelsey (1961)*	Sit-ups Strength	12	M	Coll	Novice	20	5 min	Simple	No	.582
Kohl & Roenker (1980)	Pursuit rotor Motor/neither	21	M	Coll	Novice	1	30 sec and 25 trials 30 sec and 18 trials	Motivation	Yes	1.751 .795
Kovar (1969)	Underhand free throw Motor/self-paced	16	F	Coll	Novice	6	5 min	Simple	No	.387
Kuhn (1971)	Soccer dribble Motor/reactive	18	M	Coll	Novice Experienced	10	10 trials	Motivation	Yes	-.567 .399
LaLance (1974)	Power handball serve Motor/self-paced	15	M	Coll	Novice	8	Not given	Simple	No	-.066
	Lob handball Motor/self-paced									1.048
Levy (1969)	Center football snap Motor/self-paced	20	M	Coll	Novice	18	6 trials	Motivation	No	-.462
Maxwell (1968)	Volleyball serve Motor/self-paced	16	F	Coll	Novice	8	10 trials	Pre/post	No	.738
Mendoza & Wichman (1978)*	Dart throw Motor/self-paced	7	M&F	Coll	Experienced	12	15 min	Simple	No	2.222
Moritani (1975)	Jump board Motor/self-paced	16	F	Coll	Novice	10	6 min	Pre/post	No	.235

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Morrisett (1956)	Finger dexterity Motor/self-paced	24	M&F	Coll	Novice	1	7 min	Motivation	Yes	.258
	Dial-a-maze Cognitive	24	M&F	Coll	Novice	4	7 min	Motivation	Yes	.273
	Dart throw Motor/self-paced	10	M	Coll	Novice	3	21 min	Motivation	Yes	.390
	Card sorting -Low cognitive -High cognitive	8	M	Coll	Novice	1	5 min	Motivation	Yes	.265 1.215
Murphy (1977)	Jumpshot Motor/self-paced	9	M	High school	Experienced	12	Not given	Motivation	No	.781
Perry (1939)*	Three-hole tapping Motor/neither	16	M	Elem	Novice	5	30 sec	Motivation	No	.527
	Card-sorting Cognitive	16	M	Elem	Novice	5	60 sec	Motivation	No	1.347
	Peg-board test Cognitive	12	M	Elem	Novice	5	60 sec	Motivation	No	2.327
	Symbol digit test Cognitive	15	M	Elem	Novice	5	60 sec	Motivation	No	2.008
	Mirror tracing Motor/neither	14	M	Elem	Novice	5	60 sec	Motivation	No	.858
Phipps & Morehouse (1969)*	Hockey swing Motor/self-paced	36	M	Coll	Novice	5	10 trials	Motivation	Yes	.511
	Jumpfoot Motor/self-paced	36	M	Coll	Novice	5	10 trials	Motivation	Yes	.571
	Soccer hitch kick Motor/self-paced	36	M	Coll	Novice	5	10 trials	Motivation	Yes	.025

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Rawlings & Rawlings (1974)*	Rotary pursuit Motor/neither	17	F	Coll	Novice	1	3 min	Motivation	Yes	1.051
Razor (1966)	Hand-grip -dominant hand -nondominant hand Strength	17	M	Coll	Novice	18	10 sec and 10 trials	Pre/post	No	.090 .197
Rodriguez (1967)	Sit-ups Strength	14	F	Coll	Novice	17	5 min	Simple	No	.063
Ryan & Simons (1981)*	Dial-a-maze Cognitive	13	M	Coll	Novice	1	30 sec and 9 trials	Motivation	Yes	1.478
	Stabilometer Motor/reactive	13	M	Coll	Novice	1	30 sec and 9 trials	Motivation	Yes	.690
Sackett (1934)*	Maze learning Cognitive	20	M	Coll	Novice	7	5 trials	Simple	No	2.455
Sackett (1935)*	Finger maze Cognitive	25	F	Coll	Novice	7 21 35	1 trial 3 trials 5 trials	Simple	No	1.880 1.057 3.310
Seaborne (1981)	Karate competition Motor/reactive	8	M	Coll	Novice	35	10 min	Motivation	Yes	.438
	Karate skills Motor/self-paced	8	M	Coll	Novice	35	10 min	Motivation	Yes	-.143
Shappell (1977)	Maze tracing Cognitive	15	M	Coll	Novice	20	34 sec	Simple	Yes	1.110
Sheldon (1963)	Breaststroke Motor/neither	14	F	Coll	Experienced	9	5 trials	Pre/post	No	.984
	Breaststroke kick Motor/neither	14	F	Coll	Experienced	9	5 trials	Pre/post	No	1.120

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Sheldon & Mahoney (1978)*	Basketball free throw Motor/self-paced	15	F	Coll	Experienced	15	3 min	Pre/post	Yes	-.260 .083
Shick (1970)*	Wall volley Motor/reactive	5	F	Coll	Experienced	10	3 min	Simple	No	-.068
	Volleyball serve Motor/self-paced	5	F	Coll	Experienced	10	3 min	Simple	No	1.531
Smith & Harrison (1962)*	Accuracy/speed Task Motor/reactive	10	M	Coll	Novice	6	10 sec	Motivation	Yes	.487
Smyth (1975)*	Mirror drawing Motor/neither	10	M&F	Coll	Novice	1	5 trials 5 min	Simple	Yes	.420 .293
	Pursuit rotor Motor/neither	10	M&F	Coll	Novice	1	4 min	Simple	Yes	.373
Spears (1966)	High jump Motor/self-paced	15	F	Coll	Novice	10	20 min	Simple	No	.187
Standridge (1971)	Swimming whipkick Motor/self-paced	10	F	Coll	Novice	8	30 min	Pre/post	Yes	.316
Start (1962)*	Underarm basketball throw Motor/self-paced	38	M	High school	Novice	9	5 min	Simple	No	1.356
Stebbins (1968)*	Target throw Motor/self-paced	21	M	Coll	Experienced	18	25 trials	Simple	No	.020
Stephens (1966)	Accuracy throw Motor/self-paced	8	F	Coll	Novice	1 2 3 4 5 6	9 trials	Motivation	Yes	.052 .244 .204 .684 .440 .307

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
Surburg (1968)*	Forehand tennis Motor/self-paced	25	M	Coll	Novice	24	Not given	Motivation	No	.480 1.214 .531 .900 1.367 .582
Tufts (1963)	Bowling Motor/self-paced	12	F	Coll	Experienced	9	15 min	Pre/post	No	.027
Twining (1949)	Target throw Motor/self-paced	12	M	Coll	Novice	20	15 min	Not given	No	1.097
Whitehill (1964)	Handball serve Motor/self-paced	19	M	Elem	Novice	8	7 min	Simple	No	.502
Whitehill (1965)	Handball toss Motor/self-paced	36 27	M&F	Elem	Novice	5	5 min	Simple	No	-.053 -.203 -.047
	Ball throw Motor/self-paced	36 27	M&F	Elem	Novice	5	5 min	Simple	No	-.322 -.293 -.047
	Paddleboard serve Motor/self-paced	36 27	M&F	Elem	Novice	5	5 min	Simple	No	-.148 .016 .274
Willis (1966)	Hand grip Strength	10	M	Coll High school Elem	Novice	6	Not given	Simple	Yes	.103 -.322 .092
			F	Coll High school Elem						.598 .559 -.224

Table 6

(continued)

Study	Task and task type	n	Sex	Age group	Experienced or novice	Practice sessions	Length of practice	Control	Immediate posttest	Effect size
	Standing long jump Strength	10	M	Coll	Novice	6	Not given	Simple	Yes	.377
				High school						-.073
				Elem						.784
			F	Coll						.643
				High school						-.580
				Elem						.381
	Hand grip Strength	6	M	Coll	Novice	8	Not given	Simple	No	-.382
				High school						-.156
				Elem						-.390
			F	Coll						.495
				High school						-.154
				Elem						1.056
	Standing long jump Strength	6	M	Coll	Novice	8	Not given	Simple	No	.758
				High school						-.793
				Elem						-.408
			F	Coll						.805
				High school						.914
				Elem						.291
Wissil (1965)	Football pass Motor/self-paced	20	M	Elem	Novice	15	30 trials	Motivation	No	.802
Wilson (1960)	Tennis forehand and backhand	14	F	Coll	Experienced	6	28 trials	Simple	No	-.073
	Motor/self-paced	15			Novice					.293
Wrisberg & Ragsdale (1979)	Block test Cognitive	20	F	Coll	Novice	1	3 min	Motivation	Yes	.364
	Stabilometer Motor-reactive	20	F	Coll	Novice	1	3 min	Motivation	Yes	.204

*Published

Note: M = male; F = female; Coll = college; Elem = elementary;

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utilized elementary age subjects. The meta-analysis results comparing these three age groups revealed that there were no statistically significant differences between the three groups. Therefore, mental practice appears to have positive effects on all three groups. It was noted, however, that more research is needed to examine age differences in mental practice utility.

Type of Task Differences

Of the 60 studies contained in Table 6, 48 studies used motor tasks, five used strength tasks and three used cognitive tasks. In addition, four of the studies used motor and cognitive tasks, but no between tasks comparisons were made. Feltz and Landers (1983) found that the three studies employing cognitive tasks had a larger average effect size than studies using motor tasks or strength tasks. In addition, large effect sizes for cognitive tasks were most often achieved in a relatively short practice session and with only a few trials. As for motor and strength tasks, they generally required many more trials or minutes to achieve effect sizes of similar magnitude. Therefore, task type appears to effect the mental practice - performance relationship.

Duration and Frequency of Mental Practice Differences

Feltz and Landers (1983) also performed polynomial regression analysis (Blalock, 1972) to investigate whether duration and frequency of the mental practice differences emerged. Specifically, the three variables were examined: (1) the number of practice sessions; (2) length of practice sessions in minutes; and (3) number of practice

trials per session. Results indicated no significant linear or curvilinear relationships between number of practice sessions and effect size. However, the length of practice effect size was found to be significant with the largest mental practice effects size occurring when the length of practice sessions were under one minute or between 15 and 25 minutes. The results also revealed that studies employing less than six trials, or between 36 and 46 trials per practice session, demonstrated the largest effect size. Finally, Feltz and Landers (1983) also compared the type of task to the amount of mental practice performed. They concluded that higher effect sizes were associated with less than six practice trials on cognitive tasks, while motor and strength tasks required many more trials/minutes to achieve larger sizes.

Other Variables Differences

Other potential variables of influence considered by Feltz and Landers (1983) were skill types (self-paced or closed-skill versus reactive tasks or opened-skills), the ability of the athletes (experienced or novice), design characteristics (control, simple control, pre/post testing interval (less than 10 minutes or greater than 10 minutes) and publication source (unpublished or published studies)). The only statistical significant differences occurred between unpublished and published studies. Results revealed that the average effect size for published studies (M = .74) was more than double the average effect size for the unpublished studies (M = .32).

Summary

Mental practice appears to facilitate performance somewhat better than no practice at all. In addition, it has been found that practice sessions of under one minute in length or between 15 and 25 minutes per session produced the largest mental practice effects. Frequency results revealed that studies employing less than six trials or between 36 and 46 trials per practice session demonstrated the largest effect size. Similarly, it was concluded that published studies were found to be statistically significant as compared to unpublished studies. Based on the results of Feltz and Landers (1983), it also appears that gender differences, age differences, the type of ability of the athletes, and design characteristics has no statistically significant effect on mental practice, although more investigations are needed to specifically test for the effects of these variables.

A Mental Skills Training Program

For years coaches and athletes have recognized that psychological preparation can be as important as physical preparation in helping athletes achieve maximum performance. Unfortunately, little was known about specific techniques that were effective in helping athletes mentally prepare for competition until recently. This review has shown, however, that relaxation training, mental practice and VMBR have all been found to affect various psychological and physical states and, in turn, influence performance. Thus, coaches and athletes now have a variety of techniques available to them for controlling their mental preparation and facilitating performance.

While VMBR, relaxation training and mental practice have all been shown to be related to improve athletic and motor performance, it would be a misconception to conclude that all aspects of these relationships have been fully studied and understood. Rather, some aspects of these relationships remain unexplored, other aspects have been only partially studied and understood and still other aspects have been more fully examined and understood. Because aspects of these relationships vary in the amount they have been studied and understood, a summary of what is known, unknown and only partially understood about each technique is described below.

Visual Motor Behavior Rehearsal Research Conclusions

Based on the VMBR performance research, the following principles can be made:

1. VMBR effectively facilitates athletic performance, although in some cases only partial support has been found for its effectiveness.
2. VMBR has been found to facilitate performance, regardless of the sex of the subject employed. It should be noted, however, that direct comparisons of subject sex have not been made in these investigations.
3. VMBR has been shown to facilitate the performance of college-aged subjects. Unfortunately, studies comparing the effectiveness of VMBR in enhancing performance when athletes of other ages have not been considered.
4. VMBR has been found to be effective in facilitating performance when both reactive and self-paced tasks have been

employed. Before final conclusions can be made, however, more research examining how VMBR influences performance on other task types is needed.

5. Not enough research has been conducted to determine the optimal duration or frequency of VMBR practice bouts needed to provide maximum performance enhancement.

Relaxation Training Research Conclusions

The following conclusions have been derived from the relaxation-performance research:

1. Relaxation training has been found to facilitate athletic performance. The facilitating effect of relaxation training, however, has not been found in all studies.
2. Relaxation training has been consistently found to affect various physiological and psychological states, although in some cases only partial support has been found for its effectiveness.
3. The effectiveness of relaxation training appears to be dependent on the specific type of relaxation strategy employed. Unfortunately, too few investigations have been conducted to identify which specific relaxation techniques or strategies are most effective.
4. Relaxation training has been shown to influence psychological and physiological states, as well as performance in both males and females. However, some preliminary evidence does suggest that some sex differences in the effectiveness of implementing relaxation training may be evident. Unfortunately, more

research is needed before these suggestive findings can be varified.

5. Relaxation training has been found to influence performance and/or physiological-psychological states on cognitive tasks, motor tasks and self-paced tasks. Unfortunately, comparisons between tasks types have seldom been made, so final conclusions can not be derived.
6. No optimal duration or frequency of relaxation training practice for improving performance and affecting various physiological and psychological states has been identified.

Mental Practice Research Conclusions

The following conclusions can be derived from the mental practice research literature:

1. When compared to no practice, mental practice facilitates athletic performance.
2. Mental practice has been found to facilitate the performance of males and females. Moreover, no significant sex differences have been linked to the effectiveness of using mental practice.
3. Mental practice has been found to be effective for various age groups. In addition, no significant mental practice age-related differences have been found.
4. Mental practice is most effective when cognitive, as compared to motor or strength tasks, are employed. Moreover, to effectively facilitate performance on motor and strength (as compared to cognitive) tasks, greater amounts of mental practice are required.

5. Mental practice sessions of under one minute in length or between 15 and 25 minutes per session have been found to produce the largest mental practice effects.
6. Frequency results have revealed that studies employing less than six trials or between 36 and 46 trials per practice session have demonstrated the largest mental practice effects.
7. No differences in mental practice effectiveness have been found between experienced and inexperienced subjects.

Program Overview

In an effort to help coaches and athletes develop their mental skills, this section of the manuscript contains a step-by-step description of a mental skills training program for enhancing performance. This program will incorporate aspects of relaxation training, mental practice and VMBR, the effectiveness of which were previously reviewed. Specifically, a three-phase mental skills training program will be presented and is summarized in Table 7.

As can be seen in Table 7, Phase 1 of the program involves a general orientation to mental skills training, as well as instruction and practice in Jacobson's (1973) progressive relaxation training. In Phase 2, practice in relaxation training is continued and mental practice instruction begins. Phase 3 involves the continuation of relaxation and mental practice training, as well as a discussion and practice of Suinn's (1972a, 1972b) VMBR technique.

The total program will require 30 minutes of daily practice, although Phases 1 and 2 will be practiced for only 20 minutes a day until the athlete progresses to Phase 3. It is also important to note

Table 7

Mental Skills Training Program Phases

Phase 1	Orientation and relaxation training discussion and practice. One week - 20 minutes, once a day.
Phase 2	Continuation of relaxation training adding the discussion and practice of mental practice. Two weeks - 20 minutes, once a day.
Phase 3	Continued practice of relaxation training and mental practice including the discussion and practice of VMBR. Three weeks - 30 minutes, once a day.

that the program is designed for high school age athletes of either sex who have had previous experience with the skills being performed.

Lastly, the instructor must understand the learning process if this program is to be effective. Specifically, at least four elements are necessary if learning is to take place: (1) a living, motivated organism, (2) an incentive which will lead to satisfaction of motives, (3) a barrier, or block, which prevents the organism from immediately gaining the incentive, and (4) effort or activity on the part of the organism to attain the incentive (Oxendine, 1968). While this program focuses primary attention on the fourth element of this model, it is of critical importance that the instructor realize that the other three elements must be considered as well. For if the athlete is not motivated to overcome a barrier or does not believe the program will help improve performance, learning will not take place. In essence, the instructor must consider the four elements of the learning process in implementing this mental skills training program.

Practical Guidelines for Mental Skills Training

Before the specifics of the mental skills training are examined, some general guidelines for using the program must be identified. First, this program is designed for use during the entire season of the sport to which the program is being applied. Second, the program must be presented in a suitable environment. For example, in a quiet room with dim lighting. Third, the director of the program must be aware of possible stressful situations involving the athletes, such as personal problems, school problems or team problems since these factors can easily influence the athlete's stress responses. Fourth, realistic

expectations of the program must be communicated and understood both by the athletes and director. These include the possibility that not all athletes will show the same improvements in performance, that each athlete will be affected differently, that practice is needed if improvements are to occur and that realistic individual goals must be set. Fifth, the director of the program will present live demonstrations to all athletes. Sixth, the athletes will be instructed through each of the phases of the program by the director. And, finally, all three phases of the program will be performed while the athletes are lying down unless otherwise stated.

Phase 1 - Progressive Relaxation - 16 Muscle Groups

Overview. Progressive relaxation is a technique used to teach individuals to recognize the presence of muscular contractions and upon self-command relax selected muscle groups throughout the body. Thus, the purpose of this phase of the program is to help the athletes learn to relax. In addition, relaxation will be used to help the athletes control their concentration by helping them clear their mind of problems and distracting thoughts (Nideffer and Deckner, 1970).

Steps in Teaching Progressive Relaxation. It has been shown that athletes can learn to relax in 10-12 days by practicing 30 minutes per day (Bernstein and Borkovec, 1973). To teach relaxation, the director should follow the steps outlined below:

1. Find a quiet spot where you will not be disturbed.
2. Lie down and get into comfortable position.
3. Close your eyes and imagine a relaxing scene (e.g., the ocean, a quite meadow or whatever scene evokes a peaceful tranquil feeling).

4. Inhale while tensing your muscles and then exhale as you release your muscles. (Have the athletes do this twice for each group of muscles shown below.)

    a. Dominant hand and forearm
    b. Dominant biceps
    c. Nondominant hand and forearm
    d. Nondominant biceps
    e. Forhead
    f. Upper cheeks and nose
    g. Lower cheeks and nose
    h. Neck and throat
    i. Chest, shoulder and upper back
    j. Abdominal or stomach region
    k. Dominant thigh
    l. Dominant calf
    m. Dominant foot
    n. Nondominant thigh
    o. Nondominant calf
    p. Nondominant foot

5. Now feel a total sense of relaxation and comfort over the whole body. Feel the relaxed feeling in your hands, arms, face, shoulders, abdomen, legs and feet. Feel how totally relaxed you are.

6. Finally, take a deep breath and slowly let the air out. Repeat, then breathe rhythmically to achieve the level of relaxation you desire.

Guidelines for Teaching Relaxation. When teaching relaxation the director should follow a number of guidelines. Some of these guidelines are listed below:

1. The athletes' attention should be focused and maintained on the muscle groups (e.g., concentrate on tensing the muscles in the right hand and right forearm by making a tight fist. You should be able to feel tension in the hand and forearm, then relax).

2. At a predetermined signal from the director (such as the word Now), the muscle group is tensed, and tension is maintained for a period of 5-7 seconds.
3. A second predetermined signal (such as the word Relax) is used to inform the athlete when to release muscle tension.
4. When tensing the muscle group, the athletes should inhale, and when releasing the muscle group the athletes should exhale.
5. The director should monitor the athletes' progress in learning to relax. An efficient way of doing so is to lift the athletes' limb during relaxation and feel the amount of muscular tension which is present. Upon command, the athletes should be able to release all tension from the limb.

Phase 2 - Mental Practice

Overview. Mental practice consists of cognitive repetition of a skill, without observable movement, with the specific intent of improving performance (Corbin, 1972). The purpose of this phase of the program, then, is to get the athletes to mentally practice the correct execution of a specific sports skill. After practicing the relaxation procedures learned in Phase 1 for 10 minutes, the athletes will then utilize mental practice. This procedure will be followed throughout Phase 2.

Steps in Teaching Mental Practice. In teaching the athletes how to mentally practice, the following steps or directions should be given:

1. In your mind think of a positive image of your performance for the skill of interest that will produce a feeling of readiness and confidence. For example, think of a positive image of yourself making the perfect foul shot.

2. Then imagine yourself moving through the correct skill performance (try to get outside your body and actually observe yourself doing the correct performance).
3. Next, imagine yourself correctly performing the skill, going through the exact motions needed to correctly execute it.
4. Repeat the same skill as before and try to perform it even better.
5. Now watch yourself as if an observer, going through these motions and really concentrate on your technique (slow motion).
6. Next, still in your imagination, continue to practice your skill (remember to watch as if an observer) until told to stop.
7. Just relax and think of something calm.
8. Now, go and physically practice the skill for 10 trials.

Phase 3 - Visual Motor Behavior

Overview. Visual Motor Behavior Rehersal is a psychological technique used to learn or refine athletic skills and combines imagery, deep muscle relaxation and concentration. Specifically, VMBR is comprised of three compoents: (1) initial relaxation; (2) performance visualization or imagery; and (3) simultaneous relaxation and performance visualization used during a simulated stressful situation. The purpose of the VMBR phase, then, is to get the athletes to mentally experience performing their specific skill correctly under a stressful situation such as actual competition. The VMBR phase will be practiced 30 minutes each day for three weeks and after the three-week training

period should be used as both a regular practice drill and as a precompetitive mental preparation technique.

Steps in Teaching VMBR. The following steps are taken from Suinn (1972a and 1972b) and should be used in teaching VMBR:

1. After practicing the skill, find a quiet spot where you will not be disturbed.
2. Lie down and get into a comfortable position.
3. Close your eyes and imagine a relaxing scene.
4. Then begin moving through the steps of the progressive relaxation training (as previously described).
5. Imagine yourself moving through the correct skill performance under a nonstressful situation.
6. Next, while still laying down, imagine yourself performing the skill, still under a nonstressful situation, and go thrigh the motions of actually perform the skill.
7. Now imagine yourself successfully performing the correct sl under a stressful situation such as in actual competit. Not only see yourself, feel yourself. Feel the sweat, l your clothing, feel the object, hear the crowd, hear noise, feel the pressure, be as detailed as you can with images.
8. Just relax and take a deep breath slowly.
9. Physically practice the skill for 10 trials.

Using Mental Skills Training to Improve Foul Shooting Performance

The following is an example of how a coach can use the previ described mental skills training program to help his or her ath

improve foul shooting performance. In this particular example, the coach is using the program with experienced high school basketball players.

I would like everyone to find a quiet, relaxed spot where you will not be disturbed. Now lie down and get into a comfortable position. Close your eyes and imagine a relaxing scene. Now that you are in a comfortable position, I want you to tense and relax specific muscle groups on my command. Your goal is to focus on the difference between tensed and relaxed feelings in these muscle groups. In addition, I want you to inhale while tensing your muscles and then exhale as you release your muscles.

Let's begin by tensing the muscles in the right hand and right forearm by making a tight fist. You should be able to feel tension in the hand and forearm; then relax. Now I want you to tense the muscles in the right biceps by pushing your elbow down against the floor. You should be able to feel tension in the biceps without involving the muscles in the lower arm and hand; then relax. Now let's try the biceps again.

Follow the above directions for each area of the body listed below:

1. Left hand and forearm - make fist
2. Left biceps
3. Forehead - make a frown
4. Upper cheeks and nose - squint eyes
5. Lower cheeks and nose - clinch jaws
6. Neck and throat
7. Chest, shoulder and upper back - take a deep breath and hold
8. Abdominal or stomach region - tense stomach

9. Right thigh
10. Right calf
11. Right foot - point toes
12. Left thigh
13. Left calf
14. Left foot - point toes

Now, find the best positive image for you that will produce a feeling of readiness and confidence. For example, think of yourself performing the perfect foul shot. Imagine yourself moving through the correct foul shot; try to get outside of your body and actually observe yourself performing the correct foul shot. Next, still while laying down, image yourself correctly performing the foul shot by going through the motions. Repeat the same foul shot as before and try to perform it even better. Now watch yourself, as if an observer, going through these motions and really concentrate on your technique in slow motion. Next, still in your imagination, continue to practice your foul shot and remember to watch as if an observer until told to stop.

You should stop picturing and feeling your foul shot now and just relax and think of something calm. Good, now I want everyone to get up slowly and walk to the foul line and physically practice your foul shot 10 times. After physically practicing the skill, I then want you to find a quiet spot where you will not be disturbed. Lie down, get into comfortable position, close your eyes, and imagine a relaxing scene. Then begin moving through the steps of the progressive relaxation training as previously learned. Imagine yourself moving through your foul shot just as you did on those shots that were correctly executed. Go through the motions of actually performing the foul shot.

Now imagine yourself successfully performing the correct foul shot under a stressful situation such as in actual competition; feel the sweat, feel your clothing, feel the basketball, hear the crowd, hear the noise, feel the pressure, be as detailed as you can with your image. Imagine yourself performing successfully. Remember, feel the sweat, feel your clothing, feel the basketball, hear the crowd, hear the noise, feel the pressure, be as detailed as you can. Good, make the shot several times in a row. Now just relax and take a deep breath slowly. Then, I want everyone to get up slowly and walk to the foul line and physically practice your foul shot 10 more times.

Program Evaluation

To determine if the mental skills training is actually reducing stress and facilitating performance, it is important to evaluate the athletes while they are participating in the program. Evaluation procedures are used to determine if the mental skills training instructions are being met by the athletes. Similarly, evaluation procedues will determine the effectiveness of each phase of the mental skills training. One effective evaluation procedure would employ the use of pre-program, mid-program and post-program tests of performance for the specific skill of interest. For example, a coach could compare preseasons foul shot percentage scores to midseason and post-season scores. Similarly, a file could be kept on each athlete. This file may include: (a) a self-record relaxation chart; (b) an imagery assessment record; and (c) various self-control assessment scales (See Appendix A, B, C and D). An analysis of the athletes' ratings on these scales could then be made. Finally, the athletes' file should also include

evaluations of individual conferences held with the athlete throughout the phases of the program.

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Appendix A

Relaxation Chart

Session 1 Date:		Session 2 Date:		Session 3 Date:		Session 4 Date:		Session 5 Date:	
Before	After	Before	After	Before	After	Before	After	Before	After

Tension Level

1	25	50	75	100
Sleepy Calm	Fairly Relaxed	Mid-Range	Fairly Tense	Really Up-tight

Taken from Orlick, Terry. In Pursuit of Excellence. Human Kinetics Publishers, Inc. 1980.

Appendix B

Self-Control Scale

SCS-100

1	25	50	75	100
Sleepy Calm	Fairly Relaxed	Mid-Range	Fairly Tense	Really Up-tight

Session or Trial	Situation or Event	Desired Tension Level	Tension Level Before SC Strategy	Tension Level After SC Strategy	Strategy Used	Comments on Strategy or Performance
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Taken from Orlick, Terry. In Pursuit of Excellence. Human Kinetics Publishers, Inc. 1980.

Appendix C

Sports Imagery

		Yes	No	Unsure
1.	Can you see yourself standing in your uniform?	___	___	___
2.	Can you see it in color?	___	___	___
3.	Can you now see your uniform in a different color?	___	___	___
4.	Can you see yourself lying down?	___	___	___
5.	Can you see yourself stretching?	___	___	___
6.	Can you see yourself running along the road?	___	___	___
7.	Can you see yourself running up a very steep hill?	___	___	___
8.	Can you see yourself running over the top of the hill?	___	___	___
9.	Can you see yourself running down the other side of the hill, out of control, right into a lake?	___	___	___
10.	Can you see yourself performing a sports skill that you often do in practice?	___	___	___
11.	Can you see yourself doing the same skill in competition?	___	___	___
12.	Can you see the coach and other athletes watching?	___	___	___
13.	Can you see yourself doing that skill a different way?	___	___	___
14.	Can you see yourself correctly executing a sports skill with which you have difficulty?	___	___	___
15.	Can you see yourself relaxed in a situation which usually causes tension?	___	___	___

Taken from Orlick, Terry. In Pursuit of Excellence. Human Kinetics Publishers, Inc. 1980.

Appendix D

Rating Scale

(based on vividness of image)

No Image At All		Vague And Dim		Recognizable But Not Clear		Moderately Clear		Very Clear	Perfectly Clear
1	2	3	4	5	6	7	8	9	10

Taken from Orlick, Terry. In Pursuit of Excellence. Human Kinetics Publishers, Inc. 1980.

Appendix E

Mental Practice References

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PSYCHOLOGICAL TECHNIQUES FOR ENHANCING ATHLETIC PERFORMANCE

by

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ABSTRACT

A research review was conducted for the purpose of examining the effectiveness of Visual Motor Behavioral Rehearsal (VMBR), relaxation training and mental practice in facilitating the acquisition and performance of motor skills. Specifically, the effectiveness of these techniques in enhancing performance was determined by examining the number of studies reviewed which demonstrated statistically significant results, and by determining the direction of those results. The findings revealed that VMBR, relaxation training and mental practice all facilitated athletic and motor performance, although the effectiveness of these techniques was found to be related to other variables such as subject gender, subject age, task type (open versus closed, cognitive, strength, motor) and duration and frequency of mental practice. While a number of variables related to the effectiveness of these techniques were identified, it was also concluded that additional research is needed to further examine VMBR, relaxation training and mental practice under conditions where these potential variables of influence are more highly controlled and/or manipulated. Finally, a three phase mental skills training program for enhancing athletic performance was developed by incorporating the three techniques reviewed.