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Flotation REST and Imagery in the Improvement of Athletic Performance

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Recent years have seen a rapid growth in the application of psychological principles and techniques for improving sport performance. Because performance anxiety and competitiveness may raise arousal above the optimum, and excessive levels of arousal are known to impair a wide range of complex skills including those involved in sports, many of these efforts have been directed toward achieving relaxed alertness and concentration (Lane, 1980). Relaxation techniques from behavior therapy and behavioral medicine (e.g., Benson, 1975) have been successfully applied in the sport setting (e.g., DeWitt, 1980; Syer & Connolly, 1984). Imaginal rehearsal of the desired sequence of sensory/motor units involved in good performance has also been used, both by itself and as a part of multimodal methods (e.g., visuomotor behavior rehearsal, which combines imagery, relaxation, and actual performance; Suinn, 1980). Although the data are somewhat mixed, the weight of the evidence favors mental practice as effectively improving the performance of both expert and novice athletes (Feltz & Landers, 1983; Richardson, 1967; Suinn, 1980).

Both imagery and the lowering of arousal are facilitated by a temporary reduction of ambient stimulation (e.g., Benson, 1975). Profound stimulus reduction, as achieved in the Restricted Environmental Stimulation Technique (REST; Suedfeld, 1980), is a deeply relaxing experience, as indicated by self-report (Hutchison, 1984; Lilly, 1977; Suedfeld, Ballard, & Murphy, 1983) and psychophysiological measures (Jacobs, Heilbronner, & Stanley, 1984; Koula, Kemp, Keane, & Belden, 1987; Turner & Fine, 1982; Turner, Fine, McGrady, & Higgins, 1987). Flotation REST has been successfully used in clinical stress management and other aspects of behavioral medicine (Suedfeld & Kristeller, 1982).

REST has been used in attempts to improve relaxation and imagery in athletes (Hutchison, 1984; Stanley, Mahoney, & Reppert, 1987; Teich, 1983). However, most of the relevant reports are in the realm of anecdote. In the only controlled study, Lee and Hewitt (1987) reported that visual imagery during flotation REST resulted in higher judges' ratings and a trend toward fewer self-reported physical symptoms than did visual imagery only or a control condition. The subjects were novice and intermediate competitive gymnasts. No purely ob-

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jective measure of performance was possible: judges' ratings are subjective and may be affected by a variety of factors.

The current study was designed as a controlled test of the purported facilitative effect of REST and imagery on athletic performance. To control for the nonspecific effects of REST, two comparison groups were used. One experienced another, somewhat unusual, setting as an attention and effort control condition; the other was a normal-environment control group.

Method

Subjects and Procedure

University students were recruited through on-campus advertising for a study on "the effects of mental imagery on a motor skill." Only those volunteers who played basketball occasionally or not at all were accepted. The final group consisted of 20 men and 10 women. With distribution balanced across treatments, 10 subjects were otherwise randomly assigned to each of three treatments.

Each subject participated for 3 days: Day 1, self-report and performance pretests; Day 2, treatment condition; Day 3, posttests. Questionnaires were used to measure previous athletic and imagery experiences and prediction of free-throw success. The performance tests started with five warm-up shots. The score was then recorded on 20 free throws, with a short rest break after the first 10. The posttests repeated the same formats and scoring procedures.

Imagery Training

Subjects in all three conditions (1 hr each) listened to a tape recording guiding them through multisensory imagery of basketball foul shooting. Visual, auditory, tactile, proprioceptive, cognitive, and affective dimensions were used. The last 15 minutes were devoted to performing the imagery exercise along with the tape. Self-ratings of the effects of this experience were collected after the session.

Treatment Environments

REST. The dark, sound-reducing tank, resembling a covered bathtub, contains 35 cm of a dense skin-temperature water and Epsom salts solution. The subject floats with the face and chest out of the water. Each session is preceded and followed by a shower and shampoo. A monitor listens over the intercom throughout the session to answer any questions. All subjects completed the session without difficulty.

Alpha Chair. The shell-like alpha chair, designed to induce relaxation and concentration, almost encloses the subject, cutting off much of the peripheral visual field. The extremely comfortable cushions contain built-in stereo earphones. A footstool is provided to increase comfort.

Control. Control subjects sat alone in an office, in a comfortable armchair. Music and reading materials were provided for use when the imagery tape was not being played.

Results

Repeated-measures ANOVA on foul-shooting scores showed a significant interaction, $F(2,24) = 11.00$, $p < .001$. Tukey paired comparisons showed signifi-

cant differences only on the posttest, where the REST group ($M=11.5$, $SD=2.6$) made significantly more baskets than either the alphas ($M=7.0$, $SD=3.7$) or the controls ($M=6.7$, $SD=3.8$), both $p<.05$. For comparison, the pre to post changes were +37%, +13%, and −11%.

The groups reported different levels of previous basketball experience, $F(2,27)=3.56$, $p<.05$. Although the alpha group had the highest average level of experience, none of the pairwise comparisons showed a significant difference (all $p>.05$ by Tukey test). There was no significant intergroup difference in self-rated athletic ability or predicted performance. Only one subject had used a visualization technique before. There were no significant sex differences.

The posttreatment across-groups main effect on predicted performance was $F(2,27)=4.68$, $p<.02$. The REST group ($M=14.0$, $SD=3.1$) was more confident than alpha ($M=9.7$, $SD=2.8$; $p<.05$, Tukey test); no other intergroup difference reached significance.

Discussion

These results provide strong empirical evidence of improvement in an athletic skill after flotation REST. All groups received imagery training, the alpha group in an unusually quiet and relaxing environment; although the REST group evidenced higher posttreatment confidence than the alpha group, no significant difference existed with the controls. Thus, expectancy alone does not explain the results. REST may induce a state of arousal closest to optimal for the task and/or it may enable subjects to return to such a level 24 hours after treatment. Imagery may be more vivid or more accurate in REST, so that the two components interact synergistically to produce improved performance, or perhaps REST makes imagery more accessible later.

This study did not provide a comparison of the effectiveness of REST as opposed to imagery or other training techniques. Such a test should be performed to confirm and identify more exactly the contribution of REST per se.

The relevance of the findings to actual training is limited by the task and the sample. Our free-throw tests were not part of an actual game. Foul shooting in any event takes place during a suspension of normal play and, like gymnastics, is a coactive rather than an interactive component of group performance. The results should be verified in competition and with interactive as well as coactive sports. Other questions are whether REST can be used to "unlearn" nonoptimal behaviors or to aid recovery from fatigue or injury, its effect on various sports or skills, and its interactions with other types of training.

The two studies now in the literature used subjects who were either inactive in the sport being studied (the current experiment) or in the novice/intermediate class (Lee & Hewitt, 1987). In the training of high-performance athletes, even a marginal improvement may justify the use of REST: it is economical, rapid, has no known negative side-effects, and requires minimal effort.

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