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Psychological and Physiological Responses to Autogenic Feedback Training: The Response of Athletes New to Autogenic Training

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This study examined how athletes new to autogenic training (AT) psychologically and physiologically respond to autogenic feedback training (AFT). It specifically examined AT's warmth sensation training (WST) by comparing an AFT-condition's responses to those of an AT-condition. The psychological indices were subjective evaluation scores regarding (1) motivation for WST and (2) warmth sensation. The physiological index was skin temperature. The AFT condition's score regarding motivation for WST was higher than that of the AT condition, but the AFT condition's score regarding warmth sensation was lower than that of the AT condition. Thus, athletes new to AT do not feel a greater sensation of warmth by performing AFT as opposed to AT; nevertheless, AFT increases their motivation for AT.

key words: athlete, autogenic training, motivation

Purpose

As part of mental training, many athletes conduct a relaxation technique known as autogenic training (AT). AT has been shown to improve athletes' ability to compete and prevent athletes from "psyching out," or succumbing to the pressure of performing at a tournament. However, it generally takes about one to two months to become sensitive to the warmth and weight of one's body, both of which are necessary for practicing AT (Matsuoka & Matsuoka, 1989). As a result, it is important to maintain athletes' motivation until such abilities are acquired, especially because athletes prefer to obtain fast results (Kusumoto, 2000). Autogenic feedback training (AFT), a method that combines AT with biofeedback, may help athletes maintain their motivation to practice AT because biofeedback enables athletes to track the psychological and physiological changes that occur as they practice AT (Kasai, 2000).

In order to examine whether AFT can increase athletes' motivation to use AT, the present study compared how athletes react, both psychologically and Short Report

physiologically, to AFT and AT. This study specifically investigated warmth sensation training (WST) —training to become sensitive to the warmth of one's body—because how to sense the warmth of one's body can be easily learned and WST is crucial for practicing AT.

Method

Experimental participants, location, and environment. 18 males (ages: 20.3 ± 1.7 years) belonging to sports clubs (i.e. baseball, judo, karate, kendo, table tennis) at a university in Tokyo, Japan gave their informed consent to participate in this study. The experiments were conducted in the shield room of the university's psychology laboratory. All participants were new to AT, and none were regularly using another relaxation technique. The experiment was performed in the shield room of the university's psychology laboratory. The shield room had a temperature of $24.5-26.7^{\circ}$ C, humidity of 36.4-51.3%, and illuminance of 35.0 lx.

Experimental conditions. Two experimental conditions were used: the AT condition (eyes closed, AT warmth sensation training carried out on the right hand) and the AFT condition (eyes open, AT warmth sensation training carried out on the right hand while the athlete watches a display of his right palm captured by a thermo tracer). The display used in the AFT condition was positioned approximately 70 cm from the seated participant, as conducted by Okouchi (1991). In the AFT condition, skin temperature information was presented as a visual signal with real-time feedback using a proportional method, in which feedback information is presented successively and proportionally to the changes that occur in the physiological response.

Both during the experiment briefing and immediately prior to conducting the experiment, participants were instructed to continually recite "My right hand is warm" in their minds during the AT. In both conditions, participants were then required to carry out warmth sensation AT on their right hand during the experiment. The experiment was a within-subjects design, and the order of the two experimental conditions was counterbalanced among the participants. As a result, both experimental conditions were never carried out on the same day.

Psychological and Physiological Indices. Subjective evaluations of motivation for WST and sensation of warmth were scored using a visual analogue scale (VAS). The experimental participants were instructed to rate their degree of motivation for WST and the degree to which they felt a sensation of warmth by marking the appropriate point on a 10 cm line labeled "Not at all" at one end and "Extremely" at the other. The distance from "None at all" to each participant's mark was measured in millimeters, and these values were defined as the subjective evaluation scores of motivation for WST and sensation of warmth. To evaluate participants' motivation for WST, participants were required to rate how much they agree with

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	AT	AFT	Result of <i>t</i> -test (<i>t</i> value)
Motivation for WST	63.6 (±15.8)	70.4 (\pm 14.9)	t (17) = 2.17*
Warmth sensation	60.2 (±16.5)	52.3 (\pm 19.5)	t (17) = 2.19*

 Table 1
 Mean (standard deviation) of subjective evaluation scores for motivation for WST and sensation of warmth in both experimental conditions, and results of paired *t*-test.

* *p* < .05

the statement, "I felt motivated to take part in the warmth sensation training" as conducted by Okouchi (1991); to evaluate participants' sensation of warmth, participants were required to rate how much they agree with the statement, "I felt a sensation of warmth."

The physiological index was skin temperature. Skin temperature was measured using a thermo tracer, which took readings from the palm of the right hand every second, and recorded them at 10-second intervals.

Procedure. In order for the participants to become accustomed to the experimental environment, they sat relaxed with their eyes open for approximately 10 minutes. To begin the experiment, participants sat upright in the position most commonly used for AT. The experiment consisted of three phases: (1) pre-experimental rest for three minutes ("pre-experiment"); (2) experimental condition (AT or AFT) for three minutes ("experiment"); and (3) post-experimental rest for three minutes ("pre-experiment"). During the pre-experiment and post-experiment phases, participants sat relaxed with their eyes closed. After the experiment phase, they were asked to record their subjective evaluations regarding motivation for WST and sensation of warmth.

Analysis. The subjective evaluation scores regarding motivation for WST and the subjective evaluation scores regarding sensation of warmth were analyzed using paired *t*-tests for experimental condition (AT, AFT).

Skin temperature was analyzed by taking the mean value from each of the three phases of the experiment and performing a three-way repeated-measures analysis of variance for the following two factors: phase of the experiment (pre-experiment, experiment, post-experiment) and experimental condition (AT, AFT). A multiple comparison was subsequently performed using Ryan's method at a 5% level of significance.

Results

See Table 1 for the mean values of subjective evaluation scores regarding motivation for WST and sensation of warmth, as well as the *t*-test results. The results of the *t*-test regarding motivation for WST in both experimental conditions show that the AFT condition scores were significantly higher than AT condition scores (t(17)=2.17, p<.05). The results of the *t*-test for sensation of warmth in both experimental conditions show that the AFT condition show that the AFT condition scores were significantly higher than the AFT condition scores (t(17)=2.19, p<.05).

An analysis of variance reveals the main effect of the phase of the experiment to be significant (F(2, 34) = 12.94, p < .001). The results of a multiple comparison test show a significant increase in skin temperature from the pre-experiment phase to the experiment phase (MSe = 0.12, p < .05), as well as from the pre-experiment phase to the post-experiment phase (MSe = 0.12, p < .05). Additionally, the skin temperature during the post-experiment phase (MSe = 0.12, p < .05).

Discussion

In this study, skin temperature increased as the experiment progressed. The use of biofeedback in the AFT condition is believed to enable subjects to better track their own psychological and physiological changes than in the AT condition (Kasai, 2000). This may be why the motivation for warmth sensation training was higher in the AFT condition than in the AT condition. In addition, previous AFT studies indicate that AFT does not increase skin temperature more than AT (Surwit, Pilon, & Fenton, 1978), and the results of this study support such reports. The subjective evaluation score of motivation for the warmth sensation training (WST) was higher under the AFT than under the AT. The subjective evaluation score of warmth sensation was higher under the AT than under the AFT.

In conclusion, AFT does not enable athletes to feel a greater sensation of warmth than AT; nonetheless, AFT effectively increases athletes' motivation for AT.

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