The Effects of Progressive Muscle Relaxation and Autogenic Relaxation on Young Soccer Players' Mood States

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Abstract

Purpose: **This study was designed to compare the effects of two different relaxation techniques, namely progressive muscle relaxation (PMR) and autogenic relaxation (AGR) on moods of young soccer players.**

Methods: **Sixteen adolescent athletes (mean age: 14.1 ± 1.3) received either PMR or AGR training. Using Profile of Mood States-Adolescents, their mood states were measured one week before relaxation training, before the first relaxation session, and after the twelfth relaxation session.**

Results: **Mixed ANOVA revealed no significant interaction effects and no significant main effects in any of the subscales. However, significant main effects for testing sessions were found for confusion, depression, fatigue, and tension subscales. Post hoc tests revealed post-intervention reductions in the confusion, depression, fatigue, and tension subscale scores.**

Conclusions: **These two relaxation techniques induce equivalent mood responses and may be used to regulate young soccer players' mood states.**

INTRODUCTION

It is generally acknowledged that any psychological intervention should be guided by a sound conceptual framework. Indeed, conceptual clarity is a prerequisite for an analysis of how psychological processes are regulated [1]. Similar to Morgan [2] and Lane and Terry [3], this study conceptualises mood as a unipolar dimension. Following this framework, mood is proposed to consist of vigour, tension, anger, depression, fatigue, and confusion dimensions.

Mood regulation is important for athletes for at least two reasons. Firstly, it has been postulated that certain mood patterns are advantageous for athletes' performance. For instance, successful performance is associated with above average vigour scores and below average negative mood scores [2]. Moreover, in a recent meta-analytic study, Lane, Beedie, and Stevens [4] revealed that performance can also be facilitated by negative moods such as tension and anger, especially when they are accompanied by zero scores on depression. Thus, appropriate mood regulation

strategies to achieve these patterns may be beneficial for athletes' performance. Secondly, mood regulation is a common self-regulatory process and important in individuals' daily lives [1]. In fact, in a comprehensive study conducted by Thayer, Newman, and McClain [5], the researchers revealed a variety of mood regulation strategies used by participants. Importantly, Thayer et al [5] observed that active mood regulation strategies such as relaxation techniques are commonly used in mood regulation.

The effects of relaxation in mood regulation can be observed in a study of Japanese adults [6]. The researchers reported positive effects of 10-minute relaxation exercises on general mood ratings using Profile of Mood States. Furthermore, they observed a greater reduction in confusion and fatigue scores post-intervention in the relaxation group compared with the control group [6].

Several relaxation techniques are available and can be categorised as mental relaxation or physical relaxation such as autogenic relaxation (AGR) and progressive muscle relaxation (PMR) respectively [7]. It has been suggested that different relaxation techniques may induce different relaxation responses. For instance, in a comprehensive review of the effects of relaxation techniques, Lehrer [7] concluded that methods with predominantly cognitive components such as AGR are likely to produce specific cognitive effects such as reducing anxiety and enhancing positive mood. On the contrary, PMR, with its skeletal muscle emphasis, has been shown to affect muscular components such as those measured by surface EMG [7].

Comparative studies of these two techniques are limited. In one study, Shapiro and Lehrer [8] observed that both techniques were effective in reducing symptoms and intensity of anxiety and depression. The researchers also observed significant differences between the two techniques on subjective perception of warmth in the limb and depth of breathing. However, no differences were found in the subjects' heart rate and skin conductance [8]. In a more recent study, Klein-Hebling and Lohaus [9] examined the effects of progressive muscle relaxation and imagination on children aged 9-12 years. While their findings showed that both techniques are effective, the researchers only observed short term effects (after every session) but not medium term effects on relaxation [9].

In summary, understanding the nature of mood may help athletes to reach optimal performance and promote optimal daily life functioning. Given the potential contribution of relaxation in regulating mood states, its effectiveness in adolescent athletes is worthy of further investigation. Although it has been argued that different relaxation techniques produce unique responses, comparative study of the differences between PMR and AGR in regulating mood states among adolescents is limited. Thus, this study examines differences between the effects of these two relaxation techniques on mood state changes.

Specifically, two research questions were posed: (1) can relaxation training regulate mood states in adolescent athletes? And (2) do PMR and AGR differ in their mood responses? To answer these questions, a 12-session programme of PMR and AGR training was conducted among adolescent athletes.

METHODS AND SUBJECTS

Participants:

Sixteen adolescent soccer players aged 13 to 15 years (14.1± 1.3) were recruited to this study. The subjects reported that they had never received any relaxation training. Consent forms were obtained from both the participants and their parents.

Instruments:

Profile of Mood States-Adolescents[10]*:* Mood states were measured using Profile of Mood States-Adolescents (POMS-A). In brief, POMS-A contains 24 simple mood descriptors such as angry, energetic, nervous, and unhappy. Respondents indicate on a five-point scale (0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit, 4 = extremely) whether they have experienced such feelings. The stem "how do you feel right now?" was used as the response timeframe. Detailed descriptions of the validity and reliability of this instrument are available elsewhere [10]. In brief,

Terry et al [20] reported strong factorial and criterion validity of the scale. Moreover, internal consistency estimates from three independent samples ranging from 0.74 to 0.86 were also reported.

Relaxation instrumentation: Pre-recorded relaxation instructions were used for relaxation training, along with other relaxation training accessories (e.g., mats, CD players, and headphones). The relaxation instruct-tions followed a script proposed by Greenberg [11].

Procedures:

Permission to conduct the study was obtained from the relevant authorities. Specifically, permissions to involve school students in the study were obtained from the Ministry of Education and the school principal. Furthermore, the study protocol was approved by the Research Ethics Committee (Human) of the author's institution. Participants were randomly assigned to one of two relaxation groups: AGR or PMR.

AGR is based on the notion of relaxing the mind in order to relax the body [7]. It uses both visual imagery and body awareness to move a person into a state of deep relaxation. Specifically, this technique focuses on imagining peaceful places followed by developing an awareness of physical sensations. It consists of self-suggestion of heaviness and warmth on the limbs, a regular and rhythmic heartbeat, coolness on the forehead, warmth in the solar plexus, and autonomic breathing [7].

PMR consists of sequentially tensing and relaxing individual muscle groups [7]. It helps individuals to develop body awareness and educates them how to release muscle tension. Engaging in a PMR exercise, individuals may start from the top of the body and progress to the bottom, or vice versa. Progressing sequentially gives the individuals an easy-to-follow sense of order [7].

Inherent in the research design was the absence of a control group. Admittedly, pre-post design without a control group is limited in some respects. Specifically, without a control group, the findings may be influenced by other confounding factors. Despite this limitation, the use of this design is not unprecedented. For instance, Klein-Hebling and Lohaus [9] used a similar design in a recent study.

In this study, although a control group was not employed, the sessions in which mood states were measured may add weight to the strength of the findings. Specifically, mood states were measured on three occasions: baseline, pre-intervention, and post-intervention. Between the baseline and pre-intervention measures, no relaxation trainings were conducted. A non-differential finding was therefore expected between the baseline and pre-intervention measurements. On the other hand, changes in the mood states were expected between pre-and post intervention sessions. It is the view of the authors that the measurement session, in itself, may be taken as a control condition (i.e. without any training).

Each group attended the training program for three sessions per week for four weeks. The number of sessions was based on a study in which Lohaus et al [12] found that participants showed improvements in mood rating after five sessions of relaxation training. The increased number of training sessions was driven by the expectation of observing chronic effects of relaxation.

For the PMR training procedures, participants were instructed to assume a comfortable position. All constraining items such as shoes and glasses were removed. Participants were then asked to close their eyes, place their legs comfortably apart, and place their hands away from their bodies with palms facing upward. They were then instructed to listen and follow pre-recorded PMR instructions. The AGR group followed the same procedures, except that they listened to pre-recorded AGR relaxation instructions instead.

For both groups, each session lasted approximately 30 minutes. Sessions were conducted in a room with blue-painted walls, and the air conditioner temperature was set at 27°C. The training sessions were supervised by the second author, and the procedures were conducted in a group of eight per session. Participants were seated approximately one meter from each other. As previously mentioned, mood states were measured on three occasions: baseline (a week prior to relaxation training), pre-intervention (before the start of the first session), and post-intervention (immediately after the end of the 12th session). Questionnaires were administered to the same groups, but participants were separated from each other to avoid interaction and

possible influences on each other.

Statistical Analysis:

Two statistical analyses were used. Descriptive statistics were used for data screening and mixed factorial ANOVA was used to examine within and between group differences. Data were analysed using SPSS (v.12). Raw data were converted to corresponding *t* scores. The significant value was set at $P<0.05$.

RESULTS

The data were checked for accuracy, distributional properties, and missing values. No missing values or outliers were present, and the distributional properties

were within normal range. Descriptive statistics are presented in Table 1.

The differences in the mood scores across the independent variables were analysed using mixed factorial ANOVA. An assumption of the repeated measures in ANOVA is that differences in the dependent variable scores must be essentially similar across the levels of both independent variables [13]. Based on Mauchly's test of sphericity, no significant differences in the variances of the differences in all of the subscales were found across the testing sessions. Therefore, the assumption of the homogeneity of variance was met.

The results revealed no significant interaction effects in any of the subscales. No significant main effect was found either. However, significant main effects on confusion, depression, fatigue, and tension subscales were found for testing sessions.

Table 1: Descriptive statistics of mood scores in adolescent soccer players

		N	AUTOGENIC Range (Min-Max)	AUTOGENIC Mean (SD)	PMR Range Min-Max	PMR Mean (SD)
Baseline	Depression	8	45-56	46.38 (3.89)	45-56	48.75 (4.80)
	Fatigue	8	40-59	44.38 (8.14)	43-78	53.13 (11.41)
	Tension	8	39-51	41.25 (4.46)	39-51	42.75 (5.50)
	Vigor	8	39-67	55.88 (11.14)	41-67	56.00 (8.62)
	Anger	8	45-66	50.25 (9.72)	45-53	48.00 (3.55)
	Confusion	8	43-55	45.50 (4.75)	43-59	47.50 (7.23)
Pre-intervention	Depression	8	45-64	47.88 (6.66)	45-52	49.13 (2.90)
	Fatigue	8	40-52	43.75 (4.17)	40-75	48.13 (11.19)
	Tension	8	39-51	43.88 (4.52)	39-51	44.25 (5.00)
	Vigor	8	53-67	60.75 (5.37)	51-67	60.00 (6.04)
	Anger	8	45-62	49.13 (5.96)	45-58	47.63 (0.57)
	Confusion	8	43-63	50.00 (7.63)	43-59	47.50 (6.21)
Post-intervention	Depression	8	45-49	45.50 (1.41)	45-49	45.50 (1.41)
	Fatigue	8	40-49	41.13 (3.18)	40-68	46.50 (9.46)
	Tension	8	39-45	39.75 (2.12)	39-51	41.25 (4.17)
	Vigor	8	29-67	52.75 (14.43)	43-67	55.38 (9.21)
	Anger	8	45-45	45.00 (0.00)	45-53	46.00 (2.83)
	Confusion	8	43-47	43.50 (1.41)	43-55	45.50 (4.75

PMR: Progressive Muscle Relaxation, SD: Standard Deviation

Table 2: Pairwise comparison of mood scores between baseline, pre-intervention and post-intervention

Subscales	Sessions	Mean Differences	Std. Error	P Value
Confusion	Baseline – Pre-intervention	-2.25	1.87	0.27
	Baseline – Post-intervention	2.00	1.20	0.14
	Pre-Post-intervention	4.25	1.58	0.03
Depression	Baseline – Pre-intervention	-0.94	0.70	0.22
	Baseline – Post-intervention	2.06	0.95	0.06
	Pre – Post-intervention	3.00	1.13	0.03
Fatigue	Baseline – Pre-intervention	2.81	1.67	0.14
	Baseline – Post-intervention	4.94	1.82	0.03
	Pre – Post-intervention	2.13	0.84	0.04
Tension	Baseline – Pre-intervention	-2.06	1.36	0.18
	Baseline – Post-intervention	1.50	0.75	0.08
	Pre – Post-intervention	3.56	1.30	0.02

The results of the pairwise comparisons revealed significant differences between pre- and post-interventions for these four subscales while no differences were observed between baseline and pre-intervention. Detailed descriptions of the results are presented in Table 2.

DISCUSSION

Little is known about the comparative effects of PMR and AGR on regulating mood states in adolescent athletes. Results of this study revealed that progressive muscle relaxation and autogenic relaxation do not differ in their mood responses. Contrary to the notion that cognitive oriented techniques such as AGR are likely to induce pronounced cognitive effects, this study showed that both AGR and PMR produce equivalent mood response. Lehrer [7] reasoned that despite each relaxation technique's unique modality (i.e., cognitive and somatic), generalized effects could also occur. In other words, techniques with skeletal muscle emphasis such as PMR also induce cognitive effects, and vice versa. In line with Lehrer [7], the cross-modality effect could explain the non-differential

findings in the mood response among participants using PMR and AGR.

It has been previously reported that relaxation induces positive moods in children and adolescents [12,14]. Contrary to this finding, this study revealed no changes in positive moods after 12 sessions of relaxation. In fact, there was a pattern of decrease in post-intervention positive mood scores. It is rather difficult to reconcile this finding. However, we speculate that motivational factors may explain the decrement in the positive mood scores. Specifically, participants of this study were required to attend supervised training sessions three times a week for four consecutive weeks. The number of sessions that the participants had to attend and travelling from their schools to the training location may have been perceived as burdensome, given their other personal and academic commitments. It is speculated that the commitment they had to make to complete the training may have reduced the appeal of the training sessions and consequently positive mood.

Despite the non-differential findings in the positive mood scores, we did observe reductions in four of the negative subscales score. The findings, especially the significant decrease in the depression subscale score, may provide important practical implications for mood regulation strategies for adolescent athletes. Lane and

Terry [3] proposed that depression plays a crucial role in regulating other mood dimensions. They suggested that a decrease in depression subscale score is likely to lead to a decrease in other negative mood dimensions. Indeed, we observed significant decreases in confusion, depression, fatigue, and tension scores, while a pattern of decrease was found in the anger scores post-intervention. These results might have a connection with Lane and Terry's[3] contention regarding the central role of the depressed mood in regulating other mood dimensions.

Due to the transitory nature of mood states, there could be other explanations for the changes in post-intervention mood states. Specifically, it might be possible that the reduction in the negative mood score post-intervention was due to a placebo effect [15]. The placebo effect is a favourable outcome arising purely from the belief that one has received a beneficial treatment [15,21]. In sport, there is evidence of the influential effects of placebos on sports performances. For instance, it was observed that athletes who were led to believe that they received performance enhancement supplements, while in fact they received a placebo, showed improvement in their performance [16,17,18]. Although this effect was not examined in this study, participants were informed that they would engage in a technique that would make them relax. It could be argued that the reduction in their negative moods might have been driven by their belief about the effect of the technique, rather than its actual effect.

The observed changes in participants' moods might also be influenced by other regulating strategies used by athletes. For instance, in a study of mood regulating strategies used by athletes, the researchers revealed three most common strategies used by athletes to regulate mood dimension assessed by POMS. The strategies were 'listening to music', 'exercise', and 'change location'[19]. Given that the uses of other regulating strategies were not controlled, the findings of this study should be interpreted with this limitation in mind.

While this study observed mood changes following a 12-week programme of relaxation, several limitations should be considered when interpreting the findings. Firstly, this study used self-reported measures which are potentially influenced by social desirability biases.

Secondly, the sample size was small and it was limited to football players, thereby restricting the ability to generalise the findings beyond this sport. We encourage future studies to examine the utility of PMR and AGR in other sports in order to determine whether our findings are age-specific or more general. Furthermore, we suggest that future qualitative research be conducted in an attempt to tap into methods that could make the relaxation training enjoyable for adolescents.

CONCLUSION

This study sought to determine the effects of two relaxation techniques on young athletes' mood states. The findings offer at least two important implications. Firstly, the study revealed that both progressive muscle relaxation and autogenic training produce similar mood responses. Therefore, it appears that both techniques may be used to regulate athletes' mood states. Secondly, a reduction in positive mood scores was found post-intervention. We speculated that the demand of the training may have compromised participants' moods. Therefore, we believe that enjoyment of the training should first be established in order for relaxation to be effective (thereby minimising potential negative feelings towards the sessions).

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