PROGRESSIVE MUSCLE RELAXATION: CAN IT REDUCE COMPETITIVE ANXIETY?

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Authors’ Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Abstract
The study purpose was to determine the effect of progressive muscle relaxation training on reducing competitive anxiety among shooting athletes.

Materials and methods. An experimental approach with a pretest-posttest control group design was used in this study. The experiment was carried out eight times. A total of 12 athletes, 8 males and 4 females, who were shooting athletes, took part in this research. The athletes in this study, who joined the regional training center in East Java Province, Indonesia, ranged in age from 20 to 44 years. In this investigation, saturated samples, including those from all individuals, were used. Data were obtained from competitive anxiety scales during the pre- and post-test periods. Independent samples t-tests were used to assess the data.

Results. The t-value for this study is -14.210, and the p-value is 0.001. These findings suggest that progressive muscle relaxation training reduces competitive anxiety in shooting athletes. The athlete's awareness of the value of mental training contributes to reduction in competitive anxiety. This study has gained traction since athletes are aware of the value of preparing for training before competing because they attend and participate in the regional training center.

Conclusions. Progressive muscle relaxation training can be used as an intervention to help shooting athletes reduce their competitive anxiety.

Keywords: athletes, competitive anxiety, mental training, progressive muscle relaxation, shooting sports.

Introduction
The somatic approach in the application of mental training in the world of sports aims to increase the level of awareness of the sensations that will be received by the athlete's body (Jannah et al., 2021). One of these somatic approaches is progressive muscle relaxation. Progressive muscle relaxation training is a form of concentration exercise that involves the body’s muscles directly in the implementation process (Sholikhin et al., 2019). This training will make the muscles tense, then relax them (Komarudin, 2015).

Unlike other mental training techniques, progressive muscle relaxation does not only focus on relaxing the body but also benefits athletes who are aware of their body’s (muscle) tension, so that increased awareness will make athletes more sensitive to their mental state (Jannah, 2017). Using progressive muscle relaxation training techniques will help athletes improve their ability to maintain their psychological state.

The application of progressive muscle relaxation in the world of sports has been done before by Khabiri et al. (2017) and Alwan et al. (2013), which describe that anxiety and negative thoughts experienced by athletes can be reduced by providing progressive muscle relaxation. The results of this study are supported by research (Mokaberian et al., 2021), which says that applying progressive muscle relaxation was shown to reduce the level of cortisol secretion through physical anxiety as well as sympathetic activity.

Mental training through a somatic approach has also been carried out by Burçak Çelik (2020), which shows that with mental training, the competitive anxiety experienced by athletes can be reduced. This concept is in line with several studies conducted by Townsend (2010), Shirazi & Zargarzadeh (2014), and Gaylord et al. (2009) that found that by doing this mental technique, competitive anxiety can be reduced and one is better able to control oneself emotionally and physically, which are caused by anxiety, tension, and
stress. There are also 116 other studies on progressive muscle relaxation that show that this mental training technique is proven to reduce depression, pain, and anxiety (Ali et al., 2009).

The application of mental training through a somatic approach is very important for shooting athletes because shooting sports are one of the measurable sports that can train athletes to concentrate, make decisions quickly and accurately, and control themselves (Kamseno et al., 2018). Shooting is an activity that is carried out by releasing bullets, which will follow a certain trajectory that leads to the target at a certain distance, which requires encouragement from the tool itself, so that in its use it requires coordination and endurance (Alfianto et al., 2020).

To better understand the mechanics of shooting games, there are several models related to several factors that will affect the performance of shooting athletes, starting with mental factors that affect the athlete's heart rate, breathing, and muscle tension, followed by the position of the weapon on the body, the contact force of the rifle, the movement towards the muzzle of the weapon, and the position of the target point at the time of the shot.

By applying mental training through progressive muscle relaxation technique this will give the body time to rest, such as through muscle relaxation, reduced oxygen consumption, respiratory rate, heart rate, and blood lactate (Mokaberian et al., 2021), which leads to some physiological changes on a regular basis, thus would indicate a potential reduction of anxiety symptoms experienced by athletes.

Competitive will appear when athletes feel that they are unable and afraid to do something related to match performance. Competitive anxiety can be said as a natural reaction to environmental threats, such as sports competitions which can show physical and psychological responses, because athletes get threats or demands from outside (Loveyama & Widodo, 2020). Athletes who are competing, they tend to prepare well and be aware of the body movements and mental skills they are doing (Taneja & Zutshi, 2019).

Like wise athletes in shooting sports, when facing a match, the problem that often occurs is the emergence of different levels of competitive anxiety, which is related to the psychological state of each athlete. This concept is in line with research that has been conducted by (Swadesi, 2013) that competitive anxiety is divided into three levels, namely low, moderate, and high competitive anxiety. Athletes who are classified as having a low level of competitive anxiety, then in competition their performance will be good and can increase, on the other hand athletes who are classified as in high anxiety then their performance will decrease.

Based on the description and identification that has been described, this study aims to determine whether there is an influence progressive muscle relaxation to reduce competitive anxiety?

Materials and methods

Study participants

A total of 12 shooting athletes who were members of the training center for the Province of East Java. The age range of the subjects was 20–44 years, with 8 male and 4 female. Saturated samples, all subjects, were used in this study. Participants were divided into 2 groups: the experimental group and the control group. Each group consists of six athletes: four male and two female.

Study organization

In this study, an experimental approach was carried out. The experimental design used was the pretest-posttest control group design. There were two groups in this design: the experimental group and the control group. In each group, pretest data collection was carried out. After that, the experimental group was given treatment in the form of progressive muscle relaxation. However, the control group was not given any treatment. Then came the final stage of collecting post-test data in the experimental group and the control group. The description of the research design is in accordance with Table 1 of the research design and is as below:

<table>
<thead>
<tr>
<th>Table 1. Research Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
</tr>
<tr>
<td>Experiment Group</td>
</tr>
<tr>
<td>control groups</td>
</tr>
</tbody>
</table>

Information:
T1 – Pre-Treatment Measurement in the Experimental Group
T2 – Pre-Treatment Measurement in the Control Group
E – The experimental group treatment was in the form of progressive muscle relaxation
T3 – Measurement After Treatment in the Experimental Group
T4 – Measurement After Treatment in the Control Group

The advantage of this design is its proactive history. This means that the pretest describes the subject's initial abilities before the research is carried out. Progressive muscle relaxation was given only to the experimental group. While the control group was not given any treatment. Progressive muscle relaxation is performed eight times consecutively, twice a week.

The Progressive muscle relaxation procedure was tested on a number of shooting athletes according to their characteristics before being used in the study. The Progressive muscle relaxation steps refer to (Jannah, 2017) through Steps 7. The first step is to direct the subject into a position as comfortable and relaxed as possible. Second, the subject is directed to focus on breathing itself, while breathing regularly. Feel the body becoming more relaxed and calm. The third step is to carry out intrapersonal communication with the limbs, from the head to the toes, to feel the sensation of heaviness. The fourth step is the same as the third, but a warm sensation is suggested. The sixth step is to feel a warm sensation on a warm stomach. The seventh step is to feel a cold sensation on the forehead. The closing section directs the subject to suggest that they feel safe, comfortable, warm, relaxed and happy.

The instrument used is the Competitive Anxiety Scales consist of somatic anxiety, worry, dan concentration disruption. A total of 16 items with alternative score ranges of answer choices 1–4. The maximum score that can be obtained by the subject is 64, while the lowest score is 16. The results of the competitive anxiety scales construct validity.
were 0.408-0.560 with a correlation coefficient of 0.643. Based on the competitive anxiety scales score range then categorized into three parts, namely high, medium, and low. The categories are as in Table 2 below.

Table 2. Categories of Competitive Anxiety Scales Scores

<table>
<thead>
<tr>
<th>Categories</th>
<th>Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>16-31</td>
</tr>
<tr>
<td>Medium</td>
<td>32-47</td>
</tr>
<tr>
<td>High</td>
<td>48-64</td>
</tr>
</tbody>
</table>

Based on the competitive anxiety scales score range then categorized into three parts, namely high, medium, and low. The categories are as in table 2 below.

This research was conducted in accordance with ethical principles of the Helsinki Declaration for human research and was approved by research Ethics Committee of the Surabaya State University.

Statistical analysis

The data analysis technique used is the independent t test. The purpose of the independent t test is to test the differences between the two groups independently. The scores used are the gain scores of the experimental and control groups. The gain score is the difference between the posttest minus the pretest data. Calculations were performed using a computer application tool, namely Jeffrey’s Amazing Statistics Program (JASP) version 0.14.1.0.

Results

The results refer to the superiority of the experimental design used is proactive history. This means that the pretest data is able to provide information on the abilities of the subjects of each group. In each group, pretest data collection was carried out. After that, the experimental group was given treatment in the form of progressive muscle relaxation training. However, the control group was not given any treatment. Then came the final stage of collecting post-test data in the experimental group and the control group. The description of the research design is in accordance with Table 3 of the research design and is as follows.

Based on data from table 3, it shows that the average competitive anxiety score between the control group and the experimental group before the intervention was the same, namely 58.67. When referring to the category of anxiety scores, the score is in the high category, which means that this data describes the information that the condition of the shooting athletes in the experimental group and the control group had anxiety at a high level before doing mental training with the progressive muscle relaxation technique.

Furthermore, the results of the study presented data on emotion regulation scores before and after the intervention of progressive muscle relaxation as a whole. Based on the pretest and posttest data for the experimental group and the control group, the following data were obtained on table 4 below.

Based on data from table 4, after the application of progressive muscle relaxation, the experimental group of shooting athletes refers to the number 36.5, which shows that after carrying out the exercise intervention with the progressive muscle relaxation technique, the experimental group of shooting athletes belongs to the category of moderate competitive anxiety. The gain score in the experimental group is -22.17 which indicates that there is a decrease in sport anxiety in shooting athletes.

In the control group of shooting athletes, the post-test score showed the number 58.67 which stated that the average competitive anxiety of shooting athletes in the control group was in the high category. The control group's gain score was 0.5 which indicated that there was an increase in the competitive anxiety of shooting athletes in the control group.

The changes that occurred in the two groups were tested statistically, whether there was a difference in the gain score between the experimental group and the control group. The results of data analysis show the following:

The results in table 5 show at a value of -14.210 with an ap value of <0.001. This means that there is a difference between the experimental group and the control group. Because the gain score is the difference between the posttest and pretest...
data, this indicates that there are differences in the gain score data for the experimental group and the control group. This difference in gain score is assumed to be due to the intervention of progressive muscle relaxation given to the experimental group. So the results of these calculations also mean that there is an effect of progressive muscle relaxation on reducing competitive anxiety in shooting athletes.

### Discussion

The results of this research indicate that there is an effect between mental training and progressive muscle relaxation techniques to reduce anxiety. The two groups studied (the experimental and control groups), before they got the progressive muscle relaxation mental exercise, the anxiety scores of the two groups were in the same position. However, after being given progressive muscle relaxation training, the experimental group began to show scores with a decrease in anxiety. This research is in line with research conducted by Rachmaningdiah & Jannah (2016), which shows that a decrease in anxiety can occur after the implementation of mental training in athletes in the form of autogenic training.

In this study, when progressive muscle relaxation is carried out, it requires at least 3 phases, namely the education, acceptance, and practice phases, in which the three phases are included in the structuring of mental exercises (Terry et al., 2020). Besides that (Komarudin (2015) and Jannah (2016) stated that there are two main components in the progressive muscle relaxation procedure, namely systematic tensing (stretching the muscles for 5 seconds) and relaxing of various muscle groups (making muscles that are initially tense relax for 10-15 seconds).

Mental training given to athletes focuses on developing specific responses that are useful for fighting anxiety (Montero-Marin et al., 2019). The response in question is the relaxation response which is characterized by a series of physiological adjustments that arise without any tension in the mind and body (Jannah et al., 2021), where this will be balanced with the activity of the sympathetic nerves and physical rest (Adwas et al., 2019), also helps to increase the positive and negative emotions that individuals experience (Alexiou et al., 2018), so that the hormones that cause body dysregulation can be reduced (Siregar et al., 2022).

Competitive anxiety in athletes usually appears in situations before and before the competition has many indicators. The causes of this anxiety are divided into three, namely: Competitive Anxiety, Cognitive Anxiety and somatic anxiety (Adisasmoto, 2007). Competitive anxiety is a mistake reflecting the feelings of athletes so that it causes an unsuccessful outcome or fear of failure. Cognitive anxiety is an athlete's subjective perception of a competitive situation followed by a somatic response. Somatic anxiety is a physiological state in response to stressful situations that athletes are aware of. This physiological state will lead to two things, namely helpers or obstacles in a match. Thus, the indicators that appear in athletes are competitive, cognitive, and somatic anxiety (Kumbara et al., 2018).

The results of this study are also in line with research conducted by (Mattle et al., 2020), which explains that there is a relationship model between various factors that are interconnected and can affect the performance of shooting athletes. These factors start with mental factors that result in decreased heart rate, tension, breathing rhythm, increased metabolism, and the production of stress hormones (Siregar et al., 2022), which is followed by the position of the body, the strength of the contact towards the gun, the position of the gun, the muzzle movement of the gun, as well as the point position of the target at the time of the shot, and ends with the result of the athlete's shot (Jannah et al., 2021).

Types of sport that in practice require little physical demands, the greater the chance for unwanted behavior to occur (Pahan & Singh, 2022), and the more information that can be received, the greater the probability of success (Lopatiev et al., 2013). By giving progressive muscle relaxation to shooting athletes, the mental training given will make the muscles begin to stretch and relax sequentially (Rochmawati, 2015), so that relaxation will help reduce negative psychological symptoms, such as the feeling of tension that athletes have will slowly disappear (Resti, 2014; Torales et al., 2020).

### Conclusions

The conclusion that can be described from this research is that progressive muscle relaxation exercise has an effect on reducing competitive anxiety in shooting athletes, as evidenced by the results of a different test (independent samples t-test) of -14.210 with a significance level of 0.001.

### Acknowledgment

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### Conflict of interest

The authors declares that there is no conflict of interest.

### References


ПРОГРЕСИВНА М’ЯЗОВА РЕЛАКСАЦІЯ: ЧИ МОЖЕ ВОНА ЗНИЖУВАТИ РІВЕНЬ ЗМАГАЛЬНОЇ ТРИВОЖНОСТІ?

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Авторський вклад: A – дизайн дослідження; B – збір даних; C – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 6 с., 5 табл., 33 джерела.

Метою цього дослідження було визначення впливу тренувань із прогресивної м’язової релаксації на зниження рівня змагальної тривожності у спортсменів-стрільців.

Матеріали та методи. У цьому дослідженні використовували експериментальний підхід за схемою попереднього та підсумкового тестування з використанням контрольної групи. Експеримент проводили вісім разів. Загалом у дослідженні взяли участь 12 спортсменів: 8 чоловіків і 4 жінки, які займалися спортивною стрільбою. Спортсмени в цьому дослідженні, які досяглися до діяльності регіонального тренувального центру в провінції Східна Ява, Індонезія, були віком від 20 до 44 років. У цьому дослідженні використовували насичені вибірки, у тому числі від усіх осіб. Дані отримували за шкалаю змагальної тривожності в періоди попереднього та підсумкового тестування. Для оцінки цих даних використовували t-критерії Стьюдента для незалежних вибірок.

Результати. У цьому дослідженні значення величини t становить -14210, а значення величини p дорівнює 0,001. Ці результати свідчать про те, що тренування з прогресивної м’язової релаксації знижують рівень змагальної тривожності у спортсменів-стрільців. Усвідомлення спортсменом цінності ментального тренінгу сприяє зниженню рівня змагальної тривожності. Це дослідження набуло популярності, оскільки спортсмени усвідомлюють цінність підготовки до тренувань перед змаганнями, тому що вони відвідують регіональний тренувальний центр і беруть участь у його діяльності.

Висновки. Тренування з прогресивної м’язової релаксації можна використовувати як втручання, щоб допомогти спортсменам-стрільцям знизити рівень змагальної тривожності.

Ключові слова: спортсмени, змагальна тривожність, ментальний тренінг, прогресивна м’язова релаксація, стрілецький спорт.

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