

## **Training in personal defense techniques and its influence on the stress threshold of students**

### **Treinamento em técnicas de defesa pessoal e sua influência sobre o limiar de estresse dos alunos**

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#### **ABSTRACT**

Training in self-defense techniques is carried out regularly in both civil and military contexts. Self-defense techniques are put into practice in dangerous situations such as a threat or a physical attack, which can generate great stress on the individual. When carrying out this study, we wanted to analyze the influence that training in self-defense techniques has on the stress experienced by students in a dangerous situation or while being attacked. For this reason, I have compared the measure of stress experienced by 14 students during their performance, facing situations of physical threat that they perform in simulated self-defense practices, which are carried out in this training. The student's stress was measured with the Determination Test (DT) of the Vienna Test System. These defense practices against simulated attack situations take place at two different moments within the training course, one at the beginning and another once the training course has finished; therefore, the students have completely learned the defense techniques. I carried out the first measure of stress in situations of physical threat, in the simulation at the beginning of the training course, when the students had not yet learned any self-defense techniques. The second measurement was performed 21 days later, when the students had received self-defense training. This came during the simulation of situations of physical threat that is developed once the teaching of these techniques has finished and occurs at the end of the training course. The results show that the stress tolerance threshold increases with training. The results obtained in the variables measured pre and post show

a decrease in the "median reaction time to the stimuli" and an increase in the variables "number of stimuli answered" and "correct reactions". This demonstrates that these subjects achieved a stress tolerance threshold in stressful situations with the highest physical threat, which was at the end of this formation. Therefore, there is an important degree of difference in the stress resistance of the subjects before the simulation of the first day of training, and that of the last day once they had already learned the self-defense techniques. These findings could contribute to highlighting the usefulness of this type of training both in military units and in civilian entities, not only to improve technical knowledge of self-defense but also to promote a more adaptive stress response in this type of situation.

**Keywords:** effects of teaching, self-defense, stress, attack situations, military training, threat.

### RESUMO

O treinamento em técnicas de autodefesa é realizado regularmente, tanto no contexto civil quanto no militar. As técnicas de autodefesa são colocadas em prática em situações perigosas como uma ameaça ou um ataque físico, o que pode gerar grande tensão sobre o indivíduo. Ao realizar este estudo, quisemos analisar a influência que o treinamento em técnicas de autodefesa tem sobre o estresse experimentado por estudantes em uma situação perigosa ou enquanto são atacados. Por este motivo, comparei a medida do estresse experimentado por 14 alunos durante seu desempenho, enfrentando situações de ameaça física que eles realizam em práticas simuladas de autodefesa, que são realizadas neste treinamento. O estresse do aluno foi medido com o Teste de Determinação (DT) do Sistema de Teste de Viena. Estas práticas de defesa contra situações de ataque simuladas acontecem em dois momentos diferentes dentro do curso de treinamento, um no início e outro uma vez terminado o curso de treinamento; portanto, os alunos aprenderam completamente as técnicas de defesa. Realizei a primeira medida de estresse em situações de ameaça física, na simulação no início do curso de treinamento, quando os alunos ainda não haviam aprendido nenhuma técnica de autodefesa. A segunda medida foi realizada 21 dias depois, quando os alunos tinham recebido treinamento em autodefesa. Isto ocorreu durante a simulação de situações de ameaça física que é desenvolvida uma vez terminado o ensino destas técnicas e ocorre no final do curso de treinamento. Os resultados mostram que o limite de tolerância ao estresse aumenta com o treinamento. Os resultados obtidos nas variáveis medidas pré e pós mostram uma diminuição no "tempo médio de reação aos estímulos" e um aumento nas variáveis "número de estímulos respondidos" e "reações corretas". Isto demonstra que estes sujeitos alcançaram um limiar de tolerância ao estresse em situações estressantes com a maior ameaça física, que estava no final desta formação. Portanto, há um importante grau de diferença na resistência ao estresse dos sujeitos antes da simulação do primeiro dia de treinamento, e do último dia, uma vez que eles já haviam aprendido as técnicas de autodefesa. Estas descobertas poderiam contribuir para destacar a utilidade deste tipo de treinamento tanto em unidades militares quanto em entidades civis, não só para melhorar o conhecimento técnico de autodefesa, mas também para promover uma resposta mais adaptativa ao estresse neste tipo de situação.

**Palavras-chave:** efeitos do ensino, autodefesa, estresse, situações de ataque, treinamento militar, ameaça.

## 1 INTRODUCTION

At present, self-defense training is being taught in educational centers specialized in martial arts, where amateurs, professionals, and special groups such as battered women, etc. are trained. In turn, training in self-defense techniques is part of the basic and fundamental learning that is taught in military educational centers. In particular, in the Defense area, taking into account Law 2/86 of March 13 FCS, Organic Law 4/2015 Citizen Security, D.R. 194/2010 Agent of the authority, Legitimate Defense, a personal defense course is being taught for soldiers from the three Spanish armies. This instruction is carried out by the School of Physical Education Sciences of the Spanish Forces Armies (ECEP), which belongs to the Army War College.

These conferences are mainly aimed at Officers/NCOs who are going to assume in their Units for a continuous period of time, the execution and direction of the Instruction of Close Combat and Non-Lethal Intervention and Agent of the Authority, as well as their teaching to other dashboards. The total duration of this study plan is three weeks (90 hours) and it consists of a theoretical part and a physical training part. All of this training is carried out at the Central School of Physical Education in Toledo, Spain (ECEP). This study plan includes: training in upper and lower body hitting techniques, the location of vital points, blocking techniques, release and grab techniques, locking techniques, projection techniques, choke techniques, floor techniques, intervention procedures, techniques with a stick, skills combat-oriented psychological skills, physical training framed in the CCC-INL, techniques with knives and firearms, with people on vehicles, procedures in areas with water, protection of authorities and conflict/incident simulation.

It is well known that the physiological response of the organism is affected by different psychological states (Rodríguez, Del Pino and Alvaredo, 2011). Self-defense situations expose people to a scenario of uncertainty, in which different threatening stimuli can appear at any time, causing great stress to the person. Therefore, it would be necessary to know to what degree this type of teaching contributes to modifying and controlling the student's stress threshold when exposed to potential attack situations. Recent studies have measured the activity that occurs in an individual in different situations related to combat. As a measure of the psychophysiological responses during the parachute jump of specialized military personnel (Clemente-Suárez & Pérez-Robles, 2012; Clemente-Suarez, De la Vega, Robles-Perez, 2016; Clemente-Suárez & Robles-Pérez, 2012, 2012, 2013).

This response produces stimulation of the sympathetic nervous system that increases energy production through anaerobic metabolic pathways and heart rate, which provides more energy to the muscles (Clemente-Suárez and Pérez-Robles, 2012; Clemente-Suarez and Perez-Robles, 2013; Grossman and Christensen, 2007; Hübner, 1984; Taverniers et al., 2011).

The individual can interpret these situations as potentially dangerous where their integrity is compromised, thus increasing sympathetic and physiological activation (Clemente-Suárez & Robles-Pérez, 2012), associated with a state of anxiety, this response is similar to that evaluated in athletes during stressful sports situations where the brain is overstimulated (Martens, Vealey, & Burton, 1990), although at a lower level. However, this significant activation is not perceived by the participants, since they score low results on the scale of perceived exertion (RPE) that they were given during combat maneuvers (Clemente-Suarez & Robles-Pérez, 2015; Clemente-Suárez and Robles-Perez, 2012, 2013). Research carried out in other similar contexts proves the benefits of training with primary reflexes of police officers in simulated situations of reduction and personal defense (Peter Renden, Geert Savelsbergh, and Raoul Oudejans 2017). It was also found that police officers experience anxiety while having to use violence in situations of reduction and defense (Anderson, Litzengerger, and Plecas 2002).

As previously mentioned, given that the training consists of a theoretical part and a practical part where they are exposed to simulations of danger and attack situations it has been shown how training in simulated attack situations, favors better individual performance when facing real situations (Renden et al., 2015). It has also been measured how training in simulated stress situations generalizes to new situations (Driskell, Eduardo Salas and Joan H. Johnston, 2001).

Studies of the organic and cognitive response of the individual during combat situations, whether simulated or real, are limited and are mostly focused on the measurement of organic parameters (such as heart rate variation, maximum oxygen consumption or muscle strength) before and after carrying out different combat missions (Lester et al. 2010; Nindl et al. 2002; Ricciardi, Deuster and Talbot, 2007; Rintamäki et al. 2005). Therefore, analyzing the influence of this training on the stress response of the subjects contributes to adding more complex variables, and gets closer to understanding the influence of this teaching. Taking into account the possible relationship of stress factors with performance in combat situations, some areas of military training have introduced education in stress control and reduction techniques, to reduce anxiety and be

able to face stressful situations with more strategies. In addition, several resources have been developed to treat the effects of stress in soldiers who have participated in operational zones (Hourani et al. 2011). The results reflected here have been obtained from a search carried out in the following scientific databases: Web Science, Pubmed, Dial Net, Google Scholar, Defense Documentation Service (DIDOM).

Verifying that this training is effective for the military to deal with this type of situation in a more appropriate and efficient way would contribute to increasing the opportunity of this type of teaching in units or civil entities related to training. The hypothesis that I propose is that the training in personal defense techniques provokes better response to the stimuli presented by the test in the second measurement that is to say, that the reaction time variable to the stimuli presented decreases, and the value of the test is higher number of stimuli answered and correct responses, in this second measure.

## **2 METHOD**

In this investigation an experimental design was carried out due to the impossibility of having a control group. Pre and post-measurements of a group of individuals were performed.

### **2.1 PARTICIPANTS**

The sample consist of 14 male students, all of them military officers and non-commissioned officers from different units of the Spanish army. This number constitutes 100% of the students attending this instruction in self-defense techniques. We have used a non-probabilistic and accidental sample.

### **2.2 MATERIALS**

The stress of the individual has been measured with the digital test Vienna Test System by Schuhfried (2012). We have used the S1 adaptive short form of the DT test (DT) included in this battery of computerized tests. This instrument measures the individual's resistance to the stress caused, that is, the stress threshold presented by the student. The test results provided us with the variables "reaction time", "number of correct responses", "number of incorrect responses", "number of omitted responses" and "number of stimuli responded by the subject". This test has a reliability of 0.99, which shows that it is a fairly accurate measuring instrument. Several studies have confirmed that the DT has a high internal and external construct validity. Neuwirthy and Benesch (2012).

### 3.3 PROCEDURE

In this study we have measured the stress response of the students when carrying out the practical self-defense exercise in a simulated threat situation. At the beginning of the training course, the students were informed that we were going to carry out this research and their consent was requested.

Once the course has started during the first simulated practice, the students are exposed to different acoustic and visual stimuli (colors) and where they must react to each of them in the appropriate way on the panel buttons and pedals. Students must respond as quickly as possible to acoustic or optical signals emitted by the system. The responses are emitted by pressing the corresponding buttons on the panel or by pressing the pedal of the system corresponding to the stimulus presented. This measurement was taken just prior to conducting the two simulated defensive drills included in the instruction. These practices are carried out one at the beginning of the self-defense course and again once it is finished. The course takes 21 days with 90 hours of training.

The two practical exercises carried out by the students in this training consist of six different simulated situations of physical threat and attack by another person to the student. The student must put into practice the knowledge learned in the instruction on personal defense. The two practical exercises have the same characteristics of unpredictability, environmental conditions (temperature, lighting, and noise), and types of defensive situations.

## 4 RESULTS

### 4.1 DATA ANALYSIS

The results issued in the DT by each student in both the first and the second simulation practices were collected.

The two measures have been analyzed with the application of the Wilcoxon W test, which is a non-parametric test that compares the mean range of two related samples (as an alternative to Student's T in normal population). This test compares two related measurements and determines if the difference between them is due to chance. The results in the Wilcoxon W test show statistically significant differences with a  $p < .001$ , in the decrease of the "median reaction time" variable. Significant differences are also obtained in the increase of the variables "correct answers" and "number of stimuli answered" with a  $p < .01$ . Therefore, there is a significant difference in the stress experienced by the students between the first and the second measure.

## 5 DISCUSSION

In previous studies, variations in the stress response to different combat situations have been observed. However, in the data sources used by Dialnet, Science Research, Pubmed, DIDOM, Google Scholar and Worldwide Science, no analysis of this response in military teaching situations has been found. The study carried out shows how a variation is produced in the stress threshold of students in these situations, which has been caused by this training. The data analysis that we carried out demonstrates how three of the measured performance variables have varied significantly after teaching these techniques with respect to the beginning of this. The variable "median reaction time" decreased, increasing the values in the variables "responded stimuli" and "correct responses". This proves how individuals, who manage to maintain an activation level adapted to the situation, produce fewer response errors, more hits, and with a lower response latency.


The optimal level of stress is the degree of activation of the organism that allows the individual to act efficiently at a given moment and situation. Beyond this level, the individual begins to have more performance errors in the required task. In this study we have measured this performance to find out where the students have their stress threshold in each measurement. This training has recently been completed with the introduction of teaching psychological skills. The results obtained by this study could encourage the inclusion of the psychological skills training module for combat, not only in this type of self-defense instruction, but in other training related to combat. Although as a future line of research, it would be to determine if the decrease in the level of stress is produced by the technical knowledge, or by the psychological knowledge included in the training program. This study presents great originality since no similar studies have been found in the field of the armed forces. Also, the fact of the influence that a type of training has, a priori not related to psychological factors, in the human mind is very novel and opens up new lines of research in the field of teaching in this sense. ✓

Despite the foregoing, this study also has limitations such as the fact that a small number of the studied samples have been used (although 100% of the students in the course have been used as a sample). Another limitation associated with this study is that the relationship of previous experience of the subjects in self-defense was not measured (due to the difficulty of carrying out an objective measurement). The non-existence of a follow-up of the stress measurements of these subjects over time means that these results



cannot be extrapolated beyond the moment in which they have been measured (that is, immediately after having received the training). In the future, it would be convenient to carry out new studies on the subject taking into account these limitations, favoring the relationship between variables of prior knowledge and stress measures, and increasing the sample size. It would also be interesting to increase the measurements to a greater number of similar courses. If a study of the variations of the stress response is carried out over time, while making successive measurements, it would be possible to know the effect and the level of this increase in the stress threshold, after a few months when the subjects are exposed to real attack situations. This analysis would help to generalize the benefits in the responses of the individual produced by the training over time.

The data presented and analyzed here show us that the teaching of self-defense helps the student to reduce his activation and can be exposed to self-defense situations with more adaptive stress levels. This implies that this type of training is providing resources and strategies to students that make it easier for them to face the uncertainties of a military career.

With these findings, the teaching of these type of techniques in various military or civilian areas is valuable. At the same time, the results contribute to increasing the interest in knowing the variations not only in theoretical knowledge, but also in the psychological factors of the students modified by different types of teaching. 



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