

REVIEW

**by Prof. Kirilka Simeonova Tagareva, PhD,
Plovdiv University 'Paisii Hilendarski'**

of the thesis for awarding the educational and scientific degree of 'Doctor'

in a field of Higher Education 3. Social, Economic and Legal Sciences,

Professional field 3.2. Psychology Doctoral program *in Positive Psychology*

Author: Radoslav Dimitrov Shterev

Topic: "The Influence of Vibro-Acoustic Stimulation on the Psychological Resilience of Patients with Chronic Pain"

Academic Supervisor: Prof. Dr. Yuri Pavlov Yanakiev – Plovdiv University "Paisii Hilendarski"

1. General Description of the Submitted Materials

By Order No. RD-22-727/21.03.2025 of the Rector of Plovdiv University "Paisii Hilendarski" (PU), I was appointed as a member of the scientific jury to oversee the defense procedure of the dissertation titled "*The Influence of Vibro-Acoustic Stimulation on the Psychological Resilience of Patients with Chronic Pain*" for awarding the educational and scientific degree 'Doctor' in Higher Education Area 3. Social, Economic, and Legal Sciences, Professional Field 3.2. Psychology, Doctoral Program in *Positive Psychology*. The author of the dissertation is Radoslav Dimitrov Shterev – a full-time PhD student in the Department of Psychology, with academic supervisor Prof. Dr. Yuri Pavlov Yanakiev.

The materials submitted in hard copy by Radoslav Shterev comply with Article 36 (1) of the Rules for the Development of the Academic Staff at PU and include the following documents:

- a request to the Rector of PU for initiating the thesis defence procedure;
- a curriculum vitae in European format;
- protocols from the department council regarding readiness to initiate the procedure and preliminary discussion of the thesis;
- a thesis;
- an abstract;
- a list of scientific publications on the thesis topic;
- copies of scientific publications;

- declaration of originality and authenticity of the attached documents.

The doctoral candidate has attached four publications.

2. Brief Biographical Information about the Doctoral Candidate

Radoslav Dimitrov Shterev was born in 1973. In 1997, he graduated with a degree in “Economics and Transport Management” from the University of National and World Economy – Sofia, earning a Master’s in Economics. His doctoral training began on March 1, 2021, when he enrolled as a full-time doctoral student in Positive Psychology at the Department of Psychology, Faculty of Pedagogy, PU. During his training, he responsibly completed all activities outlined in his individual study plan for the “Doctor” degree and successfully passed all required exams. In 2024, doctoral student R. Shterev was formally cleared to defend his dissertation.

Radoslav Shterev’s professional experience is not directly related to psychology and lies in the field of commerce and sales. From 2010 to the present, he has been working as a sales manager at Brain Amigo Ltd., Plovdiv, with the main type of activity being the distribution of equipment for neurorehabilitation and mental health support. His CV reflects a clear orientation and interest in the chosen dissertation topic – the use of technological methods of vibro-acoustic stimulation to influence psychological resilience.

3. Topic Relevance and Appropriateness of the Goals and Objectives Set

Radoslav Shterev’s dissertation focuses on the impact of vibro-acoustic stimulation on the psychological resilience of patients with chronic pain. The topic is relevant both scientifically and practically. Scientifically, it seeks to expand knowledge in the field of resilience studies, chronic pain research, and approaches to chronic pain treatment. Practically, the relevance lies in exploring ways and opportunities to influence the psychological resilience of patients with chronic pain through technological means. Shterev aims to examine how the potential of vibro-acoustic stimulation methods can positively affect resilience, and to identify the specific mechanisms through which this stimulation influences mental resilience and the ability to maintain attention voluntarily in patients. The main research question is: What criteria should a designer of vibro-acoustic stimulation programs follow to positively influence the resilience of individuals, and specifically, does changing the rhythm (frequency) of the stimulation positively impact attention stability, perceptions of chronic emotional and physical distress, reduction of excessive nervous system arousal after stressor confrontation, latent resilience factors, voluntary focused attention, and executive functions.

4. Familiarity with the Problem

Radoslav Shterev demonstrates familiarity with the state of the problem and creatively assesses the literature on the subject.

5. Research Methods

The chosen research methodology enables R. Shterev to achieve his stated goals. The following instruments were applied:

1. Device-based method for vibro-acoustic stimulation (VAS). The vibration stimulus in the study are reproduced by transducers built into a "chaise lounge" type chair and controlled via a control unit. Vibro-acoustic stimulation (VAS) has a stimulation frequency of:
 - 45 to 35 Hz (VRP1);
 - 40 Hz (VRP2);
 - both procedures had a duration of 23 minutes.
2. Device-based method for examining changes in nervous system arousal by measuring the electrical conductivity of the skin on the fingers.
3. Visual-Analog Scale for self-assessment of chronic pain intensity.
4. Visual-Analog Scale for self-assessment of latent resilience factors.
5. Test for assessing sustained attention of the examined persons SART2 (Sustained Attention to Response Task).

Statistical methods for processing empirical data were used, including: descriptive statistics (mean value and standard deviation), t-test for paired comparisons, analysis of variance ANOVA, and regression analysis.

6. Characteristics and Assessment of the Thesis

The dissertation consist of 230 pages and includes : introduction , 3 chapters , list of references and applications . For the research are used 118 sources – 18 in Cyrillic , 100 in Latin alphabet and 23 webpages .

The first chapter is theoretical and introduces literature review about the topic of the presentation . The accents are four : characteristic of the resilience ; neurobiological foundations of mental resilience; characteristic of apparent methods ; the vibro-acoustic simulation and resilience – mechanism and impact of the research . Definitions and models of resilience are presented . The works of a number of authors have been studied , who are exploring the resilience from psycho-physiological and neurophysiological point . The specific mechanism of the vibro-acoustic stimulation for impact on the psychical sustainability and the

factors of resilience are alleged . It is possible to impact on them with apparent techniques . There are examined connections between resilience from one side , and self control , fatigue and the recovering of voluntary focused attention , the profile of energy consumption and energy recovery of the individual from other side. This helps to clarify the necessary conditions for influence of apparent methods and the interventions . The processes on appearing of psychical sustainability are studied through research of energy consumption and energy recovery of the individual in a state of stress and after it. Theoretical propositions are given with focus on empirical confirmations (Blaket , 2012 y. ; Griffin , 2012 y. ; Kaplan , 1995 y. and others).

In the second chapter is introduced the design of the empirical research. The goal and the tasks are set , the object and the subject of the research are specified , hypotheses have been raised , the research plan is described . In the empirical research are included 30 people aged between 24 and 56 years old . From them 17 are women and 13 are man . The middle age of the participants is 38 years . Inclusion criteria in the research are diagnosed condition fibromyalgia from rheumatologist with 2-year statute of limitations . Exclusion criteria from the research are availability of comorbid diseases , pregnancy , recent surgery with unhealed wounds , recent vaccination within one month .

The third chapter of the dissertation is dedicated of analysis on results of the empirical research, discussion, conclusions, summaries and contributions .

In the research of Radoslav Shterev assumes that vibro-acoustic stimulations will impact more efficiently into the persistence of attention , into latent factors of resilience , energy recovery, stress reactions and the intensity of chronic pain of examined persons through specific and controlled change in frequency of vibro-stimulators compared to vibrations with a constant character . The following five hypotheses are elevated :

Hypothesis 1. It is assumed that the coefficient on the attention span test will be higher after the 2 procedures with VRP 1 and the second ones with VRP 2 compared to the values of the base level before starting the procedures .

Hypothesis 2. It is assumed that the value on the visual analog scale for self-assessment and measuring the intensity of the pain experienced will be higher (indication for less pain and stronger pain-relieving effect of the procedure) immediately after the end of the procedures with VRP 1 in comparison with her value immediately after the end of procedures with VRP 2 .

Hypothesis 3. It is assumed that the average level of arousal of the nervous system after confrontation with audio stressor or stress test will be lower after the two procedures with VRP 1 relative to the level of nervous excitement after the two procedures with VRP 2.

Hypothesis 4. It is assumed that the arousal of the nervous system will reach lower value during the procedures with VRP 1 relative to the level of nervous excitement during the procedures with VRP 2 .

Hypothesis 5. It is assumed that the total ball by visual analog scale for self assessment of latent factors of the resilience will be higher after the two procedures with VRP 1 relative to his value after the two procedures with VRP 2 .

The results and their analysis are pointing that the first hypothesis is confirmed . The results from t-test for comparison in pairs on the results of the researched individuals by the variable “attentional stability coefficient” after application of procedures VRP 1 and after procedures VRP 2 are showing that exist statistically significant difference which reveals that the attentional stability coefficient is significantly larger after VRP 1 in comparison with the coefficient after VRP 2 .

The second hypothesis is confirmed . Statistically significant difference is established , confirming that the ball for “self assessment of the perception about the degree of chronic pain experienced “ is larger after VRP 1 in comparison with the ball for “self assessment for the pain” after VRP 2.

The third hypothesis is not confirmed. The average level of arousal of the nervous system, assessed quantitatively by measuring the average value of skin conductance through the parameter Average SCL relative value in %, was found not to be statistically significantly lower after the stressor following VRP 1 compared to the average arousal after the stressor following VRP 2. The doctoral student suggests that the reasons for this result may be related to the short period for conducting the experiment or the passive nature of the vibro-acoustic stimulation and the lack of active training of the subject in new habits for coping with stress.

The fourth hypothesis is confirmed. The arousal of the nervous system is assessed quantitatively by measuring the minimum value of skin conductance – the parameter Minimum SCL relative value in %, which is an indicator of the lowest level of arousal of the nervous system during the measurement. A statistically significant difference was found between VRP 1 and VRP 2, indicating that the lowest achieved arousal of the nervous system during the vibro-procedure is significantly lower during VRP 1 procedures compared to the lowest achieved arousal during VRP 2 procedures.

The fourth hypothesis is confirmed. A statistically significant relationship was found between the subscales of flourishing and hope in significant life domains. The analysis shows that each subscale of flourishing positively correlates with each subscale of hope. This means

that with the increase in levels of optimistic attitude, the levels of individual elements of flourishing in the examined individuals also increase.

Regarding Hypothesis 5, the results show that the score on the visual-analog scale for self-assessment of resilience factors is higher after VRP 1 compared to the score for self-assessment of resilience factors after VRP 2. According to the doctoral student, the possible mechanisms explaining the improvement in self-assessment of resilience factors are dissociation of attention, recovery of volitional attention, concentration, energy, and emotional tone of the studied individual.

7. Contributions and Significance of the Work to Science and Practice

The scientific and applied contributions of Radoslav Shterev's dissertation consist in conducting of original study on the impact of vibro-acoustic stimulation on mental resilience. The study offers a new understanding of the role of device-based methods in improving mental resilience in patients with chronic pain. The author has presented the contributions on a theoretical plan, in methodological attitude and in applied aspect:

1. Based on the theoretical analysis carried out, contemporary concept of resilience have been intertated. It has been applied a multidisciplinary approach with emphasis on exploring the neurophysiological foundations of mental resilience and the possibilities for its positive impact through device-based methods.
2. It has been presented a systematic review of numerous studies, relating to links between resilience by the one side and the self-control, the tiredness and the recovery of volitional focused attention, the individual's profile of energy consumption and recovery after stress, by the other side.
3. It has been carried out an original empiric study, proving the benefits of introducing controlled changes in parameters of vibro-stimulation as a more effective approach to supporting resilience compared to vibro-stimulation of a constant nature.
4. In methodological attitude the current work adds contributions with using device-based methodologies for assessment and support to mental resilience. The combined methodology used to measure mental resilience may be useful for assessment of interventions for support of resilience, by having small impacts and they are apply for short periods of time.
5. In the applied plan two device-based for assessment and support to mental resilience have been developed and validated, which have the potential for entering into professional practice.

6. The empiric data give reason for development of social and health programs such as the combined instrumental-psychometric methodology for assessment of changes in the resilience, which may be used from a wide range of professionals involved in the field of mental health - school and organizational psychologists, clinical psychologists, psychotherapists, etc.

8. Assessment of dissertation publications

The publications, which has been presented for reviewing are a total of 4. Two of them are standalone articles by Radoslav Shterev, and two - co-authored with the scientific supervisor - Prof. Yu. Yanakiev. Three are in Bulgarian, and one - in English. They address topics for mental resilience and using of device-based methods for impact.

9. Personal Involvement of the Doctoral Student

I think that the conducted dissertation study is personal work of Radoslav Dimitrov Shterev and the contributions and results achieved are his individual accomplishments.

10. An Abstract

The abstract has been made according to the requirements and reflects the main results achieved in the dissertation.

11. Critical Remarks and Recommendations

I haven't critical remarks, which could have a significant impact on the review.

12. Personal impressions

I know Radoslav Dimitrov Shterev as doctoral student in psychology, as educator and lecturer. I have positive opinion for him. He is responsible and loyal in his work.

13. Recommendations for Future Use of Dissertation Contributions and Results

I recommend publishing of scientific articles and a monograph of the topic.

Within the scope in my competence I didn't find texts, which can be defined as plagiarism, nor did I receive any reports of such during the period of my work on the review.

CONCLUSION

The dissertation shows that Radoslav Dimitrov Shterev holds theoretical knowledge and professional skills in psychology and demonstrates qualities and skills for conducting independent scientific study.

For the above reasons, I confidently give my *positive assessment* of the conducted study, as presented in the reviewed dissertation, abstract, achieved results, and contributions. *I propose to the esteemed scientific jury to award the educational and scientific degree of 'doctor'* to Radoslav Dimitrov Shterev in in the field of higher education: Social, Economic and Legal Sciences, professional direction Psychology, doctoral programme Positive Psychology.

29.04.2025 г.

Reviewer:.....

(Prof. Kirilka Tagareva, PhD)