JURY'S MEMBER OPINION

by DSc. Manol Nikolov Manolov – Associate Professor, Paisii Hilendarski University

of a dissertation for the award of educational and scientific degree **"doctor"**

in: field of higher education 3.2. Psychology,
professional field *3. Social, economic and legal sciences, professional field: 3.2. Psychology*
doctoral program *Positive psychology*

Author: *Radoslav Dimitrov Shterev*

Topic: *THE IMPACT OF VIBRO-ACOUSTIC STIMULATION ON THE PSYCHOLOGICAL RESILIENCE OF PATIENTS WITH CHRONIC PAIN*

Scientific supervisor: *Assoc. Prof. Irena Ivanova Levkova, PhD, Paisii Hilendarski, University of Plovdiv*

With Order РД-22-727/21.03.2025 of the Rector of Plovdiv University "Paisiy Hilendarski" (PU) I have been appointed as a member of the scientific jury for ensuring a procedure for the defense of a dissertation on the topic of Research on the THE IMPACT OF VIBRO-ACOUSTIC STIMULATION ON THE PSYCHOLOGICAL RESILIENCE OF PATIENTS WITH CHRONIC PAIN for the acquisition of the educational and scientific degree "doctor" in the field of higher education3. Social, economic and legal sciences, professional field: 3.2. Psychology, doctoral program Pedagogical and developmental psychology The author of the dissertation is Radoslav Dimitrov Shterev - doctoral student at the Department of Psychology with scientific supervisor Prof. Yurii Yanakiev, PhD from the University of Paisii Hilendarski.

The set of materials on paper submitted by Radoslav Dimitrov Shterev is in accordance with Art. 36 (1) from the Regulations for the Development of the Academic Staff.

1. General presentation of the procedure and the doctoral student

Doctoral candidate Radoslav Dimitrov Shterev was born on April 19, 1973, and is a Bulgarian citizen. He has extensive professional experience in the field of technical sales, development of client-specific solutions, and distribution of specialized products related to both industry and healthcare. Since 2010, he has held the position of Sales Manager at Brain Amigo Ltd. – Plovdiv, where he works in the distribution of equipment for neurorehabilitation and mental health support. His responsibilities include not only sales but also technical consulting, client training, and after-sales service.

His previous professional experience includes work as a sales representative at Somfy Bulgaria, specializing in building automation, as a business development expert at Air Liquide Industrial Gases, a company engaged in the production and trade of industrial gases, and as a sales representative at Henkel Bulgaria, where he was responsible for industrial adhesives and building a distribution network.

The doctoral candidate's career trajectory, along with his educational background, demonstrates a long-standing engagement with high-tech products and solutions applied in both industrial and healthcare contexts. His accumulated experience in consulting and training clients outlines the profile of a practitioner with broad competencies, which adds further relevance and applicability to the doctoral research he has undertaken.

2. Relevance of the topic

The topic of the dissertation – "The Effect of Vibroacoustic Stimulation on the Psychological Resilience of Patients with Chronic Pain" – possesses high scientific and societal relevance, combining an interdisciplinary approach that bridges applied psychophysiology and positive psychology. In contemporary societies, marked by accelerated technological and social changes, there is a growing incidence of psychological distress, cognitive overload, and chronic stress. These developments necessitate the creation of new and effective interventions aimed at strengthening psychological resilience.

The author rightly emphasizes that while resilience has been established as a key concept in modern psychology, intervention strategies for its cultivation remain limited in terms of accessibility and efficacy. In this context, the application of vibroacoustic stimulation (VAS) as an apparatus-based method offers an innovative approach, as it bypasses the need for extensive cognitive resources or prolonged psychotherapeutic sessions. This makes it potentially applicable both for individuals with neurological and psychological impairments, and in preventive contexts for healthy individuals operating in stress-inducing environments.

The study focuses on patients with fibromyalgia – a clinically challenging group, for whom the etiology of the condition remains unclear and psychological distress constitutes a significant component of the symptomatology. This target population is particularly suitable for examining resilience-inducing factors due to the persistent experience of pain, anxiety, and cognitive dysfunction. The hypothesis that VAS may support the restoration of psychophysiological equilibrium and cognitive efficiency lays the groundwork for an empirical investigation of high applied value..

3. Knowing the problem

The doctoral candidate demonstrates thorough and systematic knowledge of the issues related to psychological resilience, as well as of contemporary intervention approaches aimed at its development and maintenance. The theoretical framework of the dissertation reviews key concepts and models of resilience – including Bronfenbrenner's ecological model, the compensatory model, and the

personological interpretations of Maddi (hardiness), Grotberg (the three categories of protective resources: “I am,” “I have,” “I can”), and Fredrickson (positive emotions and the broadening of behavioral repertoires).

The candidate skillfully integrates the psychological aspects of resilience with its underlying neurobiological processes – including the regulation of the HPA axis, sympathetic activation, neuroplasticity, neurotransmitter systems, and the role of self-control as an energy-consuming resource. In this respect, an explicitly defined integrative approach is evident, where psychological and physiological models are not presented in parallel but are conceptually interwoven in the explanation of adaptive functioning under chronic stress.

It is important to highlight that the candidate also encompasses the field of applied psychophysiology as a platform for intervention, analyzing not only well-established methods such as biofeedback, neurofeedback, and transcranial stimulation, but also lesser-known yet promising technologies like vibroacoustic stimulation (VAS). The author demonstrates not only familiarity with international literature but also a critical stance—identifying gaps in current intervention models and arguing for the development of apparatus-based methods that are accessible for everyday use by a broad range of users.

A creative approach is evident in the efforts to develop a hardware model for VAS, the construction of new assessment tools using visual analogue scales, and in the synthesis between empirically measurable parameters and subjective self-assessments. Particularly noteworthy is the use of skin conductance as a biomarker of sympathetic nervous system arousal and as an indicator of stress-regulatory capacity—an approach that reflects a deep understanding of the complex interactions between physiological and psychological components of resilience.

4. Research methodology

The methodological framework of the dissertation is precisely structured, distinguished by clear logic, methodological consistency, and empirical validity. The research is carried out through a quasi-experimental within-group intrasubject design, in which the intervention conditions alternate between two types of vibroacoustic stimulation (VAS). This design is well-suited to the stated objectives and allows for control over individual response variations while simultaneously minimizing the effect of external variables.

The independent variable is the frequency mode of the VAS—dynamic (VRP1: 45–35 Hz) and static (VRP2: fixed frequency at 40 Hz). The dependent variables include both objective physiological indicators—such as changes in skin conductance level (SCL), and subjective self-assessments—through visual analogue scales for pain and latent factors of resilience, as well as cognitive indicators, measured via the computerized SART2 test for sustained attention.

The instruments used are carefully selected and validated, ensuring the reliability of the collected data. Particularly impressive is the multi-layered operationalization of the construct "psychological resilience," which incorporates:

– a biophysiological index (SCL),

– a behavioral index (Sustained Attention Coefficient – SAC),

– and subjective self-assessments of latent factors based on the model of Maltby & Hall (2022).

The doctoral candidate demonstrates the ability to integrate classical quantitative approaches (descriptive statistics, t-tests, ANOVA, regression analysis) with psychophysiological methods. Control of potential artifacts is adequately implemented, taking into account the effects of initial exposure, cumulative stimulation, and ultradian rhythms. The precision in planning measurement time points, as well as maintaining consistency in the experimental environment (same room, device, and experimenter), further enhances the internal validity of the study.

A key methodological contribution is the development of the VAS device, positioning the doctoral candidate not only as a researcher but also as an innovator.

5. Characterization and evaluation of the dissertation work and contributions

The dissertation by Radoslav Shterev is the result of an in-depth, original, and methodologically rigorous study situated at the intersection of positive psychology, applied psychophysiology, and neuroscience. The total length of the dissertation is 230 pages, of which 213 pages comprise the main body, structured into an introduction, three sequentially developed chapters, bibliography, and appendices. The visual and analytical density of the work is high—17 figures and 51 tables support the analytical content with visual evidence and empirical precision.

Chapter One, dedicated to the theoretical framework, is exceptionally rich and conceptually dense. The doctoral candidate presents contemporary theoretical models of psychological resilience, including its psychological, neurobiological, and social dimensions. Particularly valuable is the systematization of latent resilience factors (according to Maltby & Hall, 2022), which serve as the basis for measurement in the empirical part. Key apparatus-based interventions are also analyzed—biofeedback, neurofeedback, audiovisual entrainment (AVE), transcranial direct current stimulation (tDCS), and cranial electrostimulation—and their relevance to self-regulation and resilience. The chapter concludes with a critical analysis and scientific rationale for the use of vibroacoustic stimulation as an innovative form of psychophysiological intervention.

Chapter Two focuses on the design of the empirical study. Here, the candidate combines strict experimental logic with real clinical conditions, employing a quasi-experimental within-group design with alternating procedures. A total of 30 participants diagnosed with fibromyalgia were examined, distributed across a balanced age range, with both physiological and psychological, as well as cognitive indicators assessed. Noteworthy is the fact that the candidate not only used existing apparatus-

based methods but also constructed a **proprietary VAS device**, demonstrating both research maturity and engineering creativity.

Chapter Three presents a comprehensive statistical analysis of the results using descriptive statistics, t-tests, ANOVA, and regression analysis. The findings confirm the hypotheses—most notably the significant effect of variable-frequency VAS (VRP1) on indicators of attentional resilience, reduction of autonomic arousal (via SCL), and enhancement of resilience-related self-assessments. Particularly interesting is the interpretation that the dissociative mechanism induced by VAS temporarily "frees" attention from pain focus and facilitates the restoration of self-regulation—a hypothesis with potential for future exploration.

The contributions of the dissertation can be systematized in the following directions:

- **Theoretical and methodological contribution** – the creation of an innovative conceptual framework that integrates the construct of resilience with applied psychophysiology and apparatus-based methods.
- **Instrumental contribution** – development and testing of a new VAS-based apparatus method, combined with adapted visual analogue scales for latent resilience factors.
- **Empirical contribution** – demonstration of a positive effect of VAS on resilience and attention in individuals with fibromyalgia, opening avenues for therapeutic intervention.
- **Applied contribution** – potential for translation of the model into mental health practice, especially in settings with high cognitive demands and limited access to therapy.
- **Technological contribution** – development of a VAS prototype for experimental and clinical use.

6. Assessment of the doctoral student's publications and personal contribution

The publication activity of doctoral candidate Radoslav Shterev reflects a clear thematic focus on the core issues of the dissertation—namely, the impact of vibroacoustic stimulation on psychological resilience and cognitive functioning. The presented scholarly works demonstrate not only the progressive development of his scientific interests but also the deliberate accumulation and refinement of knowledge applied directly within the dissertation. The author has published in peer-reviewed academic journals and has participated in scientific conferences, which indicates active integration into the scholarly community.

The publications present key stages of the research—ranging from the theoretical foundations of resilience and the methodology of psychophysiological measurement to the validation of the apparatus-based approach and the presentation of empirical findings. They serve as a preparatory platform through which the candidate not only tests scientific hypotheses but also evaluates the effectiveness of his own instruments. References to the specific publications and their contribution to the rationale of the dissertation can be found in the section on contributions (see pt. 5).

As for the individual contribution, it is clearly articulated in both the theoretical and practical parts of the dissertation. The candidate is the author of an original VAS apparatus system, has carried out the entire design of the study, developed and applied his own instruments, and independently conducted the empirical procedures—including sample selection, session execution, and statistical analysis. This scope of work excludes merely formal participation and confirms authorship over all significant stages of the research process.

In summary, the candidate's publication activity is thematically relevant, quantitatively sufficient, and scientifically meaningful, while his personal contribution is indisputable, clearly delineated, and comprehensively realized..

7. Autor's abstract

The abstract prepared by Radoslav Shterev is structured in accordance with the formal requirements. The document clearly and consistently summarizes the main elements of the dissertation, including: the relevance of the topic, the research aim and objectives, key hypotheses, applied methods, the structure of the dissertation, empirical results, and the conclusions and contributions made.

A positive impression is created by the terminological consistency, the precise definition of scientific categories, and the high level of coherence between the various parts of the text. The information is presented in an academic style, with an appropriate balance between theoretical depth and applied focus. The formulations of the research aim and hypotheses are clear and fully aligned with the content of the dissertation. The overview of the methodologies used is sufficiently specific and enables the research logic to be followed in a transparent and structured manner.

The abstract accurately reflects the original contributions without exaggerating them or presenting them beyond the scope of the actual results..

8. Recommendations for future use of the dissertation contributions and results

The results of the dissertation study have clear potential for application in both scientific and practical contexts. First and foremost, the developed apparatus-based protocol for vibroacoustic stimulation (VAS), combined with the assessment of latent resilience factors, can be implemented in clinical and paraclinical practices related to the management of chronic pain, anxiety, attention and fatigue syndromes, as well as for rehabilitation purposes. Its application is particularly suitable in settings such as mental health services, physiotherapy, psychosomatic medicine, and corporate wellness programs.

A second important direction for future development is the adaptation of the technology for non-professional users, through the creation of a portable version of the device or integration into a mobile format with feedback-tracking elements. This would contribute to the prevention of cognitive fatigue and the enhancement of psychological resilience across broader populations, including students, professionals working under pressure, and individuals experiencing elevated emotional stress.

Thirdly, the findings can serve as a valuable foundation for intervention programs in educational institutions, where resilience is increasingly recognized as a key factor for psychological well-

being and academic achievement. In this regard, future scientific developments could examine the effects of VAS on students, teachers, and faculty members in conditions of chronic stress and educational overload.

Despite the promising translational potential, an important critical remark concerns the need for external validation of the effects identified in the dissertation. The study is limited to a within-group design with a small sample size (n=30), which—although appropriate for an initial proof of concept—requires follow-up through controlled clinical trials and larger-scale population studies. Future research involving randomized control groups would provide a higher level of evidential strength and greater confidence in the generalizability of the results.

CONCLUSION

The dissertation of Radoslav Dimitrov Shterev is the result of in-depth research that demonstrates scientific maturity, methodological precision, and an interdisciplinary approach. The topic represents a contemporary and significant scientific challenge, and the approach to addressing it combines originality, theoretical soundness, and practical applicability. The doctoral candidate has critically analyzed existing concepts, developed an original apparatus-based tool, validated a new intervention methodology, and analyzed the results using appropriate quantitative methods.

The contributions of the dissertation are clearly identifiable and pertain to the development of theory, methodology, and practice in the field of positive psychology and applied psychophysiology, fully meeting the criteria of originality and significance.

Based on the review and evaluation of the dissertation, the abstract, the candidate's publications, and scholarly activity, I recommend to the scientific jury that Radoslav Dimitrov Shterev be awarded the educational and scientific degree "Doctor" in professional field 3.2. Psychology, doctoral program in "Positive Psychology.".

2025, 11 May **Prepared the opinion**: …….

Assoc. prof. Manol Manolov, PhD