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## THE EFFECTS OF DRUM-CLUB ACTIVITIES PROGRAM ON MENTAL HEALTH OF SOLDIERS IN KOREA

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**Abstract: Purpose.** *The purpose of this study was to develop a drum-club activities program for soldiers and to explore the effects of the program using Vibraimage technology on the mental health of soldiers.*

**Methods.** *This study used one group, pretest-posttest design. A drum-club activities programs for soldiers was offered a week with each session 2 hours for 12 weeks. A total of 33 soldiers were recruited, but 16 soldiers were dropped out of the program because they did not participate in the program more than 3 times during the 12 sessions. Finally, data from 17 soldiers were analyzed using the SPSS 22.0 program. Mental health status was measured by Vibraimage fixation standard systems (Mindin®), and the variables were aggression, stress, tension & anxiety, suspect, balance, energy, charm, self-regulation, neuroticism, concentration, and vitality index.*

**Results.** *There were statistically significant difference in anxiety ( $p = .001$ ).*

**Conclusion.** *The results indicate that the drum-club activities program was effective in decreasing aggression, suspect, and anxiety in soldiers. The drum-club activities program can be considered as one of the possible intervention strategies for soldiers. And also Vibraimage technology is very convenient and useful measurement method in psychophysiological field.*

**Keywords:** *Vibraimage technology, Mindin®, Drumming, Anxiety, Psychophysiology*

### Introduction

Vibraimage technology utilizes micromovements around head in order to diagnose the overall mental health state of the patient objectively, accurately, quickly and quantitatively [1]. The technology: a) measures human biological variables in a non-invasive and contactless manner; b) performs statistical analysis on the collected information and; c) diagnoses the state of the patients based on the statistics [2].

Vestibular system is related to all other functional systems [3] of human body, and effectively reacts to all mechanic, nociceptive or emotional changes. Also, vestibulo-emotion reflex draws reflective changes of micro-movements around the head in free standing position, through the constriction of muscles supporting the neck in the skeletomuscular system [2]. It can be said that the anatomical structure of all human species is essentially identical. Vestibular reflex about partial changes in the state is identical in standard situations. The informative nature of vestibular system in diagnosing various forms of pathological changes of the body enables a characteristic analysis of human psychological state through the processing of information about vestibulo-emotional reflex [1]. Using Vibraimage in actual diagnosis requires an establishment of criteria on the parameters. Vibraimage reads out the signal changes of the human organ systems.

Not only human but also all organisms have the differentiated periodic processes according to individual frequency characteristics. This periodicity affects a variety of physiological processes that ensure the normal activity of the body organs, including heart rate, body temperature, arterial pressure, cell respiration, and mitosis of various cells [4, 5].

And the progress of these physiological processes is related to the state of the body organ. The asynchronous cycle process is represented by two key indicators: frequency and amplitude. It is possible to inform the psychophysiological state of a specific time zone with a dynamic image that characterizes the frequency and amplitude of the point representing movement. This method is possible because all major physiological processes in humans have some correlation with each other.

In Korea, men must serve in the military for two years. Most Korean participants are having a hard time in the army because they are in their late teens and early twenties. There is a “drum club activities”, stimulating people’s positive emotion to improve the effectiveness of healing using percussion instruments (drum), that is held for 2 hours every Friday at the Nonsan Training Center. Using the Vibraimage technology solution, the emotional state changes of the participants were measured and the effects were compared.

In this study, we analyzed the effectiveness of the drumming education and training (Drum Club activities) by the accurate evaluation it through Vibraimage technology measuring machine that uses a head micromovement reflex reaction. The human state assessment includes the arithmetic expectation (average value) of micromovement parameters, concentration, vitality and the various parameters provided by Vibraimage technology.

In the past, biometric variability was usually used to identify cardiovascular pathological aspects and study the reserved capabilities of body organ in the analysis of heart rate variability [4]. The integrated diagnosis information of heart rate variability parameter differs significantly from the vestibular system measurement information made by biorhythm and vestibular activity. The heart rate variability is the main body rhythm of the human organ, while the vestibular system is an important rhythm of psychophysiology, and its function is mainly determined by the activities of other functional systems.

Vibraimage technology physical models include the articles that was invented by Viktor Minkin and N. Nikolaenko (2008) [1, 2], and the physical and thermodynamic model in Vibraimage technology was based on research by Viktor Minkin and Libb Thims (2008) [3].

Vibraimage method has a minimum correlation and records as many as 9 independent psychophysiological parameters, characterized by 3 D motion movements in human head. By the arithmetical processing for these 9 parameters, a single coefficient that characterizes the human function state is determined, and the micromovement parameter measurement is made up of Vibraimage technology. It consists of a standard camera with low temporary noise and Laptop installed with Vibraimage technology Application.

## 2. Objective and Measurement method

### 2.1 Objective

For each subject, the psychophysiological parameter values measured by Vibraimage technology (Mindin®) were obtained from two measurement testing group according to the two conditions of the pre-training state and post-training state:

Condition 1 — pre-training state;

Condition 2 — post-training state.

This study is to compare the effectiveness by finding differences in meaningful psychophysiological parameters measured from Vibraimage technology.

In the measurement stage, we detected the visual differences in Vibraimage generated by Vibraimage technology and acquired the detailed measurement data in the psychophysiological state using the digital image processing technique in Vibraimage.

### 2.2 Experiment and Analysis method

The method used in Vibraimage technology testing equipment is remote sensing, non-exploratory, and does not apply any external radiation. There is no high/low frequency electromagnetic field around the participant. The spatial distribution of micromovement was measured on the surface of living objects (human) associated with changes in the nervous muscle tremors in amplitude/frequency spectrum and psychological emotional state. The measurement results are based on the psychophysiological parameters provided by Vibraimage technology and the analysis of measurement results using statistical processing to obtain numerical values of the characteristics of the psychological emotional state of the person.

From the statistically reliable independence and by obtaining the results of the study, it is to find the changes in the functional state between two groups.

The statistically recorded differences in Vibraimage parameters demonstrate the functional, physiological, or emotional changes that are characteristic of the target group.

In the analysis, human psychophysiological parameter average value  $M$ , mean square deviation  $S$ , brain fatigue, concentration and vitality parameter were used on the basis of the following parameters.

T1: Aggression parameter, T2: Stress parameter, T3: Anxiety parameter, T4: Suspect parameter, T5: Balance parameter, T6: Charisma(Charm) parameter, T7: Energy parameter, T8: Self-Regulation parameter, T9: Neutrocism parameter.

The above parameters have given the conditional names that conform to the various emotional human state. It is not necessary to accept these names literally because the individual parameter reflects the physiological aspects of the space and reflex micromovement of head and are calculated according to a specific formula.

The individual parameter calculation formula from T1 to T9 is made according to the micromovement characteristics so that the characteristics of the functional process,

the motion energy, and all other characteristics generated in the body organs can be reflected up to 100%.

The T1 to T9 parameters were selected to record all micromovement in the head. The name of the individual Ti parameter represents the various psychophysiological characteristics according to Vibraimage application. The priority characteristic of all individual parameters is the parameter determination formula, not the name.

### **2.3 Detailed Measurement**

This healing program is conducting the drumming's education and training and the healing service through the healing effect program using drum, which is organized by SEROTONIN Institute. The participants were 33 military soldiers (all male) recruited in Nonsan Training Center. The average age of military soldiers was 23.8 years (standard deviation 0.74). The military participants group had a training every week with each session 2 hours for 12 weeks program at the Nonsan Training Center in Nonsan city on November 2018. Two time measurements were performed at the stage of 'before-training' and 'after-training at 12<sup>th</sup> week' in the drumming course. The measurement environment was installed so that Vibraimage technology operated by sitting across from one another between tester and participant. And its room was illuminated by the light on the ceiling under the enough lightness. The camera on Vibraimage technology was focused on the participant's face, and the tester sat on the other side of the participant so that the Laptop screen was not visible to the participant. At the adjustment stage, the optimum amplification factor for the electrical channel was set and was constant during the measurement period. The video at the time of measurement was captured from a camera with 30 frames and, the measurement was performed continuously for each participant. The measurement time was 1 minute for each participant.

The participant was a stationary state and sitting in a chair and frontly on a laptop pc (1.6 GHz, RAM 8 GB). Vibraimage technology equipped with camera (30 FPS). In Vibraimage technology record, the background of the monotone was placed on the back side of the participant to reduce background noise, and the head part of the participant was displayed on the screen as a whole.

### **3. Measurement Result**

For 33 participants, the status of the pre-training and post-training was obtained using Vibraimage technology measuring system. The results of Vibraimage technology were able to obtain data on the average value (M) for ten psychophysiological parameter values (T1–T9), and concentration, and vitality.

The results of the statistical analysis of the data measured before and after drumming's education and training are shown on Table 1 and Fig 1.

Table 1

The Effect of Drum-club Activities Program (N = 17)

| Variables       | Pre-test      | Post-test     | Difference (pre-post) | z     | p      |
|-----------------|---------------|---------------|-----------------------|-------|--------|
|                 | M ± SD        | M ± SD        | M ± SD                |       |        |
| Aggression      | 34.62 ± 8.82  | 33.82 ± 7.06  | 0.79 ± 8.23           | -0.49 | .619   |
| Stress          | 26.76 ± 4.73  | 30.26 ± 6.95  | -3.50 ± 7.28          | -1.72 | .084   |
| Anxiety         | 37.29 ± 3.90  | 29.13 ± 5.33  | 8.15 ± 7.04           | -3.38 | < .001 |
| Suspect         | 32.86 ± 3.00  | 31.06 ± 2.79  | 1.79 ± 4.03           | -1.63 | .102   |
| Balance         | 68.64 ± 3.81  | 64.61 ± 4.79  | 4.02 ± 7.62           | -2.15 | .031   |
| Energy          | 18.04 ± 7.07  | 17.39 ± 6.71  | 0.64 ± 7.75           | -0.21 | .831   |
| Charm           | 71.34 ± 11.60 | 68.08 ± 14.62 | 3.25 ± 19.44          | -0.49 | .619   |
| Self-regulation | 69.74 ± 6.13  | 66.16 ± 7.80  | 3.58 ± 11.20          | -1.15 | .246   |
| Neuroticism     | 24.06 ± 10.06 | 26.56 ± 6.87  | -2.50 ± 13.80         | -1.30 | .192   |
| Concentration   | 51.87 ± 27.33 | 53.59 ± 16.56 | -1.72 ±               | -0.40 | .687   |
| Vitality        | 1.34 ± 0.46   | 1.31 ± 0.39   | 0.03 ± 0.45           | -0.11 | .905   |

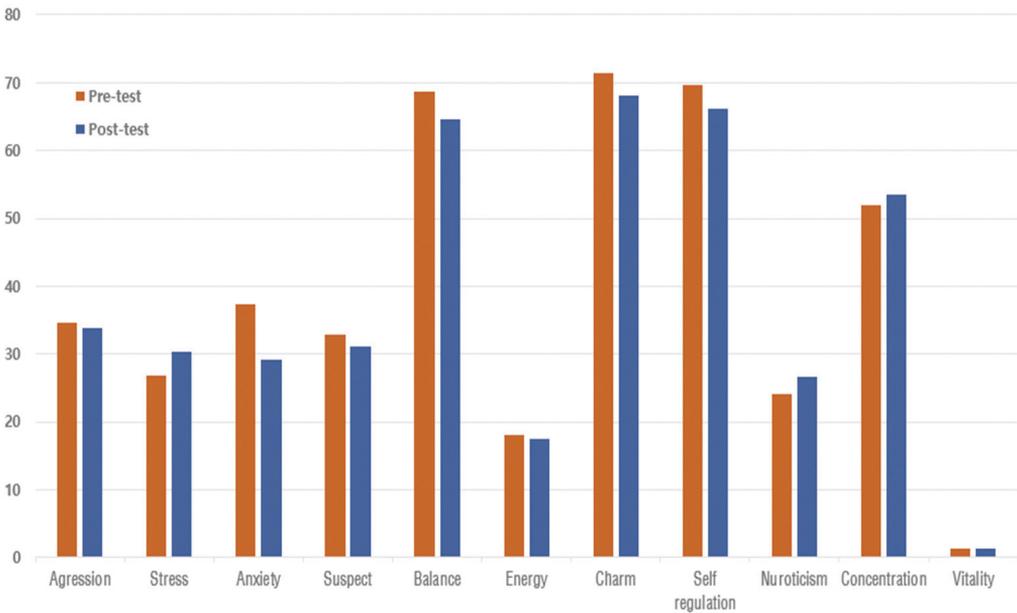


Fig. 1. The Effect of Drum-club Activities Program

Drumming training was not easy to adjust percussion sounds as a group activity, so stress and neuroticism were slightly worsened before proficiency, but those were within a normal range. But at 12th week, there was statistically significant improvement in anxiety. Other parameters of aggression, suspect, and concentration were improved.

As a result, it was found that there was a important psychophysiological change between the pre and post — training status of drumming's education and training.

In addition, the study was able to clearly and objectively identify changes in some functional states apart from the physiological, psychological, or emotional causes, although the effects of drumming's education and training vary slightly depending on the characteristics of each individual soldier or military life with special hard training. At 12<sup>th</sup> week, we found there was a long march just before drumming session.

#### 4. Conclusion

By using Vibraimage technology, we were able to easily and quickly measure the psychological emotional state of a person, and we were able to record changes in the state of the person after the education and training of the drum as well as the normal and quiet psychological emotional state of the person.

In the conducted study, the effectiveness of drumming's education and training was positive in various psychophysiological conditions and, the result proved to be effective.

The differences between the two conditions are relatively marked by psychophysiological parameters. The significant differences were so remarkable in Anxiety.

The degree of concentration increased and then, was improved as well. The distribution of the negative emotion variation was decreased.

In addition, since the measuring device of Vibraimage technology is measured by non-contacting method, it has been proven that it can be easily and conveniently measured for the effectiveness analysis of drumming's education and training.

At the same time, this study was able to objectively and efficiently identify changes in all functional conditions apart from the physiological, mental, or emotional causes, although the effects of drumming's education and training differ slightly depending on the characteristic of each soldier or military life.

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## Information letter about the 2nd International Open Science Conference *Modern Psychophysiology. The Vibraimage Technology*

DEAR COLLEAGUES!



The 2nd International Open Science Conference “*Modern Psychophysiology. The Vibraimage Technology*” will be held on June 25–26, 2019, in St. Petersburg, Russia.

It is arranged by the ELSYS Corp., the European Academy of Natural Sciences (EANS), the Russian Biometric Association (RBA), A. I. Burnazyan Federal Medical and Biophysical Center and Open Innovation Center of the Russian State Corporation Rostec.

Scientists and specialists from Japan, Korea, China, Europe, America, Russia, including, academies, research institutes, educational institutions and corporations researching, developing and using vibraimage technology and systems will take part in the conference. It is supposed to consider the theory and practice of vibraimage technology and systems application in various fields.

The Chairman of the Organizing Committee of the conference is *Viktor Minkin*, the inventor and developer of the vibraimage technology, CEO of ELSYS Corp.

*The conference will take place at the address:* Sputnik Hotel, 36 Toreza Prospect, St. Petersburg. Travel: Ploshchad Muzhestva Metro station, trolley bus 13, bus 123 to the Gostinitsa Sputnik stop.

***Opening of the conference is on June 25, 2019 (Tuesday) at 10:00 am.***

Materials for inclusion in the conference program and publication should be submitted to the Organizing Committee no later than **April 1, 2019**. The working languages of the conference are English and Russian.

Materials should be submitted ready to be published only in electronic form by e-mail at **minkin@elsys.ru** with indication in the subject line the **IOSC “Modern Psychophysiology. The Vibraimage Technology”**.

1. The text of the report (not the abstract) of no more than 5 pages of A4 sheet size (210×297 mm), page filling is uniform, hanging lines are undesirable.

2. Information about the authors (text in a separate file): Surname, First name (fully), academic degree, rank, position, place of work, service, phone number, e-mail address.

Requirements for papers: the text of the report may be in any editor, preference is given to **MS Word 6.0/95-2000** and later; text font **Times New Roman, size 12**, paper of book orientation, full justify alignment of paragraphs, automatic hyphenation. Pages should not be numbered. Left, right and top margins should be **20 mm**, should have single line spacing, first line indent 1 cm. The drawings should be in **black and white**. **Formulas** should be implemented by the built-in MS Word formula editor or as embedded images and must be within the text file. **Exclude auto formatting of nested lists**. The title of the report should have center alignment, written in all caps, bold font style, without quotation marks, dots, and underlining. Under the title of the report in s necessary to place the initials and surnames of authors, the name

of the organization from which the report is submitted, the city, e-mail (typed in lowercase letters). After 1 interval there is an abstract and after 1 interval there are keywords (no more than 5) in italics. **After 1 interval, all of the above is typed in Russian and English.** The text of the report in Russian and English is typed single space. References in the text are indicated by numbers in square brackets. Formulas with indices and degrees, Latin designations in the text of the report are typed two points larger and in bold. The texts of the reports are not edited. The decision to admit the report to participate in the conference is made by the Organizing Committee. The duration of the report is no more than 20 minutes, speeches — no more than 5 minutes. Illustrations for the report should be recorded on a USB Flash Drive stick.

The Organizing Committee takes over the publication of materials and other organizational expenses for the conference. Travel, accommodation, hotel are at the expense of the participating party. Invitation cards to the conference are not sent. ***We invite you to participate in the conference and make presentations, reports and publications.***

ADDRESSES:

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