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Letter to the Editor

Before the ApolloNeuroTM Device can be Recommended for Stress Reduction and Improvement of Well-Being, this Effect must be Confirmed by Appropriate Studies

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Letter to the Editor

We read with interest the article by McKennon *et al*. on a pilot study of the effects of the ApolloNeuroTM device (AN) on stress and well-being in 27 medical and pharmacy students and 34 control subjects [1]. Stress, burnout, and well-being were assessed using the Maslach Burnout Inventory (MBI), the Medical Student Well-Being Index (MS-WBI), the Perceived Stress Scale, the Brief Resilience Scale, and the Alcohol Use Disorder Identification Test-C [1]. After 12 weeks of using the AN, the students reported a significant improvement in burnout, emotional exhaustion, depersonalization, and well-being compared to the control group [1]. The study is noteworthy, but some points need to be discussed.

The first point is that the number of sessions in which the AN was used was not standardized, ranging from 7 to 634 sessions per participant [1]. Since the number of sessions can greatly influence the results of the five questionnaires used, the number of sessions completed by the students must be included in the analysis.

The second point is that the vibration modes ("Focus," "Sleep," "Relax," "Wake Up," "Recover," "Socialize," "Meditate") could be freely selected by each participant. Since different modes can have different effects on the scales used, the number of different modes used should also be included in the analysis. Did participants with a certain combination of modes benefit more from the device than participants who preferred a different combination of modes?

The third point is that the study was not blinded. The participants and evaluators knew who belonged to the treatment group and who belonged to the control group. It is therefore conceivable that the participants in the treatment group suspected a possible positive effect of the therapy, even though there was actually none (placebo effect).

The fourth point is that the effect of the treatment was not objectively assessed, but subjectively evaluated by the participants. There was no measurement of the ratio between sympathetic and parasympathetic tone, no polysomnography to assess sleep duration and sleep quality, no measurement of stress hormone levels (e.g., cortisol levels), no measurement of oxidative stress parameters (e.g. SOD), no measurement of heart rate variability, and no EEG recordings to assess brain wave patterns.

The fifth point is that factors influencing burnout and well-being were not taken into account and included in the analysis. Well-being over a period of three months may not only be influenced by vibrations on the skin surface, but rather by socioeconomic status, academic success, the quality of sexual and social relationships, life events, and strokes of fate. As long as these confounding factors are not taken into account in the analysis, the results may be misleading.

In summary, before recommending AN as a means of reducing stress and improving student well-being, appropriately designed studies should be conducted, treatment effects should be measured objectively, and confounding factors should be included in the analysis.

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