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Research Article

Effect of the Knowledge of Biological Changes of Deep Breathing on the Stress Levels of Introverts

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ABSTRACT

This study investigates whether providing educational information about the biological effects of deep breathing enhances the effectiveness of the exercise in reducing stress levels. A total of 301 participants were randomly assigned to either a control group or an experimental group. Both groups completed a stress scale before and after practicing the 4-7- 8 deep breathing technique, but only the experimental group watched an educational video explaining the biological benefits of deep breathing prior to the exercise. Additionally, personality traits were assessed using the Mini-Markers Big Five scale to examine whether introverts would benefit more from the intervention. Results from independent samples t-tests and ANCOVA analyses showed no statistically significant differences in stress reduction between the groups or among introverts compared to extroverts. While previous research has shown that deep breathing can be effective in reducing stress, this study suggests that a single session combined with educational content may not be sufficient to enhance its impact. Limitations such as the online format and self-reported measures are discussed, and suggestions for future research are provided.

Keywords: Deep breathing, stress reduction, psychoeducation, introversion, stress management, experimental study.

INTRODUCTION

Numerous studies have demonstrated how breathing exercises, especially deep breathing, can lower stress. Paul et al. (2007) study and Perciavalle et al. (2016) study examined the effectiveness of deep breathing in reducing stress levels and concluded that deep breathing exercises help reduce stress.

Additionally, some studies, such as the Pal et al. (2003) study, examined the effects of deep breathing exercises on the body and autonomic functions and discovered that participants who engaged in deep breathing exercises experienced an increase in parasympathetic activity and a decrease in sympathetic activity, which ultimately decreases stress levels.

Several studies have looked into the effectiveness of breathing exercise education in enhancing exercise performance. The effects of deep breathing exercise education and instructions on performance status were examined in studies by Ünver et al. (2018) and, Phillips and Sehmann (1989). Both studies found that teaching people how to breathe positively impacts performance, the likelihood to use the exercise, and improves breath control and knowledge of breathing.

To the best of our knowledge, there are no studies examining the effect of explaining the biological effects of deep breathing on stress levels. As a result, this study aims to determine whether providing educational materials about the biological changes of practicing deep breathing exercises will enhance exercise performance and reduce stress levels. In addition, this study seeks to determine whether introverted personality types will benefit more from the educational materials and experience greater stress reduction.

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HYPOTHESES

H1: The knowledge of biological changes of deep breathing enhances the effectiveness of deep breathing exercises in reducing stress levels.

H0: The knowledge of biological changes of deep breathing does not enhance the effectiveness of deep breathing exercises in reducing stress levels.

H2: Introverts will be more influenced by the information about the biological benefits of deep breathing.

H0: Introverts will not be more influenced by the information about the biological benefits of deep breathing.

METHODS

A sample of 301 participants was recruited online using a convenience sampling method and they were randomly assigned to either control or experiment group.

There were 157 males and 134 females with 5 participants preferring not to say their gender. Among the participants, 58 were between the ages of 18 and 24; 159 were between the ages of 25 and 34; and the remaining participants ranged in age from 35 to 64.

Participants in both groups were asked to first complete the Mini-Markers Big Five scale to assess for intervention personal type. Then, they were asked to think of a stressful event they have been stressed about recently prior to completing Measurement of Psychological Stress (MSP) scale to rate their stress levels before and after practicing 4-7-8 deep breathing exercises attached to the survey. The additional activity for the experimental group was to watch a video explaining the biological changes of deep breathing before practicing the deep breathing exercise.

RESULTS

An independent samples t-test was conducted to examine the impact of providing information about the biological effects of deep breathing in relation to stress levels. In the pre-test results, there was no significant difference between the control group (M=14.287, SD=3.146) and the experimental groups (M=14.636, SD=2.858), with t(299)=-1.008, p =0.314.

For the post-test results, there was no significant difference between the group who was given educational information about the benefits of deep breathing exercise (M=15.728, SD=2.668) and the control group (without educational information) (M=15.353, SD=2.795), with t(299)=-1.191, p =0.235. The results suggest that the knowledge of biological changes of deep breathing did not enhance the effectiveness of deep breathing exercises in reducing stress levels in this study. (See Figure 1, Figure 2).

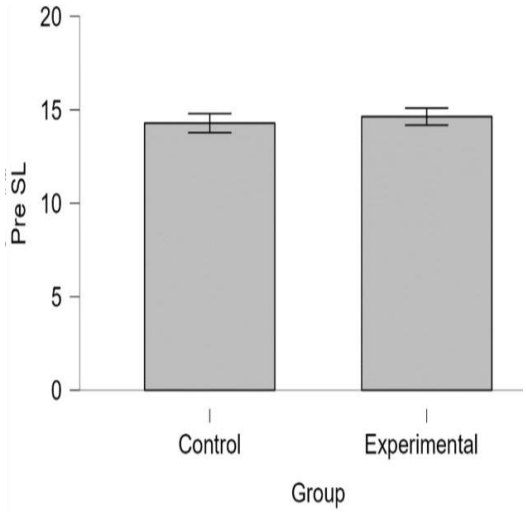

Figure 1

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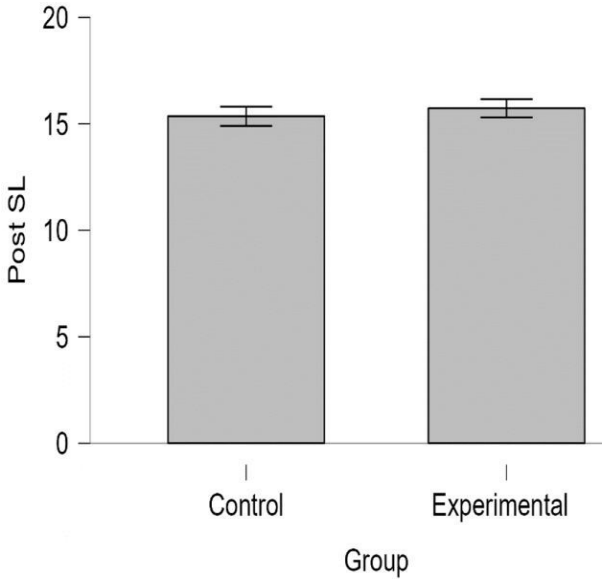

Figure 2

An ANCOVA was conducted to examine the effect of the intervention (information about the biological benefits of deep breathing) on reducing stress levels in introverts. Pre-test data was used as a covariate to control for individual differences in stress levels before the intervention. For the pre-test, the ANCOVA results showed no significant effect of introversion on stress levels before the intervention, $F(1, 298) = 3.442$, $p = 0.065$, $\eta 2 = 0.011$, indicating that introverts had the same levels of stress before the intervention compared to extroverts. The descriptives showed that the mean stress levels before the intervention were similar in the control group ($M = 14.287$, $SD = 3.146$) and the experimental group ($M = 14.636$, $SD = 2.858$). For the post-test, the ANCOVA results showed no significant effect of introversion, $F(1, 298) = 1.190$, $p = 0.276$, $\eta 2 = 0.004$, on stress levels after the intervention. The descriptives showed that the mean stress levels after the intervention were similar in the control group ($M = 15.353$, $SD = 2.795$) and the experimental group ($M = 15.728$, $SD = 2.668$). The results did not support the hypothesis that the information about the biological benefits of deep breathing would more influence introverts. (See Figure 3, Figure 4).

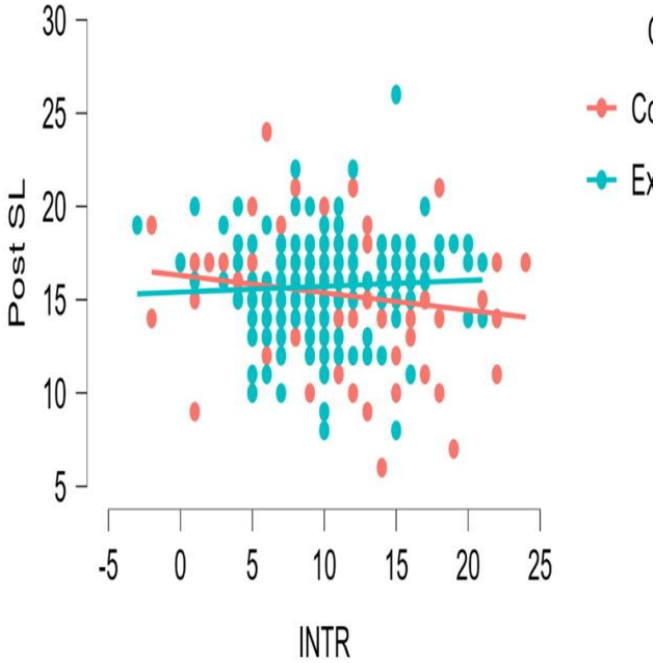

Figure 3

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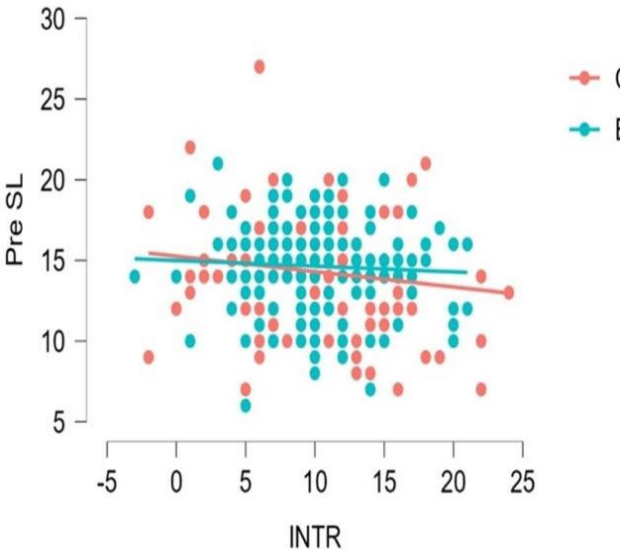

Figure 4

DISCUSSION AND LIMITATIONS

This study aimed to investigate the effect of providing information about biological changes of deep breathing on the stress levels of introverts. The study hypothesized that individuals who receive knowledge of biological changes of deep breathing will benefit more from the deep breathing exercise and will have lower stress levels. In addition, another hypothesis of this study was that introverts will be more likely to benefit from the knowledge of biological changes of deep breathing by increasing the efficacy of their deep breathing exercise after watching the explanatory video.

However, the result of the study did not support both hypotheses. The findings showed no significant difference in the stress level between the experimental group and the control group, nor between introverts and extroverts in benefiting from the information given on deep breathing.

Previous research papers examining the benefits of deep breathing showed that breathing exercise helps reduce stress. In this study, the benefits of deep breathing exercise on stress levels were insignificant. However, previous research examined the benefits of exercising deep breathing over a long period of time. Whereas in this study, the breathing technique was applied in a single session.

Additionally, there may be other explanations for the lack of significance in this study. Since the study was conducted online, there may have been potential distractions that affected the participant's performance in the study. Conducting a study in a more controlled environment is suggested for future studies. Moreover, due to the reliance on self-reporting, the result may be subject to inaccuracy.

Another limitation of this study is that there were a few missing responses in the survey's items. Hence, a middle point of the scale was given to those missing items. Using features that do not allow participants to skip items unanswered is recommended for future studies.

While this study had no significant results, it contributes to our understanding that explaining specific benefits of a therapeutic technique to clients may not increase the efficiency of the technique itself. Future research can investigate the likelihood of the correlation between the benefits of deep breathing exercise and the participant's belief in its effectiveness.

CONCLUSION

The study did not find evidence to support that the knowledge of biological changes of deep breathing enhances the effectiveness of deep breathing exercises in reducing stress levels.

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The study did not find evidence to support that introverts will be more influenced by the information about the biological benefits of deep breathing, thus their stress levels after the intervention would be lower than non-introverts.

REFERENCES

[1] Pal, G. K., Velkumary, S., & Madanmohan. (2003). Effect of short-term practice of breathing exercises on autonomic functions in normal human volunteers. *Indian Journal of Medical Research, 120*(2), 115–121.

[2] Paul, G., Elam, B., & Verhulst, S. J. (2007). A longitudinal study of students' perceptions of using deep breathing meditation to reduce testing stresses. *Teaching and Learning in Medicine, 19*(3), 287–292. https://doi.org/10.1080/104013307013667 54

[3] Perciavalle, V., Blandini, M., Fecarotta, P., Buscemi, A., Di Corrado, D., Bertolo, L., Fichera, F., & Coco, M. (2016). The role of deep breathing on stress. *Neurological Sciences, 38*(3), 451–458. https://doi.org/10.1007/s10072-016-2790- 8

[4] Phillips, K., & Sehmann, K. H. (1989). A study of the effects of breath management instruction on the breathing mode, knowledge of breathing, and performance skills of college-level brass players. *Bulletin of the Council for Research in Music Education*, (100), 58–64. https://eric.ed.gov/?id=EJ415810

[5] Ünver, S., Kıvanç, G., & Alptekin, H. M. (2018). Deep breathing exercise education receiving and performing status of patients undergoing abdominal surgery. *International Journal of Health Sciences, 12*(4), 35–38. http://europepmc.org/articles/PMC604085 3