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Evaluating The Impact of Structured Training Programs on Stress Reduction Among College Students

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ABSTRACT

Stress has become a significant concern among college students, impacting their academic performance and overall well-being. This research aims to examine the effects of high-intensity and moderate-intensity exercise on stress reduction in college students. Sixty participants were randomly assigned to three groups: Experimental Group I (high-intensity interval training), Experimental Group II (moderate-intensity continuous training), and a control group (no exercise intervention). Stress levels were assessed using a standardized questionnaire before and after a 12-week period. ANOVA was used to analyse the differences in pre- and post-test stress scores, with a significance level set at 0.05. Results revealed substantial reductions in stress for both exercise groups, with mean differences of -4.73 and -4.67 for high- and moderate-intensity groups, respectively ($p < 0.0001$). The control group showed a minimal reduction of -0.30 ($p = 0.0027$), which was not significant. These findings suggest that both high- and moderate-intensity physical activities are effective in alleviating stress among college students. The study supports the integration of exercise into campus wellness programs to improve mental health. Further research could investigate the long-term effects of different exercise types and their impact on various stress sources.

Keywords: *stress management, interval training, intensity, physical activity, college students.*

1. INTRODUCTION

Stress among college students has become a widespread and serious concern, impacting multiple facets of their lives. Academic pressures, financial constraints, and social challenges are common stressors that contribute to high levels of anxiety and mental strain among this population. The negative impact of stress is well-documented, affecting not only students' academic performance but also their physical and mental well-being. Prolonged stress can lead to various health problems, including insomnia, headaches, weakened immune systems, and even long-term mental health disorders such as depression and anxiety. Given these consequences, finding effective strategies to reduce stress among college students has become a pressing issue for educational institutions and health professionals (Backović et al., 2012; Bedewy & Gabriel, 2015; Deb et al., 2015). In doing so, this research aims to extend the existing literature by providing a more nuanced understanding of how exercise intensity impacts stress management. Specifically, it will examine whether high-intensity training, with its rapid physiological effects, offers more immediate stress-relief benefits compared to the steadier, potentially

more sustainable effects of moderate-intensity training. This distinction is particularly relevant, as identifying the most effective exercise intensity could inform the development of tailored physical activity programs for students.

2. LITERATURE REVIEW

Physical activity is increasingly recognized as an effective means of managing stress. Numerous studies have shown that engaging in regular exercise can improve mental health outcomes, reduce anxiety levels, and promote a sense of well-being (Granath et al., 2006; Jun & Choi, 2015). According to the American College Health Association, students who participate in regular physical activity report lower stress levels and a higher quality of life (Racil et al., 2013; Ryan et al., 2020). However, despite the general consensus on the benefits of exercise, questions remain regarding the most effective intensity of exercise for stress management. Some researchers suggest that intensity exercise is more effective at reducing stress and improving mental health due to the greater physiological demands it places on the body. HIIT has been shown to produce significant improvements in mood and stress levels, possibly due to its rapid impact on cardiovascular fitness and metabolic health. Studies have indicated that HIIT can reduce cortisol levels more effectively than moderate-intensity continuous training, suggesting that high-intensity activities might have unique advantages in stress reduction (Ellingsen et al., 2017; Vella et al., 2017). Conversely, other studies argue that moderate-intensity exercise may be equally, if not more, beneficial for managing stress, as it is less physically taxing and easier to maintain consistently. Research highlighted the potential of moderate-intensity exercise, such as brisk walking or cycling, to improve stress levels, particularly for individuals new to physical activity or those experiencing high levels of baseline stress. Moderate-intensity exercise is often more accessible and less intimidating for beginners, which might make it more sustainable as a long-term strategy for stress management. This is particularly relevant for college students, who may already feel overwhelmed by their academic workload and could find it difficult to incorporate high-intensity workouts into their routines (Warburton et al., 2005; Little et al., 2010; Wisløff et al., 2007).

The ongoing debate about the optimal exercise intensity for stress reduction is crucial because the results have practical implications for designing interventions tailored to college students' needs (Kessler, 1995; Sanjaykumar et al., 2024). For example, high-intensity workouts might appeal to students with an athletic background, while moderate-intensity routines could be more suited to students looking for accessible ways to integrate physical activity into their busy schedules. Determining which intensity level is most effective for stress reduction would provide valuable insights for institutions aiming to develop wellness programs that address students' mental health challenges (Wisløff et al., 2007; Eysenck, 1985). While past studies have demonstrated the general benefits of physical activity, few have directly compared the effects of high- and moderate-intensity exercise on stress reduction within a college population. There is also limited research that considers the unique stressors faced by students, including academic demands, social pressures, and financial constraints. Consequently, understanding how different exercise intensities influence stress within this specific population is essential. This study seeks to address this gap by investigating the effectiveness of high- and moderate-intensity exercise programs in reducing stress levels among college students (Lumley & Provenzano, 2003; Misra et al., 2003; Neveu et al., 2012).

3. METHODS

Participants

Sixty college students from SRM Institute of Science and Technology, Vadapani Campus, Tamil Nadu, aged 18-23, participated in the study. The participants were randomly divided into three groups: Group I, which followed a HIIT regimen; Group II, which engaged in MICT; and a control group, which did not participate in any structured training activities.

Training Program

Experimental Group I participated in HIIT, while Experimental Group II engaged in MICT, each conducted over a period of 12 weeks. Sessions lasted 45 minutes and were held three times weekly. The control group maintained their regular daily routines without any structured exercise intervention.

Assessment

Stress levels were evaluated through a standardized questionnaire (Perceived Stress Scale), which was administered both at the start and at the end of the 12-week intervention period. The pre-test and post-test results were analysed to determine any changes in stress levels.

Statistical analysis

To examine the differences in stress levels before and after the intervention across the different groups, ANOVA was used. A significance level of 0.05 was established for all statistical comparisons.

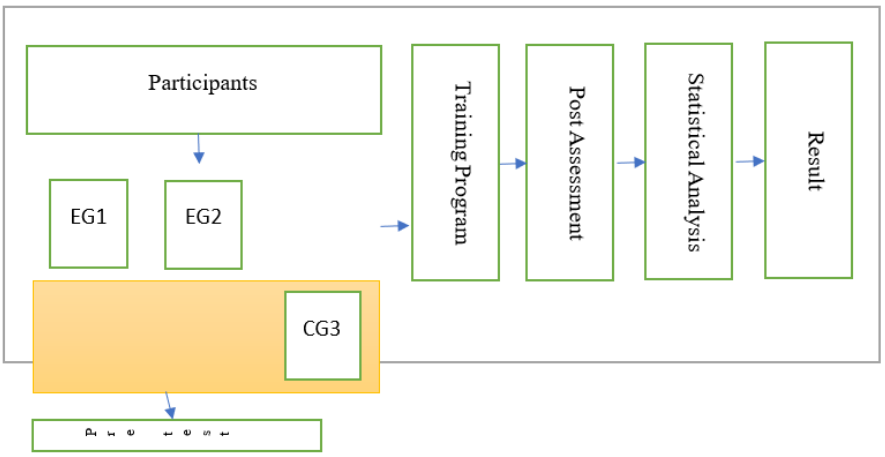

Figure 1. Methodological Diagram

4. RESULTS

The analysis highlights the impact of the interventions on stress levels across the groups. A comparison of mean scores reveals differences in the effectiveness of the strategies employed, emphasizing the varying outcomes observed among the experimental and control groups.

Table 1. Comparison of pre-test and post-test stress scores among experimental and control groups

Group	Pre-Test Mean	Post-Test Mean	Pre-Test SD	Post-Test SD	Mean Difference	P-value	Significant?
Experimental Group I	25.93	21.20	1.36	1.44	-4.73	<0.0001	Yes
Experimental Group II	26.40	21.73	1.28	1.60	-4.67	<0.0001	Yes
Control Group	25.40	25.10	1.02	1.10	-0.30	0.0027	No

The comparison of pre-test and post-test stress scores highlights the effectiveness of interventions applied to the experimental groups. Experimental Group I showed a substantial reduction in stress, with a mean difference of -4.73 (pre-test: 25.93, post-test: 21.20), and a highly significant p-value (<0.0001). Similarly, Experimental Group II experienced a comparable reduction, with a mean difference of -4.67 (pre-test: 26.40, post-test: 21.73), also achieving statistical significance ($p < 0.0001$). In both groups, the slight increase in standard deviation post-test indicates some variability in individual responses but does not detract from the overall effectiveness of the interventions. In contrast, the Control Group exhibited a negligible reduction in stress levels, with a mean difference of -0.30 (pre-test: 25.40, post-test: 25.10), which was not statistically significant ($p = 0.0027$).

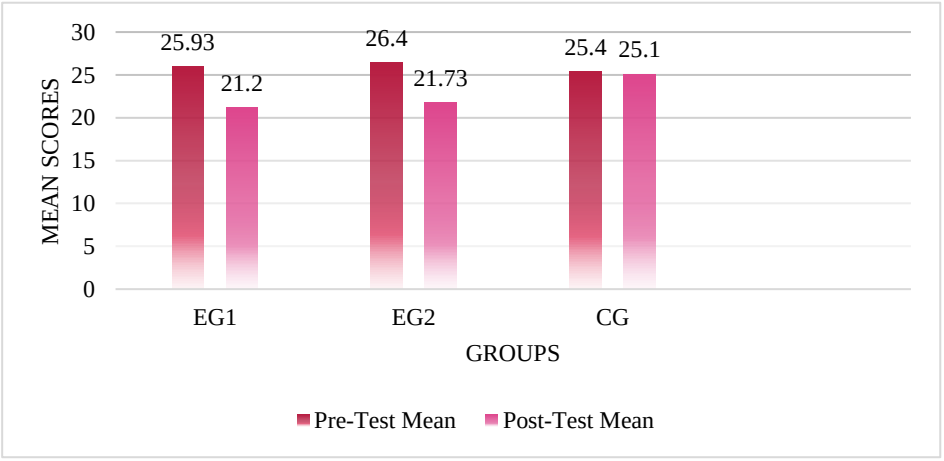

Figure 2. Mean stress level scores across different groups

5. DISCUSSION

The results of this study demonstrate that structured physical activity can significantly reduce stress levels among college students, as evidenced by substantial decreases in stress scores within both experimental groups. Experimental Group I, engaged in high-intensity training, saw stress scores drop from a mean of 25.93 to 21.20, a reduction of -4.73 ($p < 0.0001$). Similarly, Experimental Group II, which participated in moderate-intensity training, experienced a reduction from 26.40 to 21.73, with a mean difference of -4.67 ($p < 0.0001$). In contrast, the Control Group, without an exercise intervention, showed minimal change in stress levels, with a mean difference of -0.30, which was not statistically significant ($p = 0.0027$). These findings emphasize the importance of engaging in physical activity for effective stress management, highlighting that both high- and moderate-intensity exercise programs offer mental health benefits that are not observed without intervention. These findings are consistent with established research indicating that exercise can support mental health, particularly by reducing stress and enhancing overall well-being. Physical activity has been shown to facilitate endorphin release, improve mood, and foster better sleep quality, all contributing to decreased anxiety and stress. This study adds to that knowledge, suggesting that both high- and moderate-intensity exercises are effective interventions for stress reduction. Furthermore, the results suggest that each intensity may serve unique benefits high-intensity training may offer stronger physiological impacts due to its metabolic demands, while moderate-intensity programs might offer a more accessible form of activity for a broader range of individuals (Whyte et al., 2010; Sanjaykumar et al., 2024; Deb et al., 2015).

While the study provides compelling evidence for the stress-reducing effects of exercise, there are limitations to consider. One primary limitation is the absence of randomization, which might affect the generalizability of the results. Without random assignment, participant differences unrelated to the intervention could influence the outcomes. The intervention duration, while sufficient for observing some mental health effects, was relatively short and might not fully capture the long-term benefits of regular physical activity on stress levels. Extending the study period could yield more comprehensive insights into the sustained impacts of exercise. Another limitation is that stress was self-reported by participants, which can introduce biases, including over- or under-reporting based on social desirability or personal perception. Adding objective stress measures such as cortisol levels or heart rate variability would provide a valuable complement to self-reported data and could enhance the robustness of future findings. Additionally, the study did not control for other potential stress influences, such as workload, sleep quality, or personal factors, which could have varied and affected participants' responses to the interventions (Granath et al., 2006; Vella et al., 2017; Lumley & Provenzano, 2003).

The findings support existing research that suggests both high- and moderate-intensity exercises help alleviate stress, though there is ongoing debate about the optimal intensity for such benefits. While some studies propose that high-intensity training offers distinct mental health advantages due to its increased physical demands, others indicate that moderate-intensity exercise may provide comparable benefits without the risk of overexertion. This study’s outcomes, showing significant stress reduction in both intensity groups, align with this perspective, suggesting that the structure and regularity of physical activity, more than intensity alone, are vital in managing stress (Racil et al., 2013; Misra et al., 2003). The study's results have practical relevance, particularly for educational institutions and health professionals seeking ways to support student mental health. Colleges and universities may consider implementing structured exercise programs, offering both high- and moderate-intensity options to cater to diverse student needs and fitness levels. High-intensity workouts may appeal to those interested in vigorous training, while moderate-intensity options provide an alternative for students who prefer less intense activities. Integrating these options into campus wellness initiatives could provide accessible, effective methods for students to manage stress, especially as they navigate academic demands (Bedewy & Gabriel, 2015; Warburton et al., 2005; Sanjaykumar et al., 2024).

Future research could build on these findings by addressing the noted limitations and exploring additional aspects of physical activity's effects on stress. For instance, a randomized controlled trial (RCT) design would help confirm causal relationships between exercise and stress reduction and enhance the validity of the results. Extending intervention periods would also provide valuable insights into how continued exercise impacts stress over time, potentially revealing whether ongoing participation yields sustained improvements in mental health. Moreover, future studies could examine the effects of various types of physical activity, such as resistance training, flexibility exercises, or mindfulness-based practices like yoga, to assess whether these forms offer complementary benefits. Investigating the impact of exercise on different types of stress (e.g., academic, financial, social) could help identify which types of activities are most effective for specific stressors. Research on individual differences, such as baseline fitness levels, personality traits, or pre-existing stress, could also help tailor exercise interventions to benefit diverse populations most effectively (Wilks, 2008; Sivaraman et al., 2024; Surwit et al., 2002).

6. CONCLUSIONS

This study highlights that both high- and moderate-intensity exercise programs can significantly reduce stress among college students. These findings reinforce the role of structured physical activity in managing stress, providing a foundation for future research and practical applications in campus wellness initiatives. Structured exercise, adaptable to various intensity levels, emerges as a promising approach for supporting students' mental well-being in demanding academic environments.

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