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Exercise Interventions for Mental Well-Being and Academic Performance among University Students

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Abstract

University students face a particular combination of academic pressure, social change and uncertainty about the future, and concern about their mental well-being has grown steadily in recent years. At the same time there is a substantial body of evidence that regular physical activity benefits both the mind and the capacity to learn. This study examined the effect of a structured twelve-week exercise intervention on the mental well-being and academic performance of university students. A quasi-experimental design with a pre-test, a post-test and a control group was adopted. Sixty students were allocated to an experimental group, which took part in a supervised programme of moderate physical activity four times a week, and a control group, which continued its usual routine. Mental well-being was assessed through a recognised well-being scale, a perceived stress scale and a measure of sleep quality, while academic performance was assessed through grade point average, academic self-efficacy, self-reported concentration and class attendance. Paired and independent t-tests were used for analysis at the five per cent level of significance. The experimental group showed significant improvements in every measure of mental well-being and in every measure of academic performance, whereas the control group changed little. The findings indicate that a modest, regular exercise programme can meaningfully improve both the psychological health and the academic outcomes of university students, and they support the integration of physical activity into student life as a low-cost and broadly beneficial measure.

1. Introduction

The years spent at university are among the most formative in a young person's life, but they are also among the most demanding. Students must adapt to a new and often unfamiliar environment, manage their own time and finances, meet rising academic expectations and form new relationships, frequently while living away from home for the first time. This combination of pressures has made the mental well-being of university students a subject of widespread concern, with stress, anxiety and low mood reported by a sizeable proportion of the student population.

Mental well-being is not merely the absence of distress; it includes feeling good, functioning well and being able to cope with the ordinary challenges of life. For students, well-being matters in its own right, but it also has practical consequences, since a troubled or exhausted mind learns less effectively. There is therefore a close and reciprocal relationship between how students feel and how well they perform academically, and any measure capable of

improving the one may also benefit the other.

Physical activity is one such measure, and a remarkably well-supported one. A large and growing body of research has shown that regular exercise can reduce symptoms of stress, anxiety and depression, improve mood and sleep, and enhance the sense of general well-being. The benefits are not confined to the mind. Exercise has also been linked to improvements in attention, memory and other aspects of mental function that underpin learning, which suggests that it may support academic performance both indirectly, by improving well-being, and directly, by sharpening the cognitive faculties on which study depends.

Despite this evidence, physical activity tends to decline when young people enter higher education. The very pressures that make well-being fragile also crowd out exercise, as students come to regard time spent being active as time taken away from study. This is unfortunate, because it sacrifices an activity that could ease the pressures it is sacrificed to. Understanding whether a deliberate, structured exercise programme can reverse this pattern and improve both well-being and academic outcomes is therefore a question of real practical importance.

Much of the existing research on this topic has been conducted in other countries and contexts, and a good deal of it has been observational, showing that more active students tend to fare better without establishing that exercise is the cause. There is value in testing the effect of an exercise intervention directly, within a defined student population, so that any improvement can be attributed to the programme rather than to pre-existing differences between active and inactive students.

The present study therefore set out to examine the effect of a structured twelve-week exercise intervention on the mental well-being and the academic performance of university students. By measuring both outcomes within the same controlled study, it aims to provide direct evidence of whether physical activity can serve the dual purpose of supporting students' minds and their studies alike.

2. Review of Literature

The relationship between physical activity and mental health has been examined in a vast literature. Penedo and Dahn (2005) reviewed the mental and physical benefits of exercise and concluded that regular activity is associated with improved well-being and reduced symptoms of common mental disorders.

Biddle and Asare (2011), reviewing reviews of the evidence in young people, reached similar conclusions, noting consistent though modest benefits for mental health.

More recent syntheses have strengthened the case for a causal effect. Rebar and colleagues (2015) conducted a meta-analysis of meta-analyses and found that physical activity reduces depression and anxiety in non-clinical adult populations. Schuch and colleagues (2016), adjusting carefully for publication bias, confirmed that exercise has a meaningful antidepressant effect, and Stubbs and colleagues (2017) reported comparable anxiolytic benefits. Together these studies establish that exercise is not merely correlated with better mental health but can actively improve it.

The student population has received specific attention. Bray and Born (2004) documented the decline in vigorous activity that accompanies the transition to university and linked it to poorer well-being, while Herbert and colleagues (2020) found that both regular activity and short-term exercise were associated with better mental health and well-being among students. Wunsch and colleagues (2021), in a systematic review, examined the three-way relationship between physical activity, stress and academic performance in university students and found that activity tends to buffer stress and support achievement, though they called for more experimental evidence.

The connection between exercise and the capacity to learn has its own foundation. Hillman, Erickson and Kramer (2008) reviewed the effects of exercise on the brain and cognition and described improvements in attention and memory associated with physical activity. Donnelly and colleagues (2016), in a comprehensive review, examined the links between physical activity, fitness, cognitive function and academic achievement and concluded that activity can benefit aspects of cognition relevant to learning, even if the effect on grades is harder to demonstrate.

The measurement of the relevant outcomes is well established. Tennant and colleagues (2007) developed and validated a widely used scale of mental well-being, and Cohen, Kamarck and Mermelstein (1983) created the perceived stress scale that remains a standard measure of how stressful people find their lives. The availability of these validated instruments has made it possible to assess the psychological effects of exercise with confidence.

In summary, the literature firmly establishes that exercise improves mental

health and well-being, that students are a population in particular need of such benefits, and that physical activity is plausibly linked to better cognition and learning. What remains comparatively scarce is direct experimental evidence, within a defined student population, that an exercise intervention improves both well-being and academic performance together. The present study addresses this need.

3. Significance of the Study

This study is significant because it tests, under controlled conditions, whether a simple and inexpensive intervention can address two of the most pressing concerns in higher education at once: the mental well-being of students and their academic success. By measuring both outcomes within the same experiment and by including a control group, it allows any improvement to be attributed to the exercise programme rather than to chance or to differences between students. The focus on a structured programme of moderate activity, rather than on elite training, makes the findings directly applicable to ordinary students and to the institutions that serve them. The results are of practical value to universities, student-welfare services and physical educators seeking effective, affordable ways to support students, and they contribute experimental evidence to a field that has relied heavily on observation. In these ways the study speaks to a question of growing importance with evidence of direct practical use.

4. Objectives of the Study

The study is built around the following two objectives:

1. To examine the effect of a structured twelve-week exercise intervention on the mental well-being of university students.
2. To examine the effect of the same exercise intervention on the academic performance of university students.

5. Hypotheses of the Study

In support of these objectives, the following null hypotheses were formulated and tested:

H1: There is no significant difference between the pre-test and post-test mental well-being of university students following the exercise intervention.

H2: There is no significant difference between the pre-test and post-test academic performance of university students following the exercise intervention.

6. Research Methodology

6.1 Research Design

The study employed a quasi-experimental design with a pre-test, a post-test and a control group. This design was suited to the aim of determining the effect of an intervention while accounting for changes that might occur over time independently of the programme. The control group made it possible to distinguish the effect of the exercise intervention from the influence of the academic calendar and other ordinary events of student life.

6.2 Participants

Sixty university students volunteered for the study after being informed of its purpose and procedures. They were allocated in equal numbers to an experimental group and a control group, with thirty students in each. Participants were apparently healthy and were not engaged in any structured exercise programme at the time of recruitment. The experimental group took part in the supervised exercise programme, while the control group continued with their usual daily routine without any prescribed activity.

6.3 Selection of Variables

Two domains of outcome were assessed. Mental well-being was measured through a validated mental well-being scale, a perceived stress scale and a measure of sleep quality. Academic performance was measured through the grade point average obtained in the relevant assessment period, a scale of academic self-efficacy, a self-reported rating of concentration during study, and the percentage of classes attended. Together these measures captured the psychological and the academic dimensions of student life.

6.4 The Exercise Intervention

The experimental group undertook a structured programme of moderate physical activity four times a week for twelve weeks. Each session combined aerobic activity, such as brisk walking and light jogging, with recreational games, and was supervised to ensure safety and consistency. The duration and intensity of the sessions were increased gradually across the twelve weeks as the students adapted. The structure of the programme is summarised in Table 2.

6.5 Testing Procedure

All participants completed the well-being and academic measures before the programme began and again at its conclusion. The questionnaires were administered under similar and confidential conditions, and academic records were obtained with the consent of the participants. Care was taken to test both groups within the same period so that they

were exposed to the same stage of the academic calendar.

6.6 Statistical Techniques

The paired t-test was used to compare pre-test and post-test scores within each group, and the independent t-test was used to compare the two groups at the post-test stage. The mean and standard deviation were calculated for every variable, and a significance level of five per cent was adopted throughout.

7. Results and Discussion

7.1 Baseline Characteristics of the Groups

Table 1 presents the baseline characteristics of the two groups, which were closely matched and showed no significant differences at the outset, confirming that they were comparable before the intervention.

Table 1

Baseline Characteristics of the Experimental and Control Groups

Characteristic	Experimental (n=30)	Control (n=30)
Age (years), mean ± SD	19.8 ± 1.3	19.9 ± 1.2
Gender (male / female)	16 / 14	15 / 15
Year of study (1st / 2nd / 3rd)	12 / 11 / 7	11 / 12 / 7
Baseline GPA (out of 10)	7.12 ± 0.78	7.08 ± 0.81

7.2 The Exercise Intervention

The structure of the twelve-week programme is shown in Table 2. The duration and intensity of the sessions rose gradually, allowing the students to build their fitness safely while keeping the demands moderate and achievable throughout.

Table 2

Structure of the Twelve-Week Exercise Intervention

Weeks	Frequency	Duration	Activity	Intensity
1 – 4	4 / week	45 min	Brisk walking, light jogging, recreational games	Moderate
5 – 8	4 / week	50 min	Aerobic circuit and team recreational games	Moderate
9 – 12	4 / week	55–60 min	Mixed aerobic activity and recreational sport	Moderate–vigorous

7.3 Effect on Mental Well-Being (Objective 1)

The first objective concerned mental well-being. Table 3 reports the pre-test and post-test scores of the experimental group together with the results of the paired t-test.

Table 3

Pre-Test and Post-Test Mental Well-Being of the Experimental Group (n = 30)

Variable	Pre-test	Post-test	t	p
Mental well-being score (14–70)	44.2 ± 6.8	52.6 ± 6.1	6.92	0.000
Perceived stress score (0–40)	21.4 ± 4.9	15.8 ± 4.5	6.41	0.000
Sleep quality (1–10)	5.3 ± 1.6	6.9 ± 1.4	5.08	0.000

The experimental group improved significantly on every measure of mental well-being. The well-being score rose substantially, perceived stress fell by more than five points, and the quality of sleep, which is both a contributor to and a sign of good mental health, improved markedly. These results are entirely consistent with the wider evidence that regular moderate exercise reduces stress and lifts mood, and they show that the benefit was achieved within a single academic term. The control group, by contrast, showed only small and non-significant changes over the same period, as reported in Table 5.

7.4 Effect on Academic Performance (Objective 2)

The second objective concerned academic performance. Table 4 reports the pre-test and post-test scores of the experimental group on the four academic measures.

Table 4

Pre-Test and Post-Test Academic Performance of the Experimental Group (n = 30)

Variable	Pre-test	Post-test	t	p
Grade point average (out of 10)	7.12 ± 0.78	7.58 ± 0.74	4.31	0.000
Academic self-efficacy (out of 50)	31.6 ± 5.2	37.2 ± 4.8	5.54	0.000
Concentration during study (1–10)	5.6 ± 1.5	7.1 ± 1.3	5.21	0.000
Class attendance (%)	78.4 ± 9.1	88.6 ± 7.2	4.87	0.000

The experimental group also improved significantly on every academic measure. Grade point average rose, academic self-efficacy increased, students reported sharper concentration during study, and class attendance improved appreciably. These gains are likely to reflect several connected influences: reduced stress and

better sleep free the mind to learn, improved well-being supports motivation and regular attendance, and the cognitive benefits of exercise may sharpen attention directly. The improvement in attendance is itself noteworthy, since a more active and engaged student is more likely to be present, and presence is a basic precondition of academic success.

7.5 The Control Group

For comparison, Table 5 reports the pre-test and post-test scores of the control group on selected measures from both domains.

Table 5

Pre-Test and Post-Test Scores of the Control Group (n = 30)

Variable	Pre-test	Post-test	t	p
Mental well-being score	43.8 ± 6.6	44.6 ± 6.4	1.18	0.25
Perceived stress score	21.1 ± 4.7	20.5 ± 4.8	1.02	0.32
Grade point average	7.08 ± 0.81	7.15 ± 0.79	1.34	0.19
Academic self-efficacy	31.9 ± 5.0	32.4 ± 5.1	1.07	0.29

The control group showed only small and non-significant changes across all measures, which confirms that the improvements observed in the experimental group were a genuine effect of the exercise programme and not a result of the academic calendar or other influences common to all students.

7.6 Comparison between the Groups and Testing of Hypotheses

To confirm the effect of the programme, the post-test scores of the two groups were compared using the independent t-test, with the results shown in Table 6.

Table 6

Independent t-Test Comparison of Post-Test Scores between Groups

Variable (post-test)	Exp.	Control	t	p
Mental well-being score	52.6	44.6	4.96	0.000
Perceived stress score	15.8	20.5	4.02	0.000
Grade point average	7.58	7.15	2.27	0.027
Academic self-efficacy	37.2	32.4	3.73	0.000

The experimental group scored significantly better than the control group on every measure compared. The first null hypothesis, that there is no significant difference in mental well-being following the intervention, was rejected, since the experimental group improved significantly while the control group did not. The second null hypothesis, that there is no significant difference in academic performance, was likewise rejected. Both objectives were thereby fulfilled, and the evidence shows that the exercise intervention produced significant and favourable changes in both the mental well-being and the academic performance of the students.

8. Major Findings

1. The twelve-week exercise intervention produced significant improvements in mental well-being, perceived stress and sleep quality in the experimental group.
2. The same intervention produced significant improvements in grade point average, academic self-efficacy, concentration and class attendance.
3. The control group, following its usual routine, showed only small and non-significant changes in both domains over the same period.
4. The experimental group scored significantly better than the control group on all post-test measures compared, confirming the effect of the programme.
5. The improvements in well-being and in academic performance appeared together, consistent with a close link between how students feel and how well they learn.
6. A modest programme of moderate activity, requiring no special facilities, was sufficient to produce these benefits within a single academic term.

9. Conclusion

This study set out to examine the effect of a structured twelve-week exercise intervention on the mental well-being and the academic performance of university students. The evidence is clear and consistent. Students who took part in the programme experienced significant improvements in well-being, stress and sleep, and at the same time achieved significant gains in grades, self-efficacy, concentration and attendance, while students who continued their usual routine did not. The presence of a control group allows these benefits to be attributed with confidence to the exercise programme itself.

The wider significance of these findings lies in their demonstration that a single,

simple intervention can serve two of higher education's most important goals at once. Supporting students' mental health and supporting their academic success are often treated as separate concerns, addressed by separate services, yet this study shows that regular physical activity advances both together. The programme used here was modest in its demands, requiring only moderate activity four times a week and no specialised facilities, which makes it realistic for ordinary institutions to provide. For universities seeking an affordable and broadly beneficial way to help their students flourish, the integration of structured physical activity into student life offers a promising and well-evidenced path.

10. Limitations and Suggestions for Future Research

The study has limitations that should be acknowledged. It involved a modest number of students over a single academic term, so the durability of the benefits beyond that period was not established. Several outcomes, including concentration and sleep quality, relied on self-report, and the academic measures were drawn from one assessment period. Future research could follow students over a longer period to test whether the gains persist, could include larger and more diverse samples, and could examine which forms and amounts of activity yield the greatest benefit. Research of this kind would build on the present findings and help institutions design exercise provision that supports students as effectively as possible.

This paper concerns mental well-being in an educational and research context. Students who are struggling with stress, low mood or anxiety are encouraged to reach out to their university counselling service or a qualified mental-health professional, who can provide individual support.

References

Biddle, S. J. H., & Asare, M. (2011). Physical activity and mental health in children and adolescents: A review of reviews. British Journal of Sports Medicine, 45(11), 886–895.

Bray, S. R., & Born, H. A. (2004). Transition to university and vigorous physical activity: Implications for health and psychological well-being. Journal of American College Health, 52(4), 181–188.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24(4), 385–396.

Donnelly, J. E., Hillman, C. H., Castelli, D., Etnier, J. L., Lee, S., Tomporowski, P., … Szabo-Reed, A. N. (2016). Physical activity, fitness, cognitive function, and academic achievement in children: A systematic review. Medicine & Science in Sports & Exercise, 48(6), 1197–1222.

Herbert, C., Meixner, F., Wiebking, C., & Gilg, V. (2020). Regular physical activity, short-term exercise, mental health, and well-

being among university students. Frontiers in Psychology, 11, 509.

Hillman, C. H., Erickson, K. I., & Kramer, A. F. (2008). Be smart, exercise your heart: Exercise effects on brain and cognition. Nature Reviews Neuroscience, 9(1), 58–65.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: A review of mental and physical health benefits associated with physical activity. Current Opinion in Psychiatry, 18(2), 189–193.

Rebar, A. L., Stanton, R., Geard, D., Short, C., Duncan, M. J., & Vandelanotte, C. (2015). A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. Health Psychology Review, 9(3), 366–378.

Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016). Exercise as a treatment for depression: A meta-analysis adjusting for publication bias. Journal of Psychiatric Research, 77, 42–51.

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., … Stewart-Brown, S. (2007). The Warwick–Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. Health and Quality of Life Outcomes, 5, 63.

Wunsch, K., Fiedler, J., Bachert, P., & Woll, A. (2021). The tridirectional relationship among physical activity, stress, and academic performance in university students: A systematic review. International Journal of Environmental Research and Public Health, 18(2), 739.