

Effects of a Healthy Lifestyle and Mental Well-Being Programme on Stress and Physical Activity among Secondary School Students: A Pre–Post Intervention Study

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ABSTRACT

Mental health issues have become a significant factor affecting the development of adolescents. Upon entering adolescence, secondary school students must cope with academic demands, peer relationships and changes in lifestyle; these factors can easily lead to increased stress and affect their overall health. Existing research indicates a close link between a healthy lifestyle and a positive mental state, with physical activity considered capable of improving mood, reducing psychological strain and promoting psychological resilience. As schools are key settings in adolescents' daily lives, they have gradually begun to implement health promotion programmes to improve students' physical and mental well-being; however, the effectiveness of such interventions still requires further validation. This study employed a single-group pre–post design to evaluate a Healthy Lifestyle and Mental Well-Being Programme among 42 secondary school students in Malaysia. Paired-sample t-tests revealed no statistically significant changes in psychological stress (pre: $M = 18.54 \pm 4.14$; post: $M = 18.90 \pm 4.77$; $t = -0.367$, $p = 0.716$) or physical activity levels (pre: $M = 24.51 \pm 5.03$; post: $M = 25.63 \pm 5.58$; $t = -0.859$, $p = 0.396$) following the intervention. Despite the absence of statistically significant objective changes, programme feedback was consistently positive, with mean satisfaction scores ranging from 3.78 to 4.20 out of 5. These findings suggest that while short-term measurable effects were limited, the programme demonstrated strong acceptability and warrants further investigation using controlled designs with extended follow-up periods.

Keywords: Healthy lifestyle; Mental well-being; Physical activity; Stress; Secondary school students

INTRODUCTION

Adolescent mental health has become a persistent concern in the fields of education and public health worldwide. The adolescent period is characterised by physical, physiological and social role changes, making students susceptible to emotional fluctuations, increased stress and changes in behavioural patterns. In recent years, studies across multiple countries have found that the prevalence of anxiety, stress and psychological distress among secondary school students is on the rise, with mental health issues beginning to impact academic performance, interpersonal relationships and long-term health and development.

The World Health Organization notes that mental health is a vital component of adolescent well-being, and a positive mental state contributes to learning ability, social adaptation and future quality of life (World Health Organization, 2021)²⁰. When mental health issues persist over time, they may further affect sleep, physical activity and lifestyle patterns.

In addition to academic demands, lifestyle is increasingly recognised as a key factor influencing adolescents' mental well-being. A healthy lifestyle typically encompasses regular physical activity, a balanced diet, adequate sleep and a reduction in sedentary behaviour. These behaviours are not only linked to physical health but are also associated with emotional regulation, stress management and psychological resilience.

Recent research indicates a clear correlation between insufficient physical activity and mental health issues. Regular exercise can improve mood, enhance positive experiences and reduce the risk of anxiety and depression

(Pascoe et al., 2020; Biddle et al., 2020)². Systematic reviews indicate that moderate-to-vigorous physical activity is associated with lower levels of psychological distress, whilst prolonged sedentary behaviour may increase psychological burden (Rodriguez-Ayllon et al., 2019; Sampasa-Kanyinga et al., 2020)¹³.

Sleep patterns have also attracted attention. Insufficient sleep affects neural recovery capacity, increases feelings of fatigue and emotional volatility, and reduces students' ability to cope with academic stress (Lukács, 2025)⁷. Dietary habits and digital device usage patterns are increasingly becoming key areas of focus in mental health research (O'Neil et al., 2020; Stiglic & Viner, 2021)¹².

Although existing research has examined the relationship between lifestyle and mental health, most studies employ observational designs, with few evaluating interventions within a school setting (Raeside et al., 2024)¹¹. Current evidence tends to focus on single behavioural factors, such as physical activity or sleep, whilst there is a lack of research on comprehensive interventions combining healthy lifestyles with psychological support (Alosaimi et al., 2023)¹³.

The school environment offers high feasibility and reach; promoting the development of positive lifestyle habits among students through structured programmes may represent a key pathway to improving mental health. Implementing health promotion programmes within the school setting not only enhances students' health awareness but also helps establish long-term behavioural patterns.

Accordingly, this study designed and implemented a health lifestyle and mental health promotion programme. Using pre- and post-tests, it assessed changes in students' stress levels and physical activity levels before and after the programme, and further analysed students' acceptance of the programme content, thereby providing a reference for school health education practice.

METHODS

Study Design

This study employed a single-group pre–post intervention design to evaluate the impact of a health lifestyle and mental health promotion programme on secondary school students' stress levels and physical activity levels. By comparing measurement results from the same group before and after the programme, the study sought to observe potential changes in students' mental well-being and health behaviours.

The pre–post design provides a relatively direct reflection of short-term changes following the intervention and is suitable for evaluating the effectiveness of health promotion programmes in school settings. This study utilised school activities as the implementation platform, combining education on healthy lifestyles with mental health support to encourage students to develop positive behavioural patterns through programme participation.

The overall research process comprised four stages: pre-test survey, programme implementation, post-test survey, and data collation and analysis. All measurements were conducted using a standardised questionnaire to ensure the comparability of pre- and post-test data. Please refer to Table 1 for further details.

Table 1: Basic Characteristics of the Study Participants

Variable	Category	n	Percentage (%)
Gender	male	20	47.6
	female	22	52.4
Year	Form 1	8	19.0
	Form 2	10	23.8
	Form 3	9	21.4
	Form 4	7	16.7
	Form 5	8	19.0

Note : N=42

Participants and Setting

The study participants were secondary school pupils taking part in a programme promoting healthy lifestyles and mental well-being. The study was conducted within the school's normal teaching environment and organised on a class-by-class basis.

Inclusion criteria were as follows: (1) currently enrolled secondary school pupils; (2) full participation in programme activities; (3) completion of both pre- and post-test questionnaires.

Exclusion criteria included: (1) severe missing data in the questionnaires; (2) duplicate entries; (3) failure to participate in the full programme.

A total of 42 valid pre-test samples and 41 valid post-test samples were ultimately obtained.

Prior to the commencement of the study, students were briefed on the programme's objectives, participation procedures and questionnaire completion requirements. Questionnaires were collected anonymously to minimise social desirability bias and enhance the authenticity of responses. Please refer to Table 2 for further details.

Table 2: Overview of Questionnaire Dimensions and Items

Dimension	Item	Number of items
Psychological stress	B1–B8	8
Physical activity	C1–C8	8
Project feedback	D1–D4	4

Intervention Programme

This study implemented the Healthy Lifestyle and Mental Well-being Programme.

The programme was designed in accordance with school health promotion principles and guidelines for adolescent mental health education, with content focusing on establishing positive lifestyle habits and enhancing stress management skills.

The programme primarily comprised the following components:

Part One: Promotion of physical activity. By organising students to participate in basic physical activities and practise healthy behaviours, the programme aimed to increase students' levels of physical activity and reduce sedentary behaviour.

Part Two focuses on healthy lifestyle education. The programme introduces students to regular exercise, positive lifestyle habits and health management knowledge, helping them to develop behavioural awareness.

Part Three focuses on mental health support. Through training in stress recognition, emotional management and daily coping strategies, students' ability to adapt to academic and life pressures is enhanced.

Part Four focuses on participation feedback and reflection. Students are encouraged to document their experiences and develop a sustained commitment to participation.

The entire programme is delivered through group participation, with a strong emphasis on students' active involvement and experiential learning. The programme was delivered over 3 weeks, comprising 10 sessions of approximately 20 minutes each.

Measurement Instrument

The study employed the 'Healthy Lifestyle and Mental Well-Being Programme Questionnaire' as the primary measurement tool. The questionnaire comprised four sections: demographic information, stress levels, physical activity levels, and feedback on the programme.

The questionnaire utilised a five-point Likert scale, with all items requiring self-assessment based on the students' actual experiences over the preceding seven days.

Stress Level

The stress level measure was used to assess students' recent psychological state and comprised eight items, adapted from the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983)¹⁷. The items covered academic stress, emotional control, feelings of anxiety, sense of life control, and emotional exhaustion.

Items are scored on a scale of 1 to 5, where 1 indicates 'never' and 5 indicates 'frequently'. The questionnaire includes reverse-scored items to reduce response bias and enhance measurement reliability. The stress level is ultimately determined by the cumulative total score.

The score interpretations are as follows:

8–18 points: Low stress level

19–29 points: Moderate stress level

30–40 points: High stress level

Please refer to Table 3 for further details.

Table 3: Distribution of Students' Stress Levels

Stress Level	Number of participants in the pre-test (n)	Number of participants in the post-test (n)
Low pressure (8–18point)	17	20
Medium pressure (19–29point)	25	21
High pressure (30–40point)	0	0

To investigate the project's impact on students' psychological stress levels, a paired-sample t-test was conducted on the pre- and post-test data; the results are shown in Table 4.

Table 4: Comparison of students' psychological stress levels before and after the assessment

Variable	Pre-test mean (M±SD)	Post-test mean (M±SD)	t-value	p-value
Total score for psychological stress	18.54 ± 4.14	18.90± 4.77	-0.367	0.7716

Note: $p > 0.05$; the difference is not statistically significant.

Physical Activity Level

Physical activity level is used to assess students' participation in physical activity over the past week. It comprises eight items, designed with reference to the Physical Activity Questionnaire for Adolescents (Kowalski, Crocker, & Donen, 2004)¹⁸. The measurement covers the frequency of sports participation, daily activities, school physical education, after-school activities and sedentary behaviour. The adapted nine-item stress scale demonstrated acceptable internal consistency in the current sample (Cronbach's $\alpha = 0.792$).

Reliability statistics		
克隆巴赫 Alpha	基于标准化项的克隆巴赫 Alpha	项数
0.792	0.755	9

A five-point rating scale is used for evaluation, which includes reverse-scored items to control for the influence of sedentary behaviour on overall activity levels.

The total score is interpreted as follows:

8–18 points: Low level of physical activity

19–29 points: Moderate level of physical activity

30–40 points: High level of physical activity

Please refer to Table 5 for further details.

Table 5: Distribution of students' physical activity levels

Physical activity level	Number of participants in the pre-test (n)	Number of participants in the post-test (n)
Low-intensity exercise (8–18points)	5	5
Moderate-intensity exercise (19–29points)	30	28
High-intensity exercise (30–40points)	7	8

Note: Physical activity levels are categorised according to the questionnaire scoring criteria.

To investigate the impact of the project on students' levels of physical activity, the pre- and post-test results were analysed; the results are shown in Table 6.

Table 6: Comparison of students' physical activity levels before and after the study

Variable	Pre-test mean (M±SD)	Post-test mean (M±SD)	t-value	p-value
Total score for physical activity	24.51 ± 5.03	25.63 ± 5.58	-0.859	0.396

Note: $p > 0.05$; the difference is not statistically significant.

Programme Feedback

The programme feedback section is used to understand students' subjective evaluations of their experience of the activities and the programme's effectiveness. It comprises four items, primarily assessing programme satisfaction, perceived stress relief, changes in interest in physical activity, and willingness to participate in the future.

Scoring utilises a five-point agreement scale, with higher scores indicating more positive student evaluations of the programme.

The study employed a 5-point Likert scale:

Psychological stress section: 1 = Never, 5 = Often;

Physical activity section: 1 = Very low, 5 = Very high;

Item feedback section: 1 = Strongly disagree, 5 = Strongly agree.

Please refer to Table 7for further details.

Table 7: Analysis of Project Satisfaction

Project	Average score (M)	Rating
D1 The project is enjoyable	4.20	Above average (4.0 out of 5.0)
D2 It helps to relieve stress	3.78	Above average (4.0 out of 5.0)
D3 It increases interest in sport	3.83	Above average (4.0 out of 5.0)

D4 Willingness to take part in similar activities again	3.90	Above average (4.0 out of 5.0)
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Note: A 5-point Likert scale is used; a higher score indicates a greater degree of agreement.

Data Collection Procedure

1. Data collection was carried out in accordance with a standardised procedure.
2. A pre-test survey was conducted prior to the programme to assess students' initial stress levels and physical activity levels.
3. Following the pre-test, students were organised to participate in the healthy lifestyle and mental health promotion programme.
4. A post-test questionnaire was administered upon completion of the programme to evaluate changes following its implementation.
5. All questionnaires were completed independently by the students and subsequently collated and coded by the researchers.

Data Analysis

Once the data has been collated, the statistical analysis phase begins.

1. Descriptive statistical methods are first used to summarise the basic characteristics of the sample, including frequency, mean and standard deviation.
2. Subsequently, changes in stress levels and physical activity levels between the pre- and post-tests are compared to evaluate the effectiveness of the programme intervention.
3. The programme feedback section is summarised using mean scores to reflect the students' overall level of acceptance.

Prior to the paired-sample t-test, the normality of difference scores was verified using the Shapiro-Wilk test for both stress ($W = 0.979$, $p = 0.640$) and physical activity ($W = 0.976$, $p = 0.527$), confirming that the parametric assumption was satisfied.

正态性检验 (Shapiro-Wilk)

Variable	w-value	p-value	Conclusion
pressure difference	0.979	0.640	$p > 0.05$
Difference in physical activity	0.976	0.527	$p > 0.05$

DISCUSSION

This study investigated the effects of a healthy lifestyle and mental well-being programme on psychological stress and physical activity levels among secondary school students, using a single-group pre-post intervention design. The results indicated that neither stress levels nor physical activity levels showed statistically significant changes following the intervention ($p > 0.05$). These findings, whilst not confirming the programme's efficacy through statistical significance, nonetheless offer meaningful insights into the design and evaluation of school-based health promotion programmes.

Psychological Stress

The pre-test mean stress score was 17.13 ($SD = 4.25$), placing the overall sample within the low-to-moderate stress range. Following the intervention, the mean score decreased marginally to 16.11 ($SD = 3.98$), though this

change did not reach statistical significance ($t = 1.38$, $p = 0.175$). The distribution data further showed a modest shift: the number of students in the low-stress category increased from 17 to 20, whilst the moderate-stress group decreased from 25 to 21. Although these distributional changes lack inferential statistical support, they suggest a tentative trend toward reduced perceived stress.

Several factors may account for the absence of statistical significance. The intervention duration was relatively short, and stress reduction through lifestyle modification typically requires sustained behavioural change over an extended period. noted that psychological interventions frequently require adequate exposure time before producing measurable effects, particularly for constructs such as perceived stress, which is influenced by multiple concurrent life factors. Additionally, the baseline stress levels of participants were already relatively low, creating a ceiling effect that limited the capacity for detectable improvement. Studies targeting populations with clinically elevated stress levels may be better positioned to observe significant post-intervention reductions (Pascoe et al., 2020)².

The relatively low stress levels observed at baseline may also reflect the specific school context in which the study was conducted. Secondary school students in structured programme environments may experience temporarily reduced academic pressure, which could mask the intervention's impact. Future studies should consider controlling for concurrent academic demands and examination schedules when measuring stress outcomes.

Physical Activity

Physical activity levels remained stable across the intervention period, with pre- and post-test means of 24.51 (SD = 4.61) and 22.11 (SD = 4.54), respectively ($t = -0.064$, $p = 0.949$). The majority of students fell within the moderate physical activity range at both time points, and the distribution across low, moderate and high activity categories showed negligible change.

These results are consistent with prior research suggesting that short-term school-based physical activity interventions may not produce significant changes in self-reported activity levels (van Sluijs et al., 2007)¹⁶. Physical activity behaviours are deeply embedded in daily routine and are shaped by factors beyond the school setting, including home environment, access to recreational facilities and parental support. A programme delivered within a single school activity context may be insufficient to alter habitual activity patterns as captured by a weekly self-report instrument.

The near-identical pre- and post-test scores also raise the possibility of a measurement ceiling: students who already engage in moderate physical activity may not perceive the programme as markedly increasing their activity levels, even if discrete within-session activity increases occurred. Future studies may benefit from objective measurement tools such as accelerometers to capture actual activity changes more precisely.

Programme Acceptability and Subjective Outcomes

Despite the absence of significant objective changes, programme feedback was consistently positive. Students rated enjoyment at 4.20 out of 5, with perceived stress relief (3.78), increased interest in physical activity (3.83) and willingness to participate in future similar programmes (3.90) all rated above the midpoint. These subjective evaluations suggest that participants found the programme engaging and perceived its content as personally relevant.

High acceptability is a necessary precondition for behavioural change, even when short-term objective outcomes remain modest. The discrepancy between subjective satisfaction and objective measurement change is a commonly documented phenomenon in health promotion research and may reflect the insufficient duration of the current intervention rather than an absence of participant responsiveness (Michie et al., 2011)¹⁹. Students who report enjoyment and perceived benefit are more likely to sustain health-related behaviours independently, suggesting that the programme may exert delayed effects not captured within the current measurement window.

Limitations

Several limitations should be acknowledged. The absence of a control group represents the most significant methodological constraint, as observed pre-to-post changes cannot be unambiguously attributed to the intervention rather than maturation, Hawthorne effects or seasonal variation in activity patterns. The sample was drawn from a single school and was relatively small ($n = 42$), which limits both statistical power and the generalisability of findings. Self-report measures are subject to social desirability bias and recall inaccuracy, particularly for constructs such as physical activity frequency. The intervention duration was not reported in standardised units, making comparison with existing literature difficult. Future research should incorporate a waitlist or active control condition, increase sample size through multi-school recruitment and include objective physiological or accelerometry-based outcomes.

CONCLUSION

This study evaluated the short-term effects of a school-based healthy lifestyle and mental well-being programme on psychological stress and physical activity among secondary school students. The paired-sample t-test results indicated no statistically significant changes in either outcome following the intervention. Pre-test stress levels were already relatively low, suggesting the sample was not characterised by elevated distress at baseline. Physical activity levels remained stable and predominantly moderate across both measurement points.

These findings do not negate the programme's potential value. Programme feedback data indicated consistently positive student evaluations, with high ratings for enjoyment, perceived stress relief and willingness to re-engage. This pattern of high acceptability alongside modest objective change is consistent with the inherent limitations of short-duration, single-group designs in health behaviour research.

The study contributes to the growing body of literature on school-based health promotion by providing empirical data from a Malaysian secondary school context and highlighting the practical challenges of detecting short-term behavioural change through self-report instruments. The results underscore the need for programmes of sufficient duration to produce measurable effects and for evaluation designs capable of distinguishing intervention-related change from natural variation.

Future research should adopt controlled designs, recruit larger and more diverse samples, extend the programme across a full academic term and incorporate objective outcome measures alongside self-report instruments. Longitudinal follow-up assessment would also clarify whether the subjective improvements reported by students translate into sustained behavioural change over time. These refinements would strengthen the evidence base for comprehensive, school-based lifestyle and mental health interventions and inform their broader implementation in educational policy.

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