



Effectiveness of Mindfulness-Based Mandala Colouring on Stress and Concentration Among School-Going Children: A Pre-Experimental Study

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ABSTRACT

Background: School-going children commonly experience stress arising from academic pressure and social demands, which may adversely affect concentration and academic performance. Mindfulness-based interventions have demonstrated efficacy in reducing psychological distress and improving attentional functioning in paediatric and adolescent populations. **Objective:** This study aimed to assess the effectiveness of mindfulness-based mandala colouring in reducing stress and improving concentration among school-going children. **Methods:** A quantitative pre-experimental one-group pre-test post-test design was adopted. A total of 60 school-going children were selected using purposive sampling. Data were collected using a standardised scale and concentration checklist. The intervention consisted of guided mindfulness-based mandala colouring sessions for 30 minutes daily over 2 weeks. Validity and reliability of tools were ensured through expert review and pilot testing. Data were analysed using descriptive and inferential statistics (paired t-test, chi-square test). **Results:** Findings revealed a significant reduction in stress scores and improvement in concentration levels after the intervention ($p < 0.001$). No significant association was found between demographic variables (age, gender, grade level) and pre-test stress levels. **Conclusion:** Mindfulness-based mandala colouring was found to be effective in enhancing concentration among school-going children. Schools may integrate such creative mindfulness practices into co-curricular activities to promote emotional well-being.

Keywords: mindfulness; mandala colouring; stress; concentration; school children; pre-experimental study

INTRODUCTION

School-going children often face challenges such as academic pressure, peer competition, and emotional instability, which can lead to stress and reduced concentration [1]. Mindfulness practices, which cultivate awareness of the present moment, have been shown to improve emotional regulation and academic performance in children and adolescents [2,3].

Mandala colouring, a structured art form involving symmetrical patterns, when combined with mindfulness, provides a therapeutic medium for relaxation and self-expression [4]. Studies indicate that mindfulness-based mandala colouring helps children reduce stress, improve attention span, and enhance creativity [5,6].

Despite growing evidence of its benefits, structured mindfulness-based mandala colouring interventions are not routinely implemented in school settings. This study therefore aimed: (i) to assess pre-test and post-test stress and concentration levels among school-going children; (ii) to evaluate the effectiveness of mindfulness-based mandala colouring in reducing stress and improving concentration; and (iii) to examine associations between pre-test scores and selected demographic variables.

METHODS

Research Design: A quantitative pre-experimental one-group pre-test post-test design was adopted to evaluate the effectiveness of the intervention.

Sample and Sampling: A total of 60 school-going children ($n = 60$) aged 11–14 years from a selected school in Kerala, India, were recruited using purposive sampling. Children attending school regularly and whose parents provided written informed consent were included. Children with any diagnosed psychiatric or neurological condition, or prior structured mindfulness training, were excluded.

Data Collection Instruments: Data were collected using a structured interview schedule comprising two sections: (a) a standardised stress scale to assess the level of stress, and (b) a concentration checklist to evaluate attentional capacity. The tools were adapted from validated instruments available in the literature.

Validity and Reliability: Content validity was established through a panel of experts in psychology, nursing, and education, in accordance with standard recommendations for tool development [7]. Reliability was confirmed via a pilot study ($r = 0.89$).

Data Collection and Intervention: Pre-test data were collected prior to the intervention. The intervention comprised guided

mindfulness-based mandala colouring sessions conducted for 30 minutes daily over a period of 2 weeks (10 sessions in total). Each session began with a 5-minute mindfulness breathing exercise, followed by 20 minutes of structured mandala colouring, and concluded with a 5-minute group reflection. Post-test data were collected immediately following the final session.

Statistical Analysis: Data were analysed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics. The paired t-test was used to compare pre-test and post-test scores, and the chi-square test was used to examine associations between demographic variables and pre-test scores. A p-value of <0.05 was considered statistically significant. All analyses were performed using SPSS version 20.

RESULTS

Demographic Characteristics

The majority of participants were aged 12–13 years (45%), with an equal distribution of boys and girls. Grade 7 students constituted the largest subgroup (40%). Approximately 60% of participants reported no prior exposure to any form of mindfulness practice.

Pre-Test and Post-Test Stress and Concentration Levels

In the pre-test assessment, 62% of participants demonstrated moderate stress, 25% high stress, and 13% low stress. Regarding concentration, 70% showed low-to-moderate concentration levels. Following the intervention, 68% of participants exhibited low stress, 25% moderate stress, and 7% high stress. Post-test assessment revealed that 72% of participants achieved high concentration levels.

Table 1. Distribution of stress levels at pre-test and post-test (N = 60)

Stress Level	Pre-Test, n (%)	Post-Test, n (%)
Low	8 (13.0)	41 (68.0)
Moderate	37 (62.0)	15 (25.0)
High	15 (25.0)	4 (7.0)
Total	60 (100.0)	60 (100.0)

Note. n = frequency; % = percentage.

Table 2. Distribution of concentration levels at pre-test and post-test (N = 60)

Concentration Level	Pre-Test, n (%)	Post-Test, n (%)
Low–Moderate	42 (70.0)	17 (28.0)
High	18 (30.0)	43 (72.0)
Total	60 (100.0)	60 (100.0)

Note. n = frequency; % = percentage.

Effectiveness of the Intervention

Paired t-test analysis revealed a statistically significant reduction in stress scores following the mindfulness-based mandala colouring intervention (p < 0.001). A statistically significant

improvement in concentration scores was similarly observed (p < 0.001), indicating that the intervention was effective in both reducing stress and enhancing concentration among school-going children.

Table 3. Comparison of pre-test and post-test stress and concentration scores among school-going children (N = 60)

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	95% CI of Difference	t (df = 59)	p
Stress	21.80 ± 6.10	15.00 ± 5.40	−6.80	−8.14 to −5.46	−10.13	<0.001
Concentration	17.20 ± 5.80	23.40 ± 5.60	6.20	4.91 to 7.49	9.60	<0.001

Association between Demographic Variables and Pre-Test Scores

Chi-square analysis revealed no statistically significant association between pre-test stress or concentration scores and demographic variables, including age, gender, and grade level (p > 0.05).

The present study demonstrated significant reductions in stress and improvements in concentration following a structured mindfulness-based mandala colouring intervention [1]. These findings are consistent with prior research reporting positive effects of mindfulness-based art interventions on attention and emotional well-being in young people [5,6,11,12]. Mindfulness-based colouring interventions have also demonstrated efficacy in reducing test anxiety in adolescents [8], and a school-based

DISCUSSION

mandala colouring programme similarly reduced academic stress and burnout among secondary school students [9]. A study conducted among high school students in India similarly reported significant reductions in academic stress following mandala art therapy [10].

The structured, repetitive patterns of mandala colouring may promote relaxation responses, whilst concurrently applied mindfulness techniques encourage children to focus on the present moment, thereby reducing cognitive distractions and improving sustained attentional capacity [13,14]. The neurobiological mechanisms proposed for such effects include activation of the parasympathetic nervous system and reduction in cortisol levels associated with mindfulness practice, together with the attentional demands inherent in a structured colouring task.

These findings suggest that mindfulness-based mandala colouring is a feasible, low-cost, and easily implemented intervention that may be integrated into school curricula without disrupting academic schedules. The use of a validated mindfulness framework alongside an engaging creative activity may enhance acceptability among children [15]. Further randomised controlled trials with larger, more diverse samples and active control groups are warranted to confirm these findings and establish optimal intervention parameters.

STRENGTHS AND LIMITATIONS

This study contributes to the limited evidence base on structured mindfulness art-based interventions in Indian school settings, using a standardised and reliably tested measurement approach. Limitations include the pre-experimental single-group design, small purposive sample recruited from a single school, and the absence of a control group, which preclude causal inferences. Follow-up data to assess the sustainability of intervention effects

were not collected. Future studies should employ randomised controlled designs with larger, representative samples and validated, standardised instruments across diverse educational settings.

CONCLUSION

Mindfulness-based mandala colouring was effective in significantly reducing stress and improving concentration among school-going children. These findings support the integration of mindfulness and art-based practices into daily school routines as part of a holistic approach to child development and emotional well-being. Schools, educators, and policymakers are encouraged to consider such evidence-informed, low-cost creative interventions in co-curricular programmes.

DECLARATIONS

Ethics Statement

This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from institutional ethics committee. Written informed consent was obtained from the parents or legal guardians of all participating children.

Funding

No external funding was received for this study.

Conflicts of Interest

The authors declare no conflict of interest.

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