Research Article

Effect of Structured Yoga Practices on Experiential-Intuitive Processing in Adolescents: A Pilot Randomized Controlled Trial

Dr. Radhika Sourabh[1]*, Dr. A. Anand Kumar[2], Dr Nandana S[3]

[1]Senior Lecturer, Department of Integrative Medicine, Amrita School of Medicine, Amrita Institute of Medical Sciences, Amrita Vishwa Vidyapeetham, Kochi Campus, India
[2]Professor, Department of Neurology, Amrita School of Medicine, Amrita Institute of Medical Sciences, Amrita Vishwa Vidyapeetham, Kochi Campus, India
[3]Research Assistant, Department of Neurology, Amrita School of Medicine, Amrita Institute of Medical Sciences, Amrita Vishwa Vidyapeetham, Kochi Campus, India
Corresponding Author: *Dr. Radhika Sourabh
Department of Integrative Medicine, Amrita School of Medicine, Amrita Institute of Medical Sciences, Amrita Vishwa Vidyapeetham, Kochi Campus, India
Email: radhikaaf@aims.amrita.edu ; radhikaaf@gmail.com

Abstract

Intuition is a complex integrative cognitive process involving distributed neural networks and rapid experiential processing. Contemporary dual-process models conceptualize intuition as fast, automatic cognition corresponding to System 1, contrasted with slower analytical reasoning. Traditional yogic literature also describes an intuitive dimension of cognition that may be refined through contemplative practices. The present pilot randomized controlled trial examined whether structured yogic practices influence experiential and rational cognitive processing in adolescents. Forty-two adolescents aged 12–15 years were enrolled, with forty-one completing the study. The intervention group participated in a six-month program including pranayama, mudra, Krida yoga, and meditation during school hours, while the control group followed the regular school routine. Experiential and rational processing styles were assessed using standardized psychometric measures, with emotional intelligence and perceived stress as secondary outcomes. Post-intervention analysis showed significantly higher experiential processing in the intervention group ($p < .001$, $d = 1.34$), whereas rational processing was higher in the control group ($p = .004$). Emotional intelligence and perceived stress did not reach statistical significance. These findings suggest that structured yogic practices may influence experiential cognitive processing during adolescence and highlight the need for larger trials incorporating behavioural or neurocognitive measures of intuition.

Keywords: Adolescents; experiential mind; Intuition; Cognition; Yoga; Dual-process theory; Experiential processing.

1. Introduction

According to the cognitive processing framework suggested by Daniel Kahneman, our brain works in two streams. One is the automatic pilot mode or the non-conscious mind and the manual pilot mode-or the conscious mind. He calls them system 1 and system 2 respectively. The System 2 is identified as the conscious, logical system that relies on deliberate thinking and decision-making based on beliefs and choices. On the other hand, the system 1 is effortlessly generated emotion- driven impressions, intuition, and feelings, which often serve as the foundation for explicit thoughtful reasoning of System 2. (Kahneman, 2011). The automatic operations of System 1 induce unexpectedly complex patterns of ideas (Kahneman, 2011). Hodgkinson et al (2009) believe that the intuitive mind is best accessed when the noise of external distractions is quieted. Practices such as meditation, breath awareness, and reflective silence are known to sharpen intuitive perception, revealing the relation of developing intuitive mind through contemplative practices like Yoga (Cannon-Bowers, J.A., & et al., 1990))

Earlier approaches in understanding the intuitive mind and its mechanisms are extensive. Epstein et al proposed the dual-process model of rational vs. experiential thinking (Epstein et al., 1996). In the context of discovery, Bowers et al. explored intuition, emphasizing non-conscious integration of cues ((Cannon-Bowers, J.A., & et al., 1990). Whereas, Lieberman presented a neurocognitive basis for intuition, linking it to social cognition (Lieberman, 2000). However, this work integrates modern theories of cognitive neuroscience with traditional Indian contemplative niche, bridging the gap in the area.

1.1 Dual Modes of Brain Functioning

When we consider the daily functioning of the human cognition,, cognitive processing primarily works in an automatic or non-conscious mode, while deliberate, consciously controlled reasoning is engaged more selectively and requires greater cognitive effort (Gouraud et al., 2017). For example, when a person speaks, the spoken words and the gestures while speaking are through his automatic pilot mode. (Kahneman, 2011).

The conscious mind is available for introspection; we understand what happens inside our mind. Whereas, the intuitive mind, is not available for introspection. It is emotional, fast, and automatic.

We are able to create interventions to work on the conscious mind through training or teaching. But when it comes to the non-conscious mind, we don't really know how it analyses things. Whether it's applying logic or following some rule we've previously set, we don't know exactly what is happening inside.

Intuitive processing is shaped by accumulated experience and associative learning. Within dual-process frameworks, experiential cognition develops through repeated exposure and feedback, leading to rapid pattern recognition and affect-linked judgment (Epstein et al., 1996) (Kahneman, 2011). While such processing can facilitate adaptive decision-making, it may also reflect prior biases or maladaptive learning. Therefore, understanding whether structured contemplative practices can modulate experiential processing during development remains an important empirical question (Hogarth & Robin M., 2001).

2. Rationale and Research gap

Even though there are extensive theoretical explorations on intuitive mind within dual process framework, its operational and practical accessibility remains challenging in neuropsychology and cognitive neuroscience. Intuition is often inferred, fast, automatic and experiential, making it difficult to measure the direct behavioural pattern. Neuro-biologically, Intuition is not the function of a single brain region. It is the result of the integration of different areas of brain, starting from trigger to the perception. Hence, measuring intuition remains a challenge. However, there are several validated instruments that assess intuition indirectly within dual-process frameworks. One such widely used measure is the Rational-Experiential Inventory (REI),differentiates between rational–analytical modes of thinking and experiential-intuitive mode of thinking (Epstein et al., 1996). In this model, intuition is understood as experiential cognition, characterized by automatic, affect-linked, and experience-based processing.

Since intuitive processing is fast and instinctive, it is better assessed using structured tools and scales that minimize language-related barriers. People generally think and respond more naturally in their mother tongue or in the language in which their internal thoughts occur. Even if someone is fluent in another language, subtle differences in understanding and emotional connection can influence performance. Therefore, using assessment methods that reduce linguistic interference helps in more accurately capturing experiential-intuitive processing, especially in adolescents (Harris et al., 2003).

Along with cognitive style measures, related psychological measures such as emotional intelligence and perceived stress are often examined to understand the broader psychological context in which intuitive processing functions. Emotional intelligence has been associated with rapid social judgment, affective awareness, and adaptive decision-making (Schutte et al., 1998). Perceived stress, on the other hand, reflects how individuals react to the environmental demands in relation to their coping resources. Since experiential processing is closely related to emotional regulation and adaptive functioning, assessing these associated variables helps in understanding intuition within a wider psychological framework.

Although there is extensive availability of validated psychometric tools, only a limited number of randomized controlled studies have examined whether structured mind-body interventions can meaningfully influence experiential-intuitive processing during adolescence. Adolescence is a sensitive developmental phase, characterized by ongoing maturation of cognitive control, emotional regulation, and autonomic functioning. During this period of heightened neuroplasticity, patterns of thinking and responding are still being shaped. Since intuitive processing is closely connected with attention, emotion, and internal regulation, this stage may offer a valuable window for constructive intervention. However, systematic experimental research exploring these possibilities within a controlled framework remains scarce. Therefore, the current study was initiated to determine the effect of structured yogic practices on experiential-intuitive processing and related emotional variables among adolescents using a randomized controlled design.

Although the direct behavioural measurement of intuition remains methodologically complex, established psychometric tools grounded in dual-process theory provide a structured and empirically supported way to study experiential cognition. Therefore, the present study employed validated self-report measures to assess experiential and rational processing styles, along with emotional and stress-related variables, among adolescents**.**

3.3 Objectives

Primary Objective

1. To evaluate the effect of structured yogic practices on experiential-intuitive processing among adolescents, as assessed using validated psychometric measures within a randomized controlled framework.

Secondary Objectives

1. To assess the effect of structured yogic practices on rational–analytical processing styles.
2. To examine changes in emotional intelligence following the intervention.
3. To evaluate changes in perceived stress levels after the intervention.
4. To explore the relationship between experiential-intuitive processing and emotional variables among adolescents.

3.4 Hypotheses

Null Hypothesis (H_0)

i. No statistically significant difference in experiential-intuitive processing is predicted between the yoga treatment group and the non-intervention control cohort following the completion of the practice.
ii. There will be no significant changes in emotional intelligence or perceived stress between the two groups.

Alternative Hypothesis (H_1)

i. Adolescents who undergo structured yogic practices will show a significant improvement in experiential-intuitive processing in contrast to the control group.
ii. The intervention group will demonstrate marked enhancements in emotional intelligence and decline in perceived stress relative to the control group.

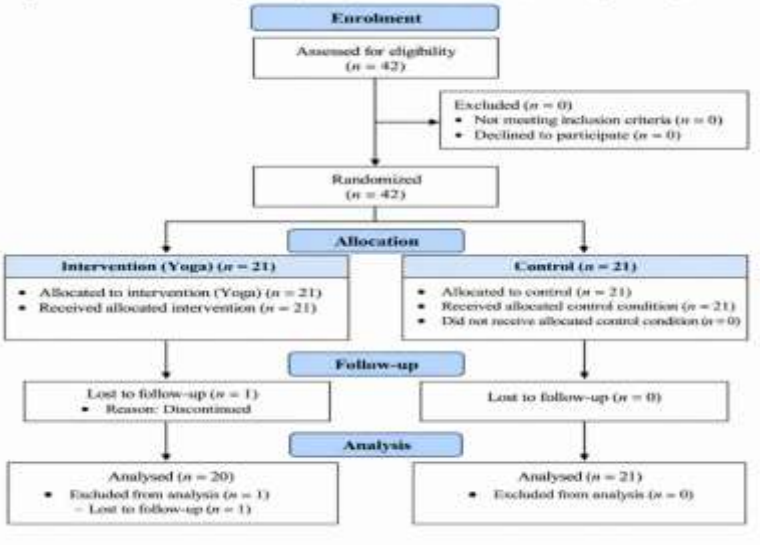
4 Methodology

4.1 Study Design

A randomized controlled pilot trial (RCT) with a pre-post comparative design was conducted to evaluate the effect of yogic practices on intuitive cognition and emotional outcomes in adolescents. The study was carried out among children enrolled in a government school located in a rural area of Ernakulam District, Kerala, India. Participants who met the predefined inclusion and exclusion criteria were randomly allocated to either the intervention group or the control group using a random number generator, a simple randomization method.

Randomization was performed by assigning participants identification numbers and allocating them to groups through a computer-generated random sequence to ensure equal probability of assignment. The allocation process was conducted prior to the initiation of the intervention. The study flow is presented in accordance with CONSORT 2010 guidelines (Figure 1).

Figure 1. CONSORT flow diagram of participant enrolment, allocation, follow-up, and analysis.



Given the framework of the intervention, participant and instructor masking was unfeasible. Outcome assessments were conducted using standardized self-report and behavioural measures, and no formal assessor blinding was implemented.

4.2 Participants

Initially, 42 school-going adolescents **(**aged 12–15 years) were enrolled out of which 1 withdrew, final n = 41. Following the withdrawal of one participant from the intervention group**,** the final sample consisted of:

1. Experimental cohort (Yoga): n = 20
2. Control group: n = 21

Participants were recruited from a government school setting in Ernakulum district and met inclusion criteria of age, willingness to participate, and ability to comply with intervention procedures. Parental consent and participant assent from the participants were documented for all involved participants.

Inclusion criteria:

The criteria for enrolment included: (i) school-going adolescents aged between 12 and 15 years, (ii) enrolled in the selected government school in the rural area of Ernakulam District, Kerala, (iii) volunteered to participate in the study procedures, and (iv) obtained documented parental/ legal guardian consent along with childhood assent.

Exclusion criteria:

Participants were excluded if they (i) had any diagnosed neurological, psychiatric, or developmental disorders reported by parents or school records, (ii) were undergoing concurrent structured psychological or yoga-based training outside the school curriculum, (iii) had medical conditions limiting participation in mild physical activity, or (iv) had irregular school attendance that would interfere with consistent participation in the intervention.

4.3 Intervention

The intervention group received daily yogic practices that included pranayama, mudra, krida yoga (Yogic games), and dhyana (Table 1). Each session lasted about 45 minutes and was delivered during regular school hours. The intervention lasted for 6- months, with daily yogic sessions integrated into the school timetable; during non-school days, sessions continued online to maintain consistency. The control group continued their usual school routine without additional yogic practices.

Table 1. Yogic Practice and Duration

Yogic Practice	Duration per Session	Frequency	Key Focus/Effect
Pranayama	10 min	Daily	Breath awareness, mental focus
Mudra	5 min	Daily	Concentration, energy balance
Krida Yoga	15 min	Daily	Cognitive engagement, experiential learning
Dhyana	10 min	Daily	Meditation, introspection, intuitive training

4.4 Assessment Tools

Individualised evaluation was conducted both prior and after the intervention using different psychometric evaluation tools. (Table 2)

Table 2. Assessment tools

Tool	Measured Construct	Age Group	Type	Reference
Rational Experiential Inventory (REI)	Experiential vs Rational Thinking	12–15	Questionnaire	(Epstein et al., 1996)
Emotional Intelligence Scale for adolescents	Emotional Intelligence	12–15	Questionnaire	(Schutte et al., 1998)
Perceived Stress Scale for children (PeSSKi)	Stress	12–15	Questionnaire	(Davis & Turner-Cobb, 2023)

4.5 Statistical Analysis

Post-intervention data were analysed to evaluate differences between the two groups. To identify statistically significant variances between the experimental and comparison cohorts, independent-sample t-tests were utilized. In cases where data violated assumptions of normality pr homogeneity of variance, non-parametric Mann-Whitney U tests were substituted. All statistical assumptions were rigoursly verified prior to the primary analysis.
A significance level of $p < .05$ was adopted for statistical inference. Effect sizes were examined to estimate the magnitude of observed differences. All analyses were performed using standard statistical software, and summary statistics are presented in Table 3.

Table 3. Independent Samples t-test results comparing cases and controls

Variable	Cases (Mean ± SD)	Controls (Mean ± SD)	t(df)	p-value
Emotional Intelligence (post)	72.90 ± 13.45	81.67 ± 15.79	-1.91 (39)	.064
REI Experiential (post)	34.85 ± 5.28	27.71 ± 5.39	4.28 (39)	< .001

The following outcome variables were evaluated:

1. **Experiential intuition** (REI-Experiential scores)
2. **Rational thinking style** (REI-Rational scores)
3. **Emotional intelligence** (Adolescent Emotional Intelligence Scale)
4. **Perceived stress** (PeSSKi)

4.6 Sample Size Justification

Given the exploratory nature of this randomized control trial, a formal a priori power analysis was not conducted. Instead, the sample size was dictated by practical feasibility within the school environment, with the primary goal of generating preliminary effect size data to guide future, larger-scale investigations.

4.7 Randomization and Allocation

The randomization sequence was generated using a computer-based random number generator by an independent investigator not involved in outcome assessment. Participants were assigned identification numbers prior to allocation. Due to the nature of the intervention, participant blinding was not feasible. No formal allocation concealment procedure was implemented.

5 Results

Final analysis included 41 participants (n=20 in the experimental cohort and n=21 in the control group**).** Group differences were assessed using post-test scores and the percentage of change across all outcomes.

5.1 Descriptive Statistics

Post-intervention means and standard deviations were as follows:

i. **Emotional Intelligence:** Intervention (M = 72.90, SD = 13.45); Control (M = 81.67, SD = 15.79)
ii. **REI Experiential:** Intervention (M = 34.85, SD = 5.28); Control (M = 27.71, SD = 5.38)

5.2 Between-Group Comparisons

5.2.1 Indpendent Samples t-tests

A significant between-group difference was observed for REI Experiential scores, with the intervention group demonstrating higher scores than controls, $t(39) = 4.28$, $p < .001$.
No statistically significant between-group differences were found for, Emotional Intelligence, $p = .064$

5.2.2 Mann–Whitney U Tests

For variables not meeting parametric assumptions:

i. **Perceived Stress (Post):** $U = 135.50$, $p = .051$
ii. **REI Rational (Post):** $U = 98.50$, $p = .004$, with higher scores in the control group

5.3 Percent Change Analysis

Percent change scores were computed to evaluate relative changes from baseline.

i. **Percent Change:** $U = 121.50$, $p = .034$, increased in the control group

There were no meaningful differences in the percent change scores for perceived stress or emotional intelligence across the study cohorts. (Table 3 and Table 4).

Table 4. Mann–Whitney U test results for post and percent change scores

Variable	Mean Rank (Cases vs Controls)	U	Z	p-value
Perceived Stress Scale (post)	17.28 vs 24.55	135.50	-1.95	.051
REI Rational (post)	15.43 vs 26.31	98.5	-2.92	.004
Emotional Intelligence % change	17.28 vs 24.55	135.50	-1.94	.052
PSS % change	18.18 vs 23.69	153.5	-1.47	.140

5. Discussion

The findings from our pilot work suggest that structured yoga practices may influence experiential- intuitive processing in adolescents. The results also point out that inward practices like pranayama, mudra, and meditation can enhance experiential processing which is otherwise hidden beneath our conscious reasoning (Patañjali & Johnston, 1975). The REI scores showing a significant rise in experiential processing in the intervention group suggest that the intuitive mind is indeed trainable and not just an automatic, unchangeable process (Epstein et al., 1996).

Interestingly, rational scores were higher in the control group. This finding may indicate that yogic practices do not primarily influence analytical reasoning, but may instead encourage greater reliance on experiential forms of cognition. This supports the dual-process view, where System 1 and System 2 work differently and may be shaped differently through experience. The findings suggest that structured yogic practice may preferentially influence experiential (System 1) processing, while schooling and regular academic exposure already sharpen System 2. This pattern may reflect a differential influence of structured contemplative practice and conventional academic exposure on experiential and analytical processing systems (Kahneman, 2011).

The marginal improvements seen in emotional intelligence and stress are also worth noting. Though not statistically strong, the direction of change suggests that with longer or more intensive practice, these effects might become clearer. Since intuition is deeply connected with empathy and compassion, a steady yoga routine may strengthen both affective understanding and resilience, which are vital for children entering adolescence (Peter Salovey & John D. Mayer, 1990)

Taken together, these findings indicate that experiential-intuitive processing may represent a dynamic cognitive mechanism that can be shaped through sustained attentional and contemplative training. Structured yogic practice may encourage a more balanced interaction between analytical reasoning and experiential processing, potentially contributing to adaptive decision-making and socio-emotional functioning in adolescents. This integration between modern psychology and yoga philosophy opens a new direction where education can aim not just at producing rational thinkers but also balanced individuals who can trust their inner sense while remaining grounded in reason.

6. Conclusion

This article draws attention by presenting the holistic perspective of intuitive cognition, by combining the contemporary theories along with the traditional eastern philosophies of Patanjali. It points out that intuition is not merely a mystical approach but is scientific and can be trained and shaped through contemplative approaches, through introspective practices like yoga. Furthermore, this ideology opens up new pathways to pursue especially in educational psychology, contemplative science and cognitive training, during the early developing stages of brain. This study offers a novel framework integrating dual-process theory with contemplative practices, suggesting that intuition can be consciously strengthened as part of human cognitive development.

7. Limitations

As an exploratory pilot study with a constrained sample size**,** the external validity of these results remains limited. The statistical power may not have been sufficient to detect small to moderate effects for certain secondary outcomes. In addition, the absence of participant and assessor blinding may have introduced response or expectancy bias. Uneven sample size due to dropouts have also negatively influenced the study.

The study relied primarily on self-report psychometric measures, which are subject to reporting bias and individual interpretation. Furthermore, the analysis focused on post-intervention between-group comparisons, and the

preliminary scope of the design restricts causal links. Reliance on self-report measures limits objectivity, future studies should incorporate behavioural or neurocognitive tasks.

Given these considerations, the findings should be interpreted as preliminary. Larger, fully powered randomized controlled trials with rigorous design, adequate sample size estimation, and potentially objective behavioural or neurocognitive measures are required to confirm and extend these observations.

Declarations

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Conflicts of Interest: The authors declare no conflicts of interest.

Ethical Approval: Approved by Institutional Review board-Amrita Institute of Medical Sciences & Research Centre, Kochi Approval No: **ECASM-AIMS-2024-605**, dated 13-12-2024

Informed Consent: Obtained from all participants (and from parents/guardians where applicable).

Author Contributions: All authors contributed equally to the study and manuscript.

Data Availability: Available upon reasonable request from the corresponding author.

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