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Pre- Post Changes in Cognitive, Behavioural and Screen-Time Indicators among Children Participating in a Whole Brain Development Programme

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Abstract: ***Background: Children with developmental and learning support needs may benefit from individualized learning opportunities that address attention, memory, motor coordination, communication, participation and everyday independence. Evaluations of community-based programmes should distinguish measured outcomes from informal observations and caregiver perceptions. Objective: To examine pre–post differences in attention, working-memory, behaviour-rating and daily screen-time records among children who participated in the Whole Brain Development Programme, and to summarize trainer observations and parent-reported themes. Methods: A one-group pre-test–post-test evaluation was conducted using 40 coded participant records (22 boys and 18 girls; ages 4–12 years) with paired measurements. Participants were described by the programme centre as having mild-level developmental and/or learning-related support needs; individual diagnoses and severity classifications were not independently verified for this analysis. The programme was delivered in weekend sessions of approximately three hours. AAS, WMS and BRS were researcher-developed, expert-reviewed 10-item formats scored 0–5 per item (total 0–50); screen time was recorded in hours per day. Results: Mean attention scores increased from 31.90 (SD=9.18) to 42.93 (SD=6.36), and working-memory scores increased from 29.98 (SD=8.66) to 42.95 (SD=5.72). Behaviour-rating scores, for which higher scores indicate better behaviour according to the researcher, increased from 28.08 (SD=8.13) to 44.18 (SD=4.48). Recorded daily screen-time estimates decreased from 2.40 (SD=1.79) to 0.71 (SD=0.67) hours. Conclusion: The records indicate encouraging pre–post differences during programme participation. Because the study had no control group and the AAS, WMS and BRS have not undergone documented formal psychometric validation, the findings are preliminary and do not establish causation or guaranteed effectiveness. Further controlled research using validated measures is required.***

Keywords: Whole Brain Development Programme; developmental support needs; attention; working memory; screen time; pre–post study; parent feedback

1. Introduction

Children with developmental and learning support needs form a diverse population. Their profiles may differ in attention regulation, working memory, language, social communication, motor coordination, academic skills, sensory processing and adaptive functioning. A programme that offers opportunities for guided practice and individualized learning tasks may be relevant to some of these developmental domains. However, the presence of a programme and reports of improvement do not, by themselves, establish treatment efficacy. Outcomes need to be measured with clear definitions and interpreted in light of the research design.

Attention supports the selection and maintenance of relevant information during learning. Working memory enables temporary retention and manipulation of information and is involved in following instructions, completing multistep tasks and learning. Executive functions include related processes such as inhibition, planning and cognitive flexibility (Baddeley, 2012; Diamond, 2013; Miyake et al., 2000). These constructs are important, but a single rating score cannot represent the full complexity of a child's cognitive development.

Children's screen use is also an important family and educational concern. Research has reported associations between screen exposure and developmental or health indicators, although findings depend on age, content, context, family routines and measurement methods. Association does not establish that screen time alone causes a developmental difficulty (Madigan et al., 2019; Stiglic & Viner, 2019). Accurate assessment requires a clear definition of device use, the number of days recorded and the reporting source.

The Whole Brain Development Programme considered in this study combines group activities with individual, time-bound tasks. The current evaluation draws on routine records collected before and after the programme period. It examines changes in four recorded indicators and considers trainer notes and parent feedback as supplementary contextual information. It does not compare the programme with another intervention, and it does not isolate the effect of any single activity.

1.1 Rationale

A practice-based evaluation can help identify patterns in existing records, improve outcome monitoring and inform the design of more rigorous future research. Positive preliminary patterns may justify further investigation, but

claims should remain proportionate to the evidence. In particular, findings from a mixed group should not be generalized to autism spectrum disorder, ADHD, dyslexia or every learning disability unless diagnostic information and adequate subgroup data are available.

1.2 Aim

To examine pre–post differences in recorded cognitive, behavioural and screen-time indicators among children participating in the Whole Brain Development Programme.

1.3 Objectives

- Compare attention scores before and after programme participation.
- Compare working-memory scores before and after programme participation.
- Examine behaviour-rating score differences, with higher BRS scores indicating better behaviour according to the researcher's scoring confirmation.
- Compare recorded daily screen-time estimates at the two measurement points.
- Summarize trainer observations and recurring themes in separate parent feedback.

2. Review of Relevant Literature and Conceptual Background

Working memory is commonly understood as a limited-capacity system involved in maintaining and manipulating information over short periods. Baddeley (2012) reviews theoretical models and continuing debates about its components. Executive functions are associated with goal-directed behaviour and include partially distinct but related processes (Diamond, 2013; Miyake et al., 2000). These constructs provide a rationale for assessing attention and working-memory-related performance in educational settings.

However, evidence that a cognitive process is important for learning does not mean that every activity marketed as brain training produces broad or lasting cognitive gains. Reviews of brain-training research emphasize the need to distinguish improvement on practiced tasks from transfer to other abilities or everyday functioning (Melby-Lervåg et al., 2016; Simons et al., 2016). Consequently, the current study reports changes in the actual recorded scales and avoids claiming generalized cognitive enhancement.

Screen-time research also requires careful interpretation. Madigan et al. (2019) reported an association between screen time and performance on a developmental screening measure in young children. Stiglic and Viner (2019) reviewed evidence concerning screen time and child health and well-being. Such research supports attention to screen-use patterns but does not demonstrate that a programme such as the one evaluated here directly reduces screen exposure. Family practices, parental supervision, school schedules and changes in device access may all influence reported screen time.

2.1 Programme evaluation framework

The programme is treated as the context in which children participated in activities over time. The outcomes in this study are the recorded attention, working-memory, behaviour-rating and screen-time values. Trainer comments and parent feedback are additional descriptive sources, not equivalent to standardized tests. Potential influences include age-related development, school learning, concurrent therapies, changes in family routines, sleep, attendance, repeated assessment and the expectations of observers.

2.2 Research questions

- Do attention scores differ between pre-programme and post-programme measurement?
- Do working-memory scores differ between the two measurement points?
- Do behaviour-rating scores differ between the two measurement points, with higher BRS scores indicating better behaviour?
- Do recorded daily screen-time estimates differ between the two measurement points?
- What kinds of changes are described in trainer notes and parent feedback?

The study is exploratory and does not test a causal hypothesis that the programme alone produces improvement. No diagnostic-specific hypothesis is tested because the consolidated workbook does not provide verified diagnostic categories and subgroup sizes.

3. Method

3.1 Research design

A one-group pre-test–post-test design was used. The same coded participants had values recorded at two time points. There was no control group, random allocation or blinded assessment. The design can identify within-participant differences but cannot establish that programme participation caused the changes.

3.2 Participants and setting

The updated participant-level master workbook contained 40 coded records with complete paired values for attention, working memory, behaviour rating and screen time. The sample comprised 22 boys and 18 girls (N = 40), aged 4–12 years. Participants were described by the programme centre as children with mild-level developmental and/or learning-related difficulties or support needs. The consolidated dataset did not provide a verified diagnostic breakdown or operational severity criteria; therefore, no diagnosis-specific or condition-specific conclusions are drawn. The programme was conducted at Canaan Cognitive Fitness Hub, Chennai, Tamil Nadu, India.

3.3 Programme description

According to the researcher, the Whole Brain Development Programme was delivered through weekend sessions of approximately three hours each. The activities reported were: (a) prayer and energizer activities; (b) Brain Gym

exercises; (c) individualized, time-bound hand–eye coordination tasks; (d) time-bound reading or writing practice; (e) Alpha Meditation; (f) activities described by the provider as Extra-Sensory Perception (ESP) simulation activities; (g) activities described as Third Eye/Midbrain-related tasks; and (h) time-bound group craft activities. Additional assessment-oriented tasks were assigned individually according to participant needs and performance.

These activities are described as reported by the programme provider. The consolidated workbook did not contain a complete session-by-session manual, standardized sequence, attendance dose, task progression chart or fidelity checklist. The manuscript therefore does not claim that a standardized intervention protocol was tested. The terms ESP and Third Eye/Midbrain are programme labels; this study did not test paranormal perception or a distinct midbrain mechanism.

3.4 Programme delivery and individualization

The reported model combined group participation with individual tasks. Individual task selection was informed by each participant's needs and performance. The exact criteria used to assign tasks, task difficulty levels, progression rules and modifications for specific disabilities should be added from contemporaneous programme documentation. Weekend session duration does not establish the number of sessions attended by each child; individual attendance records are needed to calculate exposure.

3.5 Measures and data sources

Four outcome domains were extracted from the master summary: attention, working memory, behaviour rating and screen time in hours per day. The researcher has confirmed that the assessment measures were standardized published instruments. The three rating-scale outcomes were recorded on a 0–50 range. The exact published instrument titles, editions/authors, scoring manuals and psychometric references must be stated in the instrument description and reference list before submission; these details were not identifiable in the consolidated workbook supplied for analysis. The behaviour-rating scale was confirmed by the researcher to be positively scored, with higher scores indicating better behaviour.

The researcher confirmed that higher behaviour-rating scores indicate better behaviour. Accordingly, the increase in the behaviour-rating mean is described as a favourable change in the recorded scale score. However, interpretation remains subject to verification of the exact published instrument, its scoring manual and the suitability of its use for the age and support-needs profile of this sample. Screen time was entered as hours per day, but the workbook did not consistently specify device coverage, reporting days or whether estimates came from parents or another source.

Trainer observation notes were available for a subset of participant records in the master summary. They were narrative comments by a programme-associated trainer and were not recorded using a standardized observation rubric. The separate Observation Schedule contained incomplete and apparently misaligned fields and was not converted into numerical outcomes. Parent feedback comprised 63 coded responses in a separate workbook and could not be reliably linked to the 40 participant IDs.

3.6 Procedure

Pre-programme records were dated between 6 and 13 June 2026. Post-programme records were dated between 26 September and 10 October 2026. The programme period was approximately four months. Exact participant-level attendance and the total number of sessions attended were not consistently available in the workbook. Any attendance registers or original assessment forms should be checked before final submission.

3.7 Data analysis

Means and standard deviations were calculated for pre- and post-programme values. Paired-samples t-tests compared the two time points. Mean change was calculated as post-test minus pre-test, with 95% confidence intervals. Cohen's dz was calculated using the standard deviation of paired differences. Wilcoxon signed-rank tests were used as sensitivity analyses. Values of $p<.001$ are reported as such. The analyses were not adjusted for confounding variables.

3.8 Ethical considerations

The researcher reports that ethics approval and parent/guardian consent were obtained before or during the research process. The name of the approving ethics committee, approval/reference number and approval date were not supplied for this manuscript. These details must be copied exactly from the official approval letter or institutional record before journal submission. The manuscript must not imply approval by JAIN University unless that institution's committee issued the approval.

4. Results

4.1 Paired pre–post comparisons

The updated master summary contained 40 complete paired records for each of the four variables. Table 1 reports descriptive statistics, mean changes, confidence intervals and paired-samples t-test results. A positive change indicates a higher post-programme value; a negative screen-time change indicates a lower recorded daily estimate.

Outcome	Pre M (SD)	Post M (SD)	Mean Δ	95% CI	t(39)	p	dz
Attention	31.90 (9.18)	42.93 (6.36)	+11.03	[8.49, 13.56]	8.81	<.001	1.39
Working memory	29.98 (8.66)	42.95 (5.72)	+12.98	[10.91, 15.04]	12.69	<.001	2.01
Behaviour rating*	28.08 (8.13)	44.18 (4.48)	+16.10	[14.01, 18.19]	15.61	<.001	2.47
Screen time (h/day)	2.40 (1.79)	0.71 (0.67)	−1.69	[−2.14, −1.25]	−7.67	<.001	−1.21

Note. n=40 for all outcomes. Rating scales were recorded on a 0–50 range. *Higher behaviour-rating scores indicate better behaviour, as confirmed by the researcher; interpretation remains dependent on the instrument's scoring manual. Wilcoxon signed-rank sensitivity tests were also statistically significant for all four outcomes (p<.001).

4.2 Interpretation of quantitative findings

The attention and working-memory scales showed higher mean values at post-test than at pre-test. The recorded daily screen-time estimate was lower at post-test. The paired tests indicate that the observed differences are unlikely to be explained by random sampling variation under the assumptions of the tests. Statistical significance does not, however, demonstrate that the programme caused the changes, that the changes are clinically meaningful, or that they apply to all children with a particular diagnosis.

The behaviour-rating score increased numerically. The researcher confirmed that higher BRS scores indicate better behaviour; this is a favourable direction according to the scoring approach used. However, the BRS is a researcher-developed, expert-reviewed format without documented formal psychometric validation or reliability testing.

4.3 Direction of individual change

The principal reported analysis is based on paired means. Before publication, the researcher should verify each participant's source record and assess whether any data-entry corrections or missing values affect the results. The manuscript does not infer diagnosis-specific responses, responder rates or individual clinical benefit from the aggregate means.

4.4 Trainer observations

Trainer notes in the updated master summary contained narrative descriptions for a subset of participants. The comments included examples relating to interest and engagement in colouring or craft activities, following step-by-step instructions, completing assigned tasks, responding to peers, communicating with classmates, organizing materials, puzzle-solving and fine-motor or writing-related performance. A note also recorded non-cooperation during exercises. These observations may help describe the programme context and identify behaviours for more systematic future monitoring.

The notes were recorded by a programme-associated trainer and were not based on a standardized rubric, independent observation or blinded assessment. They should therefore be interpreted as informal practice-based observations rather than objective proof of developmental change. The separate Observation Schedule included blank entries and missing or misaligned source labels. Those records were not converted into frequencies or quantitative outcomes.

4.5 Parent-reported feedback

The separate parent-feedback workbook contained 63 coded responses. The most frequently coded theme was behaviour, independence or emotional regulation (45/63; 71.4%). Social interaction, creativity, speech or communication appeared in 30/63 (47.6%); academic or study improvement in 29/63 (46.0%); concentration or attention in 18/63 (28.6%); writing or handwriting in 13/63 (20.6%); and memory or remembering in 9/63 (14.3%). Nine responses (14.3%) visibly marked a recommendation.

Parent feedback theme	Responses	Percentage
Behaviour / independence / emotional regulation	45	71.4%
Social / creativity / speech / communication	30	47.6%
Academic / study improvement	29	46.0%
Concentration / attention	18	28.6%
Writing / handwriting	13	20.6%
Memory / remembering	9	14.3%
Recommendation visibly marked Yes	9	14.3%

Themes were non-exclusive, so percentages do not sum to 100%. These counts reflect the themes coded in the feedback workbook and the issues parents chose to mention. They are not prevalence estimates, standardized measures or proof that a specified proportion of children improved. Parent responses were not reliably linked to individual participant IDs and are therefore reported separately from the 40 paired records.

4.6 Summary of Results

Overall, the quantitative records show higher post-programme means for attention and working memory and a lower recorded screen-time estimate. Trainer notes and parent comments describe perceived changes in selected everyday skills. Behaviour-rating interpretation remains pending. These converging descriptive sources are encouraging, but they do not replace a controlled design or validated outcome measurement.

5. Discussion

This exploratory evaluation identified statistically significant within-participant differences between pre- and post-programme records for attention, working memory, behaviour-rating scores and screen-time estimates. Mean attention and working-memory scores were higher after the programme period, while the recorded screen-time estimate was lower. These patterns are encouraging and provide a basis for further evaluation of the Whole Brain Development Programme. The behaviour-rating score also increased, but its direction must be verified before any conclusion about positive behavioural change is made.

The programme used weekend sessions of approximately three hours and combined group activities with individualized, time-bound tasks. The reported activities included energizers, Brain Gym exercises, hand–eye coordination tasks, reading or writing practice, Alpha Meditation, ESP-labelled simulation activities, Third Eye/Midbrain-labelled tasks and group craft. Individualized assessment-oriented tasks were assigned according to participant needs and performance. The present data do not

allow the contribution of any one activity to be separated from the overall programme context.

Attention and working memory are relevant to learning and everyday task completion (Baddeley, 2012; Diamond, 2013). Nonetheless, the literature cautions against assuming that practice on one set of activities necessarily transfers to broad cognitive or functional improvement (Melby-Lervåg et al., 2016; Simons et al., 2016). The current study reports the measured scale differences and does not claim generalized enhancement or a specific neurobiological mechanism.

Parent feedback adds an important family perspective. Parents most often mentioned behaviour, independence and emotional regulation, followed by social/communication and academic/study-related themes. These themes may help identify outcomes that families value and inform future outcome selection. Because the feedback is subjective and not participant-linked, it cannot confirm the quantitative changes or show how many of the 40 children improved in each domain.

The screen-time reduction may be relevant to family routines, but measurement metadata are incomplete. Changes could reflect altered access, parental rules, school schedules or reporting differences. Future research should define screen time precisely and, where feasible, combine parent logs with device-based records.

The ESP and Third Eye/Midbrain terms are included as programme labels only. This evaluation did not test extrasensory perception, paranormal abilities or a distinct midbrain-training mechanism. No such claims should be inferred from the observed scale changes.

5.1 Implications

The findings support strengthening routine monitoring: use the same age-appropriate measures at defined time points, maintain participant-coded records, document attendance and task progression, and collect dated observations separately from parent reports. A transparent evaluation system will make future conclusions more credible and useful to families, educators and researchers.

6. Limitations and Future Directions

6.1 Limitations

- The one-group pre–post design had no control group and cannot establish causality.
- Changes may reflect maturation, history, repeated testing, regression to the mean, school learning, concurrent therapies, family routines, sleep or other influences.
- The psychometric properties and complete scoring procedures of the three rating scales were not available in the workbook.
- The researcher confirmed that higher BRS total scores indicate better behaviour. The observed increase is described as a favourable change in the study-specific rating format; it is not interpreted as a clinically validated behavioural improvement.
- Screen-time records did not consistently define device coverage, reporting days, weekday/weekend differences or reporting source.
- Trainer notes were informal, recorded by a programme-associated trainer and not independently rated.
- The separate Observation Schedule contained incomplete or misaligned fields and was not treated as a quantitative dataset.
- Parent feedback was not linked reliably to the participant IDs and represents caregiver perceptions.
- Participant attendance, session dose, activity sequence and implementation fidelity were not fully documented.
- Diagnostic categories and severity levels were not sufficiently documented to establish outcomes for mild autism, ADHD, dyslexia or other conditions separately.

6.2 Future Research Recommendations

A future study should prospectively define the population, recruitment method, inclusion and exclusion criteria, diagnoses and support needs. Where diagnosis-specific conclusions are planned, diagnoses should be confirmed through appropriate records and subgroup sample sizes should be reported. Use age-appropriate validated measures with documented scoring direction and psychometric properties. Assessors should be independent of programme delivery where feasible.

A session log should record dates, duration, attendance, activities delivered, individual task targets, adaptations, and the child's response. A structured observation framework should specify observable behaviours and rating anchors. Parent feedback forms should distinguish direct observation from interpretation and should use coded participant IDs only where consent and privacy safeguards allow. Screen-time logs should specify all devices, reporting days and whether values are parent-estimated or device-derived.

Where feasible, a comparison group, randomized allocation or a carefully matched comparison design should be used. A follow-up assessment would help determine whether changes are maintained. Pre-registration and transparent reporting of all outcomes, including null or adverse findings, would strengthen confidence in the evidence.

6.3 Interpretation for practice

The current results may be described as promising preliminary findings among the children represented in the records. They may encourage continued programme evaluation and improvement. They should not be presented as a 100% success rate, proof of treatment efficacy, or evidence that all children with mild conditions will improve. Individual progress varies, and each child’s educational, developmental and clinical needs should continue to guide support.

7. Conclusion

In this one-group pre–post evaluation of 40 children with paired records, mean attention and working-memory scores

were higher at post-programme measurement, and recorded daily screen-time estimates were lower. Behaviour-rating scores also increased numerically, but the scoring direction must be confirmed before the result can be interpreted. Trainer notes and separate parent feedback described perceived or observed changes in task engagement, following instructions, communication, independence and other everyday skills.

The findings are encouraging and suggest that the Whole Brain Development Programme merits more rigorous evaluation. The results do not establish that the programme caused the observed changes, do not prove 100% effectiveness, and cannot be generalized to every child or diagnostic group. The strongest conclusion supported by the present records is that positive pre–post patterns were observed in selected measures during programme participation, with further controlled research needed.

Declarations

Ethics and institutional permission: The researcher reports obtaining parent/guardian consent and receiving university instructions permitting research analysis and report preparation after topic/synopsis and final-project approval. These academic approvals are not described as formal ethics committee approval. The approving ethics committee and reference number were not supplied; the author should follow the university's written ethics requirements and state the status accurately.

Consent: Parent/guardian consent was reported as obtained. State whether child assent was obtained, where developmentally appropriate, and describe the consent procedure accurately.

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Conflict of Interest

The author is associated with Canaan Cognitive Fitness Hub, the centre at which the programme was delivered. This relationship should be disclosed as a potential competing interest. The author should also clarify her role in programme delivery, participant assessment and data analysis.

Author contributions

Dr. (Hon.) Theresa S was responsible for conceptualization, programme implementation/coordination, data curation, analysis and manuscript preparation, subject to confirmation that this accurately reflects her contribution.

Data availability: De-identified data may be made available subject to ethics approval, consent conditions and institutional policy.

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