The interpersonal whole-brain model of care®: A pilot study comparing outcomes between established and first-year affiliate sites

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(Corresponding Author)

Amy O'Dell[1]
Holly A. Haynes[1,2,3]
Julian Gonzalez[1,2]
Phillip L. Haynes[4,5]
Bagie George[6]
Blanca Meyer[3]
Allegra Saunders[1]
Jayden Gaynor[7]

[1]*The Jacob's Ladder Group, USA.*
1Email: amyo@thejacobsladdergroup.org
[1,2,3]*Email: hollyh@thejacobsladdergroup.org*
[1,2]*Email: juliang@thejacobsladdergroup.org*
[1]*Email: allegrao@thejacobsladdergoup.org*
[2]*Pillar Research Institute, USA.*
[3]*Fresno Pacific University, USA.*
[3]*Email: blanca.meyer@fresno.edu*
[4]*Crimson Foundation, USA.*
[4,5]*Email: phillip_haynes@hotmail.com*
[5]*Georgian Court University, USA.*
[6]*Georgia Gwinnett College, USA.*
Email: bgeorge@ggc.edu
[7]*Juniata College, USA.*
Email: jaydengaynor05@gmail.com

ABSTRACT

This study examines whether the Interpersonal Whole-Brain Model of Care® (IWBMC™) produces consistent outcomes across implementation sites of differing maturity, comparing an established site with newer affiliates. Developed over 30 years at the Jacob's Ladder School, the IWBMC is a comprehensive approach to neurodevelopmental intervention that integrates seven interconnected elements grounded in interpersonal neurobiology. We conducted a retrospective pilot study of 16 participants (Ages 3.5-14.9) who received at least 6 months of programming, analyzing pre-post change with paired-samples t-tests(Cohen's d, 95% confidence intervals) and between-site differences with independent-samples t-tests on change scores. Significant improvements emerged across multiple neurodevelopmental, cognitive, and academic domains, including auditory, visual, and manual function; language; mobility; sequential processing; and word reading, with medium-to-large effect sizes; primitive reflex integration showed the largest gain. No between-site difference reached significance, consistent with model transfer; however, the study was underpowered ($n = 8$ per site), and several point estimates favored the established site, so equivalence cannot be concluded. Because of the small sample, these findings are preliminary and cannot support causal or psychometric conclusions. Nonetheless, they suggest that the IWBMC may be scalable across settings, and they provide a foundation for larger prospective validation studies to establish its psychometric properties and confirm its transferability across diverse implementation contexts.

Keywords: *Model transferability, Multi-site outcomes, Neurodevelopmental intervention, Reflex integration, Whole-brain approach.*

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Highlights of this paper

- A retrospective pilot study (N = 16) found significant improvements across multiple domains following a whole-brain intervention.
- Primitive reflex integration showed the largest gain; all 16 participants improved.
- No site differences reached significance, though the pilot was underpowered.

1. INTRODUCTION

1.1. The Challenge of Neurodiversity and the Need for Integrated Approaches

The past two decades have seen a dramatic rise in diagnoses of neurodevelopmental disorders. Current CDC data indicate that 1 in 31 children is diagnosed with autism spectrum disorder (ASD) Shaw et al. (2025) while attention deficit hyperactivity disorder (ADHD) and related conditions have shown similar upward trends (Abdelnour, Jansen, & Gold, 2022; Yang et al., 2023). These complex conditions present with diverse symptom profiles that vary significantly in nature and severity among individuals, challenging practitioners to develop interventions that are both evidence-based and individually responsive (Goldberg, 2023).

While considerable research has focused on identifying etiological factors and improving early diagnostic accuracy, the intervention literature has predominantly emphasized behavioral mechanisms of change (Ostrowski, Religioni, Gellert, Sytnik-Czetwertyński, & Pinkas, 2024; Yang, 2024). Recently, however, calls have emerged within the neurodiversity community for more person-centered, relational interventions (Chapman & Botha, 2023; Den Houting, 2019). Scholars champion this movement in critical neurodiversity studies, positive psychology, and trauma-informed care—fields that converge in recognizing that many individuals with neurodevelopmental differences are more vulnerable to trauma, face intersectional diagnostic challenges (e.g., girls misdiagnosed with anxiety rather than autism or ADHD), and require approaches that honor rather than pathologize neurological differences (Botha, Dibb, & Frost, 2022; Cook, Crane, Hull, Bourne, & Mandy, 2022; Rosqvist, Chown, & Stenning, 2020).

Despite growing recognition of these needs, few intervention approaches have successfully integrated the therapeutic alliance with neuroscience-guided strategies (Rilveria, 2022). Milton (2012) identified a critical barrier, which he termed the "double empathy problem"—the mutual difficulty in understanding between autistic and non-autistic individuals, historically framed as a deficit solely within autistic persons. This framing has perpetuated medical model interventions in which clinicians seek to "cure" or eliminate behaviors rather than understand differences within a social model of disability that recognizes environmental and relational barriers as primary intervention targets (Milton, Gurbuz, & López, 2022). While some newer interventions have begun to incorporate therapeutic alliance principles, they often maintain a behavioral-change focus rooted in deficit-based frameworks rather than honoring individual strengths and co-constructing meaningful goals (Pellicano & den Houting, 2022). This gap highlights the need for comprehensive neurodevelopmental interventions that integrate principles of interpersonal neurobiology with person-centered, strengths-based practices—approaches that view neurological differences not as deficits to eliminate but as variations requiring understanding, support, and environmental accommodations.

1.2. From Single-Strategy Approaches to Comprehensive Integration

Responding to these calls for a paradigm shift requires moving beyond isolated intervention strategies toward comprehensive models that integrate neuroscience-guided practices with person-centered, relational approaches. Evidence increasingly shows that multimodal interventions combining multiple evidence-based practices yield better outcomes than single-strategy approaches (Hume et al., 2021; Siegel & Drulis, 2023). However, the field faces a critical implementation gap. While individual evidence-based practices abound, few comprehensive programs successfully integrate these components while maintaining fidelity to both neurodivergent perspectives and neuroscience principles (Chapman & Botha, 2023).

Hume et al. (2021) explicitly articulate this challenge, calling for practitioners to "establish programs with strong program quality as a foundation, develop individualized and clearly articulated goals for children/youth, select and implement practices that may have different theoretical bases but also have demonstrated efficacy" (p. 4029). This directive highlights the tension between component-level evidence and program-level integration. This gap is particularly critical for interventions serving neurodivergent populations who require both individualization and comprehensive support across multiple developmental domains.

Moreover, effective integration requires more than simply combining techniques. Co-creating interventions with neurodivergent individuals and their families has shown particular promise (Schwartzman, Roth, Paterson, Jacobs, & Williams, 2024) suggesting that comprehensive models must embed collaborative goal-setting and strength-based frameworks as foundational principles rather than supplementary features. The challenge, therefore, is to develop intervention systems that simultaneously: (a) integrate multiple evidence-based practices across developmental domains, (b) honor neurodivergent perspectives and individual differences, (c) ground strategies in interpersonal neurobiology and neuroplasticity principles, and (d) demonstrate transferability across implementation contexts while maintaining these core commitments.

1.3. Limitations of Dominant Intervention Frameworks

Despite growing recognition of neurodiversity as a complex, contextually embedded phenomenon, dominant intervention frameworks for neurodevelopmental conditions remain largely rooted in behaviorist and medicalized paradigms. Much of the evidence base continues to emphasize discrete skill acquisition, symptom reduction, and behavioral modification as primary mechanisms of change, often operationalized through highly structured, protocol-driven approaches (Schuck et al., 2022). While such frameworks have demonstrated effectiveness for targeting specific behaviors or academic skills, they frequently prioritize externally observable outcomes while giving limited attention to internal developmental processes, relational contexts, and individual meaning-making (McConkey, 2023). As a result, intervention success is often defined narrowly, with limited consideration of broader developmental well-being (Cherewick & Matergia, 2024; Wagland, Sterman, Scott-Cole, Spassiani, & Njelesani, 2025).

Neurodiversity scholars have noted that these dominant frameworks tend to fragment care across domains, separating cognitive, behavioral, emotional, and physiological targets into discrete intervention silos. Reviews of autism and neurodevelopmental intervention research indicate that children and adolescents often receive multiple uncoordinated services, each grounded in distinct theoretical assumptions and outcome metrics, resulting in uneven or unsustainable developmental gains (McConkey, 2023). This fragmentation can obscure how changes in one domain influence functioning in others and may limit skill generalization across contexts.

In response to these limitations, a growing literature has called for intervention approaches that move beyond single-strategy models toward more integrative and person-centered frameworks (Fung, Ulrich, Fujimoto, & Taheri, 2022). Strengths-based and neurodiversity-affirming perspectives argue that effective intervention must address the whole person, including emotional regulation, relational safety, motivation, and contextual supports, rather than focusing solely on isolated behaviors or skills (Cherewick & Matergia, 2024). Despite increasing consensus on the need for integration, however, relatively few intervention models have operationalized these principles in a systematic and scalable way, leaving a persistent gap between conceptual advances and applied practice (McConkey, 2023; Wagland et al., 2025).

1.4. Contextual, Relational, and Environmental Influences on Neurodivergent Development

Growing interdisciplinary literature indicates that contextual, relational, and environmental factors strongly shape neurodivergent development across the lifespan. Rather than emerging solely from individual characteristics, developmental outcomes reflect ongoing interactions between neurodivergent individuals and the social, educational, and care environments in which they are embedded (Dwyer, 2022; Wagland et al., 2025). Experiences such as relational misalignment, social exclusion, limited opportunities for autonomy, and inconsistent or poorly coordinated supports can influence engagement, learning, and adaptive functioning over time (Dwyer, 2022; Wagland et al., 2025). This body of work underscores the need to move beyond individual-level explanations to consider how environments facilitate or constrain developmental capacity.

From this perspective, challenges in regulation, engagement, or learning are increasingly understood as context-sensitive responses rather than fixed individual limitations. Research across neurodevelopmental and educational contexts suggests that when environments lack consistency, relational support, and responsiveness to individual needs, neurodivergent individuals may have fewer opportunities to develop persistence, self-direction, and adaptive engagement (Cherewick & Matergia, 2024; Schuck et al., 2022; Wagland et al., 2025). Conversely, environments that emphasize relational support, coordinated care, and meaningful participation are associated with more promising developmental trajectories and more robust indicators of well-being (Cherewick & Matergia, 2024; Dwyer, 2022).

Recent scholarship has therefore emphasized the need for developmentally informed, relationally responsive approaches to supporting neurodivergent individuals (McConkey, 2023). Rather than focusing exclusively on discrete skill acquisition, this work underscores the role of environmental fit, relational context, and coordinated supports in shaping developmental outcomes and long-term functioning (Cherewick & Matergia, 2024; Dwyer, 2022). Collectively, these findings suggest that understanding neurodivergent outcomes requires sustained attention to the broader contexts in which development unfolds, with important implications for how interventions are conceptualized and evaluated.

1.5. Motivation, Agency, and Developmental Capacity

Building on relational and contextual accounts of neurodivergent development, emerging research highlights motivation and agency as central capacities that shape how individuals engage with learning and daily life—motivation and agency are increasingly conceptualized as context-sensitive developmental processes shaped by environmental affordances, relational support, and opportunities for autonomy, rather than as fixed individual traits (Valori, Carnevali, Mantovani, & Farroni, 2022). When environments support autonomy, neurodivergent individuals are more likely to initiate, sustain, and direct goal-oriented behavior over time (Cherewick & Matergia, 2024).

Empirical, theoretical, and qualitative work further highlights the relational foundations of motivation and agency—studies of motivational processes in neurodivergent populations indicate that differences in persistence or engagement often reflect how goals are framed and supported rather than reduced motivational capacity (Valori et al., 2022). Qualitative accounts likewise emphasize that motivation frequently arises in contexts characterized by autonomy, validation, and relational support, while apparent disengagement may reflect a lack of environmental fit or meaningful opportunity rather than genuine disinterest (Black et al., 2025; Hallinan & McMahon, 2024). Despite their relevance to developmental functioning, reviews of strengths-based and neurodiversity-affirming frameworks note that motivation, vitality, and goal orientation remain underrepresented in outcome measurement (Pincus & Beller, 2025).

1.6. Vitality, Meaning, and Well-being as Developmental Outcomes

In parallel with growing attention to trauma, motivation, and agency, the developmental literature has increasingly emphasized vitality, meaning, and subjective well-being as core indicators of adaptive functioning (Cherewick & Matergia, 2024; Pincus & Beller, 2025). Rather than peripheral or secondary outcomes, these internal states are central to sustained engagement, resilience, and long-term developmental trajectories. Research across neurodiversity-affirming and strengths-based frameworks suggests that experiences of perceived meaning and subjective vitality are closely linked to how individuals navigate challenges, set goals, and maintain participation in daily life (Cherewick & Matergia, 2024; Pincus & Beller, 2025). Relational and contextual factors also shape these dimensions, including the extent to which environments support autonomy, belonging, and self-expression.

Despite their relevance, vitality, and well-being, these dimensions remain underrepresented in intervention research and outcome evaluation for neurodivergent populations (Cherewick & Matergia, 2024; Dwyer, 2022; Wagland et al., 2025). Reviews of contemporary intervention literature indicate that outcome measurement continues to privilege observable behavior and skill acquisition, with limited incorporation of subjective or internally experienced dimensions of development (Dwyer, 2022; Wagland et al., 2025). This omission constrains the field's ability to capture meaningful change, particularly in trauma-informed and integrative care contexts where shifts in well-being, motivation, and sense of purpose may precede or underlie observable behavioral outcomes. Together, this body of work highlights the need for evaluative frameworks that more fully account for internal developmental states alongside external functioning when assessing intervention quality and impact.

1.7. Neurodivergence, Development, and Outcome Gaps

Over the years, neurodevelopmental research has increasingly recognized neurodivergence as a complex, heterogeneous, and developmentally embedded phenomenon rather than a unitary diagnostic category (Ne'eman & Pellicano, 2022). Contemporary neurodiversity scholarship emphasizes that neurological differences represent natural variations in human cognition and functioning, shaped by dynamic interactions between biological predispositions and environmental contexts (Dwyer, 2022). This perspective challenges traditional deficit-oriented models that conceptualize neurodevelopmental conditions primarily in terms of impairment and dysfunction, instead foregrounding variability, adaptation, and contextual fit. Despite this conceptual shift, much of the empirical intervention literature continues to rely on narrow outcome frameworks that prioritize symptom reduction, behavioral compliance, or discrete academic gains as primary indicators of success (Schuck et al., 2022).

A growing body of work has highlighted the limitations of these outcome definitions, particularly for neurodivergent individuals whose developmental trajectories often diverge from normative benchmarks in nonlinear ways (Ne'eman, 2021). Neurodiversity-affirming scholars have argued that conventional metrics often fail to capture meaningful changes in well-being, engagement, relational functioning, and internal developmental capacities that may be equally—if not more—relevant to long-term outcomes (Dwyer, 2022; Wagland et al., 2025). Moreover, standardized outcome measures are often insufficiently sensitive to the lived experiences of neurodivergent individuals, privileging externally observable behaviors over subjective states such as motivation, vitality, and sense of agency (Cherewick & Matergia, 2024). As a result, interventions may be deemed ineffective despite producing meaningful developmental shifts that fall outside traditional evaluative lenses.

These limitations are particularly salient given emerging evidence that contextual and relational factors strongly influence neurodivergent outcomes across development. Qualitative and mixed-methods research increasingly shows that neurodivergent individuals define success in terms of belonging, autonomy, purpose, and personal growth rather than solely in terms of behavioral normalization or academic performance (Black et al., 2025; Cherewick & Matergia, 2024). At the same time, reviews of autism and neurodevelopmental intervention research suggest that outcome heterogeneity remains poorly theorized, with limited integration among developmental theory, lived experience, and measurement practices (Schuck et al., 2022; Wagland et al., 2025). Together, these findings underscore a critical gap in the literature: the need for outcome frameworks that more fully reflect the multidimensional and relational nature of neurodivergent development.

2. THE INTERPERSONAL WHOLE-BRAIN MODEL OF CARE®

The Interpersonal Whole-Brain Model of Care® (IWBMC™) offers a comprehensive response to this integration challenge (O'Dell, Saunders, York, Haynes, & Gonzalez, 2025). Amy O'Dell developed the model over 30 years ago, integrating multiple theoretical frameworks and intervention approaches into a cohesive whole-person system. Much of the evidence base continues to emphasize discrete skill acquisition, symptom reduction, and behavior modification as primary mechanisms of change, often operationalized through highly structured, protocol-driven approaches (Schuck et al., 2022). While such frameworks have demonstrated effectiveness for targeting specific behaviors or academic skills, they frequently prioritize externally observable outcomes while giving limited attention to internal developmental processes, relational contexts, and individual meaning-making. The IWBMC enables individualized measurement and the development of intervention plans that address both strengths and challenges.

The IWBMC is grounded in interpersonal neurobiology, recognizing that humans are fundamentally designed for connection and that this neurological predisposition shapes developmental trajectories (Siegel, 2022; Siegel, Schore, & Cozolino, 2021). The model embraces neuroplasticity as its central operating principle—acknowledging that if brains can change through development and trauma, therapeutic approaches must mirror this adaptability (Siegel & Drulis, 2023). The seven interconnected elements of the IWBMC reflect this comprehensive approach. They include:

1. Spirit & Will: Recognition of each client as "a soul ready to be cared for" rather than simply a diagnosis, emphasizing intrinsic motivation and dignity.
2. Neurodevelopmental Methodology: Comprehensive multi-metric assessment across neurodevelopmental channels, creating individualized "neurological fingerprints."

3. Learning Style: Integration of multiple intelligence theory (Gardner, 2011) dominance factors (Hannaford, 2013), and socio-cultural learning principles (Bronfenbrenner, 1979; Vygotsky, 1978).
4. Emotional-Relational-Behavioral Assessments: Application of positive psychology (Duckworth, Peterson, Matthews, & Kelly, 2007; Seligman, 1972) and developmental frameworks.
5. Physiological Factors: Attention to the gut-brain axis, including but not limited to an exploration of medication, nutrition, and physical health as neurological foundations.
6. Social Structure: Creation of therapeutic ecosystems supporting both client and provider development.
7. Whole Person Integration: Synthesis across all domains, emphasizing interconnectedness.

2.1. The Union of Science and Love

A distinctive feature of the IWBMC is its intentional integration of rigorous scientific assessment with what O'Dell et al. (2025) call "the union of science and love" (2025). This framework recognizes that effective intervention requires both empirical precision and deep relational connection. This integration acknowledges that connection itself is physiological—our systems are primed to seek and benefit from meaningful bonds, and developmental progress requires these relational foundations (Siegel, 2022).

2.2. Implementation Science Question

Although the IWBMC has been refined over 30 years at its originating site, a critical question remains: Does this comprehensive model produce consistent outcomes when implemented across diverse organizational contexts? Implementation science research shows that evidence-based programs often fail to replicate when transported to new settings due to differences in organizational culture, resource availability, staff expertise, and other contextual factors. This study addresses the fundamental implementation question: Are IWBMC outcomes site-specific, dependent on the accumulated expertise and culture of the original 30-year-old program, or are they transferable to newer affiliate sites with appropriate training and support? Understanding model transportability is essential for determining scalability and broader impact potential.

2.3. Study Objectives

This pilot study aims to:

1. Document neurodevelopmental changes across various outcome domains in children receiving IWBMC programming.
2. Compare outcomes between the established Jacob's Ladder School site (30 years) and the newer affiliate implementation sites.
3. Examine whether effect patterns suggest site-specific versus transferable impacts.
4. Identify assessment measures demonstrating sensitivity to intervention effects.

3. METHODS

3.1. Study Design

This retrospective cohort analysis used a practice-based evidence approach and examined real-world clinical data from participants receiving IWBMC services across multiple implementation sites. The study compared outcomes between (1) Jacob's Ladder School in Roswell, Georgia (original site, 30 years of implementation), and (2) network affiliate sites in their first year of IWBMC implementation (Jeremiah's Promise, Community of Care, and wrap-around services). The study received Institutional Review Board (IRB) approval from The Jacob's Ladder School IRB (JL00225). All participants' families provided informed consent for the use of clinical data in research.

3.2. Participants

The sample for this study consisted of 16 clients, aged 3.5 to 14.9. Clients included in this sample enrolled in IWBMC programming at Jacob's Ladder or affiliated sites and received a minimum of 9 months of intervention services. Each client participated in pre- and post-intervention metric assessments as part of their initial and re-evaluation. Evaluators documented observations about behaviors and performance on the metrics, family interaction, and individual behaviors. We completed an assessment document for each child's evaluation and re-evaluation. We excluded participants with incomplete data, fewer than 6 months of program participation, or significant changes in pharmaceutical interventions during the study period.

Sample Characteristics: The final sample included 16 participants (10 male (62.5%), 6 female (37.5%)), with a mean age of 8.1 years (*SD* = 3.2, range 3.5-14.9) (see Table 1). Primary diagnoses included Autism Spectrum Disorder (*n* = 10, 62.5%), ADHD (*n* = 3, 18.8%), Developmental delay (*n* = 2, 12.5%), and learning disability (*n* = 1, 6.3%). Twelve participants (75%) had multiple co-occurring diagnoses. Service duration ranged from 11 to 15 months (Median = 12 months). Eight participants attended the Jacob's Ladder School site; eight attended first-year affiliate sites.

Table 1. Participant demographics.

Characteristic	Overall (N = 16)
Sample size	16
Jacob's Ladder School	8 (50%)
Jacob's Ladder Affiliates	8 (50%)
Gender	
Male	11 (69%)
Female	5 (31%)
Age at evaluation (Years)	
M	8.51
SD	3.78
Range	3.47–14.92

Note: M = mean; SD = standard deviation.

3.3. The IWBMC Evaluation Assessment Protocol

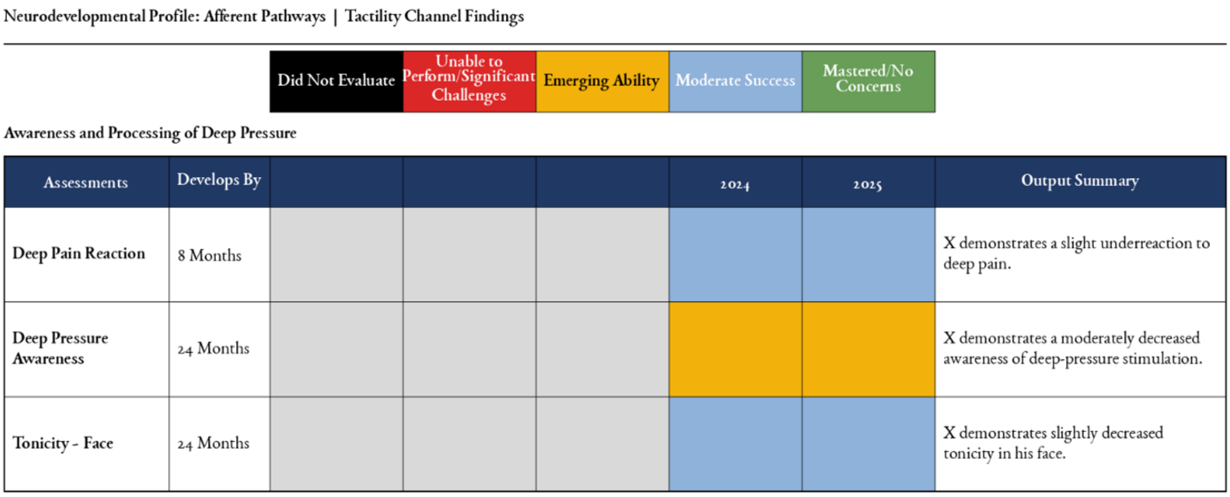
The comprehensive IWBMC assessment protocol evaluates several distinct metrics across seven neurodevelopmental domains, creating a "neurological thumbprint" unique to each client, as practitioners describe (O'Dell et al., 2025). Independent evaluators (Separate from intervention providers) conduct all assessments, reducing potential bias.

Neurodevelopmental Assessment: Six primary neurodevelopmental areas within the afferent/efferent channels are evaluated through standardized observational protocols and performance-based tasks, including, but not limited to:

1. Tactility: Sensitivity to touch, tactile discrimination, proprioception.
2. Visual: Visual acuity, tracking, convergence, figure-ground discrimination.
3. Auditory: Sound discrimination, auditory processing, sequencing.
4. Manual: Fine motor coordination, bilateral integration, manual dexterity.

5. Mobility: Gross motor coordination, balance, ambulation, spatial orientation.
6. Language: Receptive and expressive language, articulation, pragmatics.

Each area receives a composite score representing overall functioning within that domain. Metrics are coded as passed or not passed for the assessment. Higher scores indicate more advanced development. Figure 1 shows a sample of the metrics and coding for one neurodevelopmental channel (Tactility).



Neurodevelopmental Profile: Afferent Pathways | Tactility Channel Findings

Did Not Evaluate	Unable to Perform/Significant Challenges	Emerging Ability	Moderate Success	Mastered/No Concerns

Awareness and Processing of Deep Pressure

Assessments	Develops By				2024	2025	Output Summary
Deep Pain Reaction	8 Months						X demonstrates a slight underreaction to deep pain.
Deep Pressure Awareness	24 Months						X demonstrates a moderately decreased awareness of deep-pressure stimulation.
Tonicity - Face	24 Months						X demonstrates slightly decreased tonicity in his face.

Figure 1. Sample IWBMC Neurodevelopmental Assessment Profile showing pre/post data.

In addition to collecting this data, we assessed primitive reflexes (described below), interhemispheric communication, and cross-lateral abilities to complete the neurodevelopmental profile. Additionally, we gathered data on academic achievement, cognitive processing, emotional and behavioral regulation, and physiology. These assessments are detailed below.

Academic Achievement Assessment: Standardized academic skills were measured using the Wide Range Achievement Test, Fourth Edition (WRAT4). We specifically examined Word Reading (single-word reading recognition, letter, and word identification) and Math Computation (oral math and written calculation skills). WRAT4 provides standard scores (M=100, SD=15), allowing calculation of the Reliable Change Index (RCI) to determine clinically significant individual change beyond measurement error.

Cognitive Processing Assessment: We evaluated sequential processing and working memory using proprietary IWBMC protocols that assessed visual and auditory sequential memory, working memory capacity, processing speed, and attention and concentration. For processing and working memory, scores were based on the correct identification of content pieces (see Figure 2 for an example). We obtained direct scores for each participant.

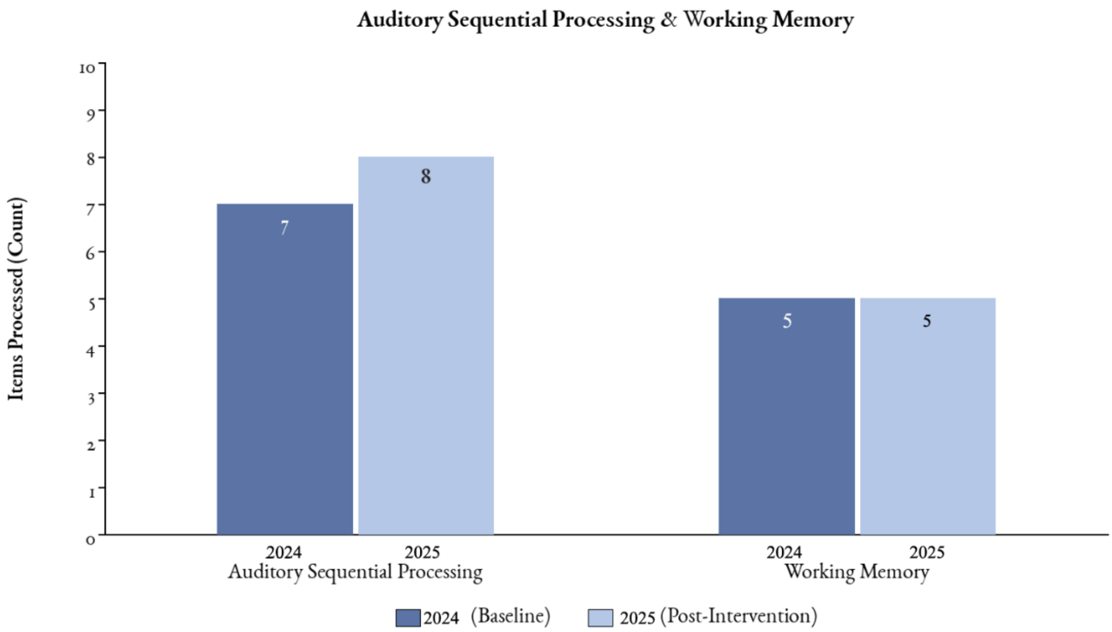


Figure 2. Sample Sequential Processing and Working Memory Assessment Showing Baseline and Post-Intervention Performance.

Primitive/Postural Early Reflex Integration Assessment: Early reflex integration is critical for motor and cognitive development. Retention of early reflexes can indicate developmental disabilities (Melillo & Leisman, 2009). Persistent early reflexes were assessed using standardized protocols to evaluate the presence or absence of the following primitive/postural reflexes, including but not limited to: rooting, sucking, Moro, Asymmetric Tonic Neck Reflex (ATNR), Symmetric Tonic Neck Reflex (STNR), Tonic Labyrinthine, Spinal Galant, and Palmer Grasp.

Behavioral and Emotional Regulation: Proprietary behavioral and emotional regulation metrics assessed emotional control, perspective taking, emotional literacy, frustration tolerance, and self-regulation skills.

Physiological Factors Assessment: Physiological measures included in the evaluation are sleep quality and duration, nutritional status, medication use, patterns, and other indicators of physical health, as noted by health experts. For this study, we tracked medications, but we did not collect data on other measures of physical health. Since only two clients had medical information, we did not include this as an analysis measure.

Independence Life Cycle Assessment: Age-appropriate independence skills were evaluated using the IWBMC Independence Life Cycle assessment, which measured daily living skills, self-care abilities, and functional independence.

3.4. Procedure: The IWBMC Intervention Approach

Intervention programming is highly individualized based on comprehensive assessment findings. Table 2 displays common interventions utilized when constructing a client's IWS–the plan of intervention developed by evaluators in conjunction with the client's family. Each client receives targeted interventions designed to address identified deficits while building on strengths. All interventions occur within the therapeutic ecosystem, emphasizing hope, truth, and love, with consistent attention to relationship quality and authentic engagement.

Table 2. Sample IWBMC Interventions by Area.

Intervention	Description
Neurodevelopmental Interventions	Tactility Interventions: • Systematic desensitization protocols for tactile defensiveness • Textured material exploration and discrimination training • Body mapping and proprioceptive awareness activities • Force modulation activities • Sensory integration protocols Visual Interventions: • Eye tracking exercises and convergence training • Visual-motor integration activities • Figure-ground discrimination tasks • Visual memory and sequencing games • Environmental modifications for visual processing support Auditory Interventions: • Auditory discrimination training • Sound sequencing and memory activities • Environmental noise management strategies • Listening therapy protocols • Vestibular Manual Skills Interventions: • Fine motor coordination exercises • Bilateral integration activities • Handwriting development programs • Tool use training • Craft and manipulation activities Mobility Interventions: • Gross motor coordination activities • Balance and vestibular stimulation • Spatial awareness training • Movement pattern development • Adaptive physical education activities Language Interventions: • Whole-word language models • Oral Mouth protocols • Pragmatic language training • Receptive language development • Augmentative communication when appropriate
Primitive Reflex Integration Interventions	Retained primitive reflexes receive targeted integration therapy using: • Rhythmic movement training • Specific reflex inhibition exercises • Vestibular stimulation activities • Cross-lateral movement patterns • Developmental positioning
Academic Interventions	Reading and mathematics instruction follow individualized educational plans incorporating: • Multisensory reading and math instruction • Phonics and whole language integration • Mathematics manipulatives and conceptual understanding • Accommodations based on neurodevelopmental profiles
Behavioral and Emotional Support	Behavioral interventions utilize positive behavior support frameworks: • Functional behavior assessment • Emotion regulation skill building • Social skills instruction • Parent coaching and environmental modifications

3.5. Statistical Analysis

Within-Group Analyses: Pre-to-post changes on each outcome measure were analyzed using paired-samples *t*-tests. Because retrospective records were incomplete for some measures, each test used all available complete pre–post pairs; consequently, the analyzed *n* varied across measures (5 to 16). Effect sizes were calculated as Cohen's *d* for paired data (d_z = mean change ÷ *SD* of the change), interpreted using standard conventions (0.20 = small, 0.50 = medium, 0.80 = large), and 95% confidence intervals were computed for the mean change on each measure.

Individual-level change was summarized using a responder analysis that classified each participant as improved, unchanged, or declined on each measure. The Reliable Change Index (RCI)—RCI = $(X_2 - X_1) / SE_{\text{diff}}$, where $SE_{\text{diff}} = \sqrt{(2 \cdot SE_{\text{measurement}}{}^2)}$ and $SE_{\text{measurement}} = SD \cdot \sqrt{(1 - \text{reliability})}$, with values ≥ 1.96 indicating change beyond measurement error at the 95% confidence level—is the intended method for standardized measures with published test–retest reliability (e.g., WRAT4). In this retrospective sample, however, WRAT4 results were available only as grade-equivalent scores rather than standard scores, so RCI could not be computed; we plan to compute it in the prospective phase, when standard scores will be collected.

Between-Site Analyses: To assess model transferability, we compared pre-to-post change scores between the established Jacob's Ladder site (n = 8) and the first-year affiliate sites (n = 8) using independent-samples *t*-tests, with Cohen's *d* (pooled *SD*) quantifying the magnitude of any site difference. Given the small sample (N = 16; n = 8 per site), the study was powered to detect only very large between-site differences ($d \geq 1.4$) at 80% power and α = .05; smaller but potentially meaningful differences could not be reliably detected. We therefore report exact *p*-values and effect sizes to aid interpretation and to avoid treating non-significance as evidence of equivalence.

Statistical Software and Inference: We conducted analyses in Microsoft Excel, jamovi, and Python (pandas for data management; scipy.stats for statistical tests), and cross-checked results across platforms. Although the study's hypotheses were directional, two-tailed tests were used throughout as the more conservative option, with α = .05. Given the exploratory nature of a pilot study, uncorrected *p*-values served as the primary basis for interpretation; to gauge robustness, we additionally examined Bonferroni and Holm–Bonferroni corrections and report these alongside the uncorrected values. Throughout, we emphasize effect sizes over *p*-values alone.

4. RESULTS

4.1. Within-Group Outcomes: Overall Sample

Table 3 presents pre-intervention and post-intervention scores for all outcome measures, along with paired t-test results and effect sizes.

Table 3. Pre-Post Intervention Outcomes for Total Sample (*N*=16).

Domain	Pre-Mean (*SD*)	Post-Mean (*SD*)	Mean Δ	*t*	*df*	*p*	Cohen's *d*	95% CI
Neurodevelopmental								
Tactility	27.4 (14.0)	29.4 (15.0)	+2.0	1.06	13	0.306	0.28	[-2.06, 6.06]
Visual	13.4 (7.47)	17.1 (8.73)	+3.7	2.52	13	0.026*	0.67	[0.52, 6.90]
Auditory	15.3 (10.5)	18.1 (9.05)	+2.9	2.86	13	0.013*	0.77	[0.71, 5.00]
Manual	22.2 (10.9)	27.0 (10.7)	+4.8	3.32	13	0.006**	0.89	[1.67, 7.90]
Mobility	20.5 (12.9)	28.9 (13.8)	+8.4	4.92	13	<0.001***	1.32	[4.73, 12.13]
Language	19.3 (17.1)	27.1 (20.8)	+7.9	4.78	13	<0.001***	1.28	[4.31, 11.41]
Academic Skills (n=8 with WRAT4 data)								
WRAT4 Reading	1.4 (1.7)	2.3 (2.0)	+0.9	3.97	7	0.007**	1.50	[0.35, 1.45]
WRAT4 Math	0.7 (1.1)	1.5 (1.7)	+0.8	3.23	7	0.018*	1.22	[0.20, 1.48]
Cognitive Processing								
Sequential Processing	63.7 (12.8)	71.4 (11.2)	+7.7	2.41	15	0.029*	0.64	[0.07, 1.19]
Working Memory	61.9 (13.4)	68.8 (12.6)	+6.9	1.89	15	0.078	0.53	[-0.01, 1.07]
Primitive Reflexes								
Total Retained	4.4 (2.8)	8.7 (3.6)	+4.3	8.14	15	<0.001***	2.03	[3.18, 5.44]
Behavioral Regulation								
Emotional Control	8.67 (3.61)	8.89 (5.21)	+10.8	0.22	9	.896	0.13	[-3.58, 4.02]

Note: Cohen's d = mean change ÷ SD of the change (d_2). ΔM = mean change. Positive ΔM indicates improvement on every measure, including primitive reflex integration (higher scores = greater integration). *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. Cohen's *d* interpretations: 0.20-0.49 (small), 0.50-0.79 (medium), ≥0.80 (large). Sub-sample n values below 16 reflect measures not administered to, or not completed by, some participants.

4.2. Neurodevelopmental Channels

Significant improvements emerged in the Auditory ($d = 0.77$, $p = 0.013$), Visual ($d = 0.67$, $p = 0.026$), Manual ($d = 0.89$, $p = 0.006$), Language ($d = 1.28$, $p < 0.001$), and Mobility ($d = 1.32$, $p = < 0.001$) channels. Tactility did not change significantly (d = 0.28, p = 0.306). Language and mobility showed the largest channel-level gains, with mean increases of 7.86 and 8.43 points, respectively.

4.3. Academic Achievement

Among the seven participants with complete WRAT4 data, word reading improved significantly (d = 1.50, p = 0.007), rising from a grade-equivalent of approximately 1.4 to 2.3, and math computation also improved significantly (d = 1.22, p = 0.018), from approximately 0.7 to 1.5. All seven participants improved on word reading, and six of seven improved on math computation. Because the available WRAT4 data were grade-equivalent scores rather than standard scores, we did not compute the Reliable Change Index, which requires standardized scores with published test–retest reliability; we plan RCI analysis for the prospective phase, when we will collect standard scores.

4.4. Cognitive Processing

Sequential auditory processing (d = 0.80, p = 0.008) and sequential visual processing (d = 0.82, p = 0.007) both improved significantly. The two working-memory subtests showed medium-to-large effect sizes (Sequential auditory working memory d = 0.72; sequential visual working memory d = 0.88) but did not reach significance, most likely reflecting the very small subsamples available for these measures (n = 5 each).

4.5. Primitive Reflex Integration

Primitive reflex integration produced the largest effect in the study (d = 2.03, p < 0.001). Integration scores increased from a mean of 4.38 at pre-intervention to 8.69 at post-intervention, where higher scores indicate greater integration. All 16 participants showed measurable improvement; 10 (62.5%) gained four or more integration points, and the median gain was 4.5 points. Because reflex integration was one component of a comprehensive, multimodal intervention, these gains should be interpreted as an outcome of the overall program rather than as a demonstrated cause of improvement in other domains; the present design cannot isolate the contribution of any single component.

4.6. Behavioral Regulation

Behavioral regulation did not change significantly over the intervention period (mean change = 0.22 points; d = 0.04; p = 0.896). Of the nine participants with complete pre- and post-intervention data, four improved, three were unchanged, and two declined. The lack of a measurable group-level effect in this domain contrasts with the neurodevelopmental gains and warrants attention in future work, including measurement sensitivity and the timeframe over which behavioral change is assessed.

4.7. Between-Site Comparisons: Model Transferability

Table 4 compares change scores at the established Jacob's Ladder site with those at the first-year affiliate sites. No between-site comparison reached statistical significance; sequential visual processing was borderline (p = 0.050), and all other comparisons fell above the .05 threshold. However, several point estimates were medium-to-large in magnitude and favored the established site—mobility (d = 0.79), tactility (d = 0.78), manual (d = 0.71), primitive reflex integration (d = 0.96), and sequential visual processing (d = 1.12), whereas WRAT4 word reading favored the affiliate sites (d = −1.04, based on only four and three participants, respectively).

Table 4. Between-site outcome comparisons.

Domain	Jacob's Ladder *n*	Jacob's Ladder Mean Δ	Affiliate Sites *n*	Affiliate Sites Mean Δ	*t*	*df*	*p*	Cohen's *d*	Sig.
Tactility	8	4.3	6	-1.0	1.44	12	0.176	0.16	ns
Visual	8	2.6	6	3.2	-0.26	12	0.799	0.21	ns
Auditory	8	3.1	6	4.5	-0.45	12	0.663	0.30	ns
Manual	8	6.4	6	2.7	1.31	12	0.216	0.23	ns
Mobility	8	10.5	6	5.7	1.46	12	0.171	0.25	ns
Language	8	8.0	6	7.7	0.10	12	0.925	0.26	ns
WRAT4 Reading	4	0.7	3	1.2	-1.36	5	0.232	0.19	ns
WRAT4 Math	3	1.0	4	0.7	0.60	5	0.576	0.18	ns
SeqAuditory Processing	7	1.29	8	0.8	0.82	13	0.429	0.25	ns
SeqVisual Procesing	7	1.43	8	2.2	2.16	13	0.050	0.21	ns
Primitive Reflexes	8	5.25	8	3.4	1.92	14	0.075	-0.11	ns
Behavioral Regulation	6	-0.2	3	1.0	-0.31	7	0.762	0.22	ns

Note: Independent-samples *t*-tests on pre–post change scores. JL = Jacob's Ladder (Roswell; established site). Aff. = first-year affiliate sites (Community of Care, JLBH, Jeremiah's Promise, Wrap-Around). Positive ΔM favors the site with the larger mean gain. The study was powered to detect only very large between-site differences ($d \geq 1.4$) at n = 8 per site; ns = not significant.

4.8. Key Transferability Findings

No outcome measure showed a statistically significant difference between the established site and the first-year affiliates, a pattern consistent with successful transfer of the model. This finding requires cautious interpretation. With only eight participants per site, the study was underpowered, and several effect sizes were medium-to-large in the direction favoring the established program. The data therefore do not establish site equivalence; rather, they indicate that affiliate outcomes were broadly comparable and that no between-site difference was large enough to be detected at this sample size. Adequately powered comparisons are needed to test transferability directly and to determine whether the observed point-estimate advantages for the established site are reliable.

4.9. Secondary Analyses

Multiple comparisons: Because we tested 14 measures, we examined how the within-group results held under correction. After Bonferroni and Holm–Bonferroni adjustment, language, mobility, and primitive reflex integration remained significant; the remaining domains did not survive correction. Consistent with the exploratory aims of a pilot study, we report uncorrected *p*-values in Table 3 and emphasize effect sizes alongside them.

Age effects: Change scores were not significantly associated with age at evaluation for any measure. Correlations were generally weak-to-moderate and negative (e.g., manual $r = -0.45$, $p = 0.107$; tactility $r = -0.41$, $p = 0.143$), suggesting a nonsignificant tendency for younger participants to show somewhat larger gains.

Responder analysis: Most participants improved on most domains: Mobility (92.9%), language (85.7%), and manual (78.6%), with 100% improving on both primitive reflex integration and WRAT4 word reading. Behavioral regulation was mixed, with 44.4% improving.

Diagnostic subgroups: Given the small and diagnostically heterogeneous sample (Autism spectrum disorder, $n = 10$; other diagnoses, $n = 6$), we did not conduct formal subgroup analyses by diagnostic category.

5. DISCUSSION

5.1. Principal Findings

This pilot study provides preliminary evidence relevant to the transferability of the Interpersonal Whole-Brain Model of Care® (IWBMC™) across implementation sites with markedly different levels of organizational maturity. Three findings stand out. First, substantial within-group improvements emerged across multiple neurodevelopmental, cognitive, and academic domains, with effect sizes for the significant measures ranging from medium (Visual, $d = 0.67$; auditory, $d = 0.77$) through large (e.g., manual, $d = 0.89$; language, $d = 1.28$; mobility, $d = 1.32$; WRAT4 word reading, $d = 1.50$) to very large (primitive reflex integration, $d = 2.03$); behavioral regulation, by contrast, did not change significantly ($d = 0.04$). Second, no outcome measure differed significantly between the established site and the first-year affiliates. This pattern is consistent with successful model transfer, but the study was underpowered—with only eight participants per site, it could detect only very large differences ($d \geq 1.4$)—and several between-site point estimates were medium-to-large in the direction favoring the established program. The data therefore indicate broadly comparable affiliate outcomes rather than demonstrated site equivalence. Third, primitive reflex integration was the most robust outcome ($d = 2.03$): all 16 participants improved, and 10 (62.5%) gained four or more integration points. Taken together, these preliminary data are consistent with the potential value of comprehensive, multimodal intervention. Although the sample is small, the pattern of gains resonates with literature advocating innovative approaches that do not focus solely on behavioral improvement or compliance-based outcomes (Ne'eman, 2021; Wagland et al., 2025).

5.2. Interpretation: Model Transferability

The absence of significant site differences, despite comparing a 30-year-old program with first-year implementations, suggests that core IWBMC components may matter more than organizational maturity when adequate training and protocol structures are in place. This finding aligns with implementation science frameworks that emphasize the role of well-defined protocols, comprehensive training, and ongoing support in facilitating successful program transport (Fixsen, Blase, Duda, Naoom, & Van Dyke, 2010). Several factors may contribute to apparent transferability. First, the IWBMC's detailed assessment and structured intervention protocols provide clear implementation guidance and reduce reliance on tacit organizational knowledge. Second, affiliate sites received extensive onboarding, including assessment training, intervention technique workshops, and ongoing consultation from Jacob's Ladder staff. Third, separating assessment from intervention delivery appears to standardize evaluation procedures across sites and may reduce site-specific assessment drift. Fourth, the emphasis on primitive reflex integration, neurodevelopmental channel development, and relationship-based intervention may represent transferable "active ingredients" less dependent on site-specific factors. Fifth, the hope-truth-love framework and emphasis on authentic relationships may transcend specific organizational histories when intentionally cultivated. However, these preliminary findings require cautious interpretation given study limitations (discussed below). Replication with larger samples, controlled designs, and fidelity measurement is essential.

5.3. Primitive Reflex Integration as a Mechanism

Primitive reflex integration emerged as the intervention component with the most significant effects (d=2.20). This finding aligns with growing recognition that retained primitive reflexes interfere with neurodevelopmental progression by creating persistent motor patterns that conflict with higher-level motor control and postural stability (Melillo & Leisman, 2009). The IWBMC's systematic approach to reflex assessment and targeted integration exercises may represent a particularly robust intervention mechanism. Nearly all participants (14 of 16) integrated at least 4 reflexes, suggesting that the protocol was effective across varied individual presentations. Reflex integration may improve other domains by removing neurological "noise" that interferes with learning and development. For example, persistent tonic neck reflexes can interfere with visual tracking and midline crossing, potentially impeding reading development (Martello, 2023). Integrating these reflexes may create conditions for subsequent gains in visual processing and academic skills.

5.4. Clinical and Implementation Implications

These preliminary findings, if confirmed in larger samples, suggest several practical implications. In clinical practice, we may find that a multimodal intervention addressing neurodevelopmental foundations, academics, and behavior yields better outcomes than domain-specific approaches. From a program implementation perspective, the IWBMC protocol may be successfully implemented beyond its origin site with appropriate training and support structures, and new programs need not wait decades to achieve outcomes comparable to those at established sites. For families seeking interventions, access to IWBMC programming through newer affiliate sites may provide outcomes comparable to those of the established Jacob's Ladder program. Comprehensive neurodevelopmental approaches that address multiple domains simultaneously may be worth considering.

6. STUDY LIMITATIONS

This pilot study has limitations that constrain interpretation and generalizability. With $n = 16$ ($n = 8$ per site type), the study was powered only to detect very large between-site differences ($d \geq 1.4$). The study could not reliably detect smaller but potentially meaningful site differences (e.g., $d = 0.5$). The small sample also precluded subgroup analyses by diagnosis, age, or other moderators. The lack of randomization and a control group prevents causal attribution. Observed improvements could reflect maturation, other concurrent services, regression to the mean, or measurement artifacts rather than IWBMC effects. Practice-based evidence approaches complement but cannot replace controlled trials. Similarly, many outcome measures are IWBMC-proprietary assessments lacking published reliability, validity, or normative data. Although standardized protocols guide administration, measurement bias remains possible. The few standardized measures (e.g., WRAT4) showed consistent improvement patterns comparable to those observed with proprietary measures, providing some evidence of convergent validity. The retrospective analysis relied on clinical evaluation data collected for service delivery rather than research. Although evaluator independence was maintained, assessments were not conducted under controlled research conditions, and data completeness issues arose. The sample was predominantly diagnosed with ASD (62.5%), recruited from families with resources to access private programming, and primarily served at southeastern U.S. sites. We cannot assume generalizability to other populations, settings, or geographic regions. Despite these limitations, this pilot study provides preliminary evidence supporting investment in larger-scale validation research.

7. FUTURE RESEARCH DIRECTIONS

The study's limitations suggest several promising directions for future research. Three complementary approaches would strengthen evidence for IWBMC effectiveness and deepen our understanding of its mechanisms. A fully prospective design represents the most rigorous next step. An adequately powered study would require 50-75 participants per site (130-170 total) to enable robust between- and within-site comparisons. Critical design elements would include: (1) standardized baseline assessments administered uniformly across all participants; (2) consistent data collection protocols throughout a designated service period; (3) fidelity monitoring to ensure intervention integrity; and (4) long-term follow-up to assess sustained outcomes. Alternatively, a hybrid approach could maximize both efficiency and rigor by integrating existing clinical data with newly collected prospective data. This design would expand the sample size while preserving the benefits of prospective data collection, including standardized protocols and predetermined outcome measures. Such an approach could accelerate evidence generation while preserving scientific validity. Finally, establishing the psychometric properties of proprietary IWBMC assessment measures should be a priority. This foundational work would examine internal consistency, test-retest reliability, and convergent validity with established instruments. Additionally, research should identify clinically meaningful change thresholds to support interpreting client outcomes in both research and practice settings.

8. CONCLUSION

This pilot study provides preliminary evidence that the Interpersonal Whole-Brain Model of Care® produces substantial improvements in neurodevelopmental, academic, cognitive, and behavioral outcomes in children with neurodevelopmental disorders. Critically, outcomes were consistent across sites with vastly different implementation histories, including the established 30-year-old Jacob's Ladder program, and first-year affiliate sites showed no significant differences across any measured domain. Primitive reflex integration emerged as a particularly robust component of the intervention that warrants focused attention in future research and clinical practice. Although these findings require replication with larger samples, controlled designs, and comprehensive fidelity assessment, they suggest that comprehensive neurodevelopmental protocols can be successfully transported to new implementation contexts with adequate training and structural resources. The IWBMC is an example of an integrated, multimodal intervention that current evidence increasingly supports. Moving from pilot findings to definitive validation will require substantial investment in prospective research with appropriate controls, but these preliminary results justify that investment. Understanding how comprehensive neurodevelopmental models function and transfer across contexts advances both implementation science and clinical practice, potentially expanding access to effective interventions for children and families facing neurodevelopmental challenges.

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