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A Multimodal Behavioral and Expressive Intervention for a Child with Intellectual Disability and Hyperactivity: A Three-Year Case Study

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Abstract

This case study outlines the clinical and treatment considerations of a 7-year-old male child (Awais Saddique) diagnosed with Intellectual Disability with Hyperactivity (ID/H). The child exhibited signs of hyperactivity, inattention, and delayed developmental milestones in addition to having comorbid febrile seizures and a history of seizure episodes. The purpose of this case study is to enhance understanding about the child's behavioral, cognitive, and emotional functioning from a biopsychosocial perspective. To address these deficits, including developmental, medical, and family histories were provided to shed light on the relationships between neurological and environmental contexts regarding the child's functioning. Subject-level interventions were implemented between August 2022 through March 2025 with the use of a combination of Applied Behavior Analysis (ABA), play therapy, and therapy with music. The child's progress was enhanced and monitored across multiple domains (e.g., adaptive functioning, attention to task, and communication/regulatory skills). The results indicated gradual improvement in the regulation of behavior and eye contact and social interactions and overall adaptive functioning. This study discusses the importance of early intervention, a structured behavioral therapy approach, and a family-centered approach to improve the quality of life for children who are suffering from comorbid intellectual and behavioral issues.

INTRODUCTION

Intellectual developmental disorder (intellectual disability; ID) is a type of neurodevelopmental disorder characterized by deficits in both intellectual capacity and adaptive behaviour, which are evident in the developmental period and affect social and practical functioning in everyday life (American Psychiatric Association, 2022). Diagnosis is characterized by two distinct conceptualizations: deficits in intellectual functioning (which

are typically indicated using standardized IQ assessments) and deficits in adaptive functioning that span cognitive domains, including communication, daily living, and socialization (American Psychiatric Association, 2022). ID frequently presents a heterogeneous clinical picture: severity can vary from mild deficits or reductions in adaptive competence to severe deficits requiring lifetime support, and cognitive, language, motor and socio-emotional domains can be variably affected (American Psychiatric Association, 2022; First, 2022).

Children diagnosed with intellectual disability often have co-occurring neurodevelopmental (e.g., attention-deficit/hyperactivity disorder; ADHD and communication disorders) and medical (e.g., epilepsy) disorders (First, 2022; Westlake, 2024). The interaction of medical/neurological co-morbidity (e.g., seizure disorders) and cognitive development is clinically meaningful - in particular, recurrent febrile seizures and epilepsy during early childhood have been associated with an increased risk for delays in language and attention, and impairments in executive functioning (First, 2022). Co-morbidities make diagnostic questions more complicated and make it more challenging to develop intervention plan because seizure activity, antiepileptic medication, and neurodevelopmental vulnerability may influence attention, arousal regulation, and learning capacity in tandem. (First, 2022; Westlake, 2024).

Growth patterns among children with atypical neurological insults and extended medical events, in some cases, are atypical. As expected, common clinical markers indicating multidisciplinary evaluation and early and supportive intervention include delays in milestone acquisition (i.e., sitting, walking, sentence creation), reduced expressivity, and impaired conceptual language abilities (American Psychiatric Association, 2022). The helpfulness of individualized early intervention programming is drawn from systematic reviews, and in most cases, children can benefit from intentional long-term treatment in communication, activities of daily living, and social interactions despite a noted cognitive deficit (Gitimoghaddam et al., 2022; Ho et al., 2020). Based on this, a biopsychosocial model with the incorporation of medical management, behavioral therapy, family training, and educational and classroom supports are widely encouraged for children with co-occurring cognitive and neurological disorders (Westlake, 2024).

Applied Behavior Analysis (ABA) and behaviour-analytic approaches continue to serve as a primary treatment approach to skill deficits and problem behaviour in children with developmental disabilities. Meta-analytic and review literature demonstrates mixed findings depending on the outcome measure and developmental disability population. For example, several meta-analyses suggest limited or heterogeneous effects of short-term programs based on ABA principles in regards to receptively language and global cognition, but when ABA-based interventions are comprehensive and long-term, they are associated with moderate to large advances in adaptive behaviours, communication, and daily life skills (Yu et al., 2020; Gitimoghaddam et al., 2022; Du et al., 2024). Important moderators of treatment outcomes include treatment intensity, treatment fidelity, family involvement, and the child's baseline cognitive profile. Therefore, ABA-based programming often takes a multi-modal approach, where behaviours are addressed by ABA methods along with naturalistic developmental treatment and family-mediated programming in order to support generalization to the child's natural environment (Gitimoghaddam et al., 2022; Du et al., 2024).

Play-based and expressive therapies encompassing child-centered play therapy, guided play-interventions, and musical therapies have both theoretical and empirical support in working with children under the age of five who have social, language and/or behavioral concerns. Play therapy provides a developmentally appropriate context through which children express emotions, develop communication skills, rehearse social roles, and practice adaptive responses to challenging situations; metaanalyses have demonstrated positive outcomes

underlying communication, emotional regulation, and behavioral difficulties in preschool and school-aged children across settings (Koukourikos et al., 2021; Parker et al., 2021). Furthermore for clinicians who are supporting children with minimal functional use of language, play therapy provided clinicians with a context for examining the child's symbolic play, developing narrative, and problem-solving mechanisms within a naturalistic interactional context (Koukourikos et al., 2021).

Music therapy has gained increasing popularity in research literature as an adjunct therapy to facilitate social engagement, attention, and communication functioning in developmental disabilities and disorders. Recent systematic reviews and meta-analyses of randomized and controlled studies involving neurodevelopmental populations, and in particular ASD, identify improvements for social responsivity and in a subset of communication outcomes, although there are variabilities in effect sizes and durability (Ke et al., 2022; Gao et al., 2024). Mechanistically, musical activities provide scaffolding for turn taking, rhythmic entrainment, and joint attention, which are all processes needed for pragmatic language and social reciprocity, thus, making music an accessible therapeutic vehicle for many children whose expressive language is limited (Ke et al., 2022; Gao et al., 2024).

Family-centered and parent-mediated components are critical adjunct components to clinic-based therapy. The implications of reviews of parent–child relationship interventions and parent training for families of children with intellectual disabilities indicate positive effects on parent-child interaction quality, parental stress, and certain dimensions of child behaviour (Westlake, 2024). Intervention generalization to home and school, with likely greater success when parents are trained to prompt, reinforce, and embed skill practice within their child's daily routine (Du et al., 2024; Westlake, 2024).

Together, the evidence is contemporary shows that the following takes place: (a) accurate diagnosis necessitates the synthesis of developmental, medical, and contextual histories; (b) comorbid neurological conditions (e.g., epilepsy) have a pronounced impact on intervention planning and developmental outcomes; and (c) multimodal interventions that include behaviour analytic strategies, play-based strategies, communicative therapies (including music), and caregiver training are the most likely approach to yield meaningful gains in adaptive functioning and social communication (American Psychiatric Association, 2022; Gitimoghaddam et al., 2022; Koukourikos et al., 2021; Ke et al., 2022; Du et al., 2024).

Rationale and aims of the present case study

This case study describes the detailed assessment and treatment journey of a 7-year-old boy, Awais Saddique, who presented with delayed expressive language, difficulties in sentence generation, hyperactivity, and experienced febrile seizures and epilepsy. The clinical presentation delayed ability to generate sentences and conceptual language, moderate cognitive functioning with good adaptive functioning skills for daily living, and hyperactivity and epilepsy prompted a few important clinical questions: how do neurological events and seizure disorder relate to language and attentional development in a boy with intellectual disability? Which combination of home and clinical treatment produce targeted, measurable improvement in communication, attention-span and behaviour? And finally, what role does caregiver teaching and simple play-based activities (e.g., art, role play, deep-breathing) facilitate the maintenance of gains across settings?

With adherence to diagnostic frameworks (American Psychiatric Association, 2022) and recent intervention literature (Gitimoghaddam et al., 2022; Koukourikos et al., 2021; Ke et al., 2022; Du et al., 2024), this paper (1) provides a detailed developmental and medical history of the case; (2) documents the assessment methods and diagnostic reasoning that led to a provisional diagnosis of intellectual disability with hyperactivity; (3) describes the multi-modal treatment program delivered between August 2021 and March 2025 (informed by ABA, with behaviour modification, play and art-based activities, music therapy elements, and

caregiver home plans); and (4) outlines indicators of progress, therapeutic challenges, and clinical recommendations that may inform practice across similar complex developmental presentations.

Case Description

Demographic and Family Context

Awais Saddique, a seven-year-old boy, lives in Tariqabad, Pakistan. He is the youngest of four children (two brothers and one sister) and is the second youngest child overall. Being a fourth-born sibling typically affords social modeling and informal caregiving from older siblings. Both parents reportedly have physical disabilities and live together, facilitating informal caregiving. The father is 40 years old and has not received formal education, while the mother is 37 years old and was educated through Grade 10 (approximately 16 years of age). The family lives in a low socio-economic status context, limiting access to specialty services for health and education. Limited/below standard access to specialty services may have contributed to the delay of detection and intervention for developmental difficulties in this instance (Ho et al., 2020).

Cultural and family support systems are an important part of the child's daily functioning. Interaction with his siblings provides socialization opportunities and opportunities for cooperative play and parallel play, while the presence of his parents establishes a foundation of emotional safety regardless of low literacy or medical knowledge. However, considering both parents' disabilities and potential economic limitations, the team acknowledges that environmental enrichment and specialized stimulation will be limited for the child and family; difficulties in development and developmental delay frequently interact with environmental and family contexts (Westlake, 2024).

Perinatal and Medical History

Awais's prenatal experience was without difficulty. His Mom had routine antenatal appointments, and the pregnancy reached full term (9 months). The delivery was reported to be normal and medically managed. There was no documented prenatal history including maternal infections, hypoxia or drug exposure.

The postnatal aspect, however, was clinically significant. Awais had febrile fits from early infancy that happened in connection to high-grade fever. At around 6 months, Awais was diagnosed with febrile fits, which transitioned into recyclic fits resembling epilepsy. He has been admitted to the hospital several times due to fits and febrile episodes.HisEEG revealed abnormal wave patterns, indicating that he is epileptic.He is currently managed with Epival (valproate) and Larase (clobazam), which are in keeping with up to date guidelines for the management of pediatric epilepsy (First, 2022).

Epilepsy and recurrent febrile fits are well known risk factors for neurocognitive impairment, particularly in the context of language development and executive function, which happens in early childhood (First, 2022; Westlake, 2024). In the context of neurocognitive impairment, antiepileptic medication may also contribute to attention fluctuations, mild psychomotor slowing and emotional lability, which must be considered within the context of observed behaviours.

There were no notable experiences with sleep difficulties or sensory sensitivities to sound, touch, or pain. Vaccinations are up to date, there are no known allergies or chronic systemic illness.

Developmental History

Developmental milestone achievement was delayed but not absent. According to caregiver reports:

- **Gross-motor skills:** Sitting independently was achieved at approximately 8 months, while walking was attained at 11 months. Crawling was notably absent.
- **Fine-motor coordination:** Functional grasp and manipulation emerged within normal limits but remain clumsy during tasks requiring bilateral coordination.
- **Language development:** Babbling and first-word production were age-appropriate; however, the transition to multi-word utterances and syntactic sentence formation has been significantly delayed. Expressive language remains limited to short phrases, while receptive language comprehension is relatively preserved.
- **Cognitive development:** Moderate developmental level. The child follows basic instructions, recognizes common objects and family members, and can engage in simple matching or sequencing tasks.
- **Social and emotional development:** The child demonstrates responsive social engagement, smiles reciprocally, and maintains adequate eye contact during interaction. He initiates play with siblings and responds positively to familiar adults, suggesting preserved attachment and social orientation.
- **Adaptive functioning:** Self-help skills such as eating, dressing, and basic hygiene are largely independent. Conceptual domains (language, reading, writing) are underdeveloped. Adaptive functioning overall corresponds to a *moderate level of intellectual disability* (American Psychiatric Association, 2022).

Behavioral and Cognitive Observations

Awais demonstrates significant hyperactivity and short attention span. In early sessions, he was seen standing, moving around the therapy room, and touching the materials impulsively. His constant movement sometimes interfered with his involvement with tasks and is aligned with diagnostic descriptions of Attention-Deficit/Hyperactivity Disorder, Combined Presentation (American Psychiatric Association, 2022). Parent and school teacher reported scores on the ADHD Rating Scale were 4 on page one and 8 on page two, indicating clinically significant symptoms of inattention and hyperactivity–impulsivity.

Awais displays distractibility; however, he displays curiosity and a desire to explore the materials. Awais is able to respond to his name, imitate verbal models, and demonstrates some basic joint attention by pointing and smiling at tasks together, which are encouraging prognostic factors (Du et al., 2024). There are no observations of stereotyped or repetitive behaviours, or self-injurious behaviours. Emotional regulation appears to be good overall; Awais consistently exclaims, “Happy” or “Good” during the course of a session, though one to two instances of stubbornness were noted.

Awais appears to have some difficulty with cognitive skills; he is able to identify letters (A–C) and simple colours with cueing and direction. Awais demonstrated understanding of one-step, and sometimes two-step, instructions. Delays in working memory seem evident, as he needed repeated verbal cues in order to complete tasks. He is observed to have some strengths in visual-spatial processing skills as well as learning by imitation through modelling, but areas of weakness include verbal abstraction, building sentences, and sustained attention.

Physical and Neurological Examination

During clinical observation, Awais appeared physically healthy, alert, and neatly dressed. Eye contact was maintained for brief periods and improved over the course of therapy. Posture and gait were normal. No gross motor abnormalities were noted beyond mild coordination issues during fine-motor tasks. Reflexes and muscle tone were within normal limits for age.

The history of recurrent febrile seizures supports a diagnosis of *epilepsy* with associated developmental delay. Neuroimaging or electroencephalographic (EEG) data were not available, but clinical presentation is consistent with partial symptomatic epilepsy with secondary developmental impact (First, 2022).

Tentative Diagnosis

Based on the integrated clinical information, behavioural observations, and developmental history, the tentative diagnosis aligns with:

- **Primary diagnosis:** *Intellectual Disability, Moderate Severity*
- **Comorbid condition:** *Attention-Deficit/Hyperactivity Disorder (Combined Presentation)*
- **Associated medical condition:** *Epilepsy (post-febrile seizure onset)*

This diagnostic formulation corresponds to the criteria outlined in the *DSM-5-TR* (American Psychiatric Association, 2022).

Therapeutic Goals and Rationale

The therapeutic aims were developed mutually between the therapist and caregivers. The short-term aims focused on the enhancement of adaptive daily living (ADL) skills, attention span, and compliance with behaviour. The long-term aims were aimed at enhancement of executive functioning skills, expressive language, and social communication skills.

Due to the dual profile of intellectual disability and hyperactive behaviour, a multi-modal treatment plan was implemented comprised of Applied Behaviour Analysis (ABA) for systematic behaviour modification, play and art-based activities to encourage creativity and emotional expression, and music therapy to foster attention and rhythm-based action. This integrated approach is consistent with evidence that suggests better outcomes when behavioural and developmental therapies have been used in conjunction with expressive modalities (Ke et al., 2022; Koukourikos et al., 2021; Du et al., 2024).

Therapeutic Intervention and Progress

1. Overview of Intervention Framework

Awais's intervention program spanned from **August 2022 to March 2025** and was conducted through weekly individual sessions in a clinical setting. The therapeutic approach integrated **Applied Behavior Analysis (ABA)** principles, **play-based learning**, **art and music therapy**, and **family psychoeducation**. This multidisciplinary framework was designed to target deficits in attention, language, and adaptive functioning while promoting behavioral regulation and self-expression.

Integrated multimodal interventions have been shown to improve developmental outcomes in children with intellectual disabilities when compared to single-modality programs (Eckes et al., 2023; Jiang et al., 2025). The program was individualized following a **functional behavior assessment (FBA)**, which identified core difficulties including hyperactivity, limited sentence formation, and inconsistent task completion.

2. Applied Behavior Analysis (ABA) Techniques

ABA formed the backbone of the intervention, emphasizing reinforcement, shaping, and task analysis. Each session began with **discrete-trial teaching (DTT)** to enhance compliance and reduce impulsivity. Desired behaviors (e.g., sitting for 5 minutes, following one-step instructions) were reinforced through **token economy** and **verbal praise**. Undesirable behaviors such as task refusal were managed through **planned ignoring** and **response cost** strategies.

Gradually, the reinforcement schedule shifted from continuous to variable-ratio to promote maintenance of skills in naturalistic contexts (Lovaas, 2022). Target behaviors were operationalized and monitored using weekly charts. Data showed incremental improvement in **attention span (from 2 to 8 minutes)** and **task completion (from 40% to 85%)** across six months.

3. Play-Based Therapy

Play-based learning sessions provided an unstructured medium for developing social reciprocity, symbolic thinking, and emotional regulation. Activities included **block building, role play, and turn-taking games**, tailored to developmental level. Through guided play, Awais practiced waiting for turns, imitating peer behavior, and sustaining joint attention.

Play therapy fosters communication and self-regulation in children with developmental delays by creating a non-threatening context for learning (Koukourikos et al., 2021). Over time, Awais transitioned from solitary to associative play, initiating interactions with peers and responding to simple cooperative tasks such as "build a tower together." His spontaneous verbalizations increased from isolated words to short phrases (e.g., "give me ball," "I play car").

4. Art-Based Therapy

Art sessions were introduced biweekly to strengthen fine-motor coordination, creativity, and emotional expression. Drawing, coloring, and clay modelling were used to engage visual-spatial processing and symbolic thinking. Awais displayed enthusiasm for using bright colors and geometric shapes, often smiling during the process, suggesting positive affective engagement.

Art therapy supports sensory integration and expressive communication among children with intellectual disabilities (Selau et al., 2022). Improvements were noted in **grip strength**, **bilateral coordination**, and **task persistence**, paralleling reported benefits in fine-motor development literature (Du et al., 2024).

5. Music-Based Activities

Music therapy was integrated to enhance auditory attention, rhythm perception, and motor coordination. Sessions included **rhythmic clapping**, **sing-along songs**, and **simple instrumental play** using tambourines and xylophones. Awais demonstrated high responsiveness to musical cues, frequently synchronizing hand movements with rhythm and showing visible excitement.

Research supports the use of **music interventions in neurodevelopmental rehabilitation**, emphasizing improvements in auditory processing and emotional stability (Jiang et al., 2025; Children, 2025). Over successive months, music activities were paired with verbal labeling tasks ("clap when you hear red") to strengthen auditory discrimination and cognitive flexibility.

6. Family Involvement and Psychoeducation

Parental engagement was considered a crucial component. Psychoeducation sessions were conducted monthly, focusing on behavior management, reinforcement strategies, and realistic goal setting. Parents were trained to use consistent verbal cues and reinforce positive behaviors at home.

Family-based interventions enhance generalization of learned skills and reduce behavioral relapse (Ho et al., 2020). The mother's involvement, in particular, led to observable consistency in home routines such as scheduled study time and structured play periods.

7. Progress Evaluation

Progress was systematically monitored using both **quantitative and qualitative measures**:

Behavioral observation logs documented reductions in impulsivity and aggression.
Skill acquisition charts tracked the number of mastered behaviors per month.
Parent feedback forms reflected improved communication, self-care, and cooperative behavior.

Discussion and Clinical Implications

This case study highlighted the therapy experience of Awais Saddique, a seven-year old boy identified with Intellectual Disability with hyperactivity. The intervention program took place

from August 2022 to March 2025 and included elements from Applied Behavior Analysis (ABA), play therapy, as well as art-based and music-based sessions. The presented positive outcomes of increased attention span, better expressive language, and improved adaptive functioning were mirrored in upcoming evidence based on multimodal rehabilitation approaches for children with neurodevelopmental disorders (Du et al., 2024; Jiang et al., 2025).

1. Combination of Multimodal Interventions.

Recent literature identifies that most single-modality programs don't often meet the unique cognitive and behavioral challenges presented in children with developmental disorders. By adding expressive play and sensory modalities alongside beahvioral interventions can provide progressive improvements holistically (Eckes et al., 2023). In this example, incorporating ABA within the expressive modalities allowed strengthening of preferred behaviors alongside creativity and emotional expression.

The findings are also consistent with Selau et al. (2022) as they found improved results related to adaptive behavioral interventions pairing structured reinforcement with creative activities able to show greater improvement within self-regulation and communication in children with intellectual disabilities.

2. Cognitive and Neurologic Processes

Neurocognitive models of development indicate that structured and recited behavior provides reinforcement that strengthens prefrontal-striatal pathway wiring that is relevant to executive functioning in behavior (Lovaas, 2022). While this is happening, music and art-based activities engage right temporo-parietal cortical regions that separate out sensory input and assist with affect regulation (Gao et al., 2025).

Thus, Awais's gradual improvement in sentence formation and sustained attention to task can reflect an increase in overall neural plasticity due to multisensory engagement. Evidence from neuroimaging demonstrating increased activation of auditory-motor pathways following rhythmic therapy among children with developmental disabilities supports this interpretation (Children, 2025).

3. Psychosocial and Behavior Gains

Social-behavioral outcomes provided additional evidence beyond neurologic changes. Awais, who initially spent more time engaged in solitary play, transitioned into more cooperative play, which corresponds to evaluating play therapy for increases in peer interactions and empathy in neurodiverse children (Koukourikos et al., 2021). Behavioral charting also provided support by collecting data revealing considerable decreases in impulsive movements and effort avoidance, which are consistent with meta-analyses evaluating the efficacy of ABA in decreasing hyperactivities (Du et al., 2024).

Family psychoeducation was equally essential. Parents meaningfully reinforced Awais's desired behavioral change at home, which assisted with generalization across settings. Children’s behavioral outcomes have been shown to produce stronger and more stable gains when parents mediate progress with child engagement (Westlake, 2024).

3. Cultural and Environmental Context

Interventions were carried out in a Pakistani cultural context, where family interdependence and community-based play affected child behavior. Including parental involvement and culturally familiar activities (e.g., cricket, local music) enhanced motivation and adherence. Recent work across cultures emphasizes the importance of adapting to missing contexts in child therapy and that culturally informed therapies would promote greater acceptability and long-term engagement (Aftab & Nazir, 2023).

5. Clinical Implications

This vignette highlights the need for thorough, child-centered, and culturally competent intervention plans for children with intellectual disability and hyperactivity.

Clinicians should:

- Design multimodal therapy based on behavioral, sensory, and expressive targets.
- Include parents as co-therapists with an organized home plan.
- Conduct data-informed evaluation of progress with objective data (i.e., charts, rating scales).
- Prioritize adaptive functioning (i.e., daily living, hygiene, communication) over symptom reduction.

6. Limitations and Future Directions

As a case study report, the ability to generalize the findings is limited. It is suggested that in the future this type of treatment intervention should be repeated across a larger sample using mixed-methods designs that capture quantitative changes along with qualitative experiences (Parker et al., 2021). Furthermore, the systematic approach to digital assistive learning tools could assist with cognitive engagement, especially for learning language growth and executive functioning (Yu et al., 2020).

7. Conclusion

In summary, Awais's therapeutic progression over three years shows that a combination of structured ABA treatment along with expressive therapies like play, art, and music can be beneficial for children with intellectual disabilities and hyperactivity in numerous ways. The results also indicate that maintain a suitable framework for multimodal, family-centered and culturally contextualized therapeutic treatment is evidenced based with a favorable prognosis when intervention was done consistently and individualized.

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