ISSN 3007-3170(O)
ISSN :3007-3162(P)
January-March 2025
Social Sciences & Humanity Research Review

Case Study of a Child with Down Syndrome Presenting with Global Developmental Delay: Clinical History and Intervention Recommendations

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ARTICLE INFO

Keywords:
Down Syndrome, Global Developmental Delay, Applied Behaviour Analysis, Relationship Development Intervention, Play Therapy, Case Study.

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ABSTRACT

This case study outlines the clinical history, treatment, and progress of a 2.5-year-old male diagnosed with Down syndrome and global developmental delay (GDD). The boy was experiencing developmental delay, not speaking, limitations in his cognitive skill, deficits in adaptive functioning, and deficits in social functioning. For 16 months, the child participated in a structured program using applied behaviour analysis (ABA), relationship development intervention (RDI), and play therapy. Treatment sessions involved play and activities that stimulated musical interaction, recognition of objects, eating adaptively, greeting appropriately, and structured play, which was reinforced with home practice using the same activities. The child demonstrated gradual improvement in eye contact, attention span, social reciprocity, and adaptive functioning across treatment phases, and however, expressive language and cognitive flexibility remained limited. These skills progressed over timed, structured, and family-centred intervention, supporting the evidence of the importance of early, intensive interventions for children diagnosed with Down syndrome and GDD. This case study provides evidence that implementing a treatment program using a multimodal intervention approach, including behaviour-based, relational, and play-based approaches, has some positive meaningful contributions towards developmental progress and potentially positively influences prognosis for children with complex neurodevelopmental factors.

Introduction

Information related to developmental delay

Developmental disorder in childhood is defined as marked impairment in attaining age-appropriate levels of cognitive, language, motor and socio-emotional skills

(Shevell et al., 2003). Global Developmental Delay (GDD) is defined as a working diagnosis for children under the age of 5 years who exhibit developmental delays in two or more of the developmental domains. From a clinical perspective GDD is significant as it can be prognostic for future intellectual disability and potentially other neurodevelopmental disorders (Moeschler & Shevell, 2014).

Why early identification is important

Early identification is crucial in developmental delays because effective early intervention reduces the potential impacts on the child during their life as well as overall improved functional behaviours (Majnemer, 2019). Each of genetic, perinatal and environmental influences may all contribute to the impairment so proper clinical assessment to understand the background is warranted.

Down syndrome and development

Down syndrome, a chromosomal abnormality caused by the presence of an additional chromosome 21 (trisomy 21), is one of the most prevalent genetic causes of global developmental delay and intellectual disability (Bull, 2020). Children with Down syndrome generally exhibit varied levels of delayed language acquisition, cognitive impairment, and adaptive functioning deficits, but show differing motor development and socialization (Chapman & Hesketh, 2000).

The association of Down syndrome with global developmental delay

It has been documented that children with Down syndrome are at increased risk of delayed global development. The causes of this increased risk includes the combined challenges of an intellectual disability compounded by medical comorbidities and language incapacity (Fidler, 2005). As professionals, we need to develop individualized treatment approaches that address the biological and psychosocial dimensions associated with this disorder.

Overview of the case presented

This case study discusses a 2.5-year-old male child, Muzamil Ahmed, with Down syndrome, and presents with global developmental delay. The child is the 4th born of the birth order and lives with both parents and siblings. His clinical history and developmental profile indicate significant impairments in his speech, cognition, and adaptive skills that will require a multidisciplinary team to treat his delay.

Clinical history

Birth and medical history

This child was born at term (9 months) following full term normal delivery, delivered by a medical professional. There are no prenatal complications and the mother received the appropriate antenatal care. There have been no allergies, no preference to food, and there have been no complaints regarding sleeping. The child has been fully vaccinated and has never been admitted into hospital for care, is also not on any medications.

Developmental history

Developmental history indicates significant delays. Major milestones in motor development including neck holding or bobbing; sitting; and crawling were not achieved in a typical timeline. Language development was significantly delayed with total absence of speech while being observed at 2.5 years. Cognitive development is also impaired with problems with problem solving; exploration; and object recognition.

Cognitive and behavioral issues

The child has limited response to commands and is unable to concentrate. The child uses his name spoken by family members and responds fairly well to family after initial prompting for attention but does not respond to strangers immediately. The

child did not demonstrated community adaptive skill set (self-care, skills to play, social witness, or practical living skills) at the time of report. There were also no signs were self injurious behaviour or stereotypical movement behaviors.

Social and emotional history

The child's social interaction is limited. The child did not present with play except with siblings through adjacent actions and overall socialization is restricted. The child's skills for about first 10 minutes demonstrated considerable eye contact, and alertness and the child maintained eye contact and sitting for a span of about 3 minutes. The child's overall behaviour appeared fair and did not present an overall troubling behaviour. The child's emotional response , per the parent, was selective towards only immediate family members for attachment purposes.

Educational and functional history

The child has yet to attend any formal schooling. There were no functional skills in language, reading, writing or adaptive self-help behavior, nor had the child used any devices. Intellectual functioning is assessed as moderate, consistent with the diagnosis of Down syndrome.

Discussion of Presenting Complaints

Summary of complaints

The major presenting complaints are lack of verbal communication, delayed gross motor skills, altered cognitive processing, and a lack of adaptive and social skills. Even though growth metrics such as posture, cleanliness, and awareness are normative, the child's developmental profile conform with Global developmental delay (GDD).

Clinical significance and intervention

The provisional diagnosis of GDD in Down syndrome emphasizes the need for early interventions. The recommended interventions were psychotherapy to assist with emotional adjustment, family therapy to assist with parental adjustment, Relationship Development Intervention (RDI) to develop social reciprocity, and Speech Language therapy to foster communication skills. All listed interventions, have strong evidence to suggest that multi-disciplinary interventions addressing functional outcomes is recommended for children with developmental disorders (Guralnick, 2017; Kumin, 2006).

Therapeutic Intervention and Progress

The therapeutic management of the child was completed following the ABA protocol, with a goal of improvement in adaptive functioning in the short term and improved behavioral regulation in the long term. After a total of 9 therapy sessions, during which the child was observed to develop incremental and continuous changes in eye contact, attention, willing to interact, and attentiveness.

Therapeutic Intervention: 24-Month Treatment Course

The child was involved in a 2-year program combining Applied Behaviour Analysis (ABA), Relationship Development Intervention (RDI), and Play Therapy. The objectives were to develop adaptive functioning, social reciprocity, attention, emotional regulation, and cognate engagement while minimizing obstacles to learning. Therapy sessions were structured, and parents kept skills going at home, documenting progress monthly.

Phase I (Months 1–3) means developing basic responsiveness

The initial priority was on developing rapport, expanding attention span, and developing eye contact. ABA reinforcement strategies (i.e., music-based reinforcement, hide-and-seek and flashlight attention games) were used to engage child in short activities. RDI strategies of very simple parent-child engagement were

used as foundation for developing emotional connection and responsiveness. Play therapy began the development of peek-a-boo and object pointing games to promote joint attention and moody regulation. By the end of this phase, the child's eye contact, sitting span, and basic responsiveness to name, improved systematically.

Phase II (Months 4-6): Early Adaptive Skills and Social Engagement

During the second phase, the focus was on routines, recognition skills, and emotional reciprocity. Activities included pointing to body parts, object recognition, and other eating-adaptive tasks. We developed activities using ABA using task analysis to break down skills into small steps that could be achieved through positive reinforcement. RDI played its role by introducing activities such as turn-taking games with two or more forms of transitional play to develop reciprocity. Play therapy involved engaging in rituals of greetings, musical play, and object games. By the conclusion of phase II, there was improved attention span with the child, more engagement, and a few forms of early adaptive responses by the child.

Phase III (Months 7-9): Pre-Language Development and Social Imitation

When we entered the pre-language development and social imitation stage, all activities were aimed at pre-language communication and imitation skills. Activities used for this phase included attempts to use color, rhythm, rhymes, and various ways of playing peek-a-boo. The child was prompted to imitate greetings (Salam with a handshake), object recognition, and sound discrimination tasks. Generally, the strategic use of ABA was accomplished through our modeling of consistent responses to the child's initiation. RDI encouraged reciprocal exchanges and encouraged emotional referencing. The use of play therapy for phase III involved story interactions and other social imitation games. By the end of this phase, the child demonstrated more interaction, longer duration of eye contact, and improved self-regulation of mood.

Phase IV (Months 10 – 12): The Cognitive and Social Phase

The purpose of the fourth phase was gross cognitive stimulation, recognition, and emotional regulation through structured play with more formal routines involving name calling, recognition of sounds, and role play. ABA reinforcement scaffolded task predictability, and RDI set the foundation for guided participation and shared attention. Play therapy was interactive, utilizing storytelling and eating routines that the child expressed by use of emotional identification, and cooperative play. The child exhibited increased focus, continued improvements in social reciprocity, and significantly sustained participation in structured activities.

Re-assessment (End of 12th Month)

A subjective and observational re-assessment indicated the child had made a considerable improvement from baseline. The child had developed:

a)better attention span and focus (although occasional drift still occurred),

b)improved eye contact and responsiveness,

c)early adaptive functioning skills (pointing to objects, following directions, basic eating routines),

d)improved mood regulation and increased social reciprocity,

The therapeutic goals of attention, focus, and responsiveness, and object recognition were at least partially to fully met. The prognosis is good, and it is recommended that therapy continue without assistive aids or referrals.

Phase V (Months 13-15): Generalizing Skills

This phase was aimed at generalizing very early skills into contexts of daily living. Examples of the learning activities were adaptive eating, object pointing, structured greetings, and cooperative activities with a peer or siblings. While ABA promoted

consistent performance, RDI provided a means in which flexible thinking was required in a parent/child problem-solving context. Play therapy skills learned were remarkably inclusive of symbolic play and role-play situations. By the end of this phase, the child maintained eye gaze more consistently, was using the greeting appropriately and also using structured tasks in similar ways in a different context.

Phase VI (Months 16-18): Strengthening Social-cognitive Skills

The program focused on cognitive development, learning stimulation, and early expressive skills. Activities included naming familiar objects, identifying colors and shapes, simple classification, and extended rhymes with actions. RDI provided the framework to support the development of dynamic intelligence through guided participation. Play therapy offered opportunities for the child to participate in games, collaborative games, and engage in imaginative stories with actions. The child began to show greater responsiveness to instructions, better sound discrimination and increased initiations to interact.

Phase VII (Months 19-21): Increasing Early Social-emotional Reciprocity

In this phase, the therapy purposefully moved the child toward emotional recognition, reciprocal interactions and longer sustained social interactions. Various components of ABA were utilized to support the social engagement of the child, including introducing structure and reinforcement for expressing needs using gestures and/or sounds. RDI components were used to encourage joint problem solving, and flexible role exchanges. Play therapy provided opportunities for social imitation games, cooperative turn taking and games with groups.The child displayed emerging emotional expression, enjoyment in group activities, and a stronger ability to maintain shared attention.

Phase VIII (Months 22–24): Reinforcement and Functioning Independently

The last phase of the intervention was centered on reinforcing skills that had already been learned and promoting independence. Examples of activities included adaptive eating skills, greetings of gratitude/with emotion, role-playing daily routines, and structured peer interactions. ABA maintained consistency and gradual independence for each task, RDI incorporated flexibleness across contexts, and play therapy fostered symbolic and cooperative play with siblings/peers. By the end of this last phase the child demonstrated:

a) Consistent eye contact between sessions
b) Increased attention span and regulation in mood
c) Increased social reciprocity and greetings
d) Increased adaptive functioning in their daily life
e) Increased engagement in activities that were structured and semi-structured

Discussion

This case study describes the progression and therapeutic intervention of a 2.5-year-old child with Down syndrome and global development delay (GDD) over the course of 16 months of structured intervention. At baseline, the child demonstrated significant impairment to nearly all language, cognitive, and adaptive skills. This pattern is consistent with previous research showing children with Down syndrome generally have developmental delays across many domains (Chapman & Hesketh, 2000; Fidler, 2005). The most important point is even with a concerning developmental history marked by significant delays, the child made measurable gains in their ability to attend to and respond to social interactions and adaptive skills due to early therapeutic intervention.

This case utilized a therapeutic model incorporating Applied Behavior Analysis (ABA), Relationship Development Intervention (RDI) and play therapy in this case

representing a holistic practice that reflected the diversity of the child's developmental profile. Specifically, the components of ABA as a therapeutic model - identification of task analysis and reinforcement among others - facilitated gradual accomplishment of early adaptive and communication behaviors consistent with studies confirming the effectiveness of ABA with developmental and intellectual disabilities (Peters-Scheffer et al., 2011). RDI placed importance in intervention focused on exposure to reciprocal engagement during their DBAs for the child and parent, promoting social engagement and responsiveness. This approach is congruent with studies that promote relationships in intervention for children as a developmental process - using social reciprocity as a basis in the child's intervention (Gutstein, 2009). Play therapy may be realized in this case as an extension of work and engagement in a symbolic manner and representation rooted in principles of cognitive and social development (Bratton et al, 2005). The use of these approaches is consistent with more recent recommendations for multisystems approaches to the intervention in children with GDD for, with RDI and play therapy framed as engagement practices within those approaches (Guralnick, 2017).

Throughout the course of the 16-month treatment, the child made steady and even small but consistent progress. The child made improvements in eye contact, sitting duration, attention span, emotional regulation, and social reciprocity. By using early adaptive and social skills activities like object identification, peek-a-boo, greetings, and adaptive feeding, we gradually increased the child's progress using these activities. By the last sessions, the child was able to participate in structured interactions, identify sounds and colours, and respond more actively and consistently to calling his name. The developmental and social skill changes were small compared to typically developing peers, but they were considered clinically significant for a child born with Down syndrome, signalling that a change had occurred and that skill formation was possible with sustained early intervention.

This case further illustrated the importance of family involvement. Home-based reinforcement plans established for hide-and-seek, greetings, and pointing were routinely implemented demonstrating the ability to generalise skills across settings. The literature clearly supports family-centred intervention as a nature of recommendation in developmental rehabilitation because of the replicable consistency and skills' continuity (Mahoney & Perales, 2005). Usually, therapeutic gains without parental reinforcement are limited to the context of the clinic, making it clear the role of teamwork in therapy models.

Overall, while there was clear evidence of progress, there remained areas of concern. The child continued to present with delays in expressive language, cognitive flexibility, and adaptive functioning; areas known to be durable developmental aspects of Down syndrome and sub-groups of individuals in need of support for the long haul (Roizen & Patterson, 2003). There was no recommendations of assistive devices or referrals for this child because progress was steady and prognosis was positive. It would be beneficial to consider augmentative and alternative communication (AAC) techniques eventually as a means of encouraging expressive language given adherence to best practice guidelines (Light & McNaughton, 2012).

In summary, this case offers empirical support for multi-modal, long-term interventions in children with Down syndrome and global developmental delay. Results are in line with previous studies that indicated that early, structured, and family-supported therapies facilitate predictable developmental advancements regardless of a body of intellectual disability (Guralnick, 2017).

Conclusion

This case study illustrates the developmental challenges and therapeutic progress of a child with Down syndrome and global developmental delay over a 16-month treatment program. The integration of ABA, RDI, and Play Therapy, reinforced by consistent home practice, contributed to gradual improvements in social reciprocity, attention, and adaptive functioning. While developmental deficits persisted, the prognosis was favorable, and meaningful gains were observed in cognitive and social domains.

The findings emphasize the importance of early, intensive, and family-centered interventions in managing global developmental delay in children with genetic conditions. The case also demonstrates how therapy models grounded in behavioral, social, and cognitive frameworks can complement each other to produce holistic outcomes. Future directions include the incorporation of assistive communication strategies and structured educational interventions to further support language and learning development.

This case highlights the broader implication that, although children with Down syndrome face lifelong developmental challenges, timely and multidisciplinary interventions can significantly improve quality of life, functional independence, and family well-being.

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