



## Sources of Information about Naturalistic Developmental Behavior Interventions

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### Abstract

This *CASEmaker* bibliography includes selected sources for defining the key characteristics of naturalistic developmental behavioral interventions (NDBI), their outcomes for children and families, social validity, and common programs that fit the criteria for NDBI. NDBIs represent a significant advancement in early intervention for children with autism spectrum disorder. Interventions that integrate natural learning environments and evidence-based caregiver coaching effectively enhance social communication, cognitive development, and adaptive behaviors. Research supports the positive outcomes associated with NDBI and highlights their social validity and acceptance among caregivers and practitioners.

### Introduction

Naturalistic developmental behavioral interventions (NDBIs) represent an evolution of evidence-based autism interventions, integrating principles from developmental and behavioral sciences to promote functional and meaningful participation in the child's typical family and community activities. This *CASEmaker* presents selected sources of information that overview autism interventions, describe the key features of NDBIs, describe the outcomes and social validity of NDBI, and highlight common NDBI programs.

### Overview of Autism Interventions

Initially, interventions for autism were often rooted in institutional care with minimal focus on individualized approaches. As awareness of autism spectrum disorder (ASD) increased, so did the variety of intervention strategies. In the mid-20th century, behavior approaches such as applied behavior analysis (ABA) were on the rise, with an emphasis on structured environments and reinforcement techniques to shape behavior. Over time, these methods have been refined and supplemented with developmental models that recognize the importance of social, emotional, and communication skills. The rise of the neurodiversity movement also recognizes the inherent strengths of individuals with autism because of their neurodiversity and their right to live with and further develop their unique characteristics (Schuck et al., 2022). Although the neurodiversity movement has advocated for a shift

away from the medical model for autism intervention, neurodiversity advocates are in favor of intervention when it (a) is provided in a respectful manner, (b) focuses on teaching useful skills, and (c) improves subjective quality of life (Chapman & Bovell, 2022; den Houting, 2019; Kapp et al., 2019). Integrative approaches like NDBIs have gained more prominence within the last decade due to their flexible, child- and family-centered approaches. They have also gained popularity due to the growing recognition of the need for therapeutic approaches that focus on the strengths, preferences, goals, and values of individuals effected by autism spectrum disorder, allowing for co-construction of therapy based on the respective interests of individuals with autism and learning opportunities provided within family routines (Gabovitch & Curtin, 2009; Schuck et al., 2022). The following references describe the evolution of autism interventions and the influence of the neurodiversity movement.

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- Chung, K., Chung, E., & Lee, H. (2024). Behavioral interventions for autism spectrum disorder: A brief review and guidelines with a specific focus on applied behavior analysis. *Journal of Korean Academy Child Adolescent Psychiatry*, 35(1), 29-38. <https://doi.org/10.5765/jkacap.230019>
- Schuck, R. K., Tagavi, D. M., Baiden, K. M., Dwyer, P., Williams, Z. J., Osuna, A., Ferguson, E. F., Jimenez Muñoz, M., Poyser, S. K., Johnson, J. F., & Vernon, T. W. (2022). Neurodiversity and autism intervention: Reconciling perspectives through a naturalistic developmental behavioral intervention framework. *Journal of Autism and Developmental Disorders*, 52, 4625-4645. <https://doi.org/10.1007/s10803-021-05316-x>

### Rx Prescription for Practice Rx

Improve your knowledge of naturalistic developmental behavior interventions by reading the following.

- Frost, K. M., & Ingersoll, B. (2024). Mapping the active ingredients and mechanisms of change of a naturalistic developmental behavioral intervention using mixed methods. *Journal of Early Intervention*, 46(2), 155-173. <https://doi.org/10.1177/10538151231217450>
- Ingersoll, B., Douglas, S. N., Brodhead, M. T., Barber, A., & Kaczmarek, L. A. (2024). Interdisciplinary competencies for implementing NDBIs with young children with autism and other social communication challenges. *Journal of Early Intervention*, 46(2), 138-154. <https://doi.org/10.1177/10538151231218928>
- Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Kasari, C., Ingersoll, B., Kaiser, A. P., Bruinsma, Y., & McNERNEY, E. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45, 2411-2428. <https://doi.org/10.1007/s10803-015-2407-8>
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### Description of NDBI

NDBIs are an innovative and evidence-based approach to early intervention for children with autism spectrum disorder. Combining principles from both developmental and behavioral sciences, NDBIs emphasize embedding learning opportunities within everyday routines and activities (Chung et al., 2024; D'Agostino et al., 2023; Schreibman et al., 2015). The interventions are designed to be child-centered and responsive and leverage the child's interests to engage in social communication, cognitive tasks, and adaptive behaviors. In NDBIs, the adult role is to build upon and foster existing child motivation to engage and communicate (Frost & Ingersoll, 2024; Gengoux et al., 2021). This allows children to learn through experiences that are personally relevant and meaningful to them, while also motivating them to acquire functional skills. The focus on using the child's interests to co-construct therapeutic experiences fosters a more equitable learning environment while simultaneously protecting against 'norm-driven' interventions focused on symptom reduction and behavioral compliance (Schuck et al., 2022). When providers use evidence-based coaching strategies, parents and other caregivers become equipped to provide natural learning opportunities throughout the child's day within meaningful family contexts. NDBIs not only enhance the child's functional skills but empower families to support child learning effectively across contexts important to the family (Ibañez et al., 2018). The following references describe the common characteristics of NDBIs.

- D'Agostino, S. R., Duenas, A. D., Bravo, A., Tyson, K., Straiton, D., Salvatore, G. L., Pacia, C., & Pellecchia, M. (2023). Toward deeper understanding and wide-scale implementation of naturalistic developmental behavioral interventions. *Autism*, 27(1), 253-258. <https://doi.org/10.1177/13623613221121427>
- Frost, K. M., & Ingersoll, B. (2024). Mapping the active ingredients and mechanisms of change of a naturalistic developmental behavioral intervention using mixed methods. *Journal of Early Intervention*, 46(2), 155-173. <https://doi.org/10.1177/10538151231217450>
- Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., Rogers, S. J., McGee, G. G., Kasari, C., Ingersoll, B., Kaiser, A. P., Bruinsma, Y., & McNERNEY, E. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for

autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 45, 2411-2428. <https://doi.org/10.1007/s10803-015-2407-8>

### Outcomes Associated with NDBI

Child and family outcomes associated with NDBIs have been notably positive. Research suggests NDBIs effectively improved joint engagement in children (Kasari et al., 2010; Kasari et al., 2015), improved child social communication skills (Baranek et al., 2015; Brian et al., 2022; Estes et al., 2021; Sandbank et al., 2020; Stahmer et al., 2017; Wetherby et al., 2014), and increased the frequency and quality of interactions between children and their caregivers (Edmunds et al., 2024). NDBIs are linked to improvements in cognitive abilities and adaptive behaviors, such as daily living skills and independence (Sandbank et al., 2020; Tiede & Walton, 2019). Positive parent outcomes have included decreased caregiver stress and increased caregiver self-efficacy (Brian et al., 2017; Tomeny et al., 2020; Turner-Brown et al., 2016). Some studies have shown mixed results when NDBI was moved out of hospital and university conditions and implemented in community settings (Jobin et al., 2024; Nahmias et al., 2019; Pellecchia et al., 2024). The following references provide information about child and family outcomes associated with NDBIs.

- Jobin, A., Stahmer, A. C., Camacho, N., May, G. C., Gist, K., & Brookman-Frazee, L. (2024). Pilot feasibility of a community inclusion preschool program for children with autism. *Journal of Early Intervention*, 46(2), 239-254. <https://doi.org/10.1177/10538151231217483>.
- Pickard, K., Mellman, H., Frost, K., Reaven, J., & Ingersoll, B. (2023). Balancing fidelity and flexibility: Usual care for young children with an increased likelihood of having autism spectrum disorder within an early intervention system. *Journal of Autism and Developmental Disorders*, 53(2), 656-668. <https://doi.org/10.1007/s10803-021-04882-4>
- Song, J., Reilly, M., & Reichow, B. (2024). Overview of meta-analyses on naturalistic developmental behavioral interventions for children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, Advance online publication. <https://doi.org/10.1007/s10803-023-06198-x>
- Tomeny, K. R., McWilliam, R. A., & Tomeny, T. S. (2020). Caregiver-implemented intervention for young children with autism spectrum disorder: A

systematic review of coaching components. *Review Journal of Autism and Developmental Disorders*, 7, 168-181. <https://doi.org/10.1007/s40489-019-00186-7>

### Social Validity of NDBI

The social validity of NDBIs is widely recognized, reflecting their practicality and effectiveness in real-world settings. Social validity pertains to the perceived relevance and importance of an intervention's goals, procedures, and outcomes. NDBIs are valued because they integrate into daily routines and activities, making them accessible and applicable for all families. They emphasize parent involvement and natural contexts, and align with the family's desires to support their child's development in meaningful ways (D'Agostino et al., 2019; Schuck et al., 2024). Research indicates that parents find NDBIs culturally adaptable and respectful of family dynamics, enhancing their engagement and satisfaction (Haine-Schlagel et al., 2020; Szlamka et al., 2022). Although parent perceptions of NDBI are largely positive, studies have shown that practitioners perceive NDBIs as ineffective and inappropriate (Hampton & Sandbank, 2022). Studies also showed that practitioners who typically work with children with autism indicated they had little to no knowledge of NDBI practices (Aranbarri et al., 2021; Hampton & Sandbank, 2022), indicating a need for more training and support to interventionists. The following references provide information about the social validity of NDBIs.

- Haine-Schlagel, R., Rieth, S., Dickson, K. S., Brookman-Frazee, L., & Stahmer, A. (2020). Adapting parent engagement strategies for an evidence-based parent-mediated intervention for young children at risk for autism spectrum disorder. *Journal of Community Psychology*, 48(4), 1215-1237. <https://doi.org/10.1002/jcop.22347>
- Schuck, R. K., Dwyer, P., Baiden, K. M., Williams, Z. J., & Wang, M. (2024). Social validity of pivotal response treatment for young autistic children: Perspectives of autistic adults. *Journal of Autism and Developmental Disorders*, 54(2), 423-441. <https://doi.org/10.1007/s10803-022-05808-4>
- Szlamka, Z., Hanlon, C., Tekola, B., Pacione, L., Salomone, E., WHO CST Team, Servili, C., & Hoekstra, R. A. (2022). Exploring contextual adaptations in caregiver interventions for families raising children with developmental disabilities. *PLoS One*, 18(12), Article e0295831. <https://doi.org/10.1371/journal.pone.0295831>

## Staff Competencies for Implementing NDBI

Studies are beginning to identify key competencies needed to deliver NDBIs effectively. Studies have found that interdisciplinary competencies including knowledge of early childhood development, NDBI strategies, family-entered practices, cultural responsiveness, caregiver coaching, and teaming are active ingredients in effective NDBI (Ingersoll et al., 2024; Zwaigenbaum et al., 2015). Others have underscored the importance of cultural competence and flexibility when individualizing services to the preferences, priorities, and culture of families (Pickard et al., 2023). Studies also note that resource provision and supportive leadership are key components to institutionalizing the use of NDBIs by shaping the perceptions and attitudes of practitioners (Aranbarri et al., 2021). The following references describe key competencies needed to implement NDBIs with fidelity.

- Aranbarri, A., Stahmer, A., Tablott, M., Miller, M., Drahota, A., Pellecchia, M., Barber, A., Griffith, E., Morgan, E., & Rogers, S. (2021). Examining US public early intervention for toddlers with autism: Characterizing services and readiness for evidence-based practice implementation. *Frontiers in Psychiatry*, 12, Article 786138. <https://doi.org/10.3389/fpsyt.2021.786138>
- Ingersoll, B., Douglas, S. N., Brodhead, M. T., Barber, A., & Kaczmarek, L. A. (2024). Interdisciplinary competencies for implementing NDBIs with young children with autism and other social communication challenges. *Journal of Early Intervention*, 46(2), 138-154. <https://doi.org/10.1177/10538151231218928>
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## Common NDBI Programs

Several manualized NDBIs exist. They all share the common feature of mediating the child's learning through planned and serendipitous interactions with the caregiver. Some NDBIs focus on play routines or social play routines since children tend to have high interest in play and are motivated to engage in play activities. Predominantly play-based NDBIs include Pivotal Response Treatment (PRT), Play and Language for Autistic Youngsters (PLAY) Project, Joint Attention, Symbolic Play, Engagement, and Regulation (JASPER), the Early Start Denver Model (ESDM), and Pathways Parent Training Program. Other NDBIs have a broader focus on the range of everyday routines and activities that make up the fabric of a family's life, since the amount of time some caregivers may have available to join in the child's play may be limited. Using routines that occur throughout the day may provide more opportunities for parents to use effective strategies to engage their child in the interest-based features of an activity (van Noorden, 2024). Common NDBIs used across a range of activities include Enhanced Milieu Teaching (EMT), incidental teaching, Improving Parents as Communication Partners (Project ImPACT), and Developmentally Appropriate Treatment for Autism in Toddlers (Project DATA). Below are sources of information about play-based and routine-based NDBIs.

- Hancock, T. B., Ledbetter-Cho, K., Howell, A., Lang, R. (2016). Enhanced Milieu Teaching. In R. Lang, T. Hancock, & N. Singh (Eds.), *Early intervention for young children with autism spectrum disorder: Evidence-based practices in behavioral health* (pp. 177-218). Springer. [https://doi.org/10.1007/978-3-319-30925-5\\_7](https://doi.org/10.1007/978-3-319-30925-5_7)
- Ingersoll, B., & Wainer, A. (2013). Initial efficacy of Project ImPACT: A parent-mediated social communication intervention for young children with ASD. *Journal of Autism and Developmental Disorders*, 43, 2943-2952. <https://doi.org/10.1007/s10803-013-1840-9>
- Mahoney, G., & Solomon, R. (2016). Mechanism of developmental change in the PLAY Project home consultation program: Evidence from a randomized control trial. *Journal of Autism and Developmental Disorders*, 46, 1860-1871. <https://doi.org/10.1007/s10803-016-2720-x>
- Rollins, P. R., Campbell, M., Hoffman, R. T., & Self, K. (2016). A community-based early intervention program for toddlers with autism spectrum



disorders. *Autism*, 20(2), 219-232. <https://doi.org/10.1177/1362361315577217>

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### Conclusion

This CASEmaker bibliography provides sources of information about the underpinnings, outcomes, and social validity of NDBIs. NDBIs represent a significant advancement in early intervention for children with autism spectrum disorder. These interventions, characterized by their integration of natural learning environments and evidence-based caregiver coaching, effectively enhance social communication, cognitive abilities, and adaptive behavior in children with autism. Research supports the positive outcomes associated with NDBIs, highlighting their social validity and broad acceptance among caregivers and practitioners.

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