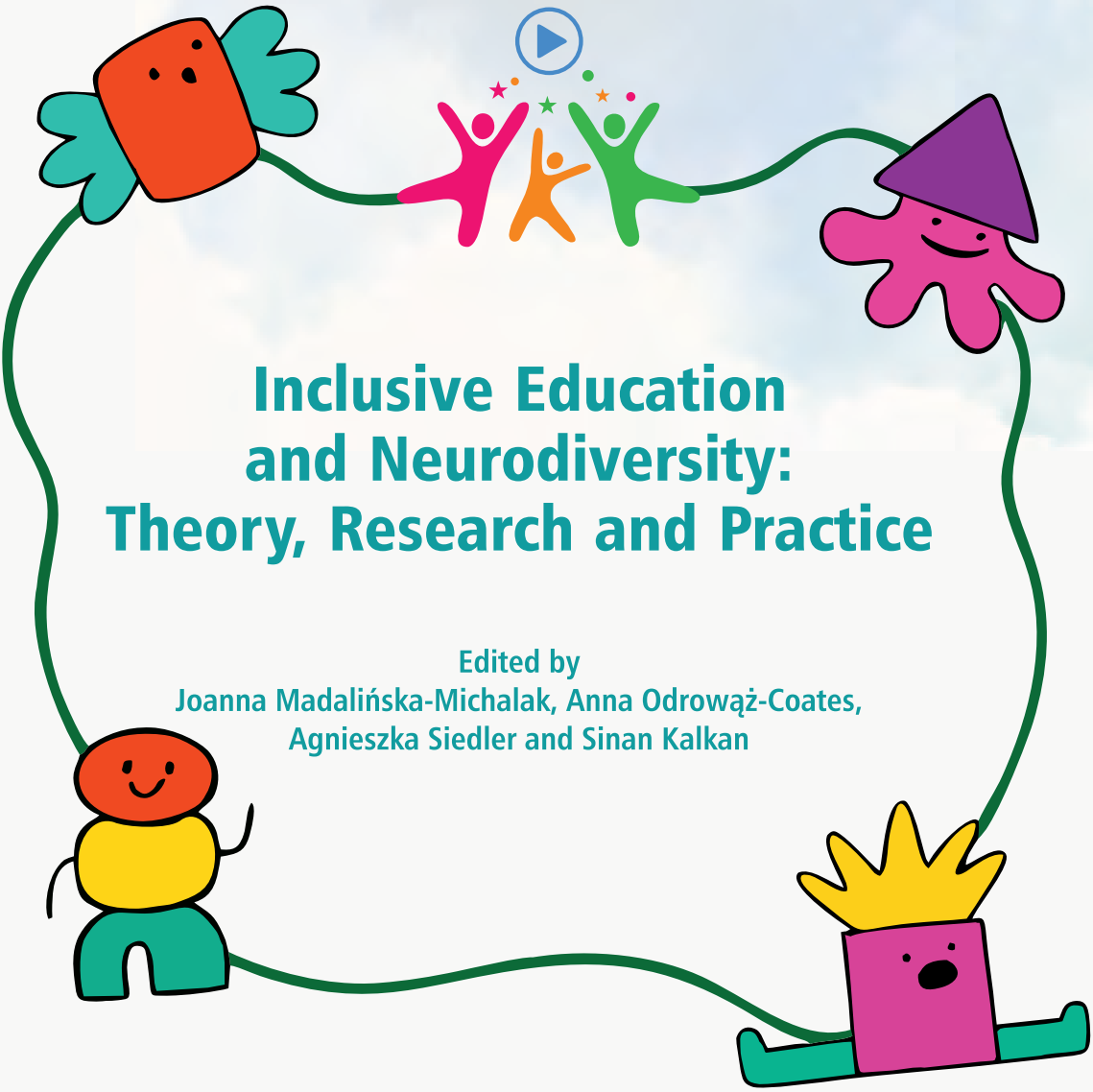

Inclusive Education and Neurodiversity: Theory, Research and Practice

Edited by
Joanna Madalińska-Michalak, Anna Odrowąż-Coates,
Agnieszka Siedler and Sinan Kalkan

UNESCO/Janusz Korczak Chair Book Series
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Dedication

This volume is dedicated to educators – particularly teachers and preservice teachers – whose daily work, professional commitment, and continuous development advance the principles of inclusive and equitable quality education for all.

It is dedicated to children with autism spectrum disorder and to all learners whose diverse ways of experiencing, understanding, and engaging with the world continue to challenge and enrich educational practice.

It is also dedicated to families, researchers, and practitioners whose efforts contribute to building more inclusive, responsive, and equitable learning environments grounded in the values of inclusion, participation, and lifelong learning, in alignment with the Sustainable Development Goals, UNESCO's Education Agenda, and the fundamental values of the European Union, particularly respect for human dignity, equality, and diversity.

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FOREWORD

CHARTING A PATH FORWARD FOR INCLUSIVE EDUCATION AND PRACTICE AROUND NEURODIVERSITY

Every child deserves to be seen. Seen not as a diagnosis, a behavioral profile, or a problem to be managed, but as a full human being whose way of moving through the world has value. Their differences carry meaning, and their potential depends in large part on whether the adults and institutions around them respond with curiosity and care rather than fear or exclusion. Such convictions animates every chapter of this volume, and it is the conviction I bring to these opening pages.

I am honored to contribute the Foreword to *Inclusive Education and Neurodiversity: Theory, Research and Practice*, edited by Joanna Madalińska-Michalak, Anna Odrowąż-Coates, Agnieszka Siedler, and Sinan Kalkan. What the editors and contributors have assembled is more than a scholarly collection. It is a sustained and deeply humane argument for why the education of neurodiverse children matters and why prevailing approaches demand change.

Emerging from the Erasmus+, funded EARLY-ASD project and the UNESCO/ Janusz Korczak Chair Book Series, the volume reflects an international and collaborative spirit. Contributors from Poland, Türkiye, Israel, the United Kingdom, Romania, Sweden, and the United Arab Emirates address autism and neurodiversity across educational contexts, examining diagnosis, early intervention, digital pedagogy, family support, motor functioning, social competence, and the often under-examined experience of loneliness among people with intellectual disabilities. Taken together, the chapters offer one of the most comprehensive and internationally grounded treatments of autism and neurodiversity in current educational scholarship.

The book is organized into sections. The first establishes conceptual and diagnostic foundations, addressing the differentiation of ASD from ADHD, attachment disorders, and trauma-related conditions; the emerging role of artificial intelligence in early intervention; the redesign of digital social stories to support inclusion and intersectionality; and the implications of the neurodiversity paradigm for how we talk about difference and identity. The sec-

ond section turns toward practice, drawing on evidence-based interventions informed by the NCAEP systematic review, findings from the EARLY-ASD project on bridging research and classroom realities, the central role of families as partners in development, and a cross-national study of loneliness that closes the volume with a sobering account of what remains at stake.

Across this work, the contributors consistently resist easy answers. Diagnosis, they remind us, is not an endpoint but a beginning. One that can mislead when detached from developmental history, cultural context, and a child's wider social environment. Early intervention matters, but only when grounded in evidence, delivered with care, and sustained by families who are genuinely empowered rather than merely instructed. Digital tools offer promise, but only when they deepen relationships rather than substitute for them.

Running beneath the scholarship is a commitment that deserves explicit recognition: empathy, not as sentiment, but as a professional discipline. It is the effort to take seriously what it means to be a child who processes the world differently, a parent navigating systems not designed with their family in mind, or a teacher striving to support every student without adequate preparation or support. The chapter on loneliness among persons with intellectual disabilities brings this moral dimension into sharp relief, naming social isolation not as an unfortunate byproduct but as a failure of the systems we have built.

Yet rigorous and compassionate scholarship is not enough. Its value is found in whether it prompts action. I therefore close with a challenge to those who will read this volume.

To researchers: do not allow your findings to remain confined to journals and conferences. The distance between what we know and what occurs in classrooms, clinics, and policy offices remains vast. Pursue the partnerships and modes of dissemination that give your work life beyond the academy. The EARLY-ASD project offers a compelling model of what becomes possible when universities work alongside teachers, families, and communities.

To practitioners and educators: approach this book not as confirmation, but as an invitation to deeper inquiry. The diagnostic complexities described here have real consequences. A child whose trauma is misread as autism, or whose autism is dismissed as misbehavior, is a child whose needs are unmet. Invest in professional learning, advocate for interdisciplinary collaboration, and recognize families not as obstacles, but as essential partners.

To policymakers: the evidence is not new. What has lagged is the will to act at scale and with coherence. The chapters on social work preparedness, family empowerment, and enduring loneliness are also indictments of policy failure. Read them accordingly.

And to all of us, as members of shared communities: inclusion is not a technical challenge with a technical fix. It is a question of values. Of whether we are willing to build institutions that accommodate the full range of human variation. This volume makes a compelling and evidence-based case that we must. The children at the center of this scholarship are not abstractions. They are in our classrooms, our neighborhoods, and our families. They are waiting for our practices and our policies to catch up with what research has long made clear.

I am grateful to the editors for their vision and labor, and to the contributors for the rigor and humanity they bring to these pages. This is scholarship that reminds us why the work matters.

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PREFACE

Joanna Madalińska-Michalak
on behalf of the EARLY-ASD Project Consortium

This volume, *Inclusive Education and Neurodiversity: Theory, Research and Practice*, is the outcome of collaborative work developed within the Erasmus+ project EARLY-ASD – *Upskilling Preservice Teachers to Support Young Children with Autism Spectrum Disorder through Digital Social Stories* (2024-1-PL01-KA220-HED-000246304), coordinated by the University of Warsaw. The project brings together an international consortium of higher education institutions and educational technology organisations committed to improving teacher education and inclusive practices for children with autism spectrum disorder (ASD), starting from early childhood.

EARLY-ASD adopts a cross-disciplinary approach, integrating expertise from special education, early childhood education and care (ECEC), and educational technologies. The consortium aims to strengthen national and international cooperation among institutions involved in teacher education, with a particular focus on preparing pre-service and early-career teachers to support the social, emotional, and educational development of autistic children. In doing so, the project contributes to building sustainable networks of collaboration, knowledge exchange, and capacity building across participating countries.

The book has been prepared in close connection with the EARLY-ASD Conference 2026, *Diversity, Neurodiversity, and Digital Social Stories in Early Childhood Education*, co-organized by the University of Warsaw (UW) and Maria Grzegorzewska University (APS), to be held in Warsaw, Poland. The volume reflects the scientific and practical discussions developed within this context and is intended to support the dissemination of project outcomes, as well as broader academic and professional dialogue on inclusive education.

The publication is co-financed within the Erasmus+ project 2024-1-PL01-KA220-HED-000246304 (EARLY-ASD) and supported by the Polish Educational Research Association (PERA), Warsaw and Poznań Divisions. This support has been crucial in enabling the consolidation, dissemination, and further development of project results, as well as in fostering interdisciplinary dialogue on teacher education, inclusion, and neurodiversity.

The EARLY-ASD consortium consists of the University of Warsaw (Poland, lead partner), Maria Grzegorzewska University (Poland), Çanakkale Onsekiz Mart University (Türkiye), Complutense University of Madrid (Spain), University of Bucharest (Romania), and Mellis Educational Technologies (Türkiye). Together, these partners form a cross-national and interdisciplinary network dedicated to advancing inclusive education through research, innovation, and practice-based collaboration.

This volume emerges at a time when education systems worldwide are increasingly called upon to respond to the growing recognition of neurodiversity as a fundamental dimension of human development and learning. While theoretical, empirical, and policy developments in the field have advanced significantly in recent decades, the translation of knowledge into coherent and sustained educational practice remains uneven across contexts. This book seeks to address this challenge by bringing together diverse perspectives on inclusive education, neurodiversity, and autism spectrum disorder (ASD), with particular emphasis on the intersections between research, policy, and practice.

The volume is situated within the UNESCO/Janusz Korczak Chair Book Series and is published by The Maria Grzegorzewska University Press (Warsaw, 2026). It reflects collaborative work among scholars and practitioners from multiple countries and disciplinary backgrounds, underscoring the inherently interdisciplinary and international nature of inclusive education.

The central aim of this edited collection is to explore how inclusive education and neurodiversity can be understood, conceptualized, and enacted across different educational systems and professional contexts. The volume is structured in two sections. The first section, *Foundations of Inclusive Education, Neurodiversity and Early ASD*, provides conceptual, theoretical, and policy-oriented perspectives, including clinical differentiation, neurodiversity-affirming approaches, artificial intelligence in early intervention, digital social stories, assistive technologies, and cross-national perspectives on inclusion. The second section, *Interventions, Implementations and Lifespan Outcomes*, focuses on applied research, intervention models, implementation challenges, and lived experiences across the lifespan, including family empowerment, early intervention practices, physical functioning, social competence, and loneliness among individuals with intellectual disabilities.

A key premise of this volume is that advancing inclusive education requires more than the accumulation of evidence. It necessitates sustained attention to the conditions under which evidence is interpreted, adapted, and

implemented within diverse educational systems. The chapters therefore highlight not only what is known but also how knowledge is translated, or fails to be translated, into practice.

I would like to express my sincere gratitude to all authors who contributed to this volume for their scholarly engagement, intellectual generosity, and commitment to advancing inclusive education and neurodiversity research. I am also deeply grateful to the reviewers for their constructive feedback and to The Maria Grzegorzewska University Press for their professionalism and support throughout the publication process.

I extend my appreciation to all EARLY-ASD project partners for their collaboration, expertise, and continuous engagement throughout the project lifecycle, with special thanks to the University of Warsaw as the coordinating institution and to all partner institutions whose commitment has made this work possible. I also acknowledge the valuable contribution of the Project Advisory Board members and invited experts, whose insights have significantly enriched the intellectual development of both the project and this volume. Finally, I warmly recognize the participants, educators, pre-service teachers, families, and practitioners involved in EARLY-ASD activities, whose engagement has been essential to the practical relevance of this work.

It is my hope that this volume will contribute to ongoing international dialogue and provide meaningful insights for researchers, educators, policymakers, and practitioners working to create more inclusive and equitable educational environments for all learners.

SECTION I

FOUNDATIONS OF INCLUSIVE EDUCATION, NEURODIVERSITY AND EARLY ASD

CHAPTER 1

NEURODIVERSITY AND INCLUSIVE EDUCATION: KEY CONCEPTS AND PERSPECTIVES

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INTRODUCTION: NEURODIVERSITY, AUTISM, AND INCLUSIVE EDUCATION

Who belongs in the classroom? The question sounds simple, even self-evident. It is neither. The history of special education is, to a significant extent, the history of how successive generations have answered it – each answer shaped by prevailing assumptions about human difference, the purposes of schooling, and the obligations of the state toward those whose minds and bodies do not conform to normative expectations embedded in educational systems. The concept of neurodiversity – the proposition that variation in human neurological development is a natural feature of the species rather than a deviation from a fixed norm – can be understood as another moment in this longer historical trajectory. More importantly, it reframes the question in ways that carry both theoretical and practical implications, rather than merely redistributing individuals within systems that remain structurally unchanged.

The term neurodiversity was introduced in the late 1990s by Judy Singer, a sociologist who is herself autistic, to describe the range of neurological variation within the human population – not as a clinical classification, but as a way of recognising cognitive diversity analogous to biodiversity (Singer, 1999). Since then, the concept has developed in complex and sometimes contested ways. Autistic scholars and self-advocates have used neurodiversity to challenge deficit-based narratives that frame autism primarily as a condition requiring remediation. Disability studies scholars have examined its relation to social and political models of disability, at times extending and at times critiquing its assumptions. Clinical and philosophical debates, in turn, have asked how an affirmation of neurological difference can be reconciled with the lived reality of support needs among individuals requiring substantial assistance (Chapman, 2021; Dwyer, 2022; Jaarsma & Welin, 2012). These discussions remain unresolved, and any attempt to present them otherwise risks oversimplification. Within this broader intellectual landscape, autism spectrum disorder has become a particularly significant site where these tensions are enacted within educational systems.

Against this background, this chapter situates neurodiversity, inclusive education, and early autism spectrum disorder (ASD) within a shared analytical frame. It treats them as conceptually interconnected while acknowledging persistent theoretical and practical tensions. It traces the shift from deficit-oriented understandings of autism toward neurodiversity-informed perspectives, while also examining the implications of this shift for educational systems that remain largely structured around neurotypical assumptions. Inclusive education is approached here not as a pedagogical option, but as a systemic and rights-based obligation. Particular attention is given to early childhood, understood as a critical period for development, intervention, and institutional response.

The discussion further addresses the persistent gap between research, policy, and practice. This gap reflects not only challenges of knowledge transfer, but also the structural and organisational conditions that shape how educational systems operate. The chapter also considers the increasing role of digital technologies and artificial intelligence in early ASD contexts, attending both to their potential and to the new forms of inequality they may generate or intensify. Alongside these system-level dimensions, attention is given to teachers, families, and broader support systems as central actors in the enactment of inclusive education.

Rather than resolving these debates, the chapter works within them, treating their tensions as analytically productive. The contributors to this volume approach neurodiversity, early ASD, and inclusive education from clinical psychology, pedagogy, social work, occupational science, digital technology, and disability studies – perspectives that do not easily converge. The coherence of the volume does not rest on theoretical consensus. It rests instead on a more demanding proposition: that autistic children, young people, and adults cannot be positioned as marginal participants in educational and social systems designed without them in mind. Formal inclusion alone is insufficient. What is required is sustained critical engagement with the neurotypical assumptions embedded in institutional routines, spatial arrangements, pedagogical practices, and regimes of recognition.

The chapters are organised to move from conceptual and policy foundations, through intervention research, to applied and practice-oriented analyses of educational, clinical, and social systems.

FROM DEFICIT MODELS TO THE NEURODIVERSITY PARADIGM

Educational and clinical accounts of autism were, for much of the twentieth century, structured by a language of deficit. Kanner's (1943) early description of infantile autism is difficult to read outside this historical context: the child is defined primarily through absence, particularly in relation to expected forms of affective reciprocity and social engagement. Subsequent research did not simply reproduce this orientation; it systematised and extended it. Autistic individuals were consistently characterised in terms of impairments in social understanding, conversational reciprocity, sensory regulation, and adaptive functioning. Diagnostic classifications gave this epistemic orientation institutional authority. Even in DSM-5-TR, where autism is framed within a neurodevelopmental model, the underlying classificatory logic continues to be organised around impairment (American Psychiatric Association, 2022). This continuity is significant, as it indicates that conceptual change in autism research has not fully displaced the earlier grammar of deficiency.

Oliver's (1990) social model of disability introduced a decisive shift in this conceptual architecture. Its intervention was not to deny impairment or to idealise difference, but to relocate analytical emphasis. Disability could no longer be understood solely as an attribute of the individual body or mind; it also

had to be read through the organisation of environments, institutional routines, communication norms, and evaluative assumptions that structure participation. For autistic learners, this reorientation is consequential: the guiding question shifts from how the child might approximate normative expectations to how educational environments produce or sustain experiences of difficulty. This perspective opens analytical and practical space for environmental adaptation, alternative communication systems, sensory responsiveness, and curriculum design grounded in diverse learning profiles.

The neurodiversity paradigm extends this critique, although not without internal tensions. It not only emphasises the socially constructed dimensions of disability, but also advances a stronger ontological claim: neurological variation itself is a dimension of human diversity rather than a deviation from a singular normative standard (Armstrong, 2010). This claim should not be reduced to a slogan. It has significant political force, but it remains conceptually contested. Certain formulations risk marginalising experiences of distress, dependency, and substantial support need, particularly among autistic individuals with complex profiles. Nevertheless, its central provocation is difficult to dismiss: if educational systems are organised around an implicit model of the autonomous, verbally fluent, self-regulating neurotypical learner, then exclusion is not an unintended outcome but a structural effect of design.

Gierzyński (Chapter 3) examines how this paradigm has been interpreted, operationalised, and at times simplified within educational discourse, particularly in relation to identity formation and affirmative approaches to autism. His analysis foregrounds the conceptual tensions involved in treating autism simultaneously as a lived identity, a neurodevelopmental condition, and a category of educational practice. The volume does not attempt to resolve these tensions; their persistence is treated as analytically productive rather than problematic.

What the shift from deficit-based models to neurodiversity-informed frameworks has achieved, even in the absence of theoretical consensus, is a reorganisation of the questions that structure educational thought and practice. The central concern is no longer limited to identifying deficit and its remediation, but extends to what conditions are required for flourishing, and what forms of institutional responsibility follow from this recognition. This shift is not merely semantic. It reconfigures the normative foundations of educational practice. The chapters that follow trace its implications across contexts that differ substantially in method, scale, and disciplinary orientation, but are unified by their engagement with these redefined questions.

INCLUSIVE EDUCATION AS A HUMAN RIGHTS IMPERATIVE

The claim that inclusive education constitutes a human rights obligation – rather than a policy preference or a pedagogical orientation – has been firmly established in international law since the adoption of the Convention on the Rights of Persons with Disabilities (CRPD) in 2006. Article 24 requires States Parties to ensure access to inclusive, quality, and free primary and secondary education within local communities, together with reasonable accommodations and individualized supports necessary for effective participation (United Nations, 2006). General Comment No. 4 of the UN Committee on the Rights of Persons with Disabilities (2016) further clarifies that inclusion cannot be reduced to physical placement in mainstream settings. If teaching remains inaccessible, if learning environments are not adapted, and if participation depends on a child's capacity to accommodate an unchanged system, then the right to inclusive education is not fulfilled.

This interpretation reconfigures the moral grammar of schooling. Belonging cannot be understood as a discretionary inclusion granted once a child is deemed manageable or sufficiently close to normative expectations. Instead, responsibility shifts towards educational systems themselves – toward the institutional, pedagogical, and structural conditions that produce exclusion, segregation, or conditional participation. Despite the normative clarity of this framework, its implementation remains uneven, and in many contexts contested in practice.

The distance between legal commitments and lived educational experience is well documented across European contexts. The European Agency for Special Needs and Inclusive Education (2018) demonstrates significant variation among member states in translating inclusive policy into school-level practice, with disparities shaped by resource allocation, teacher preparation, institutional cultures, and governance structures. In the case of autistic learners, this variability is particularly visible. While some inclusive placements, when adequately supported, are associated with improved academic, communicative, and social outcomes, others reproduce exclusion within mainstream settings, where sensory environments, limited support, and weak peer engagement undermine meaningful participation (Humphrey & Lewis, 2008; Lindsay, 2007). In this sense, legal and policy frameworks are insufficient on their own to guarantee inclusion in practice.

UNESCO's Global Education Monitoring Report (2020) situates inclusion and equity at the centre of broader educational transformation, framing

exclusion simultaneously as a systemic failure of schooling and as a violation of human rights. This framing is important insofar as it prevents neurodiversity from being confined to a narrow domain of special education policy. Instead, it positions inclusion as a systemic responsibility across all levels of education systems.

Within this volume, this perspective is developed further through analyses of policy implementation, teacher preparation, family involvement, and digital infrastructures. As demonstrated in the contributions by Memiş (Chapter 4), Madalińska-Michalak (Chapter 6), and Ben Ari (Chapter 7), among others, these domains function not as separate policy areas, but as interdependent conditions that determine whether rights-based commitments acquire practical force or remain declarative principles with limited impact on children's everyday educational experiences.

EARLY ASD: WHY THE EARLY YEARS MATTER

The case for early intervention in ASD is not only pedagogical; it is also developmental and, to a more limited but still relevant extent, neurobiological. During the first three to five years of life, neural systems show heightened sensitivity to environmental input, and synaptic plasticity provides part of the explanatory background for why timing matters in early development. Dawson et al. (2012), for example, reported that early behavioural intervention may be associated with measurable changes in cortical responses to social stimuli. This finding should be interpreted cautiously. It does not imply that early intervention "reorganizes" autism itself, but it does make it difficult to sustain a purely delayed or reactive approach once developmental differences are evident.

The broader intervention literature converges on a similar conclusion, while also emphasising heterogeneity, dosage effects, intervention quality, and the centrality of family context. Across studies, children who receive evidence-informed support in the earliest developmental period tend to show more favourable trajectories in communication, adaptive functioning, and cognitive development compared to those whose intervention begins later, even when intervention models are broadly comparable (Daniolou et al., 2022; Sandbank et al., 2020). Timing, in this sense, is not a peripheral variable but part of the intervention mechanism itself.

Prevalence data further reinforce the relevance of early identification and support. Recent surveillance in the United States estimates that approximately

1 in 31 eight-year-old children meet diagnostic criteria for ASD (Shaw et al., 2025), while global estimates, although variable due to methodological differences, consistently position autism as one of the most frequently identified neurodevelopmental conditions in early childhood (Zeidan et al., 2022). This epidemiological reality means that early childhood educators, paediatricians, speech and language therapists, and family support professionals will routinely encounter autistic children, including those without a formal diagnosis. This creates a clear professional responsibility to recognise developmental differences, document them responsibly, and support families in accessing appropriate assessment and intervention pathways. It does not, however, entail turning educators into diagnosticians; maintaining this distinction remains essential for both ethical and practical reasons.

Early identification is further complicated by the phenotypic overlap between ASD and other developmental or clinical presentations. As Odachowska-Rogalska (Chapter 2) demonstrates, differential diagnosis is particularly challenging where ASD intersects with ADHD, attachment-related difficulties, trauma-related presentations, or language disorders. In such cases, behavioural similarities can obscure underlying differences, especially when clinical interpretation is constrained by narrow diagnostic frameworks. At the same time, education, health, and social care systems operate with different temporalities and conceptual vocabularies. As a result, children may remain in educational settings where teachers must already respond to complex needs, uncertainty, or distress, while clinical clarification is still pending. Papieska (Chapter 13) provides a concrete case study of a child with emotional dysregulation and executive functioning difficulties, illustrating how such profiles are negotiated in everyday classroom practice where diagnostic clarity and pedagogical response do not always align.

The emphasis on early years in this volume reflects more than a preventive orientation. Early childhood is a critical period in which communicative, social, and emotional patterns begin to consolidate, and in which parent–child interaction becomes a primary site of developmental shaping. Delays in providing support during this phase may widen the gap between developmental needs and environmental responsiveness. Importantly, this is also the period for which the empirical evidence base on intervention is most robust. Waligórska, Sam, and Odom (Chapter 11) examine this evidence through the framework of evidence-based practices in early autism intervention, while Meda et al. (Chapter 9) foreground family empowerment as a structural component

of early support systems. Taken together, these contributions resist overly linear interpretations of early intervention. They suggest that while early support is consistently associated with more favourable outcomes, its effectiveness depends on the quality, ethical orientation, and relational conditions of its implementation. The more difficult question, therefore, is not whether early intervention matters, but under what conditions it is justified, effective, and responsive to both children and families.

BRIDGING RESEARCH, POLICY, AND PRACTICE

Inclusive education and early ASD intervention share a persistent challenge: systems often possess more knowledge than they are able, or willing, to translate into practice. The distance between evidence and implementation is therefore not simply a matter of weak dissemination. It is produced within the institutional organization of the field itself. Researchers, teachers, clinicians, families, and policy actors operate with different temporalities, constraints, and assumptions about what constitutes usable knowledge. What emerges is not a gap to be closed, but a structural form of friction in the circulation of educational knowledge.

Researchers generating evidence on intervention effectiveness work within methodological frameworks oriented toward validity, reliability, and generalizability. These frameworks do not always map neatly onto the contingent and relational conditions of educational practice. Practitioners, by contrast, make situated decisions in real time, drawing on contextual and experiential knowledge that is often absent from formal research designs. Policymakers operate under yet another set of logics, shaped by political priorities, fiscal constraints, and administrative cycles that may not align with either research or practice.

Implementation science has developed a substantial body of work aimed at analysing and improving this translation process (Fixsen et al., 2013; Dingfelder & Mandell, 2011). Its central insight is that the uptake of evidence-based practices cannot be reduced to knowledge transfer. It depends instead on the alignment of organizational structures, professional capacities, and institutional cultures that determine whether practices can be enacted with sufficient fidelity to produce the outcomes demonstrated in research settings. The AFIRM platform – discussed in the contribution by Waligórska, Sam, and Odom (Chapter 11)–illustrates both the scale of contemporary digital dissemination (with over one million module completions) and its limits, insofar as in-

creased knowledge acquisition does not automatically translate into sustained changes in classroom practice.

Policy frameworks for inclusive education and early ASD intervention frequently evolve more slowly than research evidence and diagnostic practice. The European Disability Strategy 2021–2030 (European Commission, 2021) articulates strong commitments to inclusion and accessibility; however, translating these commitments into binding legislative mechanisms, resource allocation models, and accountability structures remains a persistent challenge that exceeds the scope of strategic documents themselves.

This volume engages these tensions directly. Memiş (Chapter 4), together with Madalińska-Michalak and Kalkan (Chapter 10), examine AI governance frameworks and EU-funded innovation initiatives as embedded interventions within educational systems already shaped by institutional inertia, uneven capacity, and professional constraints. These analyses show that policy frameworks do not operate in a neutral space of implementation, but enter environments structured by pre-existing routines, hierarchies, and interpretive practices. Consequently, policy coherence on paper does not guarantee coherence in practice.

The tensions identified across these contributions should not be interpreted simply as implementation failure. Such a reading would be reductive. Rather, they point to a more fundamental challenge: system-level transformation in fields where knowledge production, professional identity, and institutional constraint are deeply interdependent and often misaligned.

THE ROLE OF TEACHERS, FAMILIES, AND SYSTEMS

Educational reform debates often become abstract until the question of teachers is brought back into focus. It is difficult to sustain any strong account of inclusive education without examining what teachers know, what they believe, and what they are able to enact in everyday classroom practice. Research on inclusive education repeatedly returns to this point. Where teacher preparation is limited, where professional identity remains shaped by normative assumptions about learners, and where confidence in inclusive pedagogy is weak, policy intentions rarely translate into meaningful classroom change (Loreman et al., 2011; Lindsay et al., 2013). These dynamics are visible in practice. Teachers with a working understanding of ASD, who interpret behaviour developmentally rather than primarily as disruption, and who approach neurodiversity as

part of ordinary classroom variation, are more likely to adopt practices that support participation rather than restrict it.

Initial teacher education does not consistently prepare graduates for this complexity. Reviews of pre-service programmes indicate a recurring pattern of limited coverage of ASD, fragmented engagement with inclusive pedagogy, and insufficient integration of theory with classroom realities (European Agency for Special Needs and Inclusive Education, 2018). Subsequent professional development rarely compensates for these gaps. It is often short-term, decontextualised, and insufficiently embedded in teachers' daily practice to support sustained change. Against this background, the EARLY-ASD project, discussed in Chapter 10 (Madalińska-Michalak & Kalkan), foregrounds the intersection of teacher learning, digital competence, and evidence-informed practice in early autism support. Within the same technological and pedagogical horizon, Madalińska-Michalak (Chapter 6) examines teacher preparedness and competence development in relation to assistive technologies, while Ben Ari (Chapter 7) analyses the role of digital tools and immersive learning environments in inclusive education in Israel.

Families cannot be positioned as secondary actors in processes of inclusion. Their role is constitutive rather than supplementary. What is often described as "family empowerment" involves a reconfiguration of how parents understand child development and navigate institutional systems. Empirical research on early intervention consistently shows that when parents are supported to implement evidence-based strategies within everyday routines, developmental gains are more likely and tend to be more stable over time (Dunst & Espe-Sherwindt, 2016; Sandbank et al., 2020). However, interpreting this solely as programme effectiveness risks overlooking the relational and contextual conditions that make such practices possible. The effectiveness of parent-implemented intervention is inseparable from the everyday environments in which it unfolds, as well as from the quality of interaction between parent and child.

At the same time, the relationship between families and professional systems remains uneven. Diagnosis, access to services, and communication with professionals are rarely linear processes. Parents frequently navigate multiple institutional logics, each governed by distinct expectations, vocabularies, and constraints. Meda et al. (Chapter 9), based on qualitative research in an early intervention centre in the United Arab Emirates, illustrate how these dynamics are experienced in practice and how they shape participation in intervention systems. Their analysis complicates any assumption that knowledge of "what

works" is sufficient in itself. The conditions under which support is delivered, the relational infrastructures of intervention, and the positioning of families within decision-making processes all shape what "effectiveness" actually means. Extending this perspective, Grudziewska (Chapter 8) examines social work systems in Poland, highlighting structural unevenness in their preparedness to support neurodiverse individuals within welfare frameworks.

DIGITAL TRANSFORMATION AND NEW INEQUALITIES

Digital technologies now occupy a prominent place in early ASD education, but their emergence cannot be read as a straightforward narrative of progress. Some of their affordances are particularly relevant for autistic learners, including stable visual presentation, multimodal input, adjustable feedback, and reduced reliance on rapid verbal processing. These features help explain why tools such as augmentative and alternative communication systems and digital social stories have become integrated into evidence-informed practice rather than remaining peripheral innovations (Alzrayer et al., 2014; Hume et al., 2021). At the same time, the category "digital technology" is too heterogeneous to sustain a unified analytical claim: communication devices, social story applications, adaptive learning platforms, and AI-based diagnostic systems raise distinct pedagogical and ethical questions. Kara (Chapter 5) extends this discussion by examining digital social stories through the lens of intersectionality, drawing attention to issues of representation, identity, and inclusion in digital educational content.

The growing interest in artificial intelligence in ASD contexts is particularly uneven. Research on AI-supported diagnosis, screening, and developmental monitoring has generated considerable attention, with some studies reporting high levels of accuracy. However, these findings become significantly more fragile when examined in relation to methodological design, including small or unrepresentative samples, limited external validation, and opacity in model construction. As a result, the apparent robustness of such systems often does not translate into reliable performance in real-world educational or clinical settings.

Memiş (Chapter 4) develops a critical account of these developments by challenging the prevailing technological optimism surrounding AI in ASD intervention. He demonstrates that many AI systems are trained on datasets that systematically overrepresent white, male, and Western-educated populations. This introduces structural bias into diagnostic and predictive models, which may be difficult for clinicians, educators, and families to identify or

contest due to limited transparency in algorithmic decision-making. Consequently, systems that appear effective in controlled environments may perform inconsistently in more complex contexts, such as multilingual families, under-resourced preschools, or diverse clinical populations. The central issue is therefore not only technical but also distributive.

Where AI-based screening tools function less reliably for certain populations, or where access is concentrated in well-resourced settings, technological development risks reproducing and intensifying existing inequalities rather than reducing them. Delayed or missed identification in turn leads to delayed access to intervention, with consequences that are unevenly distributed across social groups. Ethical frameworks articulated by WHO (2021), UNICEF (2025), and UNESCO (2021) emphasise transparency, accountability, and non-discrimination in the deployment of digital technologies in health and education. Current applications in ASD-related AI do not consistently meet these standards, a limitation that requires more explicit recognition within the field.

Digital inequalities extend beyond algorithmic systems to broader questions of access and infrastructure. Research on digital inclusion among disabled children consistently shows that access to devices, stable connectivity, and appropriately adapted software is closely linked to socioeconomic status, thereby reinforcing pre-existing educational inequalities (Soldatic et al., 2025). In this context, Ben Ari (Chapter 7) analyses large-scale implementation of immersive digital learning environments in Israel, including the Athena Fund programme, which reached over 9,000 teachers and 72,000 students through digital tool distribution and the establishment of 130 immersive learning environments. This case demonstrates both the transformative potential of sustained institutional investment in digital inclusion and the structural conditions required for its effectiveness. These include not only access to technology, but also continuous professional development for educators and ongoing technical and infrastructural suport – conditions that remain unevenly distributed across education systems, including in high-income contexts.

TOWARD DIGNITY, EMPATHY, AND SUSTAINABLE INCLUSION

The conceptual architecture of this volume rests on a claim that is neither self-evident nor uncontested: that the quality of an educational system cannot be meaningfully separated from its treatment of those whose participation re-

quires the greatest accommodation. This is not primarily a question of efficiency or cost-effectiveness, although the economic arguments for early intervention and inclusive education have been made persuasively (Knapp et al., 2011). Rather, it is a normative claim that situates education within a broader ethical and rights-based framework.

At its core, this argument rests on the recognition that dignity – understood as the irreducible worth of each person as a subject of their own life – is not contingent upon cognitive performance, communicative fluency, or conformity to socially constructed norms of behaviour. Educational systems that restrict the attribution of dignity to those who meet implicit thresholds of neurotypicality do not merely fall short of an ideal standard; they actively reproduce exclusion in ways that human rights frameworks identify as structural violation.

Empathy is frequently invoked in discussions of inclusive education, yet its operational meaning is far from straightforward. It may refer to a teacher's capacity to interpret a child's actions not as disruption but as communication, to recognise sensory rather than behavioural forms of distress, or to make sense of silence and withdrawal without immediately translating them into deficit. Such interpretive practices are significant, as classroom interaction is in part shaped by how educators frame what they observe. However, empathy cannot be reduced to an individual disposition. On its own, it does not reconfigure pedagogical structures, assessment regimes, or the material organisation of classrooms. A more demanding question, therefore, concerns whether educational environments are designed on the assumption of neurological variation from the outset. Several chapters in this volume engage precisely with this issue, examining models of educational design in which difference is anticipated rather than retrofitted as accommodation.

A similar tension is evident in the discourse of "sustainable inclusion," which often emerges as a response to a recurrent pattern in educational reform: interventions that appear effective under conditions of external funding or project-based support tend to lose momentum once those conditions are withdrawn. The issue, however, is not only one of continuity. It also concerns the institutional location of inclusion within education systems. Where inclusion is attached to temporary initiatives, specialist roles, or individual commitment, it remains structurally vulnerable. Its consolidation as a durable feature of educational systems requires deeper institutional reconfiguration. This would involve, among other things, embedding neurodiversity within initial teacher education curricula, developing accountability mechanisms that move

beyond placement metrics to examine the quality of participation, and recognising families as epistemic partners rather than passive recipients of expertise. None of these shifts can be easily accommodated within existing institutional logics. The contributions in this volume do not resolve this tension; rather, they demonstrate its persistence and its structural character.

The issue of loneliness (Chapter 14, Tah et al.), drawing on comparative research from Northern Ireland, Poland, Romania, and Sweden, offers a particularly stark illustration of the consequences of partial or incomplete inclusion. Loneliness among individuals with intellectual and developmental disabilities cannot be understood as an incidental outcome of educational or social participation. It functions instead as a key indicator of whether inclusion extends beyond formal placement into the domain of relational and social belonging. The finding that loneliness in this population is systematically elevated, insufficiently measured, and inadequately addressed across diverse national contexts points to a broader limitation of inclusionary policies: their tendency to prioritise structural access while neglecting the social conditions through which participation acquires substantive meaning.

CONCLUSION

This volume does not offer solutions to problems that are genuinely intractable. The relationship between neurodiversity and inclusive education is characterised by productive tensions that resist resolution: between affirming autism as a form of human diversity and acknowledging the substantial support needs that many autistic people experience; between the rights-based imperative of inclusion and the material and institutional conditions that determine whether inclusion is meaningfully realised; and between the promises of digital innovation and the structural inequalities that shape differential access to its benefits. Engaging with these tensions analytically, rather than resolving them prematurely through normative closure, constitutes one of the central commitments of the scholarship assembled here.

Across its empirical, conceptual, and policy contributions, the volume is underpinned by a shared conviction that autistic children and adults, together with their families, educators, and wider communities, are entitled to educational and social systems grounded in a substantive recognition of their humanity. This recognition does not displace critical inquiry; rather, it depends upon it. Rigorous engagement with evidence, sustained theoretical reflection, and

an honest appraisal of the limits of current systems are precisely what allow such recognition to acquire analytical and practical significance. Scholarship that attends carefully to the complexity it describes does not merely interpret the world differently; it contributes to shaping the conditions under which that world is understood.

Taken together, the chapters included in this volume span multiple disciplines, national contexts, and methodological traditions. Their contribution lies not in producing a unified account, but in mapping a field defined by contested foundations, empirically grounded yet uneven practices, persistent policy tensions, and enduring ethical commitments. It is within this structured complexity that contemporary debates on neurodiversity and inclusive education must be situated.

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CHAPTER 2

DIFFERENTIATING THE CLINICAL PRESENTATION OF ASD FROM OTHER DISORDERS IN EDUCATIONAL PRACTICE

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INTRODUCTION

Autism spectrum disorders (ASD) belong to the group of neurodevelopmental disorders characterised by persistent difficulties in the domains of social interaction, cognitive functioning, and communication abilities (Lord et al., 2020). These symptoms emerge in early development and have a significant impact on an individual's functioning across various contexts of everyday life. Contemporary diagnostic approaches emphasise the spectrum nature of the disorder, indicating considerable variability in symptom severity as well as in cognitive and adaptive functioning profiles (American Psychiatric Association [APA], 2013; World Health Organization [WHO], 2019).

Symptoms of the disorder, particularly those involving aspects of social interaction, are especially observable in educational settings attended by the child. It is often during the early stages of education that initial diagnostic hypotheses regarding a child's difficulties are formulated, and these frequently determine the direction of subsequent diagnostic inquiry. Meanwhile, the diagnosis of autism spectrum disorders may be highly demanding due to multiple factors, including aetiological determinants, the manifestation or masking of symptoms, and developmental context.

An additional factor complicating the diagnostic process is the overlap of symptoms with other clinical entities, as well as the need to conduct differential diagnosis and/or identify co-occurring disorders. In clinical practice, one of the most common challenges is differentiating ASD from such conditions as attention-deficit/hyperactivity disorder (ADHD), attachment disorders, anxiety disorders, social communication disorder, or obsessive–compulsive

disorder (APA, 2013). In particular, difficulties in social functioning and behavioural regulation may lead to misinterpretation of the clinical picture, especially in children and adolescents (Odachowska-Rogalska, 2023). Comorbidity, particularly with ADHD and anxiety disorders, may mask specific autistic features or lead to their secondary intensification (Attwood, 2007; Baron-Cohen, 2008). All these elements confirm that the diagnosis of ASD requires a multidimensional assessment including developmental history, clinical observation, and the use of standardised diagnostic tools. It is worth emphasising that the process of differentiating autism spectrum disorder within an educational setting is preliminary and functional in nature – schools do not establish a clinical diagnosis, but they play a key role in initiating it and guiding diagnostic hypotheses, thereby helping distinguish ASD from other developmental and emotional difficulties.

The aim of this article is to present key issues related to differentiating ASD from other mental and neurodevelopmental disorders, with particular emphasis on diagnostic criteria and clinical implications of accurate diagnosis, as well as to indicate selected elements that may be observed by teachers, pedagogues, or school psychologists and serve as a basis for developing diagnostic hypotheses guiding parents towards appropriate support.

CHARACTERISTICS OF THE CLINICAL PRESENTATION OF ASD IN RESEARCH

Although ASD is a neurodevelopmental disorder with considerable phenotypic heterogeneity, there are certain domains in which deficits are most evident. Symptoms described in diagnostic classifications include deficits in social communication as well as the presence of restricted and repetitive patterns of behaviour, interests, and activities (APA, 2013). Key difficulties therefore involve the domain of communication and social interaction, as well as characteristic patterns of behaviour and interests specific to the child, with symptoms emerging in early development and persisting over time (Skuse et al., 2024; Thurm et al., 2019).

There are certain difficulties in precisely defining the clinical picture, mainly due to the fact that contemporary research emphasises that autism is not a homogeneous disorder but rather a differentiated continuum in which individual children may differ significantly in levels of cognitive, linguistic, and social functioning (Lord et al., 2018). Such analyses are reflected in the diag-

nostic classifications DSM-5 and ICD-11, where the spectrum nature of autistic disorders is clearly indicated, and their presentation may deviate from earlier conceptualisations of autism. Nevertheless, these classifications also identify the domains in which children's difficulties become apparent.

One of the most characteristic areas of difficulty in children on the autism spectrum is social functioning. Research indicates that these children have a limited ability to initiate and maintain interpersonal relationships (APA, 2013; Lord et al., 2020; Skuse et al., 2024; Thurm et al., 2019; WHO, 2019). Difficulties are often observed in maintaining eye contact, understanding facial expressions and gestures, and interpreting others' intentions. These problems are associated with deficits in the so-called theory of mind, that is, the ability to attribute mental states such as beliefs, emotions, or intentions to other people (Lord et al., 2018). Consequently, children on the spectrum may experience social isolation and difficulties functioning within peer groups.

An important aspect of ASD characteristics, related to social interaction, involves communication disorders. The level of speech development in children on the spectrum is highly variable – ranging from complete absence of speech to well-developed formal language, which may nevertheless be used in an atypical manner (APA, 2013). Phenomena such as echolalia, i.e. repetition of heard utterances, as well as difficulties in understanding language in social context, particularly metaphors, irony, or indirect references, are observed. Research demonstrates that communication problems arise not only from language delays but also from differences in the processing of social and cognitive information (Frith, 2003).

Another important domain concerns patterns of behaviour and interests. Children with ASD often display repetitive movements such as hand-flapping or rocking, as well as a strong need to maintain routine and environmental stability. Changes in daily schedules may provoke intense stress and emotional reactions. Furthermore, narrow and highly focused interests are characteristic and may dominate the child's activity. Research suggests that such behaviours serve a regulatory function, helping the child cope with excessive stimulation and tension (APA, 2013; Lord et al., 2018).

The literature also emphasises the significance of sensory processing disorders. Many children on the autism spectrum respond atypically to sensory stimuli – they may be hypersensitive to sounds, light, or touch, or conversely display reduced sensitivity to stimuli such as pain. Researchers underline that sensory difficulties significantly influence the child's everyday func-

tioning, behaviour, and ability to participate in school and social situations (Marco et al., 2011).

Cognitive functioning in children with ASD is also highly diverse. Some individuals present with intellectual disability, while others demonstrate average or above-average cognitive abilities. However, difficulties in executive functions, such as planning, organisation, and cognitive flexibility, are characteristic. At the same time, these children often exhibit strong rote memory and an ability to detect details. This phenomenon has been described by Frith as weak central coherence, i.e. a tendency to focus on details at the expense of global understanding (Frith, 2003). Additionally, differences in functioning profiles (e.g. IQ, language functions) may co-occur with ASD and influence educational trajectories (Wilkinson et al., 2022). Moreover, the relatively frequent co-occurrence of other disorders (e.g. ADHD) may complicate differential diagnosis. Selected diagnostic tools and clinical context must therefore be chosen with consideration for the possibility of dual diagnoses (Hyman et al., 2020; Moore et al., 2022). In school practice, this implies the need to consider both developmental aspects of ASD and accompanying difficulties that may affect learning and behaviour. The spectrum of symptoms includes deficits in social communication directly related to peer interaction, restricted interests, rigidity of routines, and hypersensitivity to certain stimuli. This affects school adaptation, relationships with peers and teachers, and overall functioning within the school environment (Skuse et al., 2024; Thurm et al., 2019).

Emotional functioning should also be considered. Children on the autism spectrum often experience difficulties in recognising and regulating their own emotions, which may lead to outbursts of anger, withdrawal, or challenging behaviours. Analyses indicate that emotional problems are often secondary to sensory overload and difficulties in understanding social situations (Attwood, 2007). In the school environment, this may result in increased stress levels and adaptation difficulties.

Research indicates that ASD frequently co-occurs with other psychiatric conditions, including ADHD, anxiety disorders, mood disorders, and OCD (Lord et al., 2020; Pehlivanidis et al., 2020). Similar implications are also suggested by classification systems. This may have significant diagnostic implications and certainly requires a complex, integrated clinical assessment, often within a multidisciplinary model. Such conditions result in considerable nosological and therapeutic challenges, as symptoms may overlap or mask one another (e.g. social deficits in ASD vs. symptoms of social anxiety in

adolescents) (Briot et al., 2020; Dell'Osso et al., 2023; Kleberg et al., 2017). The presence of co-occurring psychiatric conditions and differential-diagnostic overlap may lead to diagnostic errors, delayed ASD diagnosis, or diagnoses of other disorders, with significant clinical consequences (Jarvers et al., 2025; Odachowska-Rogalska, 2023). The difficulties concern not only comorbidity but, above all, distinguishing these conditions from one another.

DIFFERENTIAL DIAGNOSIS OF AUTISM SPECTRUM DISORDERS

Differentiating ASD from other disorders does not consist solely in distinguishing individual symptoms; it should take into account a much broader developmental context, biological mechanisms, and the child's functioning across multiple settings. Researchers emphasise that proper practice requires the application of a holistic approach, integrating clinical assessment, diagnostic testing, information from parents/caregivers, and medical data where available (Chawner et al., 2021; Hyman et al., 2020). The formulation of a diagnostic hypothesis therefore requires considerable attentiveness, and expecting parents or caregivers to suggest a diagnosis may inappropriately bias the subsequent diagnostic process. In school practice, it is also important to consider the developmental perspective, as symptoms and their severity may change over time, and the diagnosis of ASD in children requires the application of criteria based on phenotypic variability and co-occurring disorders (Hyman et al., 2020). Differential diagnosis therefore requires not only extensive clinical practice but also knowledge of child development, the influence of context on functioning, and many other aspects derived from clinical experience and judgment. It is also essential to understand the specificity of disorders with similar clinical presentations, which necessitates broadening the scope of diagnostic hypotheses to include less commonly considered areas within a given environment.

ASD AND OTHER NEURODEVELOPMENTAL DISORDERS

A significant diagnostic challenge remains the differentiation of ASD from other neurodevelopmental disorders, such as language development disorders or deficits in intellectual functioning. It should be emphasised that in the former, difficulties primarily concern structural aspects of language, whereas in ASD pragmatic deficits dominate, related to the use of language in social con-

text (Bishop & Norbury, 2002; Ellis Weismer, 2013; Siedler et al., 2019). In contrast, intellectual disability is characterised by a global reduction in cognitive functioning, whereas ASD often presents with an uneven profile of abilities.

Within the domain of neurodevelopmental deficits, the most frequently discussed comparison – mainly due to diagnostic difficulties and partial symptom overlap – is that between ASD and ADHD. Contemporary research indicates numerous similarities that may hinder a clear diagnosis. Additionally, social and communication symptoms may be similar or overlapping, complicating differentiation. Both ASD and ADHD emerge in early childhood and affect the child's functioning in multiple areas of life, including school and social environments (APA, 2013). In both conditions, difficulties in peer relationships, problems with emotional regulation, and an increased risk of impulsive or inappropriate behaviour are observed. Research also indicates that children with ASD and ADHD may experience social rejection, which negatively affects their emotional development and self-esteem (Lindsay et al., 2013). A further similarity is the presence of deficits in executive functions, such as planning, organisation, and attentional control. Researchers emphasise that difficulties in response inhibition and behavioural regulation are characteristic of both disorders. Although these are considered core features of ADHD, similar problems may also occur in children on the autism spectrum (Barkley, 2015). Difficulties in concentration are also observed in both conditions, although their nature may differ (Lord et al., 2018).

At the same time, despite belonging to the same group of neurodevelopmental disorders, they differ in underlying mechanisms and the child's functional profile. Despite the similarities, children with ASD and ADHD differ fundamentally in social functioning. In ASD, difficulties primarily concern understanding social norms, emotions, and the intentions of others. As research indicates, these deficits may result from impairments in theory of mind, which hinders the interpretation of others' behaviour (Lord et al., 2020). In contrast, children with ADHD generally understand social rules but may have difficulty applying them in practice due to impulsivity and reduced behavioural control. This suggests that social problems in ADHD are primarily executive in nature, whereas in ASD cognitive deficits are more central. However, in school settings, these differences may be difficult to observe, especially as the observable behavioural outcomes may appear similar.

Differences are also evident in communication. In ASD, qualitative communication impairments are often present, such as literal interpretation of language, difficulties understanding irony, or echolalia. In contrast, language

development in ADHD is typically normal, although the child's speech may be disorganised, rapid, and interrupted. Researchers emphasise that communication difficulties in ASD arise from differences in processing social information rather than solely from attentional deficits (Frith, 2003).

Another important differentiating criterion concerns patterns of behaviour and interests. Children with ASD tend to exhibit repetitiveness, rigidity, and a strong need for routine. Changes in the environment may evoke significant stress. They also often have narrow and intense interests. In contrast, children with ADHD are characterised by variability in activity and interests, as well as a tendency to seek new stimuli. Their behaviour is more spontaneous and impulsive, and difficulties result from hyperactivity and attentional deficits (Barkley, 2015). The literature also highlights differences in sensory processing. In ASD, atypical sensory responses constitute one of the diagnostic criteria and may include both hypersensitivity and hyposensitivity (APA, 2013). In ADHD, sensory difficulties may occur but are not a central feature of the clinical presentation.

Despite clear differences, ASD and ADHD frequently co-occur. Research indicates that a substantial proportion of children with autism also meet criteria for ADHD, which further complicates diagnostic and therapeutic processes (Lord et al., 2018). In such cases, an individualised and multidimensional diagnostic approach is required.

ASD AND ATTACHMENT DISORDERS

Differentiating ASD from attachment disorders such as reactive attachment disorder (RAD) and disinhibited social engagement disorder (DSED) undoubtedly constitutes a practical challenge in educational settings. Accurate interpretation of symptoms based on behaviours presented by children and adolescents, as in the case of any diagnosed deficit, forms the basis for appropriate therapeutic intervention. However, deprivation of secure attachment results in the child becoming particularly sensitive to social interactions, and it is primarily in these domains that difficulties will become evident. Observed problems in communication or affect regulation often overlap with developmental crises, and differences in aetiology (neurodevelopmental vs. traumatic) are of fundamental importance for both planned intervention and appropriate support within educational settings (Sarr et al., 2025; Wilkinson et al., 2022; Zilberstein, 2023).

In the case of disorders in which characteristic symptoms relate to communication difficulties or affect regulation (e.g. ASD), it is essential to differenti-

ate not only areas suggesting similar presentation or aetiology but also to determine how individual symptoms are moderated or masked by developmental stages (Odachowska-Rogalska, 2023). In some cases, it is necessary not only to differentiate but also to consider and potentially identify co-occurring disorders (Kroupina et al., 2023; Mayes et al., 2017). Current classification systems DSM-5 (APA, 2013) and ICD-11 (WHO, 2019) explicitly exclude the diagnosis of RAD/DSED when criteria for autism spectrum disorder are met, although recent empirical findings suggest that clinical co-occurrence may be more frequent than these frameworks acknowledge. This issue requires a cautious approach and consideration of clinical-developmental context (Mayes et al., 2017; Wilkinson et al., 2022; Zeanah et al., 2016).

It should be emphasised that, according to classification systems for younger children (DC:0-5), as well as guidelines consistent with ICD-11 and DSM-5 (WHO, 2019; APA, 2013), differential diagnosis of attachment disorders requires the exclusion of autism spectrum disorder (Gałecki & Szulc, 2023; Kmita, 2022). Attention is also drawn to the possibility of co-occurrence of symptoms of both types of attachment disorders (inhibited and disinhibited) with ASD (with or without ADHD symptoms) in up to 65% of children in clinical samples of RAD/DSED (Mayes et al., 2017; Radziwiłłowicz, 2020). The literature highlights the need for in-depth diagnostics when there is a history of abuse and neglect (leading to RAD/DSED) co-occurring with suspected ASD, as these difficulties may overlap within families (Biswas & Beardsworth, 2022). It is also observed that children with neurodevelopmental disorders may become victims of abuse or neglect as a consequence of the challenges associated with caregiving, and parents themselves may exhibit symptoms of mental disorders.

A key difference identified by researchers is the absence of fixations and stereotypical behaviours in RAD (Kmita, 2022). However, this aspect also requires diagnostic caution. Behaviours resembling stereotypies (e.g. rocking, swaying, thumb-sucking) may be observed in children with attachment disorders from infancy and may be associated with repetitive stimulation patterns aimed at reducing emotional tension (Radziwiłłowicz, 2020). Although not identical to behavioural patterns characteristic of ASD, they may resemble and be mistaken for such symptoms (Gałecki & Szulc, 2023). A similar ambiguity concerns routine behaviours. While children with RAD generally do not exhibit strong attachment to routines as seen in ASD (Kmita, 2022), children with histories of instability may react with anxiety to change. In such cases,

predictability is associated with a sense of safety, and change may evoke anxiety, anger, or withdrawal from social interaction.

ASD AND TRAUMA-RELATED DISORDERS

Traumatic experiences, which by definition may provoke distress in virtually any individual, can have a particularly profound impact on a child's behaviour. For younger children, potentially traumatic stimuli may encompass a broader range of experiences, including those that an adult might be able to cope with (e.g. parental divorce, rejection, hospitalisation, as well as various forms of violence, including those witnessed between adult caregivers, and many others). The consequences of such experiences in children can therefore be considerable. The diagnosis of trauma-related disorders in children and their differentiation from other mental disorders is a more complex process than in adults. The impact of a traumatic event is highly individualised and depends on multiple factors, including the response of the adult caregiver. Diagnostic difficulties arise from the child's developmental level and limited capacity to verbalise internal states, as well as from the fact that symptoms in children are often non-specific or delayed (Badura-Madej & Dobrzyńska-Mesterhazy, 2000; Odachowska & Woźniak-Prus, 2018).

Diagnosing a child exposed to stress with traumatic potential requires not only familiarity with diagnostic criteria but also competence in navigating differential diagnosis, as various disorders may resemble PTSD without being equivalent to it. Misdiagnosis may result in inappropriate intervention, which can have significant consequences for the child's future (Odachowska & Woźniak-Prus, 2018). It is therefore necessary to identify specific elements suggestive of symptoms resulting from crisis experiences.

An important symptom of post-traumatic disorders is difficulty in interpersonal relationships, accompanied by reduced self-esteem and emerging self-concept disturbances. As previously noted, this aspect is also present in children with ASD, but is likewise observed in attachment disorders and other conditions. The considerable diversity of diagnostic entities with similar symptoms, combined with variability in children's responses, creates numerous diagnostic challenges. Children may not exhibit all symptoms simultaneously, some may remain hidden, delayed, or manifest as somatic complaints. In trauma-related disorders, regression to earlier developmental stages is also relatively characteristic. Behavioural changes, which are not always clearly

identifiable, contribute to diagnostic difficulties and complicate the selection of appropriate interventions (Odachowska & Woźniak-Prus, 2018).

Additionally, it is noted that diagnosing emotional disorders as PTSD in children may be difficult due to delayed symptom expression, masking of symptoms, delayed onset, concealment of distressing symptoms due to guilt or shame, and an unclear relationship between the traumatic event and dysregulated affect, anger, anxiety, and physiological symptoms, which may emerge many months after the event. In many cases, caregivers are unaware of the potential consequences of such experiences and may assume that symptoms will resolve spontaneously, without the need for professional support. It is also important to note the limited number of specialists in this area, and the fact that PTSD diagnosis is relatively under-recognised among psychiatrists. This disorder often co-occurs with other conditions such as depression, specific phobias, or substance misuse, which may dominate the clinical picture. Most commonly, PTSD requires differentiation from other anxiety disorders, as well as from co-occurring conditions such as hyperactivity, substance use during adolescence, depressive symptoms, and social withdrawal.

One of the disorders most frequently confused with PTSD is attention-deficit/hyperactivity disorder (ADHD). In therapeutic practice, cases are often encountered in which children diagnosed with ADHD, upon thorough differential diagnosis, are found to meet criteria for PTSD, with remission of symptoms following appropriate therapeutic intervention (Odachowska & Woźniak-Prus, 2018).

A significant role is played by the context of maltreatment and deprivation of a sense of safety, which may lead to symptoms resembling ASD and hinder early differentiation. For a child in early development, the absence of a secure caregiver may itself constitute a traumatic stimulus. In this context, attachment disorders may also result in symptom patterns similar to PTSD. Not without reason, both of these disorders are classified within the same group of trauma- and stress-related disorders in DSM and ICD classifications (APA, 2013; WHO, 2019). In educational practice, it is important not to automatically assign an ASD label to children with a history of trauma or attachment deprivation, but rather to conduct a comprehensive assessment that includes environmental and developmental factors (Wilkinson et al., 2022; Hoover & Kaufman, 2018; Minnis et al., 2020). Particular diagnostic caution is required in cases where the child's history indicates experiences of violence, abuse, maltreatment, and/or deprivation of secure attachment. Especially in cases of suspected RAD/DSED or PTSD, attention should be paid to the potential influence of family

and school environments on the presented symptomatology. In such situations, it is erroneous to assume ASD without a full assessment of context and characteristic symptoms (e.g. restricted repetitive patterns of interests and communication) (Mayes et al., 2017; Minnis et al., 2020; Wilkinson et al., 2022).

When there is suspicion that a child's behaviour results from experienced difficulties related, for example, to stress, it is necessary to consider the influence of both family and school environments and to avoid premature assumptions of ASD based solely on observed symptoms (Phelps et al., 2021). A comprehensive contextual assessment is essential for developing an appropriate intervention plan (Hoover & Kaufman, 2018; Minnis et al., 2020; Schepper et al., 2019; Stavropoulos et al., 2018; Wilkinson et al., 2022). It should be added that in the diagnosis of trauma-related disorders, both underestimation and overestimation may occur. The causes of this relate to insufficient knowledge of trauma-related disorders, limited availability of diagnostic methods, and a relatively small number of specialists in this field. It is also important to note that not every traumatic experience results in a PTSD diagnosis. An analysis should be conducted of the relationship between individual resources and the traumatic event, the individual's perception and evaluation of the situation, and, particularly in the case of children, the availability of support. Both underestimation and overestimation of trauma can significantly affect an individual's functioning, quality of life, health, and social functioning.

THE ROLE OF TEACHERS IN THE ASSESSMENT OF CHILD BEHAVIOUR

In educational practice, it is crucial to determine whether the observed difficulties result from neurodevelopmental characteristics of ASD or ADHD, from the consequences of trauma (PTSD) and inadequate caregiving (RAD/DSED), or from their co-occurrence, as interventions (teaching methods, social support, therapeutic approaches) differ across these groups (Sarr et al., 2025; Mayes et al., 2017; Wilkinson et al., 2022). ASD has a primarily genetic and neurobiological aetiology, characterised by clear limitations in socialisation, communication, and repetitive behavioural patterns. RAD/DSED are disorders associated with inadequate caregiving and deprivation, involving disturbances in attachment and atypical behaviours towards caregivers and strangers. PTSD, in turn, represents a response to a traumatic event, with manifestations including intrusion, avoidance, mood changes, and hyperarousal; differentiating PTSD from RAD/

DSED may be particularly difficult in younger children, where caregiving history plays a key role (Davidson et al., 2022; Hoover & Kaufman, 2018; Stavropoulos et al., 2018; Wilkinson et al., 2022; Zeanah et al., 2016).

In a child demonstrating difficulties in social interactions, combined with communication limitations and behaviours suggestive of ASD, it is advisable to consider RAD/DSED in the context of attachment deprivation and to assess whether symptoms persist following improvement in the caregiving environment (e.g. adoption, foster care), which may indicate the need to evaluate RAD/DSED alongside ASD (Kroupina et al., 2023; Mayes et al., 2017; Minnis et al., 2020). Conversely, in a child who has experienced trauma and presents symptoms of PTSD (e.g. intrusions, hyperarousal, concentration difficulties, exaggerated startle response) alongside ASD traits, the possibility of co-occurrence should be considered, and educational and therapeutic support should be planned accordingly, taking into account both trauma and developmental needs (Hoover & Kaufman, 2018; Mayes et al., 2017; Stavropoulos et al., 2018; Zeanah et al., 2016).

These disorders may present with similar clinical features but differ in aetiology and therefore require different interventions. Without accurate diagnosis, interventions may be inadequate or even harmful to the child. The literature emphasises the need for a multidimensional assessment of functioning through behavioural observation across multiple contexts, based on information from parents/caregivers, teachers, and the use of standardised diagnostic tools. Early identification, differentiation, and recognition of comorbidity constitute essential aspects of appropriate diagnostic practice (Davidson et al., 2022; Hoover & Kaufman, 2018; Minnis et al., 2020; Stavropoulos et al., 2018; Zeanah et al., 2016).

In this context, the teacher may serve as one of the most important sources of information regarding the child's functioning in a natural environment. Observations should include communication and interactions, social behaviours, adaptation to routines within the educational setting, flexibility in response to change, self-care abilities, sensory adaptation, and engagement in activities.

Good practice involves maintaining behavioural records in observation logs, making brief notes following specific situations, and using short rating tools (e.g. social behaviour checklists, sensory response scales), which enable consistent communication with diagnosticians. It should be emphasised that children with ASD may experience additional challenges in language, sensory processing, executive functioning (planning, initiation), and emotional regulation, all of which affect learning and behaviour in the classroom. Assessment should include school-based observations, information from parents/caregiv-

ers, and appropriate assessment tools (CASD, ADOS, ADI-R and observational protocols in school settings), while taking into account the possibility of co-occurring disorders (Falkmer et al., 2013; Hyman et al., 2020; Wilkinson et al., 2022). Although diagnostic tools are highly important, they are rarely sufficient on their own to determine diagnosis. Integration of information from multiple sources and observation of functioning in the natural school environment are crucial (Archambault et al., 2025; Hyman et al., 2020; Hoch & Youssef, 2020; Scheper et al., 2019; Zeanah et al., 2016).

It is within educational settings that early warning signs become visible, such as delays in speech development, limited social interaction, restricted interests, repetitive behaviours, difficulties with emotional regulation, adaptation to change, atypical sensory responses, or sudden behavioural changes. Observation should therefore encompass different contexts (classroom, breaks, group activities, individual tasks) and different times of day. It is also important to assess responses to separation from and reunion with caregivers. Information should be gathered from the entire teaching team (class teacher, tutor, support teacher) as well as from caregivers. Interdisciplinary collaboration between teachers, school psychologists, speech therapists, diagnosticians, and caregivers is essential for developing support plans and potential diagnostic and therapeutic recommendations.

A practical challenge lies in the large number of tools with limited diagnostic specificity, the need for coordination between school psychologists, special educators, teachers, and families, and the necessity to consider the possibility of dual or multiple diagnoses requiring multidimensional intervention (therapeutic, educational, environmental).

In many cases, the involvement of teachers or educators in schools or preschools is recommended in the differential diagnostic process; however, a full diagnostic assessment requires appropriate training of school staff and collaboration with psychologists (Archambault et al., 2025; Davidson et al., 2022; McMorran-Young et al., 2021; Minnis et al., 2020; Zeanah et al., 2016). The literature suggests that such training should include both knowledge of disorder symptoms and the development of skills in behavioural techniques and strategies supporting social and language development, taking into account trauma and adaptive needs within the classroom (Hoover & Kaufman, 2018; Zeanah et al., 2016). It should be emphasised that in-depth observation for the purpose of generating diagnostic hypotheses should not replace a full diagnostic evaluation (Archambault et al., 2025; Davidson et al., 2022; McMorran-Young

et al., 2021). Furthermore, research indicates the possibility of co-occurrence of multiple disorders, necessitating integrative diagnostic planning and individualised educational and therapeutic support (Davidson et al., 2022; Kroupina et al., 2023; Mayes et al., 2017; Stavropoulos et al., 2018; Zeanah et al., 2016).

Moreover, diagnosis and long-term prognosis may change alongside environmental changes (e.g. adoption, stabilisation of care). Therefore, systematic monitoring of progress and potential diagnostic and educational adjustments in response to environmental changes are essential in educational practice (Minnis et al., 2020; Scheper et al., 2019). Creating a more predictable and supportive environment should be a priority in every case, regardless of diagnosis. In some cases, it may also be advisable to consider modifications of the sensory environment, adjustment of work pace, communication support, structuring of the day, sensory breaks, predictability, clear instructions, visual supports, and social support. Schools receiving information about a child's diagnosis within the autism spectrum should obtain from diagnostic institutions (e.g. psychological and pedagogical counselling centres) a functional diagnosis indicating both strengths and weaknesses of the child. In such cases, specialists should carefully document and monitor the child's progress in therapy and skill acquisition, as well as changes in symptoms over time, particularly in relation to environmental changes (e.g. new caregiving arrangements, stable living conditions) (Hoch & Youssef, 2020; Minnis et al., 2020; Scheper et al., 2019).

CONCLUSION

Differentiating the clinical presentation of ASD in educational practice requires an integrated, multidimensional approach that takes into account developmental context, caregiving history, and the possible co-occurrence of multiple disorders. Available observational and diagnostic tools, combined with qualified interdisciplinary collaboration (school psychologists, special educators, therapists), can support accurate diagnosis and appropriately tailored intervention. It is clearly emphasised that ASD, RAD/DSED, and PTSD may co-occur or present overlapping symptoms; diagnostic decisions should therefore be based on a broad contextual assessment rather than a single source of information. Further research on diagnostic tools in educational settings and the inclusion of teachers' perspectives are necessary to improve diagnostic accuracy and the effectiveness of school-based interventions (Mayes et al., 2017; McMorran-Young et al., 2021; Sarr et al., 2025; Wilkinson et al., 2022).

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CHAPTER 3

DEVELOPMENT OF AND IN THE SPECTRUM: AUTISM, THE NEURODIVERSITY-AFFIRMING APPROACH AND POSITIVE IDENTITY DEVELOPMENT

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INTRODUCTION

Diagnostic classifications describe the autism spectrum as a neurodevelopmental disorder (ASD) characterized by significant difficulties in the social-communication domain with co-occurring restricted and/or repetitive interests and/or behavior which have their onset in early childhood (American Psychiatric Association, 2022). It is estimated that approximately 1 in 100 children are being diagnosed with ASD worldwide (Zeidan et al., 2022) and the number of diagnoses continues to rise. And with that, so has the interest in this condition, both in scientific research and in public discourse. Through time, many theories regarding the causes of autism, treatment methods, and the very definition of the condition were proposed and subsequently debunked. One of the most significant contributions was the introduction of the concept of neurodiversity, which has received both widespread support as well as some criticism. Neurodiversity has made it possible to view autism not only as a neurodevelopmental disorder, but also as a minority identity (Botha & Frost, 2020). Research on psychiatric comorbidities across the autism spectrum not only shows a high frequency of cooccurring psychiatric disorders but also that rates of mental health conditions are higher compared to the neurotypical populations (Joshi et al., 2010; Mutluer et al., 2022). One way to promote the mental health of people belonging to minority groups is to support the positive development of their identity – including their minority identity (Cooper et al., 2017, 2023; Corden et al., 2021).

In this essay, I will briefly summarize how autism has been understood over the years and the role of neurodiversity in the current discourse. I will also examine the most common criticisms of the concept of neurodiversity and present my perspective on the matter. My goal is to explore the construction of autistic identity in light of the broader social context and the prevailing narrative about autism within it, highlighting its significance in that process. I would also like to propose the theory of the "self-fulfilling diagnosis prophecy" of autism spectrum disorder and how it might partly explain the rise in diagnoses of the condition. Finally, I will reflect on the future of autism and neurodiversity, especially in light of the rapid development of new technologies, such as social media and artificial intelligence, which are having an increasingly significant impact on our everyday lives on many levels. To ensure transparency in the perspectives presented, it is good practice for the author to disclose their positionality – that is, those aspects of identity and experiences that might be of importance for the reader's own critical appraisal (Rose, 1997). I am a white, transgender nonbinary male AuDHDer (autistic ADHDer) and an early career researcher from a post-soviet country in central Europe. I would describe my political views as left-leaning and my research philosophy as a mix of critical realism and post-positivism.

CONCEPTUALISATION OF AUTISM AND NEURODIVERSITY

DEFINITIONS OF AUTISM SPECTRUM DISORDER AND HOW THEY HAVE EVOLVED OVER TIME

The term "autism" was first introduced by Eugen Bleuler, a Swiss psychiatrist best known for his pioneering work on schizophrenia, a term he also coined. For Bleuler, autism referred to a symptom of schizophrenia, describing a state of detachment from external reality and immersion in one's inner world (Bleuler, 1911). Several decades later, Leo Kanner used the term to describe a distinct pattern of behavioural characteristics observed in children with otherwise typical early development. He defined it as "early infantile autism", identifying it as a separate clinical syndrome (Kanner, 1943). The behaviours he described– marked difficulties in social interaction and communication, along with restricted and repetitive patterns of behaviour–remain central features of autism in contemporary diagnostic classifications.

Around the same time, independently from Kanner's work, Hans Asperger has been conducting similar research on "autistic psychopathy" in boys who

he considered to be prodigies in some areas but lacking in social abilities and having trouble in carrying out simple daily routines (Asperger, 1944; Asperger & Frith, 1991). His work however, was recognized and brought to wider attention much later, mainly by Lorna Wing and Uta Frith, who translated his papers into English (Asperger & Frith, 1991; Happé & Frith, 2020).

In 1980, "Infantile Autism" was added to the DSM-III classification (Rosen et al., 2021) and in 1994, Asperger's Syndrome first appeared in the DSM-IV (Rosen et al., 2021). Eventually, in 2013, four previously separate disorders: autistic disorder, Asperger's Syndrome, childhood disintegrative disorder, and pervasive developmental disorder not otherwise specified were merged into a single condition of Autism Spectrum Disorder (American Psychiatric Association, 2022; Rosen et al., 2021).

Throughout the years, our understanding of autism has been constantly evolving, often going hand in hand with new discoveries and socio-cultural changes. Changes were made not only in terminology, but also in the diagnostic criteria that had to be met in order to receive a diagnosis. For instance, in DSM-III "infantile autism" was considered a monothetic diagnosis, that is, it required meeting all of the diagnostic criteria in order to receive one. This was changed in the revised DSM-III-R (1987), where from that moment on, one had to meet some subset of criteria (eight of sixteen items, including at least two items from A, one from B, and one from C subcategories). This means that a person who is now being labeled as "autistic" might not have been labeled as such fifty years ago, and vice versa. As Happe and Frith pointed out in their review (Happé & Frith, 2020), the definition of autism significantly broadened its scope: from a rather uncommon, distinct disorder of childhood to a more common, dimensional condition affecting people of all ages, genders and backgrounds.

Changes in who is and who is not autistic, and the high heterogeneity of the group have had significant consequences. First of all, this hinders research, especially in a longitudinal context, as it makes intergroup comparisons more difficult. But more importantly, broadening the diagnostic criteria, along with the rising awareness meant an increase in the number of people who could be diagnosed. Unfortunately, this phenomenon is sometimes exploited by politicians and other decision-makers causing in turn public anxiety and propagating the narrative of an "autism epidemic" (Haslet, 2025). At this point, it is worth asking ourselves the question: Why does the increase in the number of autism diagnoses evoke such negative emotions? The reason for this is that for

years autism has been (and continues to be) perceived as something negative and undesirable. This emphasis on equating atypical individuals with the generally understood "norm" is a consequence of the medical model of disability, through the lens of which autism has been viewed for years.

AUTISM THE CLASSICAL MEDICAL MODEL OF DISABILITY

For most of the 20th century, the dominant narrative on autism was the conventional medical model, often referred to as a medical model of disability (Retief & Letšosa, 2018; Zaks, 2024). This model is normative in nature (Chapman, 2021), i.e., it assumes the existence of certain specific norms, from which any deviation is considered a pathology. Therefore, within this paradigm, the main goal of research is to "cure" autism – normalizing the autistic person to make them more like a neurotypical individual (Dwyer, 2022). This emphasis on "fixing" autism is evident in traditional behavioral therapies, such as Applied Behavioral Analysis (ABA), where one of the goals is to suppress one's neuroatypical (deviant) behaviors and make the individual conform to the neurotypical majority and act in a more neurotypical manner (Wagland et al., 2025).

The use of the medical model has undoubtedly contributed to enormous progress in expanding knowledge about autism and improving understanding of this condition. At the same time however, it was this progress that highlighted the serious limitations and gave rise to criticism of that model. Dwyer (2022) points out to the fact that many disabled individuals find this emphasis on normalization to be frustrating, as they may not be able or just willing to adjust themselves to the so-called "norm". The same sentiment may apply to the autistic people.

Disability scholars also highlight that the consequence of categorizing people as "normal" and "abnormal" is segregation, which leads in turn to marginalization, exclusion and stigmatization (Chapman, 2021; Shakespeare, 2006; Zaks, 2024). We learn that being classified into the latter category is something that should be avoided at all costs. This is evident, for example, in the terminology that refers to people with disabilities (as well as people with autism) as "suffering from" or "afflicted", even if they may not perceive themselves as such (Dwyer, 2022). This is also evident in the diagnostic criteria for the Autism Spectrum Disorder, which are based on deficits and the difficulties experienced by the individual.

Pressure to be perceived as the neurotypical majority may cause many people from autistic minority to develop behaviours known as masking (cam-

ouflaging). These are conscious or subconscious attempts made by neurodivergent individuals to suppress, adjust or modify their neurodivergent traits in order to conform to the demands of neurotypical society (Ai et al., 2024; Hull et al., 2024; Khudiakova et al., 2025). Studies suggest that this could be a response to stigmatization of autism-related traits, behaviours and autism spectrum diagnosis in general which are viewed by society as unfavourable. Maintenance of the "mask" puts a heavy burden on one's cognitive and emotional resources, which may have negative consequences for mental health – increasing the risk of depression and anxiety as well as overall poorer well-being (Ai et al., 2024; Khudiakova et al., 2025).

The medical model does not take into account the possibility of positive, healthy identification with the diagnosis. This is particularly important in the case of lifelong conditions, such as autism, which becomes an integral part of the individual and, by extension, of their identity (Botha et al., 2022; Cooper et al., 2017, 2023). Indeed, autistic people may be thought of as an identity-based minority that faces this social stigma (Botha & Frost, 2020). It is therefore not hard to see that, with this approach, it is difficult to cultivate a positive image of oneself. This makes healthy identity development very difficult. Because people are constantly pretending to be someone they're not, hiding their true autistic self, it's hard for them to find a sense of authenticity. And along with narrative focused on their flaws comes a sense of internalized shame, stigma and a diminished sense of self-efficacy (Ai et al., 2024; Dwyer, 2022; Jahandideh et al., 2025; Khudiakova et al., 2025).

SOCIAL MODEL OF DISABILITY AND NEURODIVERSITY PARADIGM

As a response to the limitations and negative consequences of the conventional medical model, a significant majority of the autism community endorsed the concept of neurodiversity. The most basic definition explains neurodiversity as an analogy to biodiversity – just as there is diversity of the many forms of life, so too is there diversity of different brains and minds (Dwyer, 2022; McLennan et al., 2025; Singer, 2017; Walker, 2021). This concept does not assume that there are "better" or "worse" minds, but emphasizes their variety – with all the advantages and disadvantages that come with it. This way of thinking stems from the social model of disability. That model, in contrast, does not attribute the causes of disability to the person with a disability, but rather to limitations in society, the environment, attitudes, and organizational structures – which are the reasons why a person experiences discrimination

and exclusion (Shakespeare, 2006). The general narrative is more strength-focused, emphasising that under certain circumstances, previously perceived flaws could be viewed as potential assets. For instance, one's narrow interests can develop into expertise in a particular field and may help in choosing the right career path.

The main goal of the neuro-affirming approach is to create environments that could be as inclusive as possible for people of different neurotypes and abilities, allowing them to thrive and reach their full potential. This approach is applicable not only in school and academic settings, but also in workplaces, public institutions, and the public space in general

The neuro-affirmative approach consists of adjustments made to the environment through the use of universal design, as well as changes in the way and style of communication (Wagland et al., 2025).

The social model lens also allowed for more frequent active inclusion of autistic people in the research. In line with the idea of "nothing about us without us", their role shifted from being the subjects of the research to becoming decision-making participants, often serving as the researchers themselves. By giving a voice to autistic people, it became possible to capture more in-depth and nuanced perspectives, which contributed, for example, to the development of theories of double empathy, masking, and burnout (Hull et al., 2024; Jahandideh et al., 2025; Milton, 2012). This also makes it possible to prioritise research in a way that truly reflects the needs of people on the autism spectrum and is relevant to them (Dwyer, 2022).

Finally, the efforts of autistic and neurodivergent self-advocates has led to the emergence of the neurodiversity movement. Its main objectives are closely tied to those of the general disability justice movement, that is to seek adequate representation, respect and equality – in this case – for all neurominorities. Activists aim to end discrimination and stigmatization of the neurodivergent people by advocating (and self-advocating) for necessary adjustments in various settings, ending harmful treatments, engaging with stakeholders, participating in public discussions as well as empowering the neurodiversity community in their pursuit for a good quality of life (Walker, 2021).

IDENTITY DEVELOPMENT

Human identity and its development has been for years one of the most intriguing topics in psychology. After all, it concerns the most personal essence of

our humanity and our existence. A positively formed sense of identity is one of the indicators of mental health and well-being (Cooper et al., 2017; Crocetti et al., 2023; Maehler & Hernández-Torrano, 2025). The development of identity is an ongoing process, with the most critical periods occurring during early childhood and adolescence (Crocetti et al., 2023; Maehler & Hernández-Torrano, 2025). Especially in their teenage years, young people go through a complex process of biological, cognitive and emotional changes that involve more intense introspection about one's goals, values and the self (Albarello et al., 2018; Maehler & Hernández-Torrano, 2025).

Identity could be divided into two dimensions: personal and social. To put it simply, personal identity answers questions: "Who am I as a person? Who am I in relation to others?", while social identity answers questions: "Who are we as a group? Who are we in relation to other groups?" (Albarello et al., 2018). However, this is not a strict, binary division, but rather a spectrum in which a given dimension becomes more salient depending on the circumstances (Crocetti et al., 2023; Turner et al., 1979). Among the most important contributions in the identity development research are those of Erik Erikson and James Marcia (Erikson, 1968; Marcia, 1966).

Within the field of developmental psychology, researchers mainly focused on personal identity and its development over time. Erikson's psychosocial theory states that identity formation is a series of processes by which a person synthesises different experiences and identifications, committing to life domains they find meaningful, therefore achieving a sense of continuity of the self over time and space (Crocetti et al., 2023; Erikson, 1968). Each of these stages is marked by a certain psychosocial crisis, the successful resolution of which allows for a smooth transition to the next stage of life and lays a foundation for resolving later crises. Identity development is particularly highlighted in Stage 5 ("Identity vs. Role Confusion; ages 12–18) and its positive resolution is described by Erikson as achieving "wholness" and "sense of inner identity" (Erikson, 1968; Maehler & Hernández-Torrano, 2025) that is an ability to describe oneself.

Elaborating on Erikson's work Marcia introduced his identity status paradigm (Marcia, 1966). Those identity statuses are ways in which an individual copes with identity crises described by Erikson. Exploration and commitment are two key processes differentiating four identity statuses: (i) achievement – where after exploring different alternatives individual commits to a certain identity; (ii) foreclosure – where commitment is made without exploration; (iii) moratorium –

where there has been no commitment and the exploration is still ongoing and (iv) diffusion – a status where exploration and commitment are absent.

Further research on personality development has shown that achieving a certain status is not something that is set in stone. One of the more prominent theories – a three factor model (Crocetti et al., 2023) expands on the statuses proposed by Marcia, assuming that identity formation is a continuous process of interaction between commitment, in-depth exploration (actively thinking about the commitments one has made) and reconsideration of commitment (seeking alternatives when one finds their commitments unsatisfactory). These interactions take place within what are known as the identity maintenance cycle (commitment and in-depth exploration) and identity formation cycle (commitment and reconsideration of commitment).

The authors of the model emphasize, however, that the formation and maintenance of identity are processes strongly influenced by social context and external factors and do not occur in isolation from them (Crocetti et al., 2023).

This relates to one of the most important theories in social psychology – the social identity theory (Tajfel & Turner, 2004) and social categorization theory (Turner et al., 1979). Although social identity has mainly been related to social and collective outcomes (e.g. intergroup behaviours, conflicts and discrimination), belonging to a certain social group informs one's own identity through defining (labelling) oneself as a member of that group.

Autism identity can be understood both as a social and as a personal identity.

In studies on personal identity among autistic individuals, the main focus has been on the identity centrality – that is, the extent to which identifying as an autistic person is a significant part of the self and how people make sense of autism as a part of themselves, both in positive and negative ways (Cooper et al., 2023; Davies et al., 2024). Studies that examined autistic social identity concentrated on the feelings of belonging to the wider autistic community and solidarity with other autistic individuals (Davies et al., 2024). Overall, research suggests that positive autistic identity, that is endorsement and acceptance of autism as an important, integral part of oneself as well as autistic community connectedness are associated with better self-esteem, self-concept and general wellbeing, and with lower rates of anxiety, stress and depression (Cooper et al., 2023; Davies et al., 2024)

The moment of receiving an autism diagnosis can be a life-changing event for an individual and therefore significantly impact one's sense of self (Cooper et al., 2023; Davies et al., 2024; Kapp et al., 2013). When considering the im-

pact of a diagnosis on the development of identity, the timing of the diagnosis must also be taken into account, especially in the case of individuals who were diagnosed later in their lives. This applies primarily to groups of people who, until recently, were often overlooked or not taken into account in the diagnostic process – that is basically everyone who are not white, cis-gender boys (Dwyer, 2022; Zeidan et al., 2022). These individuals often face difficulties or feel different from their peers, without knowing why (Corden et al., 2021). And while receiving a diagnosis can bring a sense of relief or understanding, it often also triggers feelings of sadness, shame, anger, and confusion. It is also important to remember that, in addition to their autistic identity, many people may also identify with other minority identities – racial, ethnic, sexual, or gender. Intersectionality can play a significant role in how a person perceives their own autistic identity and the support they might need (Davies et al., 2024)

The development of an autistic identity is therefore a complex process that unfolds on multiple levels and depends on numerous intra- and interpersonal factors as well as the environmental context.

THE 'SELF-FULFILLING DIAGNOSTIC PROPHESY'

Before I turn to a discussion of how a neuroaffirmative approach might support the development of a positive autistic identity, I would like to examine the process by which adolescents and young adults search for this identity, taking into account the role that social media platforms such as TikTok or Instagram may play in this process.

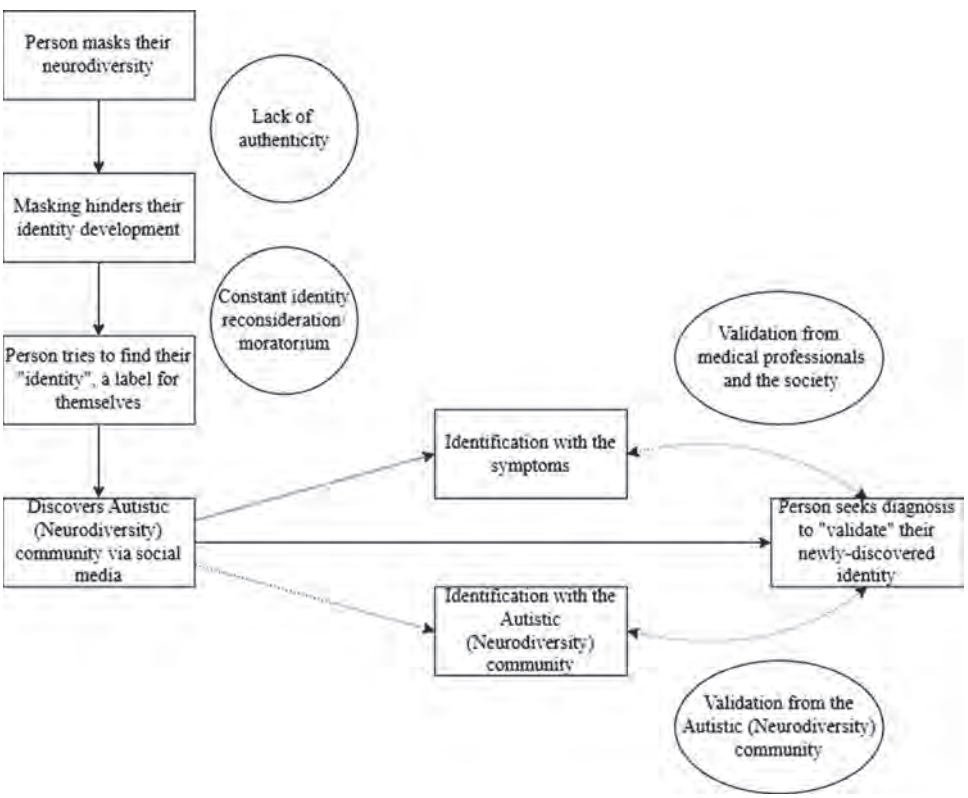
Given the information regarding the development of autistic identity and masking (camouflaging), I would like to propose here the theory of the "self-fulfilling diagnostic prophecy," which – in my opinion – may partially explain the current rise in autism spectrum diagnoses (and other neurodiversities such as ADHD), particularly among these age groups.

As I have mentioned before, one of the consequences of the contemporary medical model of disability is the general negative perception of autism. It describes autism as a tragedy to a person "affected" by it and their families, as a burden; something deviant, to get rid of. Therefore, in order to fit in into the expectation of the neurotypical majority, a person masks their autistic (neurodivergent) traits, behaviours and eventually their identity (Khudiakova et al., 2025). Because people are constantly playing different "roles" in different settings, it is difficult for them to develop a sense of authenticity. Ultimately, some

of them may end up feeling lost and confused. They no longer know which of their behaviors, goals, and values are their own, and which are their "mask". In their search for answers to the question that haunts them: "Who am I, really?" they come across content about neurodiversity (autism, ADHD etc.), most often on social media. As they listen to their peers' stories, they begin to see themselves in them, realizing that they experience and perceive the world in similar ways. This, in turn, prompts some of these people to seek an official diagnosis. On the one hand, to gain validation from experts and the general public, and on the other hand, to gain validation within the neurodiverse community. I have visualised the process I described in the form of a mind map (Fig. 1).

Figure 1

Visual presentation of the "self-fulfilling diagnostic prophecy" theory in the form of a mind map



Source: Self-generated

IDENTITY PRIDE

Although autism is often described as a stigmatized minority, where its members frequently hide the fact that they belong to this group, one can also observe the exact opposite phenomenon. Research on autistic identity has revealed that some individuals express pride in being neurodiverse (autistic). They emphasized the advantages of their neuroatypical brains, such as hyperfocus, deep engagement with their special interests, and the ability to think outside the neurotypical box (Davies et al., 2024). They in a sense reappropriate the term "autistic", changing its previous pejorative meaning.

APPLYING NEURODIVERSITY-AFFIRMING APPROACH FOR FOSTERING HEALTHY IDENTITY DEVELOPMENT

So what might a neuroaffirmative approach look like in practice? What should be taken into account in its application? Given the core principles of the neurodiversity paradigm and the social model of disability, neurodiversity-affirming practice can be understood as an approach that supports the autonomy, self-determination, and well-being of autistic individuals and their families (Wagland et al., 2025). The main focus is on appropriately adapting the environment and surroundings in which a person with autism spends time and is active, regardless of whether it is a school setting, a workplace, or any other public space. Because autism is a spectrum, the needs of people with autism will often vary greatly. An individualized, strength-based approach is therefore essential. However, there are certain general best practices in universal design that can benefit not only neuroatypical people, but also everyone else – even those without particular special needs. Most examples come from the school environment and involve adaptations across various dimensions. In terms of sensory aspects, these include ensuring that rooms are properly soundproofed, using soft lighting, and avoiding strong odors (Wagland et al., 2025). From a social perspective, effective communication is key – through the use of direct instruction or by allowing students to use other forms of communication and expression. Initiatives at the community level are also important, including education about neurodiversity and positive representation. (Wagland et al., 2025)We should promote environments where autistic and other neurodiverse people could feel like they belong, not just fit in.

MAIN ISSUES AND CHALLENGES

NEURODIVERSITY FRAMEWORK IS TOO UTOPIAN

Despite the advantages, the social model of disability has also faced criticism. The main criticisms center on the overly idealized portrayal of neurodiversity, which at times even frames neurodiverse traits as "superpowers". This one-sided approach to neurodiversity in the literature has been described as "neurodiversity lite" (Srinivasan, 2025). This term refers specifically to those aspects of neurodiversity that can, in a sense, be "monetized"; that is, those behaviors, traits, or aspects of neurodiversity that are valued within the neoliberal capitalist paradigm, while disregarding those that might pose an obstacle to an individual within that model. This category most often includes individuals who, under the previous terminology, might have been diagnosed with Asperger's Syndrome – or, more specifically, the so-called savants (Happé & Frith, 2020; Rosen et al., 2021). A major risk of interpreting neurodiversity in this way is that it excludes people who may not fit this picture. This can lead to the gaslighting of people who do not possess these desirable traits and to the perpetuation of certain stereotypes.

It should be noted, however, that while the neurodiversity approach indeed places greater emphasis on strengths, it does not deny the existence of disabilities or impairments (Dwyer, 2022). The neurodiversity paradigm focuses on the diversity of minds in a holistic way, taking into account the whole human experience. It understands that there are aspects of neurodiversity that a person may not accept, and even some that they would like to get rid of, such as sensory hypersensitivity or existing psychiatric comorbidities (Dwyer, 2022; Shakespeare, 2006; Zaks, 2024). Another thing is that not all difficulties experienced by the individual can be addressed solely through environmental adaptations; medical or therapeutic interventions are also necessary, for instance – pain management for relatively frequently co-occurring in autism hypermobility syndromes (Casanova et al., 2020).

THE SPECTRUM IS TOO BROAD

Further doubts and controversies concern the diagnostic criteria and the definition of what we actually mean by the terms "autism" and, more broadly, "neurodiversity". Current diagnostic criteria are not very specific, resulting in a high degree of heterogeneity among individuals diagnosed with Autism

Spectrum Disorder. In an interview with *Tes Magazine* (2026), Professor Uta Frith, one of the pioneers in research on this condition, stated outright that, due to the increasingly broader definition and the considerable room for its interpretation, the diagnosis itself has ceased to serve its purpose.

Later in the interview, Professor Frith proposes a new classification of autism into two main subgroups: "(…) the people who are diagnosed in early childhood – usually before age three or age five, depending on things like their intellectual abilities and language – and another group, diagnosed much later" (Frith in: Amass, 2026). Professor Baron-Cohen has also made similar suggestions; in a *Financial Times* article "The politics of autism" (2025) he wrote that we "(…) should distinguish between two types of autism: Type 1 (with learning/intellectual disability) (sic!) and Type 2 (without)".

Although these researchers' suggestions may be quite controversial and have drawn criticism from the research community (see: commentary on LinkedIn platform from Botha, 2026), I believe they highlight a more serious problem: the general limitations of current psychiatric nosology. Unfortunately, the current diagnostic system falls short in terms of the accuracy and reliability (Kotov et al., 2017). One of the main problems is the high degree of heterogeneity in diagnoses – on the one hand, the same diagnosis often encompasses very different clinical presentations (sometimes with symptoms that do not overlap at all), and on the other hand, the same symptoms appear in different diagnoses. This not only makes differential diagnosis more difficult, but also hinders research. Furthermore, in most disorders (including neurodevelopmental disorders), comorbidity is the rule rather than the exception, which makes the issue even more complicated. One response to these limitations was the development of a new classification system, the Hierarchical Taxonomy of Psychopathology (HiTOP) (Kotov et al., 2017). It identifies psychopathological syndromes and their specific components or subtypes by examining how symptoms tend to co-occur, grouping related symptoms together to reduce variability. It also organizes syndromes that frequently appear together into broader spectra, providing a structured view of comorbidity. In my view, this approach to classification paves the way for a new, more holistic perspective on mental disorders. Functional assessment, based on the International Classification of Functioning, Disability and Health (ICF), already operates along similar lines, taking into account not only the description of personal factors (functions and body structures) but also the broader environmental context (World Health Organization, 2021).

A major advantage of the ICF is that it allows for a multifaceted description of human functioning, both in terms of the challenges people face and the factors that support well-being and health (strengths). This is because it focuses on describing health and health-related conditions, which is very much in line with the principles of the social model of disability and neurodiversity. Work is already underway to implement the ICF core sets for autism and ADHD, and the early results look promising (Alehagen et al., 2025; Bölte, 2023)If we could combine the HiTOP classification model with the ICF, we would end up with a diagnostic process that is not based on assigning people to specific categories, but rather one that focuses on a personalized approach to therapy and support.

WHY DO WE DO DIAGNOSIS?

In the discussion about what is and isn't autism, it's worth asking ourselves why we actually need a diagnosis. The first reason, which I mentioned earlier, is to gain validation in social contexts. The second, more pragmatic aspect concerns the implications of the diagnosis, namely access to treatment options or tailored forms of support.

The recent trend of "TikTok self-diagnoses" among teenagers and young adults has caused significant concern among parents and clinicians. Medical professionals note that they are increasingly seeing young people in their offices who are convinced they have a specific diagnosis (often autism spectrum disorder and/or ADHD) based on the social media information (Foster & Ellis, 2024). Although there is undoubtedly a need for a broader discussion of the implications of this phenomenon, including the responsibility of digital platforms in this regard, I believe we should take a step back at this point and consider the reasons behind this situation.

Numerous studies indicate that, unfortunately, we are facing a mental health crisis among children and adolescents and autistic youth is a particularly vulnerable population (Barican et al., 2022; Mutluer et al., 2022). Young people are struggling to cope with their difficulties and are turning to the internet and social media for answers. We should consider whether these difficulties might not be caused by the current neoliberal capitalist system and the lifestyle of the late anthropocene. Solving systemic problems requires a more holistic approach and a shift in mindset. And the paradigm of neurodiversity offers precisely such an opportunity – by prioritizing well-being

over conforming to arbitrary norms, and by partially alleviating the pressures of achievement and competition. And better well-being also means greater self-esteem and a stronger sense of self-efficacy – key factors in building a positive self-image and sense of identity.

AUTISM, NEURODIVERSITY OR BOTH?

So what does the future hold for autism in light of the neurodiversity paradigm? Will it, like homosexuality, be removed from diagnostic classifications? Or is it possible to reconcile the medical and social models of disability when considering autism?

Perhaps, just as is the case with personal and social identity, this depends on the context, and autism can be both a disability and an identity in certain situations. We've come a long way in our understanding of autism, but there are still many unknowns. What neurodiversity has given us is a shift in research priorities – a greater emphasis on the real needs of people on the spectrum, lived experience, and support. By giving autistic people a voice, neurodiversity supports their agency and helps build a more positive self-image. Currently, one of the biggest challenges is also giving a voice to people who have been overlooked in research up to now. It is time for people from marginalized minorities and those with intellectual disabilities to become co-researchers as well. Another issue is building a more positive yet realistic portrayal of autism and neurodiversity in the media and educating the public on these topics.

I would like to conclude these reflections with a quote from Uta Frith, taken from the interview I mentioned earlier: "We're all neurodiverse; we can accept this because all our brains are different. But it makes a medical diagnosis completely meaningless" (Frith in: Amass, 2026).

Although Professor Frith presents the meaninglessness of a diagnosis as something negative here, perhaps this is precisely a sign that we should move beyond the rigid framework of diagnostic criteria and look at the broader context. Because if everyone is "special," then no one is special. No one is stigmatized; no one "stands out" from the rest. We are all united by a shared human experience, with all its ups and downs.

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CHAPTER 4

POLICY AND EVIDENCE-BASED ANALYSIS OF AI-SUPPORTED EARLY DIAGNOSIS IN ASD

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INTRODUCTION

> *"Our future is a race between the growing power of technology and the wisdom with which we use it." – Stephen Hawking (Zeitgeist 2015, London)*

Artificial intelligence (AI) is rapidly transforming early intervention approaches for young children with autism spectrum disorder (ASD). Applications such as AI-supported neuroimaging, machine learning (ML) models, and adaptive virtual reality demonstrate considerable potential for enhancing diagnostic accuracy and tailoring interventions to individual needs (Gkintoni et al., 2025; Maddalon et al., 2024; Zhang, 2025). Systematic reviews indicate that AI models drawing on visual data (facial images, home videos, eye-tracking), as well as behavioral, motor, genetic, and neuroimaging data, can classify ASD in children with high accuracy and identify complex patterns that conventional clinical methods may overlook (Solek et al., 2025). Traditional clinical assessment pathways may contribute to both delayed diagnosis and inequitable access, owing to their reliance on subjective clinician interpretation, prolonged waiting times, and limited scalability (Kohli et al., 2022; Solek et al., 2025). It is precisely these gaps that have motivated the examination and development of AI-based diagnostic methods (Jia et al., 2025). Particularly for the 0–6 age group, the potential of AI-assisted screening tools to reduce assessment time, provide objective measures, and integrate with population-level screening programs appears promising with respect to the timing of early intervention (Kohli et al., 2022; Zhang, 2025).

The empirical literature, however, also draws attention to notable limitations underlying the optimistic picture that AI presents in the domain of diagnosis. Systematic reviews indicate that data in existing studies are predominantly collected from high-income countries and sociodemographically homogeneous samples, and that low- and middle-income countries as well as minority groups may remain in a secondary position with respect to both data representation and access to services (Ganggayah et al., 2025; Kohli et al., 2022). Ganggayah et al. (2025), for instance, highlight that existing datasets are largely drawn from Western populations, and that the underrepresentation of ethnic, cultural, and socioeconomic diversity carries the risk of producing biased algorithms. Furthermore, the fact that AI models have not been comprehensively validated across diverse populations and clinical settings substantially limits their generalizability, thereby complicating the integration of these tools into routine clinical practice (Solek et al., 2025). Global actors such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Children's Fund (UNICEF), and the World Health Organization (WHO), which have not remained indifferent to the transformative impact of AI across domains including health, continue to establish normative frameworks through their reports and guidelines that shape the trajectory of AI development (UNICEF, 2025; WHO, 2021).

Against this background, the present chapter synthesizes findings from systematic reviews on AI-based early ASD diagnosis alongside inclusion-oriented policy frameworks developed by WHO, UNICEF, and UNESCO. In doing so, it examines the structural gaps between performance in controlled settings and outcomes in real-world conditions, with particular attention to algorithmic bias, data privacy, equitable access, and algorithmic transparency. AI- supported diagnostic processes in early ages affect not only clinical settings but also educational environments. The chapter concludes by outlining implications for teacher education and inclusive practice.

EARLY DIAGNOSIS AND THE ROLE OF ARTIFICIAL INTELLIGENCE

Given the neurodevelopmental complexity of ASD and the critical importance of early diagnosis, the question of how adequately existing diagnostic infrastructure can meet this demand constitutes the starting point of interest

in integrating AI into diagnostic processes. An interesting paradox emerges in relation to the growing prevalence of "preventive" or early interventions initiated prior to formal diagnosis for infants at elevated likelihood of autism. As the science of early intervention and its research methodologies become increasingly rigorous, the evidence base for the clinical efficacy of support provided in the earliest developmental periods appears to be losing some of its certainty (McGlade et al., 2023). Instruments commonly used in ASD diagnosis, such as the Autism Diagnostic Observation Schedule-2 (ADOS-2) and the Autism Diagnostic Interview-Revised (ADI-R), offer high validity and reliability; however, they also carry structural limitations (Alsharif et al., 2025). In particular, their lengthy administration times, intensive specialist training requirements, and high costs complicate the integration of these instruments into population-level screening programs (Kamp-Becker et al., 2021). Prolonged waiting times and geographic inequities may contribute to the closure of critical developmental windows and the loss of early intervention opportunities (Zwaigenbaum et al., 2019; McGlade et al., 2023). The heterogeneous nature of ASD, moreover, constrains hypothesis-driven research and necessitates high-dimensional data analysis across multiple subfields of biology and medicine. In this context, AI emerges as a powerful tool by virtue of its capacity to autonomously identify complex patterns within large datasets (Ferrari, 2022). The growing academic and clinical interest in AI-based approaches simultaneously raises the question of under what conditions these emerging approaches may or may not offer genuine solutions (Solek et al., 2025; Stanley et al., 2025).

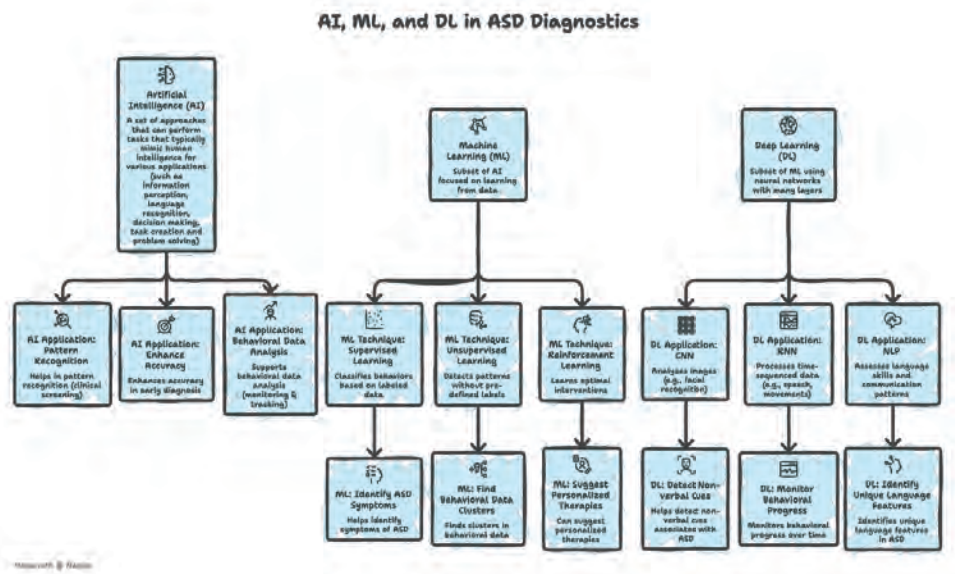
AI systems, particularly through ML and deep learning (DL) algorithms, are capable of analyzing complex data patterns that may elude human observation, thereby enabling high-accuracy classification and prediction even at very early stages (Joudar et al., 2023). The application of AI in ASD diagnosis may be categorized in several ways. Solek et al. (2025) have classified how AI, ML, and DL function in ASD diagnosis, as illustrated in Figure 1.

This classification framework demonstrates that artificial intelligence (AI) systems do not rely solely on a single data modality for the diagnosis of Autism Spectrum Disorder (ASD); rather, they are capable of utilizing multiple diverse markers such as eye-tracking, voice, facial expressions, and behavioral patterns (Jia et al., 2025) . Furthermore, various AI-based studies utilizing these indicators report high diagnostic accuracies. For instance, while deep learning models applied to eye-tracking data have exceeded 90% accuracy in some

studies (Jiang & Zhao, 2017; Li et al., 2022), voice-based approaches employing probabilistic neural networks have been reported to achieve an accuracy of 98.17% (Mohanta & Mittal, 2022).

Figure 1

An overview of AI, ML, and DL in ASD diagnostics (adapted from Solek et al., 2025, p. 127; generated using Napkin AI).



LIMITATIONS OF AI APPLICATIONS AND ETHICAL CHALLENGES

Although AI systems have been reported to offer promising accuracy rates in the early diagnosis of ASD, the "black box" problem is considered one of the most significant structural barriers to the translation of these systems into clinical practice. The logical processes underlying the diagnostic decisions of advanced DL algorithms generally remain opaque (Ganggayah et al., 2025; Wankhede et al., 2024). This lack of transparency may undermine the trust of clinicians and families in the system and may slow the adoption of AI as an independent clinical decision-support tool (Valizadeh et al., 2023). Another critical limitation concerns the homogeneity of datasets and the attendant risk of algorithmic bias. The fact that the majority of models are trained on

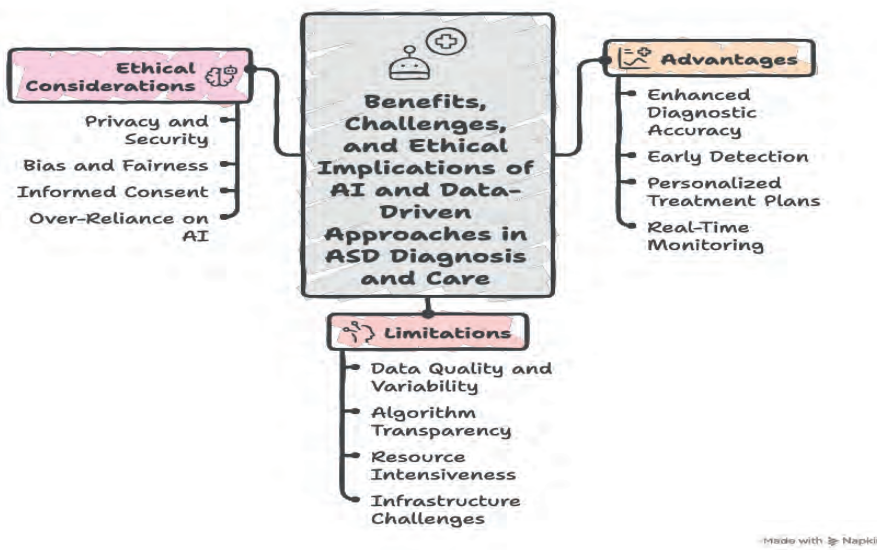
Western-centric and narrowly scoped data may increase the margin of error across diverse ethnic, cultural, and socioeconomic groups, potentially giving rise to false positive outcomes – that is, cases in which the system indicates the presence of autism risk where none exists (Aldakhil & Alasim, 2025; Ganggayah et al., 2025).

From a methodological standpoint, the exceptionally high performance rates reported in the literature are thought to frequently stem from overfitting to small laboratory-based samples (Valizadeh et al., 2023). The absence of independent external validation and longitudinal follow-up data limits the real-world validity of these models in clinical hospital settings (Aldakhil & Alasim, 2025). At the practical and ethical level, the high hardware costs demanded by these technologies may deepen access inequities by creating a digital divide, while the sensitive biometric data collected raise substantial concerns regarding data privacy and security (Ganggayah et al., 2025).

The core advantages, limitations, and ethical considerations associated with AI and data-driven approaches in ASD diagnosis and intervention processes may be summarized as presented in Figure 2.

Figure 2

Summary of the impact of artificial intelligence and data-driven approaches in ASD care and Diagnosis (Adapted from Ganggayah et al., 2025, p. 4; generated using Napkin AI).



While the potential of artificial intelligence (AI) in the early diagnosis of autism spectrum disorder (ASD) is considerable, the limitations and ethical challenges outlined in this section are of equally critical importance. When AI diagnostic tools produce delayed, biased, or inaccurate outputs, the children most adversely affected are frequently those already underserved by existing systems, namely those from low-income families, rural areas, or linguistically diverse backgrounds (Aldakhil & Alasim, 2025; Ganggayah et al., 2025). A missed, misdiagnosed, or delayed diagnosis within the early childhood developmental window does not merely affect clinical pathways; it directly shapes whether or not a child receives appropriate support in early educational settings (Kohli et al., 2022; McGlade et al., 2023; Zhu et al., 2025). Taken together, the limitations of AI diagnostic systems are not confined exclusively to clinical research contexts; rather, they yield tangible consequences for inclusive educational practice (UNICEF, 2025; Whittaker et al., 2019).

IMPLICATIONS OF GLOBAL AI FRAMEWORKS FOR ASD DIAGNOSTIC PROCESSES

The use of AI in the early identification of complex neurodevelopmental differences such as ASD in children presents both significant opportunities and profound ethical risks. The examination of ethical frameworks advanced by global actors such as WHO, UNICEF, and UNESCO is of critical importance for the equitable and safe integration of these technologies into clinical practice. These organizations aim to govern the transformative impact of AI on medicine and child development by centring concepts such as privacy, inclusiveness, autonomy, and the best interests of the child. When the subjects in question are young children and the domain is health, the need to delineate clear boundaries grounded in universal ethical principles becomes more pressing than ever.

WHO AND THE PRINCIPLES OF AI IN HEALTH

WHO has established six core principles to govern the use of AI in medicine and public health: protecting human autonomy; promoting human well-being, safety, and the public interest; ensuring transparency and explainability; fostering responsibility and accountability; ensuring inclusiveness and equity; and promoting responsive and sustainable AI use (WHO, 2021, p. 23–30). WHO

draws particular attention to the vulnerability of children and individuals with disabilities in relation to AI. Emphasizing that the adaptation of systems trained on conventional adult data to pediatric cases may carry significant risks, WHO notes the need for specific regulatory measures to safeguard the physical and mental health of children (WHO, 2024).

In diagnoses such as ASD, racial, cultural, and gender biases present in existing manual diagnostic methods may similarly be reproduced within automated diagnostic systems. When language poses a barrier in internationally implemented studies, AI models may be observed to foreground different behavioral variables. For instance, in a study in which a video-based early diagnostic tool developed within a Western-centric framework was applied to children in Bangladesh, trained algorithms tended to focus more on nonverbal and universally observable physical behaviors such as eye contact rather than verbal interaction – a pattern that evaluators attributed, in part, to the children's unfamiliarity with the language used during training (Whittaker et al., 2019).

UNICEF AND CHILD-CENTRED AI

UNICEF, proceeding from the recognition that AI systems are increasingly permeating the lives of children, developed the Children and AI guidance document and advocated that children's rights must be placed at the center of all AI policy (United Nations Children's Fund [UNICEF], 2025). UNICEF's child-centred AI approach rests on three foundational principles: protection (do no harm), provision (do good), and participation (include all children) (UNICEF, 2025, p. 8). The protection principle requires that AI systems used in diagnostic processes be free from harmful effects such as misclassification or discriminatory outputs, and that children are able to interact with these systems safely. The provision principle aims to ensure that AI-assisted early diagnosis is made equally accessible to all children regardless of their background, and that its potential to support healthcare is fully realized. The participation principle refers to the capacity of children and their families to make informed decisions regarding the AI systems that shape diagnostic processes, and to have a meaningful voice concerning the impact of these technologies on their lives.

Ensuring adherence to these principles in sensitive systems such as ASD diagnostic tools necessitates rigorous data privacy practices. In the context of AI systems, storing behavioral or genetic data unrelated to the diagnostic process on the grounds that it may prove useful for future algorithm training

should be avoided; instead, purpose-specific and minimal data collection – limited to what is strictly necessary for diagnostic purposes – is required (UNICEF, 2025; WHO, 2021).

UNESCO AND HUMAN RIGHTS-BASED AI ETHICS

UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021), establishes as a universal standard that AI must be developed in a manner that respects human dignity, human rights, and fundamental freedoms. UNESCO mandates human oversight in medical and social decision-making processes, explicitly rejecting the replacement of humans by machines. It further specifies that systems involved in diagnostic and assessment processes – particularly those capable of producing lasting effects on children – must be transparent and explainable. The ability of physicians or parents to understand how and why an algorithm has recommended an ASD diagnosis is foundational to UNESCO's principle of accountability (UNESCO, 2021; Floridi et al., 2018).

The use of black box systems in ASD diagnosis, for instance, may leave child psychiatrists unable to determine the degree to which a diagnostic output can be trusted, thereby substantially undermining the clinical trustworthiness of the system (Syriopoulou-Delli, 2025). Moreover, given that the process underlying the decision remains opaque, clinicians may be unable to justify the diagnosis to families – a situation that may substantially impede parents' ability to provide informed consent regarding their child's health condition (WHO, 2021). To address this challenge, it is important to consider the Explainable AI (XAI) framework, which is well aligned with UNESCO's accountability principles (Floridi et al., 2018; Syriopoulou-Delli, 2025).

ASSESSMENT OF GLOBAL PRINCIPLES AND RESEARCH FINDINGS

When systematic studies on the use of AI in the early diagnosis of ASD are examined, it becomes apparent that the principles emphasized by organizations such as WHO, UNICEF, and UNESCO – namely privacy, inclusiveness, autonomy, and the best interests of the child – converge with the methodological and technological challenges encountered in the field. Current systematic research indicates that, despite AI algorithms offering promising accuracy rates in laboratory settings, fundamental ethical and structural barriers continue to

complicate the equitable and safe integration of these technologies into applied contexts (Patel et al., 2025). These challenges cluster around several distinct themes, including algorithmic bias, data privacy risks, and the opaque "black box" nature of systems (Patel et al., 2025; Solek et al., 2025; Sun et al., 2025). Despite the robust ethical frameworks and guiding principles established at the global level, the studies reviewed suggest that deficiencies and structural misalignments in clinical practice persist.

A further layer of difficulty stems from the nature of ASD itself. Studies suggest that current knowledge of ASD remains incomplete, which limits what AI systems can be trained to detect (Ferrari, 2022). The literature also carries the risk of being characterized by heterogeneous findings that are often difficult to reproduce. This technical unreliability weakens the translation of policy principles into clinical practice and, in turn, their downstream application in education. This unreliability weakens the translation of policy principles into clinical practice and, in turn, their downstream application in education.

Systematic reviews report that existing AI studies are generally based on small samples, lack adequate external validation, and carry a high risk of bias in quality assessments (Aldakhil & Alasim, 2025; Gkintoni et al., 2025; Valizadeh et al., 2023). The inability of clinicians to understand the reasoning underlying diagnostic decisions made by algorithms – the so-called "black box" problem – may erode physician-patient trust (Wankhede et al., 2024). This lack of transparency, considered in relation to UNESCO's principle of human oversight and WHO's principle of clinical trustworthiness, complicates both the physician's capacity for independent decision-making and the family's ability to navigate the informed consent process (Wankhede et al., 2024; Zhang, 2025).

Broad systematic reviews and meta-analyses note that datasets are predominantly drawn from male-dominant, Western-centric, and homogeneous cohorts, with limited racial, linguistic, and socioeconomic diversity (Aldakhil & Alasim, 2025; Zhang, 2025). This pattern creates an evident tension with UNICEF's principle of including all children and WHO's principle of inclusiveness and equity. To mitigate algorithmic bias and ensure the cross-population validity of models, attention has been drawn to the need for systems to be trained on inclusive datasets that encompass gender, racial, linguistic, and socioeconomic diversity (Aldakhil & Alasim, 2025; Rêgo & Araújo-Filho, 2024).

AI and DL models that achieve high accuracy rates in ASD diagnosis possess a "black box" structure that is unable to explain which neurological or behavioral cues underlie their decisions (Syriopoulou-Delli, 2025; Valizadeh

et al., 2023). Systematic reviews emphasize that, without the integration of XAI methods, such systems cannot be trusted or regulated at the clinical level (Aldakhil & Alasim, 2025; Sohn et al., 2025). This lack of transparency in decision-making processes undermines algorithmic accountability, complicating both the physician's capacity to make independent and medically justified decisions and the informed participation of parents in the treatment process – and thus stands in direct conflict with the universal human rights and transparency principles of UNESCO (2021) and WHO (2021; 2024).

The majority of existing AI tools remain at the laboratory prototype stage and have not been adequately tested under real-world clinical conditions in primary care settings, low-resource countries, or rural areas (Mohammadi et al., 2025; Sohn et al., 2025). Although telemedicine and low-cost diagnostic tools hold potential for expanding access to services, inadequate digital infrastructure, caregivers' lack of technological literacy, and the absence of multilingual interfaces adapted to local languages and cultures represent the most significant barriers to clinical integration (Aldakhil & Alasim, 2025; Joudar et al., 2023). These infrastructural and demographic deficiencies are closely linked to WHO's principles of public benefit and sustainability, as well as to UNICEF's and UNESCO's principles of inclusiveness, global equity, and the equal benefit of all children – collectively contributing to what may be characterized as a digital divide in global health.

Systematic reviews emphasize that the meaningful involvement of autistic individuals, caregivers, and clinicians in the design and testing phases of AI systems through participatory and co-design approaches constitutes both a clinical and an ethical imperative (Aldakhil & Alasim, 2025; Sohn et al., 2025). It is explicitly noted that models developed solely through an engineering-driven focus – establishing an asymmetric human-machine interaction – are unlikely to reflect real-world priorities, patient needs, and a neurodiversity perspective (Sohn et al., 2025; Syriopoulou-Delli, 2025). This emphasis directly aligns with UNICEF's principle of participation and its child-centred multi-stakeholder approach, as advocated within the framework of core children's rights in the technology development cycle (UNICEF, 2025).

Finally, current systematic reviews demonstrate that incorporating autistic individuals, families, educators, and clinicians into the design, testing, and evaluation cycle of AI tools through co-design and participatory design principles constitutes both a clinical and an ethical imperative (Aldakhil & Alasim, 2025; Rêgo & Araújo-Filho, 2024). These participatory approaches – which center

the feedback of all stakeholders rather than adopting a purely biomedical or engineering-driven perspective in the technology development process – serve both to embed a neurodiversity-informed and equitable standpoint and to give concrete expression to UNICEF's vision of participation and child-centred AI (Sohn et al., 2025). Taken together, the systematic evidence gathered on the use of AI in early ASD diagnosis clearly points to the need for a considered form of governance – one that, rather than merely keeping pace with the speed of technological advancement, places children's rights, privacy, inclusiveness, and human-in-the-loop oversight at its center, in alignment with the frameworks established by WHO, UNICEF, and UNESCO (Gkintoni et al., 2025; Rêgo & Araújo-Filho, 2024). For these globally established ethical and political artificial intelligence frameworks to find meaningful application in early intervention processes, the issue must not remain confined solely to the clinical or diagnostic dimension. The data generated by AI systems during diagnostic processes, along with the potential algorithmic limitations inherent in these systems, have the potential to directly shape how children are supported in early educational environments (Zhang, Cao, Li, & Lv, 2026). Consequently, the macro-level principles of global AI frameworks in ASD diagnosis inherently raise the question of how these technologies will translate into classroom practices and early intervention.

REFLECTIONS FOR TEACHER EDUCATION AND INCLUSIVE PRACTICE

Schools and education professionals are increasingly likely to encounter AI-supported diagnostic reports and digital assessment outputs as part of their daily practice. Although the literature indicates that early signs of ASD can emerge as early as 12 months and that diagnosis may be possible before 18 months, most children are not diagnosed until between 48 and 60 months of age (Kohli et al., 2022). This diagnostic delay in turn slows access to early intervention services. Yet intensive interventions initiated before the age of three, when neuroplasticity is at its peak, can meaningfully improve children's adaptive and cognitive skills (McGlade et al., 2023). In this context, the integration of AI tools into early diagnosis yields critical pedagogical consequences across three distinct scenarios: accurate, delayed, and inaccurate identification.

AI tools that support early and accurate diagnosis enable the timely design of flexible, non-rule-based learning environments tailored to a child's unique cognitive profile, thereby directly strengthening inclusive education (Sohn

et al., 2025). For instance, research demonstrates that children who receive earlier diagnoses and subsequent interventions exhibit significantly better cognitive and language outcomes, alongside lower rates of intellectual disability, by school age compared to their later-diagnosed peers (Clark, Vinen, Barbaro, & Dissanayake, 2017). Conversely, delayed diagnosis extends beyond a clinical issue, depriving the child of pedagogical support during the most critical early intervention window. Algorithmic bias may also produce inaccurate diagnostic outputs, potentially leading to the unfair stigmatization of children from disadvantaged backgrounds (Aldakhil & Alasim, 2025). Such misdiagnoses can exacerbate existing educational inequalities by causing children to be placed in inappropriate special education environments (Whittaker et al., 2019). For example, misinterpreting cultural variations in social communication as pathological deficits can result in minority children receiving restrictive placement decisions rather than inclusive support (Fisher et al., 2022). At this point, AI-supported ASD tools go beyond serving as a one-time screening instrument; they offer a broader shift in which pedagogical interventions in school settings can be continuously informed and adjusted (Zhang, Cao, Li, & Lv, 2026). This shift, however, makes it necessary for these tools to be integrated into classrooms not as a straightforward technological transfer, but through a process of critical pedagogical reflection (Syriopoulou-Delli, 2025).

As teachers working with children with ASD are increasingly likely to encounter AI-generated information in their daily practice, the development of competencies outlined in UNESCO's AI Competency Framework for Teachers (Miao & Cukurova, 2024) becomes an important consideration for this group as well. In particular, the framework's emphasis on a human-centred mindset and on the ethical interpretation of AI outputs is relevant for educators who may be expected to read, contextualise, and act on AI-supported diagnostic or assessment information. Within this orientation, the capacity to understand what AI systems can and cannot do, to interpret their outputs critically, and to keep human judgement at the centre of pedagogical decisions can be considered a meaningful dimension of professional development for teachers working with young children with ASD.

Regardless of how sophisticated the technology becomes, UNESCO's (2021) principle that human judgement must not be entirely delegated to machines in consequential decisions remains relevant to inclusive education. The opaque nature of advanced deep learning diagnostic systems can obscure the reasoning behind decisions, making it harder to support the in-

formed consent and collaborative planning with families that are central to early ASD intervention (Syriopoulou-Delli, 2025). AI outputs should therefore be treated not as definitive determinations, but as one source of information among many, to be considered critically alongside developmental observations, family experiences, and the expertise of multidisciplinary teams (WHO, 2024).

CONCLUSION

It is evident that AI and data-driven technologies hold transformative potential for the early diagnosis of ASD (Rêgo & Araújo-Filho, 2024). However, the existing literature and systematic reviews demonstrate that the reliable translation of high algorithmic performance rates obtained in laboratory settings into real-world clinical practice requires the rigorous address of methodological challenges such as data inequity, algorithmic bias, privacy, and transparency – including the black box problem (Ganggayah et al., 2025; Valizadeh et al., 2023). In future technological integration processes, the preservation of human oversight rather than the replacement of clinicians by machines, the support of physicians' clinical judgment, and the application of ethical design principles that encompass disadvantaged populations must not be overlooked (WHO, 2021). As AI-assisted diagnostic tools increasingly inform educational planning for young children with ASD, educators too must be equipped to engage with these technologies critically – understanding their limitations, questioning their outputs, and preserving the human-centred judgement that inclusive practice requires. In this context, one of the critical questions that all researchers, clinicians, and policymakers working in a domain as sensitive, multidimensional, and profoundly human as autism must confront is the following: Is our primary aim merely to keep pace with the dizzying speed of ever-accelerating technological advancement, or should it be to integrate these digital innovations into practice wisely – in a manner that safeguards human dignity, children's rights, and ethical boundaries?

DISCLOSURE STATEMENT

Artificial intelligence tools were used solely for translation, grammatical editing, and assistance in the creation of figures during the preparation of this manuscript. All conceptual framing and content were entirely developed and written by the author.

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CHAPTER 5

RECONSTRUCTING DIGITAL SOCIAL STORIES: AUTISM SPECTRUM DISORDER, INCLUSION, AND INTERSECTIONALITY

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INTRODUCTION

In the 0–6 age range, social-emotional developmental is foundational (Gielen & Feltzer, 2026), as early patterns of interaction, communication and self-regulation are rapidly emerging and highly sensitive to environmental input. Early childhood represents a critical period for social, emotional, and communicative development, particularly for children identified with Autism Spectrum Disorder (ASD), (Costescu et al., 2025). Within this developmental window, early intervention has been widely recognized as a key mechanism for supporting participation, learning, and well-being (Lidstone, 2025). Traditionally, such interventions have been grounded in developmental and behavioral frameworks that prioritize the acquisition of *"appropriate"* social skills and normative patterns of interaction. However, growing scholarship within neurodiversity and Critical Disability Studies has begun to challenge these deficit-oriented approaches, calling for a fundamental rethinking of how autism is understood and supported in early childhood contexts (Valdez & Dalzell, 2025).

At the intersection of early intervention and inclusive education, digital social stories have emerged as widely used tools to support social-emotional development in young children with ASD (Lee et al., 2025). With the increasing integration of digital technologies in early childhood education, these narratives have evolved into multimodal formats incorporating visuals, audio, and interactive elements (Zhao, et al., 2025). This digitalization enhances accessibility and personalization, offering new possibilities for supporting diverse learners. Yet, it also necessitates a more critical examination of the assumptions embedded within these tools.

While digital social stories are often framed as neutral instructional supports, they also function as discursive sites where meanings about behavior, emotion, and *"appropriate"* social participation are constructed and reinforced. Through repeated exposure to narrative scripts, children may be implicitly guided toward particular ways of being, interacting, and regulating themselves in alignment with dominant social norms (Ulaşman & Sivrikaya, 2025).

THEORETICAL FOUNDATIONS: NEURODIVERSITY, DISABILITY, AND INCLUSION

NEURODIVERSITY AND EARLY CHILDHOOD

In preschool contexts (ages 0–6), digital social stories can support emerging skills (Smith et al., 2021), such as joint attention, early emotional recognition, and adaptive responses to routines and transitions. The neurodiversity paradigm represents a significant epistemological shift in how autism and other neurodevelopmental differences are conceptualized (Tafolla et al., 2025). Rather than framing ASD as a deficit to be remediated, neurodiversity positions it as part of the natural variation of human cognition, emphasizing differences in processing, communication, and interaction rather than dysfunction. This perspective challenges traditional early intervention models that prioritize normalization and instead advocates for approaches that support autonomy, well-being, and meaningful participation.

In early childhood, this shift has profound implications. Social-emotional development is often framed through normative milestones, where deviations from expected behaviors–such as eye contact, turn-taking, or emotional expression–are interpreted as deficits requiring correction. However, from a neurodiversity perspective, such behaviors may reflect alternative but equally valid ways of engaging with the social world (Shaw et al., 2025).

Within this framework, tools such as digital social stories (Xue et al., 2025) can be re-conceptualized as mediational supports that facilitate understanding between the child and their environment, rather than instruments for behavioral correction. This shift foregrounds agency and relationality, positioning children as active participants in meaning-making processes.

INCLUSIVE EDUCATION AND EARLY INTERVENTION

Inclusive education, particularly in early childhood, is grounded in the principle that all children have the right to participate meaningfully in shared learning environments, regardless of ability, background, or identity (White & Fletcher, 2026). However, inclusion extends beyond physical placement in mainstream settings; it requires systemic transformation of pedagogical practices, environments, and attitudes (Wolbring et al., 2025). In this sense, early intervention plays a dual role: it can either support inclusion by enabling access and participation, or it can reinforce exclusion by prioritizing assimilation into normative frameworks.

Traditional early intervention models often focus on individualized skill acquisition, targeting areas such as communication, social interaction, and behavior regulation. While these supports can be beneficial, they may also inadvertently frame the child as the primary site of change, overlooking the role of the environment in shaping participation. Inclusive approaches, by contrast, emphasize the need to adapt contexts, relationships, and teaching strategies to accommodate diverse learners.

Digital tools, including social stories, occupy a complex position within this landscape. On one hand, they offer flexible, accessible means of supporting understanding and communication. On the other, if designed without critical reflection, they may perpetuate narrow definitions of inclusion by encouraging conformity rather than embracing diversity. Therefore, integrating inclusive pedagogy with early intervention requires a shift toward approaches that prioritize belonging, agency, and mutual adaptation (Yang et al., 2025).

INTERSECTIONALITY AND EARLY CHILDHOOD DIVERSITY

Intersectionality provides a critical framework for understanding how multiple dimensions of identity and marginalization intersect to shape children's experiences (Miller, 2025). Originally conceptualized to examine overlapping systems of oppression, intersectionality highlights that neurodivergent children are not a homogeneous group; they may also navigate differences related to language, culture, race, gender, socioeconomic status, or migration history (Fish, 2025).

In early childhood contexts (Orel & Licardo, 2025), these intersections are particularly significant. For example, children from multilingual or migrant backgrounds may encounter additional challenges in both diagnosis and inter-

vention, including misinterpretation of communication styles or limited access to culturally responsive resources. Similarly, expectations regarding social behavior and emotional expression vary across cultures, raising questions about the universality of the norms embedded in many intervention tools.

Applying an intersectional lens to digital social stories reveals the importance of representation, cultural relevance, and contextual sensitivity (Graells-Sans, 2025). Stories that assume a single cultural framework or linguistic norm risk excluding or misrepresenting children's lived experiences. Moreover, in contexts of migration or forced displacement, trauma-informed considerations become essential, as children's social-emotional needs may be shaped by experiences of instability, loss, or adaptation.

Thus, intersectionality underscores the necessity of moving beyond one-size-fits-all approaches toward more nuanced, responsive, and equitable practices (Flynn, 2025). It also reinforces the argument that reconstructing digital social stories is not only a matter of pedagogical improvement but a critical step toward addressing systemic inequities in early childhood education and intervention.

DIGITAL SOCIAL STORIES IN ASD: DEVELOPMENTAL AND PEDAGOGICAL ROLE

ORIGINS AND PURPOSE OF SOCIAL STORIES

Social stories were originally developed as structured, individualized narratives designed to support children with Autism Spectrum Disorder (ASD) in understanding social situations, expectations, and interactions (Tawil et al., 2026). Grounded in the idea that many autistic children benefit from explicit, predictable, and visually supported information, these stories aim to reduce uncertainty and anxiety by making implicit social rules more transparent. Typically, social stories describe specific contexts–such as greeting others, taking turns, or managing transitions–using clear, descriptive language and perspective-taking elements.

From a developmental standpoint, social stories function as scaffolding tools that mediate the relationship between the child and their social environment. Drawing on sociocultural theory, particularly the notion that learning occurs through guided participation and meaning-making, these narratives can support children in interpreting social cues that might otherwise remain

ambiguous. Rather than relying solely on spontaneous social learning, social stories provide structured opportunities to rehearse and anticipate social interactions in a safe and controlled manner (Isaac et al., 2025).

However, while their original intent was to enhance understanding and reduce anxiety, it is important to recognize that social stories also embed assumptions about what constitutes *"appropriate"* behavior. As such, their pedagogical role extends beyond support toward shaping social expectations, making it necessary to examine both their benefits and limitations (Wolbring et al., 2025).

DIGITALIZATION AND MULTIMODAL LEARNING

The integration of digital technologies has significantly expanded the possibilities of social stories, transforming them from static, text-based narratives into dynamic, multimodal learning tools (Soldatic et al., 2025). Digital social stories can incorporate images, audio narration, animation, and interactive elements, allowing for greater personalization and accessibility. These features are particularly relevant in early childhood contexts, where multimodal engagement can enhance attention, comprehension, and retention.

From a pedagogical perspective (Wolbring et al., 2025), digital formats align well with principles of differentiated instruction and multimodal learning. Visual supports can aid comprehension for children who process information more effectively through images, while audio narration can support language development and accessibility for emergent readers. Repetition, a key feature of many digital platforms, allows children to revisit stories multiple times, reinforcing understanding and promoting generalization across contexts.

Moreover, digital tools enable customization to reflect individual preferences, cultural contexts, and developmental needs (Tawil et al., 2026). For example, stories can be adapted to include familiar environments, family members, or languages, thereby increasing relevance and engagement. This adaptability positions digital social stories as potentially powerful tools within inclusive early childhood settings.

At the same time, digitalization introduces new considerations related to design, access, and pedagogy. The ease of creating and disseminating digital content raises questions about quality, cultural representation, and the assumptions embedded within narratives. Without critical reflection, digital formats may simply replicate traditional, compliance-oriented scripts in more engaging forms, rather than transforming the underlying pedagogical approach.

SUPPORTING SOCIAL-EMOTIONAL DEVELOPMENT IN EARLY CHILDHOOD ASD

Social-emotional development is a central focus of early intervention for children with ASD, encompassing skills such as emotion recognition, self-regulation, perspective-taking, and participation in social interactions (Evangelou et al., 2026). Digital social stories are frequently used to target these areas by breaking down complex social situations into manageable and predictable sequences.

In terms of emotion recognition, stories can explicitly label feelings, link them to contextual cues, and model appropriate responses. This can support children in identifying both their own emotions and those of others, a foundational component of social understanding. Similarly, by presenting step-by-step strategies for managing challenging situations–such as waiting, coping with change, or responding to frustration– social stories can contribute to the development of self-regulation skills.

Perspective-taking is another area where social stories are often employed. By incorporating descriptions of others' thoughts, feelings, and reactions, these narratives can encourage children to consider multiple viewpoints. However, it is important to approach this aspect critically, as perspective-taking is often framed in ways that prioritize normative interpretations of social behavior, potentially overlooking neurodivergent ways of experiencing and expressing sociality (Russell et al., 2026).

Importantly, the effectiveness of digital social stories should not be understood solely in terms of skill acquisition. Within a neurodiversity-informed framework, their value lies in supporting meaningful participation and reducing barriers to engagement. When designed thoughtfully, they can help bridge communication gaps between children and their environments (Ulaşman & Sivrikaya, 2025), fostering mutual understanding rather than unilateral adaptation.

Nevertheless, the emphasis on predefined *"appropriate"* responses raises important questions about whose expectations are being prioritized. If social stories are used primarily to train children to conform to dominant social norms, they risk undermining agency and reinforcing deficit-based perspectives. This tension underscores the need to critically examine and reconstruct these tools, a task that becomes particularly urgent when considering diverse cultural and intersectional contexts.

RECONSTRUCTING DIGITAL SOCIAL STORIES: TOWARD AN INCLUSIVE AND NEURODIVERSITY-AFFIRMING FRAMEWORK

Reconstructing digital Social Stories requires a fundamental shift in their underlying purpose – from promoting behavioral compliance to supporting agency, understanding, and relational engagement. Traditional social stories often operate within a framework that prioritizes correct responses to predefined social situations. While such structure can provide clarity and reduce uncertainty, it may also position the child as a passive recipient of social rules rather than an active participant in meaning-making.

An inclusive and neurodiversity-affirming approach repositions the child as an agentic subject whose interpretations, preferences, and responses are valid and meaningful. Rather than prescribing a single *"appropriate"* behavior, reconstructed social stories can present multiple possible responses, emphasizing flexibility and context. This shift acknowledges that social interaction is not a fixed script but a dynamic, negotiated process.

In practice, this may involve framing narratives in ways that validate children's feelings and experiences – for example, recognizing that discomfort in certain social situations is legitimate and that different coping strategies are acceptable. By centering agency, digital social stories can move toward supporting self-understanding and self-advocacy, rather than solely encouraging adaptation to external expectations.

A key component of reconstruction involves the intentional design of narratives that reflect diverse identities, experiences, and cultural contexts. This requires moving beyond generic or standardized templates toward stories that are responsive to the lived realities of children and their families. Representation plays a central role in this process. Characters, settings, and interactions should reflect a range of cultural, linguistic, and familial backgrounds, enabling children to see themselves and their communities within the narratives.

Culturally responsive design also entails recognizing that social norms are not universal. Expectations related to communication styles, emotional expression, and interpersonal behavior vary across contexts. Reconstructed social stories should therefore avoid presenting culturally specific practices as universally correct. Instead, they can introduce variability and explicitly acknowledge that *"different people do things in different ways,"* thereby fostering openness and mutual understanding.

Language accessibility is equally critical. Providing multilingual options and incorporating familiar linguistic patterns can enhance comprehension and engagement, particularly for children from migrant or multilingual backgrounds. Additionally, multimodal design–integrating visuals, audio, and interactive elements–can support diverse communication preferences and abilities, ensuring that stories are accessible to children with varying levels of verbal expression.

Reconstruction also involves reimagining the pedagogical function of digital social stories. Rather than being used as fixed instructional scripts, they can be positioned as dialogic tools that invite interaction, reflection, and co-construction. This perspective aligns with sociocultural approaches to learning, which emphasize the importance of dialogue and shared meaning-making in development.

In this model, social stories are not simply presented to children but are explored with them. Educators and caregivers can engage children in discussions about the story, ask open-ended questions, and invite alternative interpretations or endings. This process not only supports comprehension but also encourages critical thinking and self-expression.

Digital technologies can further enhance this dialogic potential. Interactive features–such as choosing between different responses, recording personal narratives, or adapting story elements–can allow children to actively shape the content. Such engagement transforms social stories from prescriptive tools into flexible resources that support relational understanding and collaborative learning.

Reconstructing digital social stories has broader implications for early intervention practices (Bast et al., 2025). It challenges practitioners to move beyond narrowly defined behavioral goals and to adopt more holistic, child-centered approaches that prioritize well-being, participation, and identity development. This shift requires not only changes in materials but also in professional perspectives and practices.

In early childhood setting, reconstruction is particularly critical (Dixon, 1993), as rigid behavioral expectations introduced during the 0–6 period may shape long-term self-perception and participation patterns. Educators, therapists, and caregivers must engage in ongoing reflection regarding the assumptions embedded in their interventions. This includes questioning whose norms are being prioritized, how difference is framed, and whether practices support or constrain children's agency. Integrating reconstructed social stories into early intervention can thus serve as both a practical strategy and a catalyst for broader pedagogical transformation (Wolbring et al., 2025).

HOW TO REDESIGN A DIGITAL SOCIAL STORY IN PRE-SERVICE TEACHER EDUCATION?

In a preschool classroom serving children aged 4–5, a pre-service teacher developed a digital social story to support a child with ASD during transition from free play to group time. The initial version of the story followed a conventional structure, emphasizing compliance with classroom expectations: *"I stop playing. I sit on the carpet. I listen to the teacher."* While the story provided predictability, it did not account for the child's sensory sensitivities or preferred modes of engagement, and the child continued to experience distress during transitions.

As part of a teacher education task grounded in neurodiversity and inclusive pedagogy, the pre-service teacher was asked to redesign the story. The revised digital Social Story incorporated multiple ways of participating: *"When it is group time, I can sit, stand, or use my cushion. I can listen in my own way."* Visual supports were adapted to reflect the actual classroom environment, and options for self-regulation were included, such as using headphones or taking a brief break. The story also integrated simple emotion labels (e.g., "I might feel upset or not ready") and corresponding coping strategies.

Following the implementation of the revised story, the child demonstrated increased tolerance for transitions and began to engage in group activities in more flexible ways. Importantly, the goal shifted from enforcing uniform behavior to supporting participation and emotional regulation. The pre-service teacher reported a deeper awareness of how initial assumptions shaped the design of the story and recognized the importance of creating narratives that validate diverse needs and experiences. This case illustrates how digital social stories, when reconstructed through inclusive and neurodiversity-affirming principles, can better support social-emotional development in early childhood ASD contexts.

CONCLUSION

This chapter has examined the intersections of neurodiversity, early intervention, inclusive education, and ASD support in early childhood through a critical and theoretically grounded lens, with a particular focus on digital social stories (Xue et al., 2025). While these tools are widely recognized for their role in supporting social-emotional development, the analysis has

highlighted that they are not neutral pedagogical resources (Wolbring et al., 2025). Rather, they function as discursive sites where norms of behavior, emotion, and social participation are constructed, negotiated, and, at times, imposed.

By drawing on Critical Disability Studies, intersectionality, and inclusive pedagogy, the chapter has problematized traditional uses of digital social stories that prioritize compliance and normalization. It has argued for their reconstruction as inclusive, culturally responsive, and neurodiversity-affirming tools that support agency, relational understanding, and meaningful participation. This shift requires not only changes in narrative design but also a broader reorientation of early intervention practices toward equity, flexibility, and recognition of diverse ways of being (Lidstone, 2025).

Importantly, the chapter has emphasized the transformative potential of this reconstruction within teacher education. Engaging pre-service teachers in critically analyzing and redesigning digital social stories fosters reflexivity, challenges ableist assumptions, and supports the development of inclusive and culturally responsive pedagogies (Wolbring et al., 2025). In increasingly diverse early childhood contexts shaped by migration, multilingualism, and social inequality, such competencies are essential for creating equitable learning environments.

While other contributions in this volume, such as Digital Innovation in Early ASD Education: Insights from the EARLY-ASD Project, focus on applied and project-based implementations of digital tools, this chapter adopts a critical-conceptual approach. Rather than evaluating specific interventions, it interrogates the underlying assumptions, power relations, and normative frameworks embedded within digital Social Stories. In doing so, it complements practice-oriented work by offering a theoretical lens through which such innovations can be more critically and ethically understood.

DISCLOSURE STATEMENT

All conceptual content was developed and written by the author. In addition, AI tools were used for translation, grammar corrections and general editing during the preparation of this article.

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CHAPTER 6

ASSISTIVE TECHNOLOGIES IN INCLUSIVE EDUCATION FOR STUDENTS WITH AUTISM SPECTRUM DISORDER: TEACHER PREPAREDNESS, COMPETENCE DEVELOPMENT, AND SYSTEMIC SUPPORT NEEDS

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INTRODUCTION

Early childhood and primary education constitute a critical stage in children's developmental trajectories, particularly for learners with special educational needs, including students with Autism Spectrum Disorder (ASD). During this period, foundational competencies in communication, socio-emotional regulation, and social participation are established, shaping long-term educational and life outcomes. Ensuring equitable access to learning therefore requires not only inclusive pedagogical frameworks but also systematically designed support structures that enable meaningful participation of children with ASD in mainstream educational environments.

Within this context, assistive technologies (AT) have emerged as a key component of inclusive education systems. AT are broadly defined as tools, devices, and digital systems that enhance functional capabilities and facilitate access to learning for individuals with disabilities (Cook & Polgar, 2015). In educational settings, they range from low-tech visual supports and structured communication aids to advanced digital solutions, including augmentative and alternative communication (AAC) systems, interactive schedules, and applications designed to support emotional regulation and social understanding (Kagohara et al., 2013).

For students with ASD, who frequently experience challenges in communication, behavioural regulation, and predictability of social environments, assistive technologies offer significant potential to scaffold learning and participation. Empirical evidence indicates that technology-supported interventions can enhance communication skills, improve attentional engagement, reduce anxiety, and promote social interaction (Grynszpan et al., 2014). Importantly, these outcomes are closely aligned with the broader goals of social-emotional learning, which is increasingly recognised as a core domain in inclusive education. Frameworks such as CASEL (2020) emphasise competencies including self-awareness, self-regulation, social awareness, relationship skills, and responsible decision-making as fundamental for educational inclusion and peer participation.

Despite this well-established potential, the implementation of assistive technologies in inclusive education systems remains uneven, particularly in early childhood and primary education contexts. In Poland, as in many educational systems, AT integration is characterised by variability in access, limited systematic training, and inconsistent pedagogical application, especially in relation to socio-emotional development.

In this landscape, teachers occupy a central mediating role between technology and learner outcomes. Both pre-service and in-service teachers determine whether assistive technologies are effectively selected, adapted, and embedded into pedagogical practice. Their preparedness, professional competence, and access to institutional support therefore become decisive factors in shaping the quality of inclusive education. However, existing research suggests that teacher education programmes often insufficiently address the practical integration of assistive technologies, resulting in a persistent gap between theoretical knowledge and classroom application.

Against this background, the present study examines teacher preparedness, perceived competence, and professional support needs related to the use of assistive technologies in educating students with ASD. Focusing on both pre-service teachers enrolled in early childhood, primary, and special education programmes, and in-service teachers working in inclusive settings in Poland, the study explores how experiential learning, access to resources, and professional development opportunities shape pedagogical practice.

By situating assistive technologies within a broader ecosystem of teacher competence and inclusive education structures, the study contributes to understanding how systemic, pedagogical, and technological factors interact in shaping educational provision for learners with ASD.

EDUCATION FOR CHILDREN WITH ASD AND ASSISTIVE TECHNOLOGIES IN POLAND

In Poland, education and support for children with Autism Spectrum Disorder (ASD) are provided through a combination of public and private institutions that integrate diagnostic, therapeutic, and educational services. The system, coordinated by the Ministry of National Education and local authorities, offers multiple educational pathways, including mainstream settings with individualized support, integration classes, specialized centers, and special schools. Individualized Education Plans (IEPs), based on formal identification of special educational needs, guide the adaptation of curricula, teaching strategies, and learning environments.

Diagnosis is typically conducted in psychological and pedagogical counseling centers, specialized diagnostic units, and private clinics, using a combination of observation, parental interviews, and standardized tools such as ADOS-2 and ADI-R. Early diagnosis enables access to interventions including behavioral therapy (e.g., ABA), speech therapy, and sensory integration. However, access to diagnostic and therapeutic services remains uneven, with significant regional disparities and long waiting times, particularly outside major urban areas.

Students with ASD may attend mainstream or integration settings with the support of special education professionals, or specialized institutions for those with more complex needs. Therapeutic and medical services are delivered by multidisciplinary teams, including psychologists, psychiatrists, and therapists, with partial financial support provided through public funding schemes. Although the system offers a wide range of services, its effectiveness varies depending on local resources and institutional capacity.

The legal framework supporting education and care for children with ASD includes national regulations on inclusive education, social assistance policies, and provisions ensuring access to individualized suport (Sejm Resolution, 2013; The Regulation of the Minister of National Education, 2017; The Social Assistance Act, 2004; the Act on Supportive Benefits, 2023). While these frameworks establish a strong formal basis for inclusion, their implementation remains inconsistent, particularly in relation to the quality and availability of specialized support.

Against this background, the integration of assistive technologies (AT) into educational practice remains limited. Existing research in Poland points to the use of selected digital and interactive tools, such as bibliotherapy, Kamishibai storytelling, and educational robotics, which can support communication,

engagement, and social skills (Mrowiec, 2019). However, these initiatives are often fragmented and highly dependent on individual teacher competence and methodological preparedness. Experiences from remote learning have further highlighted both the potential of digital tools and the challenges teachers face, including technical barriers,

Overall, while Poland has developed a relatively comprehensive system of educational and therapeutic support for students with ASD, significant challenges persist. These include unequal access to services, variability in teacher preparedness, and the still limited and unsystematic use of assistive technologies. Addressing these gaps requires a stronger emphasis on teacher education and professional development, as well as more coherent institutional support for integrating AT into inclusive educational practice.

ASSISTIVE TECHNOLOGIES AND SOCIO-EMOTIONAL DEVELOPMENT IN ASD

Assistive technologies are defined as tools, devices, and digital systems that enhance functional abilities and support participation in learning environments for individuals with disabilities (Alnahdi, 2014). In the context of ASD, AT includes augmentative and alternative communication (AAC) systems, visual scheduling tools, emotion-regulation applications, and digitally mediated social learning interventions (Kagohara et al., 2013).

A growing body of evidence indicates that AT can significantly improve attentional engagement, communication capacity, emotional regulation, and social interaction in learners with ASD (Grynszpan et al., 2014; Odom et al., 2010). These outcomes are particularly relevant to socio-emotional development, which is increasingly conceptualised as a core dimension of educational participation rather than a supplementary domain.

The present study adopts the CASEL framework (2020), which conceptualises socio-emotional learning (SEL) through five interrelated competencies: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. For children with ASD, deficits in these domains are often pronounced, particularly in emotional regulation, social reciprocity, and peer relationship formation.

In this regard, AT may function as a mediating scaffold that supports both cognitive accessibility and socio-emotional participation. For example, emotion-tracking applications can support self-regulation, visual narratives can

enhance social understanding, and AAC systems can facilitate expressive communication and interaction. Consequently, AT should be understood not merely as compensatory tools, but as pedagogical instruments embedded within broader inclusive learning ecologies.

SYSTEMIC AND PEDAGOGICAL CHALLENGES IN AT INTEGRATION

Despite their documented potential, the integration of assistive technologies in early childhood and primary education remains limited and uneven. One key explanatory factor is the persistence of digital inequality, which extends beyond access to devices and connectivity to include disparities in digital competence, pedagogical readiness, and institutional capacity (van Dijk, 2020). Within inclusive education, these inequalities disproportionately affect learners with disabilities, for whom consistent and structured technological support is essential for meaningful participation.

Recent scholarship emphasises the importance of inclusive digital pedagogy, which integrates technological tools with equity-oriented, culturally responsive, and developmentally appropriate teaching practices (Selwyn, 2019). However, such approaches require high levels of teacher competence and institutional support, which are not consistently available.

Three interrelated categories of barriers to AT implementation are commonly identified in the literature:

- Systemic barriers, including limited funding, insufficient infrastructure, and lack of coherent implementation guidelines;
- Competence-related barriers, such as inadequate teacher training, limited practical experience, and insufficient integration of AT into initial teacher education programmes;
- Pedagogical barriers, including uncertainty regarding developmentally appropriate use of technology, concerns about screen time, and difficulties balancing digital tools with direct social interaction (Plowman & McPake, 2013; Dell et al., 2020).

In the Polish context, although inclusive education policies formally support access for learners with ASD, empirical studies indicate that implementation remains highly variable (Kopciewicz, 2018; Mrowiec, 2019; Bobik, 2022). The effectiveness of AT use is strongly dependent on teacher competence and institutional support structures, rather than on policy availability alone.

TEACHER ROLE IN ASSISTIVE TECHNOLOGY INTEGRATION

Teachers occupy a central mediating position in the integration of assistive technologies within inclusive education systems. Their knowledge, beliefs, and perceived competence directly influence whether AT is meaningfully embedded into pedagogical practice or used sporadically and inconsistently (Ainscow, 2007; Loreman et al., 2011; Rose & Howley, 2007; Russell et al., 2023).

However, research consistently demonstrates that teachers face significant barriers in this domain. These include insufficient exposure to assistive technologies during initial training, limited opportunities for practice-based learning, and a lack of structured guidance on evidence-based implementation strategies (Alkahtani, 2013; Triviño-Amigo et al., 2022). As a result, many teachers report low confidence in selecting and adapting technological tools for learners with ASD.

Additional challenges relate to institutional readiness and policy implementation. In many cases, schools lack coherent strategies for AT integration, as well as access to specialist support personnel. This limits the sustainability and scalability of technology-enhanced inclusive practices.

Moreover, effective AT integration requires careful pedagogical balancing. Excessive reliance on digital tools without appropriate pedagogical framing may risk overexposure to screen-based activities and reduce opportunities for naturalistic social interaction (Plowman & McPake, 2013). Therefore, teacher competence must include not only technical skills, but also pedagogical judgement and developmental sensitivity.

TOWARD AN INTEGRATED MODEL OF INCLUSIVE AND TECHNOLOGY-ENHANCED EDUCATION

International evidence suggests that assistive technologies can significantly enhance educational participation, engagement, and socio-emotional development for learners with ASD; however, their impact is highly contingent on teacher preparedness and institutional capacity (World Health Organization & United Nations Children's Fund, 2022; Daems et al., 2023).

Effective implementation therefore requires a systemic approach that integrates:

- structured inclusion of AT in teacher education curricula,
- practice-based training models combining theory and classroom experience,

- ongoing professional development and pedagogical mentoring,
- and intersectoral collaboration between schools, families, and specialist services.

Such an integrated model positions assistive technologies not as isolated interventions, but as embedded components of inclusive pedagogical systems. This perspective aligns with contemporary socio-technical and ecological approaches to inclusive education, which emphasise the interaction between human competence, institutional structures, and technological affordances.

RESEARCH DESIGN AND METHODOLOGICAL FRAMEWORK

The present study forms part of a broader international research project entitled *"Upskilling Preservice Teachers to Support Young Children with Autism Spectrum Disorder through Digital Social Stories*[1]*."* The project aimed to examine teacher preparation for the use of assistive technologies (AT) in supporting the social-emotional development of children with Autism Spectrum Disorder (ASD) across different national contexts.

The overall project adopted a convergent parallel mixed-methods design (Creswell & Plano Clark, 2018; Creswell & Poth, 2018), in which quantitative and qualitative data were collected concurrently, analyzed independently, and subsequently integrated to provide a comprehensive understanding of the research problem. This design enabled both the identification of generalizable patterns and the exploration of participants' experiences and perceptions.

The present chapter, however, reports exclusively on the quantitative findings from the Polish sample, focusing on survey data collected from in-service and pre-service teachers. A survey-based research strategy was employed to obtain standardized and comparable data across participant groups, enabling the analysis of perceived competence, experience, and preparedness to use assistive technologies in educational practice.

Focusing on the quantitative component allows for the identification of measurable trends in teacher preparation and facilitates comparisons between participant groups within the Polish educational context. The qualitative findings derived from the broader project will be reported separately.

[1] The project "Upskilling Preservice Teachers to Support Young Children with Autism Spectrum Disorder through Digital Social Stories" is funded under the Erasmus+ programme of the European Commission. Project number: 2024-1-PL01-KA220-HED-000246304.

PARTICIPANTS

The study sample consisted of 118 participants from Poland, including 50 in-service teachers and 68 pre-service teachers preparing for careers in early childhood and special education. All participants were either professionally engaged in, or formally preparing for, work with children aged 3–7 years in preschool and early primary education settings.

A convenience sampling strategy was employed. Participants were recruited through collaboration with university faculty members, school principals, and institutional mailing lists targeting both practicing teachers and students enrolled in teacher education programs. Inclusion criteria required participants to: (a) be currently working or studying in early childhood or special education, (b) have experience in working with, or preparing to work with, children with special educational needs, including Autism Spectrum Disorder (ASD), and (c) provide informed and voluntary consent to participate in the study.

The in-service teacher group included individuals aged between 24 and 61 ears ($M \approx 42$), with professional experience ranging from 1 to over 25 years. Their experience in working with children with ASD varied from 1 to more than 20 years. Participants in this group were predominantly female (98%), reflecting the gender distribution typical of the early childhood education sector in Poland. They were employed in a range of educational contexts, including mainstream inclusive classrooms, integration settings, special education centres, and early intervention services. The number of children with ASD they had worked with ranged from one to over fifty, indicating considerable variability in practical experience.

The pre-service teacher group consisted primarily of undergraduate students enrolled in early childhood education and special education programs. Their ages ranged from 18 to 27 years, and the majority were female (86%). Although they were at different stages of their professional preparation, all had completed at least some coursework or practical training related to special educational needs, including ASD.

Demographic data collected for the purposes of the study included age, gender, level of professional experience, type of educational setting, and experience in working with children with ASD. These variables were used to contextualize the findings and to explore differences between in-service and pre-service teachers.

All procedures were conducted in accordance with ethical standards for social science research, including voluntary participation, informed consent, and the assurance of confidentiality and anonymity.

RESEARCH INSTRUMENTS, PROCEDURE AND DATA ANALYSIS

The study employed a structured survey questionnaire developed within the framework of the aforementioned international project. Two parallel versions of the instrument were designed – one for in-service teachers and one for pre-service teachers – ensuring comparability in content and structure while allowing for minor adaptations to reflect participants' professional status. The questionnaire was translated and culturally adapted for use in participating countries (Poland, Spain, Romania and Türkiye) to ensure linguistic accuracy and contextual relevance. The Polish version underwent a process of expert review, linguistic validation, and pilot testing, which confirmed the clarity, comprehensibility, and usability of the instrument.

The questionnaire consisted of three main sections:

1. Demographic information, including age, gender, professional experience, and experience working with children with Autism Spectrum Disorder (ASD);
2. Quantitative measures, based on 5-point Likert-type scales, assessing:
   - perceived preparedness and competence,
   - prior training experiences,
   - familiarity with and use of assistive technologies (AT),
   - perceived barriers and support needs related to the implementation of AT;
3. Open-ended questions, aimed at exploring participants' perspectives on challenges, support needs, and strategies for enhancing the social-emotional development of children with ASD.

In this study, *preparedness* is understood as participants' perceived capacity to effectively support children with ASD in inclusive educational settings, encompassing both theoretical knowledge and practical competence in applying inclusive strategies.

Data were collected between February and March 2025 using an online survey administered via Google Forms. Participants received information about the study aims, ethical considerations, and the voluntary nature

of participation. The survey was completed independently, and reminders were used to increase response rates. The collected data were screened and cleaned prior to analysis.

Quantitative data from the Polish sample were analyzed using SPSS. Descriptive statistics, including means, standard deviations, and frequencies, were calculated to summarize participants' responses and provide an overview of the distribution of key variables. Given the ordinal nature of Likert-scale data, results were primarily interpreted using descriptive measures. Effect sizes were calculated where appropriate to indicate the magnitude of observed differences between groups.

The study was conducted in accordance with international ethical standards and the principles of the Declaration of Helsinki. Ethical approval was obtained from the relevant institutional ethics committee (Çanakkale Onsekiz Mart University Humanities and Social Sciences Ethics Committee; approval date: 10 February 2025). Participation in the study was voluntary, and all participants provided informed consent prior to data collection. Respondents were assured of anonymity and confidentiality, and all data were anonymized prior to analysis. The study complied with applicable data protection regulations, including the General Data Protection Regulation (GDPR).

FINDINGS

This section reports the empirical findings from Poland focusing on in-service and pre-service teachers' preparedness to support children with Autism Spectrum Disorder (ASD) in inclusive educational settings, with particular emphasis on the role of assistive technologies (AT) as an embedded component of inclusive pedagogical practice.

Within the conceptual framework of this study, assistive technologies are understood as instructional and compensatory tools that enhance access to learning, facilitate communication, and support socio-emotional functioning of learners with ASD. Rather than being treated as standalone interventions, AT are considered part of the broader instructional ecology of inclusive classrooms, shaped by teachers' professional competence, experiential knowledge, and institutional conditions.

The analysis is structured around three interrelated domains: perceived preparedness for inclusive education, experiences with and barriers to assistive technology implementation, and professional development needs. A compara-

tive approach is adopted to examine systematic differences between in-service and pre-service teachers, particularly in relation to experiential learning and readiness for classroom-based implementation.

PERCEIVED PREPAREDNESS FOR WORKING WITH CHILDREN WITH ASD

A marked and systematic divergence emerges between in-service and pre-service teachers in relation to perceived preparedness for working with children with ASD in inclusive educational environments.

In-service teachers reported a moderate level of preparedness ($M = 3.53$), indicating partial consolidation of professional competence without full mastery of inclusive instructional demands. Respondents consistently attributed the development of their practical expertise to experiential learning within real classroom environments rather than to formal pre-service preparation. In particular, sustained engagement in inclusive settings was identified as a critical factor in developing adaptive instructional strategies, behavioural management competencies, and facilitation of peer-mediated interaction.

Notwithstanding this experiential gain, in-service teachers reported persistent difficulties in the operational translation of theoretical knowledge into instructional practice. These difficulties were primarily associated with managing emotional dysregulation, maintaining sustained engagement of learners with ASD, and embedding socio-emotional learning within academically oriented instruction. These findings underscore the predominance of tacit, experience-based knowledge in inclusive teaching practice, suggesting limited proceduralisation of inclusive competencies within initial teacher education.

By contrast, pre-service teachers reported a lower level of preparedness ($M = 3.01$), reflecting limited perceived self-efficacy in implementing inclusive pedagogical strategies in real-world classroom settings. Although participants demonstrated foundational conceptual understanding of inclusive education and ASD-related needs, they reported insufficient opportunities for structured pedagogical enactment. This limitation was particularly salient in relation to socio-emotional scaffolding, peer interaction facilitation, and responsive adaptation to heterogeneous learning needs.

Pre-service teachers further articulated uncertainty regarding the operationalisation of theoretical constructs in dynamic instructional contexts, particularly under conditions requiring immediate decision-making or behaviour-

al intervention. This indicates a structural discontinuity between declarative knowledge acquisition and procedural competence development.

Collectively, these findings provide evidence of a persistent theory–practice discontinuity within Polish teacher education. Whereas in-service teachers develop competence through iterative practice-based learning, pre-service teachers remain predominantly situated within conceptual rather than applied domains of professional knowledge. This highlights the need for structurally embedded practicum models, sustained mentoring systems, and competence-based training pathways explicitly targeting inclusive and socio-emotional pedagogical practices.

ASSISTIVE TECHNOLOGIES – EXPERIENCE AND BARRIERS

The findings indicate that the integration of assistive technologies within Polish educational settings is primarily constrained by systemic, financial, and competence-related factors, rather than by deficiencies in basic infrastructural provision.

Across in-service teachers, reported difficulty levels ranged from low to moderate ($M = 2.26–3.70$), reflecting a differentiated barrier structure contingent upon the type of constraint.

Infrastructural conditions were largely not identified as critical impediments. Specifically, lack of internet access ($M = 2.26$, $SD = 1.28$) and unstable connectivity ($M = 2.74$, $SD = 1.32$) were minimally reported, suggesting relative adequacy of baseline digital infrastructure in school environments. Similarly, availability of hardware resources ($M = 3.08$, $SD = 1.54$) was assessed as moderately sufficient, indicating that physical access to technology is not the primary limiting factor.

Moderate constraints were observed in relation to institutional technical support ($M = 3.18$, $SD = 1.42$), suggesting episodic deficits in responsive ICT assistance during instructional practice.

More substantive barriers emerged at the level of digital resource ecology and professional capacity. Limited access to specialised educational software and platforms ($M = 3.26$, $SD = 1.47$) reflects constraints in domain-specific digital affordances for inclusive pedagogy. Concurrently, insufficient training in the pedagogical use of assistive technologies ($M = 3.40$, $SD = 1.33$) indicates a pronounced competence gap, despite teachers' accumulated classroom experience.

The most salient constraint was identified at the structural-financial level, with difficulty in securing funding for technological acquisition ($M = 3.70$,

SD = 1.27), positioning economic allocation mechanisms as the principal systemic bottleneck for AT implementation.

Overall, the data suggest that barriers to assistive technology integration are predominantly exogenous to classroom practice, residing instead in systemic funding structures and professional capacity-building deficits.

In contrast, pre-service teachers reported consistently elevated levels of difficulty across pedagogical, socio-emotional, and resource-mediated domains, indicating limited readiness for the operational deployment of assistive technologies in inclusive instructional contexts.

The most pronounced challenges were observed in instructional differentiation and behavioural responsiveness. Specifically, adapting instruction to heterogeneous learning profiles (*M* = 3.38, *SD* = 1.22) and managing emotional and behavioural dysregulation (*M* = 3.34, *SD* = 1.23) were identified as particularly demanding. These findings indicate limited preparedness for high-complexity classroom environments characterised by dynamic behavioural variability.

Further difficulties were reported in balancing cognitive and socio-emotional instructional demands (*M* = 3.35, *SD* = 1.09), suggesting limited integration of dual-domain pedagogical frameworks within pre-service preparation.

Deficits were also identified in the domain of socio-emotional skill facilitation in learners with ASD (*M* = 3.16, *SD* = 1.18), reflecting incomplete translation of theoretical constructs into applied pedagogical strategies.

Additionally, constraints in extending learning beyond classroom boundaries (*M* = 3.22, *SD* = 1.10) suggest limited conceptualisation of ecological continuity in skill acquisition.

Resource-related limitations, including availability of instructional materials (*M* = 3.26, *SD* = 1.10) and differentiated pedagogical resources (*M* = 3.22, *SD* = 1.05), further compound these preparedness gaps.

Overall, pre-service teachers demonstrate constrained self-efficacy across instructional, behavioural, and resource domains, reinforcing the persistence of a structural disjunction between theoretical preparation and applied inclusive teaching competence mediated by assistive technologies.

ASSISTIVE TECHNOLOGIES – PERCEIVED FUNCTION

Across both teacher groups, assistive technologies were consistently conceptualised as integral enablers of inclusive pedagogical practice for learners with ASD.

Three principal functional domains were identified: enhancement of multimodal communication (verbal and non-verbal), structuring of environmental predictability within classroom routines, and facilitation of socio-emotional regulation and peer interaction processes.

Despite this consistently positive valuation, findings indicate that AT adoption is constrained not by attitudinal resistance or epistemic rejection, but by systemic resource asymmetries, financial limitations, and insufficiently developed professional competence frameworks. This suggests that implementation barriers are predominantly structural and organisational rather than individual.

TRAINING AND PROFESSIONAL DEVELOPMENT NEEDS

In-service teachers demonstrated a strong preference for experiential, practice-embedded professional learning modalities, indicating a clear orientation toward situated cognition and workplace-based competence acquisition.

The highest-rated formats included hands-on workshops ($M = 4.22$) and on-the-job training ($M = 4.15$), followed by higher education courses incorporating applied components ($M = 3.95$), structured visual scaffolds ($M = 3.85$), and independent digital learning formats ($M = 3.60$).

These patterns suggest that professional learning is perceived as most effective when embedded within authentic instructional contexts and supported through iterative modelling, observation, and guided practice.

Pre-service teachers demonstrated convergent preferences; however, their responses indicate a stronger reliance on externally structured scaffolding mechanisms.

The highest-rated formats included hands-on workshops ($M = 4.30$), on-the-job training ($M = 4.12$), structured visual materials ($M = 4.05$), higher education courses with applied components ($M = 3.88$), and asynchronous digital learning ($M = 3.78$).

The elevated importance assigned to structured visual supports indicates a developmental need for cognitive scaffolding during early professional socialisation into inclusive teaching roles.

KEY FINDINGS AND SYNTHESIS

Across all domains, the findings demonstrate a consistent practice–theory discontinuity in inclusive education for learners with Autism Spectrum Disorder (ASD). While both in-service and pre-service teachers acknowledge the pedagogical value of assistive technologies (AT) and inclusive instructional strategies, their effective implementation remains uneven and is strongly contingent upon experiential learning and institutional support structures.

The study shows that inclusive pedagogical competence is not primarily acquired through formal theoretical preparation but is progressively constructed through sustained classroom experience combined with structured professional learning opportunities. In parallel, the integration of assistive technologies emerges as a system-sensitive process, shaped less by attitudinal resistance than by financial constraints, limited professional training, and uneven access to specialised digital resources.

A clear divergence is evident between in-service and pre-service teachers. In-service teachers demonstrate moderate but experience-dependent competence, while pre-service teachers report significantly lower levels of confidence and applied pedagogical readiness. This gap reflects a structural discontinuity between declarative knowledge acquisition and procedural competence development in teacher education.

Across both groups, assistive technologies are consistently perceived as effective tools for enhancing communication, increasing predictability, and supporting socio-emotional regulation in children with ASD. However, their classroom implementation remains inconsistent due to systemic rather than infrastructural barriers.

IMPLICATIONS FOR TEACHER EDUCATION AND INCLUSIVE PRACTICE

The findings underscore that effective inclusion in ASD education requires alignment between initial teacher education, workplace-based professional learning, and technology-enabled instructional systems.

Teacher preparation should move beyond predominantly theory-driven models towards practice-embedded and mentoring-supported approaches. Structured exposure to inclusive classrooms, combined with guided use of assistive technologies, is essential for developing applied pedagogical competence.

At the system level, the study highlights the need for sustained investment in professional development and digital infrastructure. Importantly, infrastructural readiness alone is insufficient; pedagogical capacity-building represents the critical mediating factor in effective AT integration.

The convergence between in-service and pre-service teachers in valuing experiential training further supports the need for school-based, collaborative professional learning models, including mentoring, coaching, and practice-oriented workshops.

LIMITATIONS OF THE STUDY

Despite its contributions, several limitations should be acknowledged. The study relies on self-reported data, which may introduce perceptual bias and limit the direct observability of actual classroom practices. A cross-sectional design further restricts causal interpretation and does not capture developmental trajectories of competence over time.

In addition, the study is context-specific to Poland, which limits the generalisability of findings to other educational systems with different inclusion policies and levels of technological integration. Finally, the absence of perspectives from school leaders, parents, and support specialists narrows the ecological scope of the analysis.

FUTURE RESEARCH DIRECTIONS

Future studies should adopt longitudinal and mixed-method designs to examine the evolution of teacher competence in relation to assistive technology use over time. Intervention-based research is needed to evaluate the effectiveness of structured training models combining mentoring, classroom practice, and AT integration.

Further work should also prioritise classroom-based observational studies to capture actual pedagogical practices rather than relying solely on self-report data. Comparative cross-national research would allow for a more nuanced understanding of how policy and institutional contexts shape AT implementation in inclusive education.

Finally, expanding research to include multi-stakeholder perspectives, particularly from school leaders, therapists, and families, would enable a more comprehensive understanding of inclusive education ecosystems.

CONCLUDING STATEMENT

This study demonstrates that effective preparation for inclusive education in the context of ASD requires an integrated model combining experiential learning, structured professional development, and system-level support for assistive technologies. Strengthening this alignment is essential for translating inclusive education principles into effective classroom practice and for improving educational outcomes for learners with ASD.

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CHAPTER 7

SUPPORTING STUDENTS ON THE AUTISM SPECTRUM IN ISRAEL: DIGITAL TOOLS AND IMMERSIVE LEARNING ENVIRONMENTS

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INTRODUCTION

Education for children on the autism spectrum in Israel is characterized by a complex landscape of challenges and opportunities. According to data published by the Knesset Research and Information Center (2024), 44,377 students in Israel were identified as being on the autism spectrum in 2024. Of these, 40.9% attend special education institutions, 32.5% are eligible for personal budget support while studying in mainstream settings, and 26.6% are enrolled in special education classes within general education schools. Students with autism account for 20.4% of all students in the special education system in Israel (Knesset Research and Information Center, 2024). These children exhibit a wide range of cognitive, sensory, and social-emotional needs, which require tailored educational approaches. Although specialized schools and programs exist, many classrooms continue to face challenges in providing individualized learning experiences.

Digital technologies offer promising avenues to address these challenges. Devices such as iPads allow children to interact with content at their own pace, supporting communication through augmentative and alternative communication (AAC) apps, visual schedules, and interactive educational games. Research indicates that iPad-based interventions are effective in enhancing communication skills for individuals on the autism spectrum (Alzrayer, Banda, & Koul, 2014). Moreover, immersive and multisensory environments provide experiential learning, stimulating multiple senses simultaneously and promoting active participation.

In Israel, the Athena Fund has initiated programs to support students, including those on the autism spectrum. The *Digital Toolbox for Every Special Education Teacher* program provides special education school and kindergarten teachers with digital toolkits that include an iPad and 120 hours of professional training, as well as classroom-level infrastructure such as wireless internet and projectors (Athena Fund, 2026a). Through their iPads and training, special education teachers can expose their students to advanced technology, help make learning materials more accessible, strengthen students' social skills, and improve communication with parents, teachers, and the environment (Athena Fund, 2026a).

ImagineBox establishes immersive, interactive classrooms for all students, including those with special needs and students on the autism spectrum. These classrooms use floor and wall projections, movement-based activities, and tactile elements to create experiential learning environments that give students the sense of being "inside" the learning material. Evidence for the effectiveness of ImagineBox comes from observations and reports provided by teachers, parents, and media coverage (Cashman, 2025; Konfortes & Kessler, 2023; Ness Ziona Net, 2026; Shavvim, 2025;), indicating heightened engagement, increased participation in group activities, improved social interaction, and deeper understanding of the content.

The present chapter describes the design, rationale, implementation, and outcomes of these programs, highlighting how technology supports inclusive education and neurodiverse learning in Israel. It emphasizes the central role of teachers as facilitators, the importance of personalization, and the benefits of multimodal learning approaches.

PROJECTS OVERVIEW

The Digital Toolbox for Every Special Education Teacher (2015–2022), launched in 2015 by the Athena Fund, is a program designed to provide special education teachers in Israel with iPads, a set of educational applications aligned with special education goals, three years of technical support, a personal printer, an iPad case, and additional resources. The program aims to enhance communication, learning, and daily functioning among students with special needs, including those on the autism spectrum, while fostering motivation and expanding cognitive and social horizons. iPads serve as a bridge to the students' inner world, enabling them to express themselves, explore new skills, and engage more fully

in classroom activities. Students can improve interpersonal communication with teachers, peers, and family, while developing cognitive abilities, higher-level understanding, and fine motor skills, including hand-eye coordination. Importantly, iPads support both learning and quality of life by providing opportunities for independence, self-expression, and problem-solving.

Empirical research demonstrates the effectiveness of iPads in special education settings. Alzrayer, Banda, and Koul (2014), in a meta-analysis of 15 studies, found that iOS devices (iPads and iPod Touch) can improve communication skills and engagement among students with autism and other developmental disabilities.

In the Athena Fund program, iPads serve as the primary platform for these practices, functioning as communication-support systems through dedicated applications, including personal communication boards and other Augmentative and Alternative Communication)AAC(tools that enable students to strengthen non-verbal interpersonal communication and participate more actively in learning and social interactions.

Eden and Shamir (2025) provide empirical evidence that teacher-mediated iPad use can enhance functional abilities, including communication-related skills, in children with special needs. These findings suggest that iPads, when integrated thoughtfully into pedagogy, act as powerful tools for cognitive, social, and emotional development, while enabling students to discover new dimensions of their potential and actively participate in the learning process.

The program emphasized that teachers are the key mediators between technology and meaningful learning. Each participating teacher received an iPad for professional use, enabling lesson planning, documentation, communication with parents, and classroom instruction. The digital toolbox includes applications for visual scheduling, communication support, literacy and numeracy, emotional recognition, and self-regulation. Teachers are trained to integrate iPads into small-group activities, shared storytelling, and turn-taking games. The program also provides ongoing technical support, professional development, a personal printer in some cases, and an iPad case.

Over 9,000 teachers and educators in special education had received Digital Toolboxes, supporting more than 72,000 students nationwide. Qualitative feedback indicated increased teacher confidence, creativity, and flexibility in instruction, and for students with ASD, the iPad often functioned as a bridge – facilitating communication, reducing anxiety, and providing predictability (Athena Fund, 2026a).

ImagineBox: Immersive Learning Classrooms (2022–present), launched in 2022, expands the focus from individual digital devices to interactive, multisensory learning environments. To date, 130 ImagineBox classrooms have been deployed across Israel, with additional classrooms planned for the future. The program is designed for all students in Israel, including students with special needs and those on the autism spectrum. ImagineBox creates immersive classroom environments in which students can experience learning content as if they are "inside" it, offering experiential, interactive, and multisensory learning opportunities that foster engagement, collaboration, and cognitive development.

For students with autism, ImagineBox provides additional benefits, including the creation of group communication through general communication boards, simulation of real-life situations, practice of daily life activities in a controlled environment, personalized presentation of learning material, a carefully designed sensory environment and more.

The immersive experience is created using advanced projections on walls and floors, combined with surround sound, giving students the sense that they are "inside" the learning material. The sophisticated ImagineBox technology also allows students to interact with projected content through touch.

ImagineBox serves as a meaningful tool not only for students but also for teachers, enabling them to enrich instruction in innovative ways and diversify teaching methods.

This approach allows students to virtually explore historical environments, "travel" through diverse natural settings, observe biological processes, journey through outer space, and engage in lessons across a wide range of subjects–all without leaving the classroom (Athena Fund, 2026b).

Early implementation reports from schools that have adopted ImagineBox indicate positive outcomes. ImagineBox school directors report increased student participation in lessons, more effective learning, and improved retention of the material studied (Konfortes & Kessler, 2023). Similarly, a report in the *Grapevine* section of *The Jerusalem Post* highlights that students are highly engaged in immersive, interactive classrooms, demonstrating enthusiasm, motivation, and emotional connection to the learning experiences (Cashman, 2025).

Together, these sources suggest that ImagineBox not only enhances participation but also supports deeper understanding and meaningful learning for students, including those with special needs and those on the autism spectrum.

Overall, the *Digital Toolbox for Every Special Education Teacher* and ImagineBox programs reflect complementary approaches: individualized, teacher-mediated digital tools and shared immersive learning environments. Both initiatives foster inclusion, engagement, and holistic development among students on the autism spectrum.

EDUCATIONAL RATIONALE

The reasoning behind these programs is based on years of experience in special education. Students with ASD often show uneven development, with strengths in areas like visual skills alongside challenges in social communication, emotional control, and sensory processing. Teaching approaches therefore need to be flexible, personalized, and use multiple ways of learning. This helps students stay engaged, build skills, and take part in learning in ways that are meaningful to them.

iPads offer flexible, visually structured platforms that support communication, predictable routines, and interactive feedback in special education settings. When integrated with teacher-guided instruction, iPad-based learning environments can reduce anxiety and enhance engagement and learning for children with autism spectrum disorder. Beyond serving as mere devices, iPads often act as bridges – helping students communicate, express themselves, and navigate daily routines more independently. Teacher-mediated use of iPads has been associated with improvements in functional abilities, creativity, and autonomy, emphasizing that the effectiveness of the technology depends on how it is embedded within thoughtful pedagogy rather than on the device alone (Leung et al., 2021; Eden & Shamir, 2025)

ImagineBox complements digital tools by engaging multiple senses simultaneously, promoting memory, attention, and experiential understanding. Movement, sound, and visuals provide concrete anchors for abstract concepts, relevant also for students with ASD. Immersive learning also supports social and emotional skills, offering opportunities for joint attention and collaborative problem-solving.

Teachers remain central, mediating technology, scaffolding interactions, and providing emotional support. This human-centered approach aligns with Universal Design for Learning (UDL) principles, ensuring technology serves educational goals. By combining individualized digital tools with experiential learning, these programs support engagement, skill development, and inclusive participation.

PRACTICAL IMPLEMENTATION

The practical implementation of the program integrates digital and immersive technologies into everyday educational practice, supporting both individualized learning and collaborative classroom experiences. Within this framework, two complementary tools are employed: the Digital Toolbox and ImagineBox.

Digital Toolbox: iPads are used in individual, small-group, and whole-class settings. Applications include communication support, visual schedules, literacy and numeracy games, and functional tasks. Lessons integrate iPad-based activities within broader pedagogical sequences to reinforce social interaction.

ImagineBox: supports student participation in immersive activities structured in clear phases: orientation, exploration, and reflection. Activities include problem-solving tasks, sensory-motor challenges, and cooperative games. Sessions are adapted to individual sensory and cognitive needs.

Teacher Role: Teachers act as facilitators and emotional anchors, scaffolding learning – providing temporary, tailored support that enables students to complete tasks independently while gradually reducing assistance as skills develop. Teachers also interpret digital content and monitor sensory responses. The system is open, allowing educators to design learning environments tailored to students' needs. Professional development emphasizes instructional integration and reflective practice (the process of critically examining one's own actions and decisions in order to learn from experience and improve future performance).

Adaptations: Digital tools such as iPads enable individualized adjustments based on students' communication abilities, sensory needs (e.g., sound, touch), and social-emotional support requirements. In contrast, immersive classroom activities are designed according to group composition and learners' abilities.

Integration: iPads allow students to practice skills individually, at their own pace, and in ways aligned with their communication, sensory, and social-emotional needs. In contrast, ImagineBox immersive activities engage the whole group, offering opportunities for cognitive, emotional, and physical participation. Together, these approaches provide a balanced range of learning experiences that combine individualized practice with collaborative, group-based activities.

Expert Perspective: Prof. Adina Shamir, Head of the Institute for Technologies in Special Education at Bar-Ilan University, discussed the potential of ImagineBox to enhance learning for students with special needs. She de-

scribed the immersive environment as an innovative educational space that extends beyond traditional classrooms, enabling students with complex learning challenges, including communication and literacy difficulties, to engage actively and experientially with curriculum content. According to Prof. Shamir, the technology fosters meaningful interactions that support individualized educational goals in special education (Konfortes & Kessler, 2023).

The open-system architecture allows teachers to adapt the learning environment to students' needs, a flexibility not typically available in closed technological systems.

Industry Perspective: According to Uri Ben-Ari, President and Founder of the Athena Fund, ImagineBox and related technology initiatives have expanded the organization's work in special education. He emphasized that these environments have been introduced in schools for students with special needs, enabling learners to engage with new forms of interaction that reveal capabilities not always visible in traditional settings and contribute to more dynamic and personalized learning opportunities (Konfortes & Kessler, 2023).

EVIDENCE FROM LITERATURE AND FIELD REPORTS

An increasing number of studies indicate that iPads and tablet technologies can significantly support learning and communication for children on the autism spectrum. For example, a meta-analysis of studies on iPad interventions found that these devices can improve educational outcomes when used purposefully in instruction (Aspiranti et al., 2020). Studies have shown that minimally verbal children with autism may increase their initiation of requests, responding to questions, and social communication when using an Augmentative and Alternative Communication (AAC) application on an iPad (Xin & Leonard, 2015). Other research demonstrates that structured iPad-based instruction can enhance complex requesting behaviors and the generalization of skills across contexts (Alzrayer et al., 2017). Beyond school settings, parents of children on the autism spectrum reported that their children frequently used iPads and tablets at home. These devices were used mainly for recreational activities and independent engagement, highlighting their role in children's daily routines outside of school settings (Laurie et al., 2019).

Field-based qualitative reports collected by the Athena Fund indicate that teachers perceive increased engagement, improved communication, and enhanced individualized learning through iPad integration. Parents similarly

report improved communication and skill transfer between school and home contexts. These findings suggest that iPads function not merely as assistive devices but as mediating tools for learning and communication across contexts.

Although empirical research on ImagineBox is still emerging, accumulated practical experience provides encouraging insights into its educational potential in special education settings, including for students with autism. ImagineBox allows students with diverse special needs to engage in interactive experiences and activities tailored to their individual abilities. Teacher reports indicate that the immersive environment increases engagement and attention, while the visual experience encourages interaction with the surroundings in multiple ways. In addition, it provides opportunities to practice daily life activities in an experiential format, contributing to the development of personal and functional skills. Students often show increased motivation, focus, and curiosity – they frequently do not want to leave the classroom – and actively participate by asking questions, collaborating with peers, and expressing excitement about learning in new ways. Teachers also observe improved understanding and retention of material, particularly among students who typically struggle in traditional learning environments. The immersive format allows learners to connect both emotionally and intellectually with the subject matter, fostering deeper and more lasting educational experiences.

KEY INSIGHTS

The analysis yields several key insights:

1. **Technology as a tool, not a replacement:** Success depends on teacher guidance
2. **Balancing personalization and inclusion:** iPads support autonomy; ImagineBox fosters collaboration and joint attention.
3. **Neurodiversity-informed pedagogy:** Neurodiversity-informed pedagogy views neurological differences as part of natural human variation and promotes strength-based teaching practices that adjust instruction to diverse sensory, behavioral, and learning needs.
4. **Experiential learning:** Active, multisensory learning enhances memory, motivation, and emotional connection.
5. **Implementation challenges:** Infrastructure, professional development, and observation are essential for effective use.

6. **Cross-sector synergy:** Real-world implementation provided insights that supported and enriched academic research.
7. Digital and immersive technologies support individualized learning, collective experiences, and inclusive, human-centered education.

CONCLUSIONS

The Digital Toolbox for Every Special Education Teacher and ImagineBox demonstrate the potential of digital and immersive technologies in supporting inclusive education for students on the autism spectrum. iPads contribute to improved communication, functional skills, and engagement, while immersive environments foster collaboration, attention, and experiential learning.

Effective implementation depends on teacher-mediated integration, alignment with pedagogical objectives, and continuous professional development. Both initiatives highlight the importance of combining individualized and collective learning approaches in inclusive education.

IMPACT

The Digital Toolbox has been implemented across more than 9,000 teachers, supporting approximately 72,000 students. ImagineBox has been deployed in 130 educational sites across Israel.

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CHAPTER 8

IS SOCIAL WORK IN POLAND (UN)PREPARED TO PROVIDE SUPPORT TO NEURODIVERSE PEOPLE?

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INTRODUCTION

In recent years, there has been a marked increase in interest in the concept of neurodiversity within the social sciences, education and support services (Pellicano & den Houting, 2022; Rosqvist et al., 2020). This concept refers to natural differences in the functioning of the human nervous system, encompassing, amongst others, people on the autism spectrum, those with ADHD or dyslexia (Singer, 1999; Walker, 2021). A shift in the way we think about these phenomena – from a medical to a social approach – has significant implications for the social support system, including social work (Chapman, 2021; Pellicano & den Houting, 2022). Social work, as one of the key support professions, plays a vital role in identifying needs, organising support and combating social exclusion. In the context of the growing number of neurodiversity diagnoses, the question arises as to whether this system is prepared to work with people with diverse cognitive and social functioning profiles.

The aim of this article is to analyse the extent to which social work in Poland is prepared to support neurodiverse individuals. An attempt will be made to answer the question of whether current systemic solutions, professional competencies and working methods meet the needs of this group. The thesis adopted is that the social work system in Poland is partially prepared for this task, but requires significant changes of a structural, competence-related and cultural nature.

The terms 'neurodiversity' or 'neuroatypicality' are now used in all contexts. Therefore, the focus of this study is to determine whether Polish social workers are prepared or unprepared to provide support and assistance to neurodiverse individuals. To begin with, we must answer the question: what is

neurodiversity? How is it defined in the literature? Just a few years ago, neurodiversity featured in discussions mainly in the context of communication or social difficulties (den Houting, 2019).

NEURODIVERSITY AND NEUROATYPICALITY – WHAT DO THESE TERMS ACTUALLY MEAN?

Diversity plays a key role in the development of the field of neurodiversity, as differences are highlighted as a distinguishing feature of individual people (Pellicano & den Houting, 2022; Rosqvist et al., 2020). The term 'neurodiversity' was originally coined within the autistic community in the late 1990s, formalised by Judy Singer (1998, 1999), and developed collectively as part of the autistic self-advocacy movement (Botha et al., 2024). It emerged to challenge pathologising frameworks of cognitive difference. Compared to research on other minority groups, whose categorisation is based on gender, sexual or socio-demographic factors, less attention has been paid to neurodiversity to date. Neuroatypical individuals are defined as people whose neurological functioning lies at the extreme ends of the distribution of naturally occurring differences (LeFevre-Levy et al., 2023).

Neurodiversity applies to the entire human population and acknowledges natural differences in brain function (Singer, 1999; Walker, 2021). Each of us has our own unique nervous system and set of talents, so we process, think, feel and act differently in response to the same events or stimuli. Neuroatypicality (NAT) applies (according to current knowledge) to a minority of the population whose nervous system structure deviates from the globally accepted standard. This standard is referred to as NeuroTypical (NT), meaning the majority's way of processing the world (Walker, 2021). The umbrella term 'neurodiversity' encompasses various difficulties that a person may experience: ADHD (*Attention-Deficit/Hyperactivity Disorder*); ADD (Attention Deficit Disorder); Autism (ASD – *Autism Spectrum Disorder*); dyslexia, dyscalculia, dysgraphia, dyspraxia, Tourette's syndrome, or a combination of several of these traits, such as AuDHD. Of course, this list is not exhaustive (Pellicano & den Houting, 2022; Pisula et al., 2024).

To provide a clearer picture of neurodiverse individuals, brief descriptions of them have been included. For instance, a neuroatypical person is characterised, on the one hand, by so-called hyperfocus, which is the ability to concentrate completely on a given activity or topic (Ashinoff & Abu-

Akel, 2021; Hupfeld et al., 2019). Neuroatypical people experience intense bursts of productivity and creativity; they tend to lose track of time, forgetting about meals or physical needs; one could say that everything around them 'disappears' when something 'grabs' them or interests them; they also often feel unstoppable until the moment of a 'crash', i.e. a sudden drop in interest. However, they may also experience 'paralysis', where their brain says 'do it' but their body refuses (Ginapp et al., 2023; Hirsch et al., 2018). In a state of paralysis, tasks seem impossible to start, even simple ones that previously posed no difficulty. Paralysis also causes overwhelm, fear of making mistakes and mental chaos, whilst feelings of guilt over inactivity further exacerbate the situation. Conversely, a person on the autism spectrum (ASD) is characterised by an attention to detail and persistence in tasks that fascinate their mind (Mottron et al., 2006; Plaisted Grant & Davis, 2009) . They possess the ability to recognise or create patterns (*pattern recognition*). They process information efficiently (Mottron et al., 2006), and a substantial proportion show notable strengths in factual recall and detailed memory of areas of interest (Happé, 2018; Howlin et al., 2009). Face-to-face meetings, small talk, unclear communication rules, and candid messages pose a challenge for those with ASD, as these involve greater social and communicative costs (Hull et al., 2017; Pearson & Rose, 2021). They are also more prone to overstimulation and chaos. They find it difficult to follow general instructions, as they tend to focus excessively on details. It could be said that some tasks are very easy for those with ASD, whilst others are exceptionally difficult; this results in an unstable (uneven) level of functioning and significant stress. A person with ADHD is characterised by the ability to hyperfocus (Ashinoff & Abu-Akel, 2021; Hupfeld et al., 2019). They possess problem-solving skills (Boot et al., 2017). Their creativity is reflected in their manner or dress, as well as in designing solutions (one might say they are creative individuals; White & Shah, 2006, 2011). Their preference for novelty and ability to switch quickly between tasks may be advantageous in dynamic environments, although the empirical evidence on multitasking performance in ADHD is mixed (cf. Hupfeld et al., 2019). Challenges include problems with concentration and forgetfulness, difficulties with time management, and taking on too many responsibilities and tasks. Interacting with people is also difficult, as they may be perceived by those around them as overly confident or rude. Another challenge is RSD (*Rejection Sensitive* Dysphoria), i.e. a syndrome of rejection and a strong reaction to criticism

and/or a lack of feedback (Bedrossian, 2021; Sandland, 2025). A neurotypical (NT) person finds it easier to interpret social norms through observation and relationships. For many NT people, small talk and informal face-to-face meetings are the natural way to interact. They tend to act more intuitively and analyse social rules less consciously (Frith & Frith, 2008). A challenge can be the so-called 'majority's blind spot', meaning that if something works for me, it must work for others too (cf. Milton, 2012). There may be peer pressure, i.e. the notion that 'the majority is right' – this can be unintentional but exclusionary. There is also a tendency to judge behaviour quickly rather than being curious, e.g. what helps someone function.

The concept of neurodiversity posits that neurological differences are a natural part of human diversity, rather than merely a deficit requiring correction (Singer, 1999). In contrast to the medical model, which focuses on diagnosis and treatment, the social model highlights the role of environmental and social barriers in limiting an individual's functioning (Oliver, 1990). From a social work perspective, it is particularly important to move away from viewing neurodiverse people solely through the lens of their difficulties. Increasing emphasis is being placed on *a* strength-based *approach*, which takes into account an individual's potential, competencies and individual capabilities (Armstrong, 2012). Neurodiverse individuals often experience difficulties in the areas of social, educational and occupational functioning. At the same time, their needs are diverse and require an individualised approach. This necessitates a flexible and interdisciplinary support model, in which social work plays a coordinating role.

THE SOCIAL WORK SYSTEM IN POLAND AND NEURODIVERSITY

Social work in Poland operates within the social assistance system, the foundations of which are set out in national legislation. The main tasks of social workers include assessing the client's life situation, providing support and coordinating assistance activities. In practice, these activities are carried out through a community assessment, the development of a support plan and cooperation with other institutions. As research indicates, the assessment process is based on specific tools and procedures that do not always take into account the specific nature of how neurodiverse people function (Gajek, 2022).

In theory, social work in Poland incorporates elements that can support neurodiverse individuals. Although the concept of neurodiversity is not ex-

plicitly enshrined in Polish legislation, many of the principles of social work potentially align with this approach. The problem is that their implementation is often superficial or inconsistent. Examples include an individualised approach to providing support, including the creation of support plans tailored to the unique needs of the individual, which, in the context of neurodiversity, means taking into account the specific nature of cognitive functioning (e.g. sensory difficulties, different communication styles), adapting forms of contact (e.g. fewer formal conversations and more written communication), as well as a flexible approach to goals (e.g. success does not always mean full 'independence' according to social norms). In practice, however, individualisation is often limited by: rigid administrative procedures, heavy workloads for social workers, and a lack of diagnostic tools that take neurodiversity into account (Wiater, 2023).

Social integration, which enables the inclusion of neurodiverse individuals in social and professional life, is also a key task in working with this group. The Polish social welfare system treats integration as the inclusion of the individual into society through, for example, education, the labour market or the local community. In the neurodiversity approach, this means accepting differences rather than 'levelling them out', creating environments that are accessible in terms of sensory and communication needs, and enabling participation without the need for masking. In practice, however, integration often means pressure to conform to the norms of the majority, a lack of genuine environmental adaptations (e.g. in government offices or workplaces) and the marginalisation of people who do not fit into standard activation schemes (Grabowska, 2025).

Community support is also important, particularly at the local level (municipality, district), as this enables people with ASD to work within their natural environment. The social welfare system in Poland operates mainly at the local level, which offers tremendous opportunities to work within the person's living environment, to collaborate with their family, school and employer, and to build a support network. This is crucial for neurodiverse individuals, as their functioning is heavily dependent on their social environment. However, the insufficient number of community-based services (e.g. personal assistants, job coaches), limited funding and the lack of specialisation in services tailored to neurodiversity remain a challenge (cf. Grudziewska, 2023).

In the Polish context, support and assistance for neurodiverse people are often linked to the support system for people with disabilities, which has mixed

results. On the one hand, access to benefits and support programmes is ensured, as is formal recognition of needs. On the other hand, there is a greater focus on deficits rather than an individual's strengths. There is a need to 'prove' difficulties, and in extreme cases, neurodiverse people are excluded from the support system without a formal diagnosis. Upon closer analysis, it becomes clear that the social support system is dominated by the mindset: diagnosis and assessment first, then support. This results in people without a diagnosis (e.g. adults with undiagnosed ADHD or autism) falling through the cracks, whilst support focuses on 'treating' or compensating for deficits, whilst overlooking the social context (e.g. an unsuitable work environment). As a result, instead of changing living conditions, attempts are made to 'change the person'.

The social welfare system in Poland is also characterised by fragmentation, understood as a lack of continuity in support and assistance. A neurodiverse person may simultaneously require psychological support (health system), educational adjustments (education system), social assistance (Social Welfare Centres), or vocational support (employment offices). The problem lies in the lack of coordination between the actions taken, as institutions operate independently, causing responsibility to become 'diffused'. In practice, this means that the individual or their family must 'manage the system' themselves; many needs remain unmet and this often leads to an excessive administrative *burden* (*the* so-called *'bureaucratic burden'*) (Poławski, 2025).

Another challenge for social services is the failure of services to cater for the specific needs of neurodiverse individuals, as social services are often designed for the 'average client'; for neurodiverse people, this can mean, for example, difficulties in communicating with officials (such as taking things literally or experiencing social anxiety); sensory overload in institutions, or a lack of understanding of their behaviour (e.g. avoiding eye contact being interpreted as a lack of cooperation). These systemic shortcomings are a consequence of the limited training available to social workers in the field of neurodiversity. Furthermore, no standards for working with neurodiverse individuals have yet been established. Another problem is the insufficient use of alternative forms of communication by social workers.

It should also be noted that the social welfare system in Poland is largely based on income criteria, which consequently means that neurodiverse people who work but have functional difficulties often do not qualify for support, as assistance is mainly directed towards those in extremely difficult economic circumstances (Sierpowska, 2017). 'Hidden difficulties', such as burnout or

sensory overload, are also overlooked. Furthermore, the procedures involved in obtaining assistance and/or support are complicated and stressful, and require a high level of organisational skills, which may be impaired, for example, in people with ADHD. The system also promotes so-called 'activation', understood as taking up employment under standard conditions and conforming to prevailing social norms. For neurodiverse people, this may mean having to mask their traits, living under chronic stress, and facing the risk of burnout and a deterioration in mental health (Cage & Troxell-Whitman, 2019; Higgins et al., 2021; Mantzalas et al., 2022). This stems from the lack of alternative pathways to activation and flexible forms of employment, as well as the failure to recognise diverse ways of functioning as equally valid (cf. Hennekam & Follmer, 2024; LeFevre-Levy et al., 2023).

Consequently, it can be observed that the greatest tension between the social work system and neurodiversity stems from the difference between two approaches, namely:

- the systemic (institutional) approach, which is characterised by standardisation, procedures and control,
- a neurodiverse approach that is flexible, treats each individual on a case-by-case basis, whilst embracing differences.

Until the system shifts more towards a social and inclusive model, neurodiverse individuals will function within it as 'difficult clients' rather than as equal participants in social life (Bąbel & Ostaszewski, 2023).

HOW DOES THE "TRIANGLE" OF SOCIAL SERVICES, SCHOOL, AND FAMILY FUNCTION IN POLAND (IN THE EARLY STAGES OF ASD)?

In theory, Poland has a **model of cross-sectoral cooperation**, where the three pillars–family, school/preschool, and social services–are meant to complement one another. The family is the first place where early signs of ASD can be observed, and it is usually the parents who initiate the diagnostic process for their child and then participate in the therapeutic and educational process. If, for some reason, the first symptoms of ASD are not noticed within the family environment, then kindergarten or school are the places where developmental difficulties are diagnosed, particularly those related to the child's social interactions (Pisula et al., 2024; NIK, 2020). Teachers then refer the child to a psychological and pedagogical counseling center (PPP) for

diagnosis. If the diagnosis is confirmed, the school environment develops an Individualized Therapy Program, and early developmental support and specialized classes are provided. In addition, the preschool/school collaborates with parents and other specialists, such as the PPP, to provide assistance and support. The support system includes, among other things, psychological assistance, access to various types of therapy, as well as services provided by entities such as social welfare centers.

The support system for children with ASD is formally multi-level, but in practice it is fragmented and poorly coordinated because there is no single "coordinator for the child." Assistance is provided by various institutions operating in parallel, each based on different systemic frameworks, such as the education system, the healthcare system, and the social services system. And access to assistance and support for the child and family depends on the region and the resources it possesses.

It is worth noting here that poor preparation–and sometimes a complete lack thereof–in the area of social services affects the continuity of interventions. It can be said that this is one of the main systemic problems. Obstacles include, for example:

1. Gaps between diagnosis and support. There is often a lack of a swift transition from diagnosis to therapy, and subsequently to community-based support. Long waiting lists and/or a shortage of specialists also pose difficulties, which can ultimately lead to missing the "window of opportunity", which is most critical during the first years of a child's life (McKenzie et al., 2015; Zwaigenbaum et al., 2015).
2. The fragmentation of services, as previously mentioned, where different institutions do not share information with one another, which consequently leads to the absence of a unified plan for working with the child, who ends up navigating several "different systems" simultaneously.
3. Insufficient competencies among social service staff, which can result in their frequent failure to recognize the specific characteristics of ASD or to understand the sensory and communication needs of this client group; this leads to support that is often formal rather than functional.
4. Lack of support for the family as a system, which is particularly evident in the insufficient access to psychological support for parents. There is a general lack of systematic "family support," meaning that parents become the primary coordinators of the system (which is an enormous burden).

5. Inequalities are particularly evident in access to therapy and services; especially in smaller towns, access is very limited due to a lack of specialists (NIK, 2020; Płatos, 2016).

In practice, this means that the teacher becomes the "first line of the system," as they identify difficulties, initiate diagnostic procedures, and very often coordinate cooperation with the family. Teachers often (though this is improving) lack sufficient expertise to work with children with ASD and must manage their challenging behaviors, alternative communication, and emotional regulation while simultaneously teaching the entire class. Furthermore, working within an inconsistent system results in a lack of continuity between therapy and school, as well as a lack of feedback from specialists; as a result, teachers very often do not know what works and is supportive for the child, and what needs to be changed. Also, very often, what happens to the child and what kind of help they receive is the individual responsibility of the teacher, despite the fact that there is formally supposed to be teamwork.

For parents (families), the lack of coordinated systemic solutions means that the parent or parents become a sort of "system manager," as they organize diagnosis, therapy, and school, and collaborate with various specialists–which means that, in practice, the system shifts responsibility onto the parents. On the one hand, this causes a significant emotional burden in the form of stress, burnout, and often family crises (Hayes & Watson, 2013; Pisula, 2010). It also entails financial costs, as parents very often cover the costs of therapy out of their own pockets. Another challenge is the lack of continuity in the support provided, which is quite varied but also often inconsistent, making it harder to ensure the child's stable development. And the final challenge for parents of children with ASD is the quality of support the child receives. One might get the impression that we are dealing here with a kind of inequality of opportunity, as the support a child receives depends on many factors, including, among others, parents' knowledge of ASD, their financial resources, and the family's place of residence (NIK, 2020; Płatos, 2016).

The most important systemic conclusion that emerges is that the problem is not the absence of individual elements of the system, but the lack of integration between them. In Poland, schools, social services, and the healthcare system operate alongside one another rather than in unison, resulting in inconsistent early intervention and reduced effectiveness.

When analyzing both research in this area and the practices of individual entities, it becomes clear that the most effective model is one based on ear-

ly diagnosis and rapid implementation of therapy (Zwaigenbaum et al., 2015; Dawson, 2008). It is also crucial to maintain constant collaboration between teachers, parents, and the therapist(s), who work together to implement a single, shared plan of action–such as an Individualized Education Program (IEP), therapy, and interventions at home. Finally, it is important that we support not only the child with ASD but also their family environment; only then can we observe the best results from the actions taken.

ARGUMENTS IN FAVOUR OF THE THESIS THAT SOCIAL WORK IN POLAND IS PREPARED TO PROVIDE ASSISTANCE TO PEOPLE WITH ASD

When analysing the extent to which social work is prepared to work with neurodiverse individuals, a number of arguments can be put forward to suggest that the system possesses certain resources and tools enabling it to provide support. Firstly, contemporary social work increasingly utilises constructivist and solution-focused approaches that promote the individualisation of support (Miś, 2023). These approaches assume the client's active participation in the support process and take their perspective into account. Secondly, experience of working with people in mental health crises provides an important foundation for working with neurodiverse individuals. The development of community-based work and approaches in line with international recommendations points to the system's growing capacity for adaptation (Jarkiewicz & Granosik, 2021). Thirdly, the literature highlights the growing importance of a holistic approach that takes into account various aspects of an individual's functioning – social, emotional and environmental (Zmysłowska, 2025). Such an approach is particularly important when working with neurodiverse individuals.

ARGUMENTS THAT SOCIAL WORK IS NOT SUFFICIENTLY PREPARED

Despite the resources mentioned above, there are many indications that social work is inadequately prepared to work with neurodiverse individuals. One of the main problems is the prevalence of a normative approach, which is based on comparing an individual's functioning against socially accepted standards. Diagnostic tools used in social work often fail to take into account

the specific nature of neurodiversity, which can lead to an incorrect assessment of the client's situation (Gajek, 2022). Another significant challenge is the inadequate professional competence of social workers. Training programmes rarely cover issues related to neurodiversity in depth, which limits the ability to provide adequate support. Systemic barriers, such as staff overload, bureaucratisation and limited institutional resources, are also significant. Research indicates that social workers' working conditions affect the quality of the support provided and the ability to tailor interventions to individual needs (Boryczko & Dunajska, 2022). An additional problem is insufficient cross-sectoral integration. The lack of effective cooperation between the social welfare system, education and healthcare hinders comprehensive support for neurodiverse individuals.

KEY CHALLENGES FACING SOCIAL WORK IN POLAND IN THE CONTEXT OF NEURODIVERSITY

The rapid rise in public awareness of neurodiversity and the increasing number of diagnoses within the autism spectrum, ADHD and other neurodevelopmental differences mean that the social welfare system in Poland faces new, complex challenges. These challenges are multidimensional and encompass the systemic, institutional and individual levels.

One of the most significant problems is the lack of a coherent and comprehensive policy to support neurodiverse individuals. Currently, initiatives aimed at this group are scattered across various sectors – social care, healthcare and the education system. The lack of coordination between these areas of support makes it difficult to respond effectively to individuals' needs. In practice, this means that neurodiverse people and their families are often forced to navigate the complex institutional system on their own (NIK, 2020; cf. Płatos, 2016).

Another significant challenge is the failure of diagnostic tools and procedures used in social work to take account of the specific ways in which neurodiverse people function. Standard methods of assessing life circumstances are often based on normative assumptions regarding social functioning, which can lead to a misinterpretation of these individuals' behaviours and needs. Another significant barrier is the insufficient professional training of social workers. Training programmes still give limited consideration to issues related to neurodiversity, which results in a lack of specialist knowledge

and skills in this area. Social workers often lack the tools to communicate effectively with neurodiverse individuals or to adequately identify their needs.

Systemic constraints, such as the overburdening of social workers, staff shortages and excessive bureaucracy, are also significant. A heavy administrative workload limits the ability to carry out in-depth community work and adopt an individualised approach to clients (Boryczko & Dunajska, 2022). Meanwhile, neurodiverse individuals often require long-term and personalised support.

Another challenge is the persistently low level of public awareness and the prevalence of stereotypes regarding neurodiversity. Neurodiverse individuals are often viewed through the lens of deficits, which contributes to their marginalisation and social exclusion (Pellicano & den Houting, 2022; Botha & Frost, 2020). In this context, the social welfare system should also fulfil an educational role. The problem of limited access to community-based services and specialist forms of support is also worthy of note. In many regions of Poland, access to appropriate services is uneven, which leads to a deepening of social inequalities. Another significant challenge is the insufficient consideration of the perspectives of neurodiverse individuals themselves in decision-making processes. Contemporary approaches in social work emphasise the importance of participation and empowering clients, yet in practice these principles are not always fully implemented (Miś, 2023).

SUMMARY AND RECOMMENDATIONS

The analysis indicates that social work in Poland is only partially equipped to provide support to neurodiverse individuals. On the one hand, it possesses the tools and experience that can be utilised in this area. On the other hand, however, there are significant shortcomings in terms of competence, system organisation and client-centred approach. The future of social work in the context of neurodiversity depends on the ability to adapt and openness to new paradigms. It is crucial to move away from a normative approach towards an inclusive model that takes into account the diversity of human functioning.

In light of the above, several key directions for the development of social work with neurodiverse individuals in Poland can be identified. Firstly, it is essential to develop the competencies of social workers through training and the inclusion of neurodiversity issues in educational programmes, as well as

the development of interdisciplinary competencies. Secondly, a paradigm shift is required in social work with ASD, moving away from a controlling approach towards an empowerment approach that focuses on the individual's autonomy. Furthermore, community-based services should be developed to enable support to be provided within the client's natural living environment. Such an approach promotes social integration and enhances the effectiveness of support measures. And finally, neurodiverse individuals must be included in decision-making processes concerning their lives. Participation and self-advocacy are key elements of modern social work.

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SECTION II

INTERVENTIONS, IMPLEMENTATIONS AND LIFESPAN OUTCOMES

CHAPTER 9

FAMILY EMPOWERMENT AS THE FOUNDATION OF EARLY INTERVENTION FOR CHILDREN WITH DEVELOPMENTAL DELAYS AND DISABILITIES

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INTRODUCTION

A well-known adage states, "Catch them young, and the possibilities will be endless." This expression highlights that when children receive support early in life, they have greater potential to succeed and achieve positive outcomes in later stages of development. This perspective is closely aligned with the implementation of early intervention (EI) strategies for children diagnosed with, or at risk of, developmental delays and disabilities. When EI is implemented, children receive timely, targeted support early on, which will have a lasting and powerful impact on their cognitive, socio-emotional, and physical development later in life. EI optimizes children's developmental and functional skills at an early stage, thereby broadening their opportunities for learning in school. Hence, similar to the adage of catching them young, possibilities will be endless. If children are at risk of developmental delays or disabilities, if they are exposed to EI, their chances of mitigating barriers to learning will be significantly reduced, and possibilities for successful learning will be endless.

When implemented during infancy and early childhood, EI not only enhances developmental outcomes but also mitigates the impact of delays and learning disabilities on children in school.

Contemporary EI strategies are conducted in inclusive and collaborative ways. Families are not only included in the intervention program but also empowered in various ways to accept their children's diagnosed conditions and provide the support needed. Jimenez-Arberas et al. (2024) argue that a family-centered model is an integral part of EI and is well-suited to supporting children with learning barriers. EI programs thrive in an environment where collaboration prevails. There is a need for different stakeholders to develop an EI program and implement it in ways that prepare the child to fully integrate into the mainstream school with little or no learning barriers. Against this background, this study seeks to explore how specialists at an EI center empower families and collaborate with multiple stakeholders. The study was guided by one critical research question: How do specialists at an EI center empower families while collaborating with multiple stakeholders?

The paper begins by presenting this current section as the introduction to the study. A review of related literature follows, focusing on contemporary EI. Empowerment theory is presented as the theoretical framework for this study. Research methods are presented thereafter, followed by results and discussion. The paper ends with a succinct conclusion and implications for further study.

LITERATURE REVIEW

On the one hand, when a child's development is significantly behind the expected milestones of their age, they fall in the category of developmental delay. On the other hand, disability is a condition of the body or mind that makes it hard for a person to do certain activities (Abu Dhabi Early Childhood Authority, 2023). The existence of developmental delays and disabilities gives rise to the need to provide EIs to mitigate the conditions of children at an earlier stage, so that their chances of integrating into mainstream schools will be high.

CONCEPTUALIZING EARLY INTERVENTION AND FAMILY EMPOWERMENT

EI is an integral component of inclusive education, playing a significant role in the growth and development of children with developmental delays and disabilities. It enables children to receive the necessary support before entering mainstream schooling, thereby facilitating smoother transitions and improved participation in

inclusive educational settings (Meda et al., 2026). EI is critical as it helps children improve all domains of development (Bauer & Zelazo, 2014; Hadders-Algra, 2021). Thus, the earlier children are exposed to EI, the greater the chances of not needing future intensive support services. Hopkins and Puhlman (2026) state that EI strategies available for deaf and hard-of-hearing children enabled them to cope with their disabilities in ways that did not require extensive support services.

Contemporary EI strategies are implemented by institutions collaboratively with families as partners. The rationale behind the partnership is to empower families. Family empowerment as the term suggests, involves capacitating parents and siblings of a child with developmental delay or disability to be able to gain comprehensive knowledge about the child's condition and skills needed to support the child's development and functioning (Martínez-Rico et al., 2022). Without family empowerment, some families would be in denial of their child's condition and subsequently lack knowledge about supporting the child. Family empowerment has positive outcomes for both the parent and child.

Magidigidi-Mathiso, Frantz, and Filies (2025) advocated for a community-based primary care approach to supporting families of children with developmental delays and disabilities. The approach resulted in families gaining comprehensive knowledge and skills necessary to support children with disabilities. Similarly, a study by Sedeh, Mirzaie, Chy, Ghayomi, and Sedeh (2025) concluded that family empowerment was indispensable in improving mothers' knowledge and skills about caring for their children with developmental delays and disabilities. Positive learning outcomes were observed in the motor and cognitive domains of children with disabilities whose parents were involved in the EI program (Bernabe-Zuñiga et al., 2025).

Family empowerment is credited for helping build families' capacities and enhance their competence and confidence in supporting children with developmental delays and disabilities (Dunst & Espe-Sherwindt, 2016). Martínez-Rico et al. (2022) and McCarthy and Guerin (2022) echo the same sentiment about family empowerment as critical for boosting families' confidence and enhancing their competencies in supporting their child's development. It is therefore important to view families as partners in the collaboration rather than as passive recipients of services. Martínez-Rico et al. (2022) argue that families who attended the EI program developed competence, confidence, and the capability to meet the diverse needs of their children. Research shows that there was a significant change in the family's ability to care for patients with schizophrenia before and after the integrative empowerment intervention (Iswanti et al., 2024).

In the United Arab Emirates (UAE), EI and family support are not optional, but a priority (Abu Dhabi Early Childhood Authority, 2023). EI is closely associated with family involvement in early disability diagnosis and rehabilitation (Mohamed et al., 2025; Opoku et al., 2024). The UAE expects a collaborative approach to implementing inclusion, creating a conducive environment across intervention centers to prepare children with disabilities to join mainstream education. Meda et al. (2023) postulate that collaboration is the cornerstone of a mutually enriching and effective inclusive education that successfully enables teachers to implement inclusive pedagogical practices. Collaboration among teachers, specialists, families, and community organizations is indispensable in providing adequate support to children with disabilities in EI centers.

THEORETICAL FRAMEWORK

Empowerment Theory is selected as the theoretical framework guiding this study. The theory originates from community psychology, which explains how families gain information about circumstances that affect their lives. Zimmerman (1995) later expanded the theory to include three interrelated levels: the Individual (psychological) level, the Interpersonal or family (organizational) level, and the Community level (Graves & Shelton, 2007; Zimmerman, 1995). Parents develop knowledge, skills, and confidence at the Individual level. This is consistent with this study, where fathers and mothers interacted with specialists extensively to develop a comprehensive understanding of the nature of their children's developmental delay or disability and to gain skills and confidence to support their child effectively. The interpersonal or family level involves shared decision-making and collaborative problem-solving. This occurred in the study, in which specialists worked collaboratively with the parents and the child's siblings to learn how to support the child. The community level involves the structures and policies needed to access support for a child with developmental delays or disabilities. This is consistent with the findings of this study, in which policymakers were involved in the collaboration process.

METHODS

This study was conducted using a qualitative case study, and its paradigmatic position is interpretivism. A qualitative approach was selected as the study had a small sample, and researchers wanted to interact extensively with partici-

pants to understand the dynamics of their engagement with families. This is consistent with Creswell (2012) who postulates that a qualitative approach is suitable for a study with a small sample that seeks to collect rich textual data through interaction with participants. Interpretivism was selected for this study because it is compatible with a qualitative approach and well-suited to interpreting participants' subjective views. Lapan, Quartaroli, and Riemer (2012) argue that qualitative and interpretive methods go hand in hand, and they both allow researchers to interpret textual data to understand the phenomenon.

A case study design was selected because the study focused on a particular case (the Center for EI) to deepen understanding of the phenomenon (Yin, 2018). The center functions as a non-profit institution dedicated to supporting individuals with disabilities in the UAE. Its mandate includes mitigating the underlying factors that contribute to developmental and functional impairments through comprehensive EI services. Furthermore, the center promotes inclusive educational practices designed to facilitate the seamless integration of children with disabilities into mainstream educational settings, ensuring that barriers arising from their diagnosed conditions are minimized or eliminated.

Purposive sampling, characterized by the deliberate targeting of information-rich participants (Cohen, Manion & Morrison, 2017), was used to select 9 specialists who participated in this study. The center has speech therapists, occupational therapists, physiotherapists, psychologists, social workers, and a family counselor, and has children with different disabilities and developmental delays. Data were collected through semi-structured interviews, which enabled participants to fully explain their interactions with families and the nature of their collaboration with other professionals. Data were analyzed using thematic analysis. Researchers transcribed the data, read it thoroughly, and used an artificial intelligence tool, AILYZE, to analyze it. AILYZE is a qualitative data analysis tool with algorithmic capabilities for identifying themes. The tool classified all data for this study according to the codes and themes created. It was selected for this study as its data is encrypted and not accessible by anyone.

Ethical considerations were upheld by obtaining an ethical clearance certificate from the university and permission to conduct the study from the EI center's top management. The purpose of the study was explained to all participants, and they were informed that participation was voluntary and that they could withdraw at any time. They were guaranteed that their confidentiality would be maintained. All participants signed consent forms.

RESULTS

CONCEPTUALIZING FAMILY EMPOWERMENT AS SKILL-BUILDING AND SUPPORT

Findings of this study indicate that specialists conceptualize family empowerment as the starting point of EI for children with developmental delays and disabilities. They believe family empowerment is inevitable, as some parents lack understanding of their children's conditions. This was supported by Specialist 3, who said, "The main problem is that the family does not understand the child. So, we are helping them to go down for them." The same specialist clarified parents' lack of knowledge, saying, "We take all the things that might make the EI better, like starting with the family, the parents themselves to understand what the disability is, and working with the siblings of the child." In some instances, parents do not just lack knowledge of the developmental delay or disability, but "refuse to diagnose the child" (Specialist 4) because of fear of the unknown.

Some parents are often in denial when they are informed that their child has been diagnosed with a particular disability. This is a challenge noted by specialists, which necessitates training sessions for parents to accept their child's condition and equip them with the skills necessary for support. Specialist 4 elaborates on the issue of parent denial:

> *The biggest challenge we face in intervention is the mother's initial shock. The mother does not accept the child's problem. This is the biggest challenge for us to overcome with the mother. Some mothers have spent three or four years, and still do not accept the issue.*

So, specialists play a key role in encouraging parents to take their children to EI centers for diagnosis and in helping them understand the disability. If parents/guardians do not understand the nature of the developmental delay or disability that their child will have, they will not be able to offer any meaningful support.

Specialists understand the need to equip the entire family unit with the skills and understanding to support the child. Thus, the training sessions offered are not limited to parents or guardians; they also include siblings. Specialist 1 said, "We seek to involve the family and brothers and sisters, all family in training." The primary goal of empowering the whole family is to change how they in-

teract with their children with developmental delays and disabilities and offer more support. Specialist 4 elaborates on the same point, saying,

> *The first strategy is to empower the family to deal with the child. The family is not just the mother; the father and the siblings are also part of it. We empower them all on how to deal with the child, so the child's behavioral challenges are reduced, and to address any psychological effects from the environment in which he lives. This is the first strategy that we can use with the parents to reduce the pressure.*

Therefore, empowerment is not directed at an individual parent but is a holistic process designed to build the capacity of the entire family system. Family empowerment in EI is inevitable because families are conceptualized, in a way, as therapists. This was supported by Specialist 9, who said family empowerment is "a necessity … because family is the provider of services and the first and last therapist."

Specialists are credited with imparting crucial skills to families, helping them support their children with developmental delays and disabilities. They (specialists) help families learn how to interact with their children and how to translate words and reactions. This was supported by Specialist 3, who said,

> *We also help them translate what the child is trying to communicate, what he is trying to show, what he is trying to say, or why he is having certain reactions. So, this is the first thing that we are working on.*

This elaborates that training includes helping parents interpret their child's non-verbal cues and behaviors. This shared perspective positions the specialist as a translator and coach, empowering the family by equipping them with the skills to understand their child's communicative intent, thereby transforming daily interactions into opportunities for development and connection.

Specialists in this study provided structured educational sessions for parents and their families as part of the empowerment program. Specialist 1 states, "I make awareness workshops in speech and language and articulation and communication disorders." Similarly, Specialist 2, who provided training on language and prelinguistic skills, states that he provides "guidance for the families and for the teacher." This shows that formal training sessions are conducted to enhance family knowledge and skills needed to support their children with developmental delays and disabilities. Specialists guide parents on basic yet effective ways to interact with their children with disabilities. This was

confirmed by specialist 3, who said, "We change how the family interacts with their children and use a different style of communication." A skill like communication with a child with autism may seem simplistic, but it is consequential.

In some instances, specialists enact family empowerment through specific programs and a collaborative team approach. Specialist 1 highlights that the Assessment, Evaluation, and Programming System (AEPS) curriculum used by specialists at the center "focuses on teamwork, family participation, and functional skills." This indicates the center's commitment to actively including families as partners within a transdisciplinary team. The approach is aimed at family empowerment, which in turn enables a child with a developmental delay or disability to achieve their learning and developmental goals. Specialist 5 confirmed this, saying, "We work as one team [families and specialists], and that is great because it supports the student's goal."

COLLABORATION WITH MULTIPLE STAKEHOLDERS

Collaboration among specialists is the backbone of the EI model at the center in Sharjah. Professionals across disciplines, including speech therapy, occupational therapy, physiotherapy, psychology, and social work, operate as transdisciplinary teams, sharing information, goals, and strategies. The ultimate goal of the teamwork of those transdisciplinary professionals is to support families and their children with developmental delays and disabilities. Specialist 5 reports on a collaboration saying, "as a working group, we work with the Neurologist, Physiotherapist, Occupational therapy specialist, Speech therapist, Psychologist, Social workers, specialist, and the teacher, of course, to be with the family."

In some instances, specialists collaborate with the Sharjah Private Education Authority (SPEA) and also with some private nurseries. Specialist 1 confirmed this, saying, "We collaborate with SPEA to make a screening for all the nurseries in Sharjah. We provide services for kids and their families, as well as for nurseries and teachers. Another participant echoes the same sentiment about collaborating with nurseries, saying, "the family is supported through a cooperation and coordination between the nurseries and the integration platform" (Specialist 6). Collaboration between specialists, nurseries, and the school regulatory body mainly occurs during the screening, identification, and support phases. Specialists are qualified to provide an accurate diagnosis, whereas teachers and parents of children in nurseries are not qualified to do so. After a diagnosis is made, specialists play an important role in sharing

knowledge and skills with families and teachers on how to support children with diagnosed conditions.

There is also cross-departmental collaboration, which was reported. This occurred where specialists collaborated with people working in other departments at the center. Specialist 1 reported this saying, "We cooperate also with the assistive technology department and with the Auditory Clinic to make a check-in… Yes, some kids need to wear some aids to make them hear well." In some instances, specialists at the center work together. Some specialists supervise others to ensure that high-quality support is provided to children with developmental delays and disabilities and their families. Specialist 8 supported this statement, saying, "I supervise three therapists in EI. I make sure that those therapists improve in providing services to students."

DISCUSSION

The findings of this study show that family empowerment is the cornerstone of successful EI. This aligns with the three levels of empowerment theory, *individual, interpersonal, and community* (Graves & Shelton, 2007), which is the theoretical framework guiding this study. Parents entered the EI program with a limited understanding of their children's conditions and, in some cases, were in denial, shock, and petrified. However, their exposure to the first level of empowerment theory, Individual, enabled them to overcome fear and gain confidence and competence in supporting their children through workshops and training sessions with specialists. This finding is consistent with research which shows that initial response of some parents after diagnosis of their children is to fail to come to terms with reality of their child's disability, but with constant support from professionals, they gradually accept and be in a better position to support their child (Martínez-Rico et al., 2022; Dunst & Espe-Sherwindt, 2016).

The present findings reveal that capacity building was not limited to parents or to specific caregivers. It was extended to the whole family, including siblings and other caregivers, of a child with a developmental delay or disability. This holistic approach is similar to the interpersonal or family level of empowerment theory (Graves & Shelton, 2007). Magidigidi Mathiso et al. (2025) postulate that a holistic approach to supporting a child with a developmental delay or disability is critical, as when families collectively understand a child's condition, they are better positioned to offer the necessary support. Thus, it is important to include families in all capacity-building initiatives, as they are

the first support system children have. This resonates with the literature, which reports that families are the first therapists for children with developmental delays or disabilities, and that empowering them will enhance a child's functional and developmental outcomes (Bernabe-Zuñiga et al., 2025; Hopkins & Puhlman, 2026). The statement that family is the first and last therapist, supported by specialists, is a unique one that redefines roles and clearly positions specialists not only as service providers to the child but also as a support system that enables the family's therapeutic capacity.

This study demonstrates that family empowerment was not only the result of training sessions with specialists but also a product of interactions among people across different organizations in the community. This forms the community level in the empowerment theory, where specialists collaborated with nurseries, the regulatory body (SPEA), and other relevant departments. This is consistent with the screening, identification, assessment, and support structure in the South African context, which occurs because of the collaboration of teachers, parents, the Ministry of Education, Policy Makers, and all other stakeholders coming together to support a child with developmental delays and disabilities (Maree, Condy & Meda, 2023). The collaborative approach is similar to that in the UAE, where multiple stakeholders work together to support children as part of inclusive education (Abu Dhabi Early Childhood Authority, 2023; Meda et al., 2023). In the UAE, SPEA collaborates with nurseries and EI centers in Sharjah to provide the necessary support to help children reach their highest learning potential.

Overall, the study's findings strongly support Empowerment Theory by demonstrating that empowerment is a multi-layered, iterative process essential to EI. At the individual level, families gain knowledge; at the interpersonal level, they engage in collaborative decision-making; and at the community level, they access supportive systems and services. Together, these layers enable families to transition from uncertainty and denial to competence, confidence, and active partnership. Family empowerment is therefore an indispensable element in EI.

CONCLUSION

The purpose of this study was to explore how family empowerment is conceptualized and enacted within an EI center from the perspectives of multidisciplinary specialists. The study reveals that family empowerment is the cornerstone of EI for children with developmental delays and disabilities. Specialists at

the EI center conceptualize family empowerment as the heartbeat of EI, preparing families to provide the effective developmental support children need.

Collaboration is the underlying element that holds family empowerment together, as it involves the interaction of multiple stakeholders to provide families with the psychosocial support they need to support their children. A collaboration among different specialists enables parents to gain a strong knowledge base about their child's disability and to be better positioned to understand how to support their child. This makes families become the child's primary therapists. The study concludes that family empowerment is consequential, it enhances a child's chances of joining a mainstream classroom with fewer barriers to learning and maximise his/her learning outcomes. That is why it is critical to provide EI to widen possibilities of children diagnosed with developmental delays or disabilities, as the popular saying goes, catch them young and the possibilities will be endless.

AI DECLARATION

- AILYZE was utilized for data analysis. The platform ensures data security through encryption, maintaining confidentiality. The researchers developed thematic categories and employed AILYZE to systematically code and classify the raw data according to these themes.
- Copilot was used to identify a theoretical framework appropriate for the study. It was also employed to verify the consistency of citations by ensuring that all in-text references were included in the reference list and vice versa.
- Grammarly was used to enhance the clarity, coherence, and grammatical accuracy of the manuscript, ensuring adherence to academic writing conventions.

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CHAPTER 10

BRIDGING RESEARCH, POLICY AND PRACTICE IN EARLY ASD: TEACHER EDUCATION, DIGITAL INNOVATION AND IMPLEMENTATION IN THE EARLY-ASD PROJECT

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INTRODUCTION

Autism spectrum disorder (ASD) is now widely recognized as one of the most prevalent neurodevelopmental conditions in early childhood. Yet the practical implications of this epidemiological trend for diagnostic systems, early intervention, and educational provision remain difficult to translate into coherent and sustained policy and practice. Recent surveillance data indicate that approximately 1 in 31 eight-year-old children in the United States meet DSM-5-TR diagnostic criteria (Shaw et al., 2025). Globally, despite variation in diagnostic practices and thresholds, ASD consistently ranks among the most frequently identified neurodevelopmental conditions (Zeidan et al., 2022).

These patterns place considerable demands on education systems and related services. They require not only expanded diagnostic capacity and improved access to early intervention, but also more responsive and better-coordinated forms of mainstream and specialist provision. At the same time, the challenge is not solely one of scale. It also concerns how systems interpret, prioritise, and act upon available knowledge. While prevalence data are increasingly robust, their translation into effective and sustained policy responses remains uneven across contexts.

This difficulty reflects a broader and persistent fragmentation in the relationship between research, policy, and practice in the field of early ASD. Despite a substantial and growing evidence base, alignment across these domains remains limited. The effectiveness of early intervention is well established. A systematic review and meta-analysis by Daniolou et al. (2022) demonstrates significant improvements in adaptive behaviour, communication, and cognitive functioning when intervention is initiated in the early years. Complementing this, neurobiological research indicates that early behavioural intervention can influence cortical activation patterns associated with social processing (Dawson et al., 2012), underscoring the developmental significance of timing.

However, the implementation of evidence-based practices remains inconsistent. Only a small proportion of school-based autism programmes meet established evidence-based criteria, and implementation fidelity is often limited (Stahmer et al., 2005; Hess et al., 2008). As a result, a persistent gap remains between what is known and what is systematically enacted in educational settings. Bridging this gap requires not only stronger evidence, but also more effective mechanisms for embedding research within the structures that govern educational practice.

Policy frameworks have sought to address these challenges by promoting inclusive and rights-based approaches to education. International instruments such as the Convention on the Rights of Persons with Disabilities (United Nations, 2006), the Salamanca Statement (UNESCO, 1994), and Sustainable Development Goal 4 establish inclusive education as a global commitment. At the European level, the European Disability Strategy 2021–2030 (European Commission, 2021) reinforces this orientation, while guidance from the World Health Organization (WHO, 2020) highlights the importance of responsive caregiving and structured early environments for child development. Despite these frameworks, the translation of policy commitments into practice remains uneven. Education systems continue to face constraints related to resources, teacher preparation, and institutional structures that were not originally designed with neurodiversity in mind. This misalignment between policy intent and educational reality has been documented across multiple national contexts (European Agency for Special Needs and Inclusive Education, 2018; Waitoller & Artiles, 2013).

The EARLY-ASD project (Upskilling Preservice Teachers to Support Young Children with Autism Spectrum Disorder through Digital Social Stories) provides the conceptual and empirical framework for this chapter. Funded under Erasmus+ KA220-HED (grant no. 2024-1-PL01-KA220-HED-000246304)

and coordinated by the University of Warsaw, the project brings together partners from several European countries to address a well-documented gap: the insufficient preparation of pre-service teachers to work effectively with autistic children in inclusive educational settings. As a practice-oriented and research-informed initiative, it offers insight not only into approaches to teacher education but also into the structural conditions that determine whether such initiatives can be sustained and scaled.

In this chapter, "research" refers to empirical evidence on early ASD identification and intervention, "policy" to international and national regulatory and strategic frameworks, and "practice" to the implementation of educational and therapeutic approaches in early childhood and school contexts. The central argument is that closing the research–policy–practice gap is not primarily a matter of improved dissemination. Rather, it requires sustained attention to the conditions that enable evidence-based practices to be implemented effectively. These include the professional preparation of teachers, the coherence of institutional support systems, and the structural characteristics of education systems that shape access to and delivery of services.

The chapter examines how the EARLY-ASD project responds to these challenges through its focus on teacher education, the use of digital social stories as a pedagogical tool, and cross-national collaboration. Drawing on the project's design and implementation across contexts, it identifies factors that support or constrain the translation of evidence into practice. The chapter is structured as follows: the next section outlines the theoretical and empirical foundations of early ASD intervention; the subsequent section presents the design and core components of the EARLY-ASD project; this is followed by a multi-level analysis of conditions shaping implementation, including policy alignment, contextual variation, digital innovation, and structural barriers; the final section discusses implications for policy, practice, and future research.

CONCEPTUAL FRAMEWORK: BRIDGING MODELS

The gap between research evidence, policy commitment, and classroom practice involves multiple interacting layers that cannot be adequately captured through a single conceptual lens. This chapter draws on three complementary frameworks – implementation science, translational research, and inclusive education theory – each of which addresses dimensions that remain underexplored by the others.

These perspectives are considered in relation to one another, not because they can be fully integrated, but because each illuminates a distinct aspect of the problem. Implementation science focuses on the processes that mediate between policy and practice. Translational research examines the recurring breakdowns in the movement from knowledge production to classroom application. Inclusive education theory provides the normative orientation and serves as a critical counterpoint to approaches that concentrate exclusively on technical aspects of implementation without addressing the structural conditions that generate exclusion.

IMPLEMENTATION SCIENCE

Implementation science emerged in response to the persistent observation that the availability of high-quality evidence does not, in itself, lead to changes in professional practice. The Consolidated Framework for Implementation Research (Damschroder et al., 2009) identifies a range of contextual factors that influence whether evidence-based practices (EBPs) are successfully adopted in real-world settings. These include organizational climate, leadership, resource availability, and the characteristics of individual practitioners.

In early ASD education, these factors interact in specific and often constraining ways. Teachers may be familiar with naturalistic developmental behavioral interventions as current best practice, yet remain unable to implement them with fidelity due to limited time, insufficient specialist support, or the absence of collaborative planning structures. Similarly, schools may formally endorse inclusive education while maintaining organizational conditions that limit its practical realisation.

The NPDC model, as presented by Waligórska, Sam, and Odom (Chapter 11), operationalizes these insights through a set of integrated implementation components, including EBP matrices, structured professional development, and program quality tools. The associated AFIRM platform has achieved substantial reach, exceeding one million module completions by 2026, demonstrating the scalability of digital dissemination. However, this also highlights a key limitation: increased access to knowledge does not necessarily translate into changes in practice (Sam et al., 2020). Research consistently indicates that factors such as leadership and structured coaching play a more decisive role in supporting implementation fidelity than access to information alone (Locke et al., 2019; Williams et al., 2022). This distinction remains insufficiently addressed in many implementation efforts.

TRANSLATIONAL RESEARCH

Translational research, originally developed in medical contexts to examine how scientific knowledge is converted into clinical application, has more recently been applied to education (Greenhalgh et al., 2014). Dingfelder and Mandell (2011), drawing on Rogers's diffusion of innovation model, describe stages through which a practice progresses before becoming embedded in professional culture: awareness, persuasion, decision, implementation, and confirmation. Each stage introduces potential points of failure. Practitioners may recognise the value of an evidence-based practice yet encounter institutional barriers to its adoption. Even when implementation occurs, it may diverge from the original model due to contextual pressures and competing demands.

A central issue in this literature is the tension between fidelity and adaptation. In practice, adaptation is unavoidable. Educational settings are variable, and the conditions under which interventions are validated often differ from those in which they are applied. The key question, therefore, is not whether adaptation occurs, but whether it preserves the core mechanisms responsible for an intervention's effectiveness (Stahmer et al., 2015).

The EARLY-ASD project addresses this issue explicitly through its focus on developing critical professional judgment – the capacity to determine which adaptations maintain the integrity of a practice and which compromise it.

INCLUSIVE EDUCATION FRAMEWORKS

The third framework introduces an additional layer of complexity. Inclusive education in the context of ASD is not a neutral or purely technical field; it is structured by a fundamental tension addressed across several contributions in this volume. Neurodiversity-affirming perspectives – as developed, for example, by Gierzyński in this book (Chapter 3) – conceptualise autism as a form of natural human variation. This perspective has implications for the design of educational environments and for defining what constitutes appropriate and meaningful educational goals. In contrast, deficit-based frameworks, which continue to shape the eligibility criteria of most education systems, require the formal identification of impairment as a condition for accessing support. These approaches are not easily reconciled, and institutional structures tend to privilege one logic over the other, rather than sustaining a productive balance between them.

Slee's (2011) critique of inclusive education as a form of governance is particularly relevant here. It highlights the risk that inclusion functions primari-

ly as a policy discourse, positioning disabled students in mainstream settings without altering the normative expectations against which their participation is evaluated. In early ASD education, this dynamic is clearly observable. Children may be placed in inclusive pre-school environments without the environmental adaptations, communication supports, or professional preparation required to ensure meaningful access. In such cases, formal inclusion coexists with substantive marginalisation: policy commitment is maintained, but its intended purpose is not realised.

Waitoller and Artiles (2013) further argue that research in inclusive education has often developed within disability-specific silos, limiting the emergence of a coherent theoretical basis for the systemic reforms implied by rights-based frameworks.

THE EARLY-ASD PROJECT

This section outlines the EARLY-ASD project, including its conceptual foundations, methodological approach, and core pedagogical components. It situates the project within current challenges in early ASD education and explains how its design integrates evidence-based practice, digital innovation, and pre-service teacher preparation across diverse European contexts.

BACKGROUND AND AIMS

The EARLY-ASD project is an Erasmus+ Cooperation Partnership in Higher Education (KA220-HED) that brings together partners from multiple European countries. The consortium is dedicated to supporting children with autism spectrum disorder (ASD) from early childhood and addressing a structural challenge identified in the research literature: the insufficient preparation of pre-service teachers to support autistic children in inclusive educational settings.

The project adopts a cross-disciplinary approach, bringing together expertise from Teacher Education, Special Education, Early Childhood Education and Care (ECEC), and Educational Technologies. This interdisciplinary design reflects the complexity of inclusive education and the need for integrated perspectives in teacher preparation and practice.

The consortium seeks to enhance and develop cooperation at both national and international levels, primarily among higher education institutions specialising in teacher education. In doing so, it aims to strengthen institutional collaboration and build sustainable networks across partner countries.

This starting point is empirical. Despite formal commitments to inclusive education across EU Member States, pre-service teachers consistently report low confidence and limited competence in working with autistic children (European Agency for Special Needs and Inclusive Education, 2018). This should not be understood as a failure of individual educators. Rather, it reflects the slow integration of ASD-specific evidence-based practices, neurodiversity-informed perspectives, and digital pedagogical tools into initial teacher education curricula.

The project is structured around three interrelated aims. First, it seeks to develop digital social story resources that are evidence-based, culturally responsive, and accessible across diverse national contexts. These resources are not adaptations of a single template but are designed from the outset with cultural plurality in mind. Second, it aims to embed these resources within pre-service teacher education in ways that promote critical understanding rather than instrumental use. The objective is to prepare educators who can evaluate and adapt resources, rather than simply implement them. Third, it seeks to generate knowledge on effective ASD-inclusive teacher education that can inform programme design beyond the consortium.

While these aims are complementary, they operate at different levels. The first concerns design and production, whereas the second focuses on pedagogy and professional formation. Their relationship is central to the overall logic of the project and to its contribution to teacher education reform.

The project's primary contribution lies not in the production of digital tools, but in the transformation of teacher education. The tools function as a pedagogical entry point; the focus is on how pre-service teachers come to understand, critically evaluate, and meaningfully integrate them into practice. This distinction is essential. Research on professional development has consistently shown that the provision of educational technologies – such as digital platforms, applications, or short-term training initiatives – tends to produce only limited and short-lived effects (Darling-Hammond et al., 2017; Stahmer et al., 2015). More sustained impact is associated with changes embedded in professional formation and judgment, particularly during initial teacher education, before professional routines and institutional constraints become established.

EARLY-ASD is based on the assumption that educators who develop critical evidence-based practice (EBP) literacy during initial training – understood not as an isolated module but as an integrated dimension of pedagogical reasoning – are better equipped to evaluate and use digital tools throughout their professional

careers. The focus on digital social stories reflects both an evidence-based rationale and a pedagogical design choice aligned with this objective.

METHODOLOGY

The project is grounded in a design-based research approach. Wang and Hannafin (2005) describe this methodology as combining iterative development of educational interventions with systematic empirical evaluation. Educational tools and programs are not developed in isolation and then delivered to practice; they evolve through repeated cycles of design, implementation, and revision based on how they are used in real contexts.

This approach is particularly appropriate given the dual requirement that project outputs be both technically functional as digital resources and pedagogically effective across diverse systems of initial teacher education. Across partner institutions, training modules integrate theoretical content – including ASD, neurodiversity, and evidence-based practice – with structured practical skill development focused on the design and dialogic use of digital social stories.

Evaluation is multi-source. It includes pre- and post-training knowledge assessments, observations of pre-service teachers in practicum settings, and feedback from cooperating schools and families. This approach reflects a key principle from implementation science: program evaluation must account simultaneously for fidelity, practitioner competence, and contextual adaptation (Damschroder et al., 2009). Focusing on any single dimension in isolation would provide an incomplete picture.

DIGITAL SOCIAL STORIES AND TEACHER TRAINING

Social stories, originally developed by Carol Gray (1993), are structured and individualized narratives designed to support children with ASD in understanding social situations, expectations, and appropriate responses. Their adaptation into digital formats has expanded their pedagogical potential. Digital social stories can incorporate animation, adjustable narration, interactive elements, and multimodal presentation across sensory channels, extending beyond the possibilities of static text and images. Xue and colleagues (2025) document significant effects of digital social story interventions on inappropriate classroom behaviors, with digitalization specifically contributing to accessibility and multimodal engagement. Costescu and colleagues (2025) found comparable effectiveness between digitally mediated and traditional paper-based delivery for teaching social norms – a finding that matters because it suggests

the pedagogical logic of social stories travels across formats without loss. Ulasman and Sivrikaya (2025) demonstrate a further dimension of flexibility, applying digital social stories to earthquake safety instruction with autistic individuals, which illustrates that the format is not confined to social interaction goals in the conventional sense.

At the same time, digitalization is not neutral. It can amplify the underlying assumptions embedded in the original format. As discussed by Kara in this volume (Chapter 5), traditional social stories have often reflected normative expectations of social behavior that are culturally specific and frequently aligned with neurotypical standards.

The EARLY-ASD project addresses this issue as a central design consideration. The resources developed avoid presenting a single normative model of social behavior. Instead, they incorporate multiple contextually appropriate responses and include multilingual accessibility. Pre-service teachers are not trained to use these materials as fixed tools. They are prepared to analyze, adapt, and, when necessary, create their own resources tailored to the cultural, linguistic, and individual characteristics of the children and families they work with.

This approach is grounded in the concept of critical EBP literacy. This refers to the capacity to evaluate intervention claims in relation to evidence, adapt evidence-based practices thoughtfully to specific contexts, and critically examine the normative assumptions embedded in intervention frameworks. This aligns with the argument advanced by Waligórska, Sam, and Odom in this volume: implementation readiness depends not only on technical knowledge but also on professional dispositions and supportive organizational conditions.

Accordingly, the social story resources are designed for dialogic use. They are intended to be explored with children rather than delivered to them, positioning the child as an active participant whose interpretations matter, rather than as a recipient of prescribed behavioral guidance.

FROM RESEARCH TO PRACTICE: TRANSLATION PATHWAYS AND OBSTACLES

This section examines the relationship between research evidence and its translation into educational practice, focusing on the pathways through which evidence-based interventions are disseminated, adapted, and implemented in early ASD education. It also highlights the systemic and contextual factors that shape whether and how research evidence is taken up in real-world educational settings.

THE EVIDENCE BASE AND ITS IMPLEMENTATION

The evidence base for early ASD intervention is substantial and well established. The third-generation NCAEP systematic review identified 28 focused intervention practices that meet evidence-based criteria (Hume et al., 2021). For children aged birth to five, the strongest evidence supports naturalistic developmental behavioral interventions, prompting, reinforcement, visual supports, and parent-implemented approaches. Parent-implemented interventions, in particular, have strong meta-analytic support across a range of developmental outcomes and delivery formats (Sandbank et al., 2020; Nevill et al., 2018). This finding connects directly to Meda and colleagues' discussion of family empowerment in early intervention, as well as to the AFIRM module analysis presented by Waligórska and colleagues in this volume.

However, consistent implementation in community settings and schools remains limited. The research-to-practice gap is best understood as a set of interacting factors rather than a single point of failure. These include insufficient attention to evidence-based practices in pre-service teacher education, school organizational cultures that do not actively support implementation, professional development that is often episodic and weakly connected to classroom practice, and policy environments that do not incentivize fidelity to evidence-based approaches.

The AFIRM platform illustrates both the potential and the limitations of knowledge-focused strategies. With over one million module completions, it demonstrates that knowledge dissemination can be achieved at scale. At the same time, implementation research consistently shows that increased knowledge does not necessarily translate into changes in practice. The gap between knowledge acquisition and sustained behavioral change remains a central challenge in educational reform.

TEACHER EDUCATION AS AN IMPLEMENTATION LEVER

Pre-service teacher education occupies a distinctive position within the implementation landscape. In-service professional development must operate within established professional habits, institutional cultures, and accumulated experience, which often constrain change. Pre-service education, by contrast, shapes practitioners before such habits are formed. This creates a strategic opportunity: investments made at this stage of professional formation may generate effects that accumulate over time and across multiple educational contexts.

If pre-service programs successfully embed critical EBP literacy and neurodiversity-informed perspectives, the impact extends beyond immediate classroom practices. It influences the development of professional identities, shaping not only what teachers do in their first years of practice, but also how they continue to interpret and approach their work over time.

The gap between this potential and current practice remains substantial. Across European contexts, teachers consistently report that initial teacher education does not adequately prepare them for working with autistic students (Lindsay et al., 2013; European Agency for Special Needs and Inclusive Education, 2018). The specific limitations are well documented. Exposure to ASD-specific evidence-based practices is often minimal; neurodiversity-informed frameworks are introduced inconsistently and, in some cases, superficially; and practical pedagogical tools for inclusive early childhood settings remain underrepresented relative to theoretical content in many programs.

The professional development literature provides strong evidence that isolated training sessions produce limited and short-lived effects. Sustained change is more likely when professional learning is content-rich, collaborative, extended over time, and embedded in authentic practice contexts (Darling-Hammond et al., 2017). The EARLY-ASD modules are designed in alignment with this evidence, rather than on the assumption that training alone is sufficient to produce changes in practice.

CONTEXTUAL VARIATION ACROSS PARTNER COUNTRIES

A key analytical strength of the EARLY-ASD project lies in its multinational design, which makes visible forms of structural variation that would remain less apparent in a single-country study.

In Poland, the development of special education has historically followed a predominantly segregated, specialist model. Although recent policy reforms have moved toward greater integration and inclusion, persistent tensions between specialist and mainstream provision remain unresolved. These tensions continue to shape both the preparation of pre-service teachers and the institutional contexts into which they transition upon qualification.

In Türkiye, inclusive education is formally established as a legal right for children with special educational needs. However, implementation varies considerably across regions and school types, and access to specialist support, as well as to appropriately prepared personnel, remains uneven.

Taken together, these differences indicate that no single implementation model can be transferred across partner contexts without adaptation. The design-based research (DBR) framework is therefore particularly appropriate for this context, as it anticipates contextual variation and incorporates iterative refinement informed by local implementation conditions and feedback.

This orientation aligns with translational research perspectives, which emphasise that the fidelity–adaptation dilemma cannot be resolved through uniform implementation across diverse settings. Instead, it requires distinguishing between core components of an intervention, those elements that must be preserved to maintain its theoretical and functional integrity, and adaptable components that can be modified without undermining effectiveness.

Importantly, this distinction is rarely fully identifiable in advance. It emerges through iterative cycles of design, implementation, and evaluation, which are central to design-based research and essential for understanding how interventions function across heterogeneous educational systems.

POLICY ALIGNMENT AND TENSIONS

This section examines the alignment between international policy frameworks on inclusive education and their implementation in the context of early ASD education, highlighting both areas of convergence and persistent structural tensions that shape practice across systems.

EUROPEAN AND INTERNATIONAL FRAMEWORKS

The European Disability Strategy 2021–2030 (European Commission, 2021) is structured around the concept of a Union of Equality, in which disabled people, including autistic children, are entitled to the same rights and opportunities as others. Access to quality mainstream education is identified as a key objective. This requires the removal of structural barriers to participation and, critically for the focus of this chapter, the strengthening of teacher preparation for inclusive education. The Strategy situates these commitments within the UN Convention on the Rights of Persons with Disabilities, which frames inclusive education not as a policy option but as a legal obligation grounded in human rights. While the normative framework is comprehensive, it remains largely silent on implementation mechanisms.

UNESCO's contribution to this policy architecture extends back to the Salamanca Statement (UNESCO, 1994), which established the principle

that schools should accommodate all children regardless of individual differences in ability or background. Over time, UNESCO's focus has evolved. More recent work has shifted from affirming the right to inclusion toward interrogating whether placement in mainstream settings without adequate support can be considered inclusion in a substantive sense (UNESCO, 2020). This shift reflects a growing recognition of the distinction between formal and substantive inclusion, and of the gap that often separates policy commitments from lived educational experiences.

WHO guidance on early childhood development (WHO, 2020) adds a further dimension by emphasizing responsive caregiving and developmentally appropriate environments as universal conditions for child development, while also acknowledging that children with developmental differences require additional targeted support within these systems.

UNICEF adopts a somewhat different framing, positioning inclusive education as an integral component of quality education for all (UNICEF, 2026). This approach challenges the tendency to treat inclusion for autistic children as a specialist domain separate from mainstream early childhood education systems. Within this perspective, family engagement, social participation, and child wellbeing are understood as central educational outcomes rather than supplementary concerns alongside academic or behavioral indicators. Meda and colleagues' chapter in this volume provides an empirical illustration of these principles in practice, documenting processes of family empowerment in an early intervention setting in the UAE. It offers a grounded account of how such policy frameworks are enacted in real contexts, moving beyond their primarily declarative function.

MISMATCHES BETWEEN POLICY AND IMPLEMENTATION

Coherence at the level of international policy discourse does not translate into coherence in implementation. Discrepancies between policy commitments and practice are sufficiently persistent to require systematic analysis rather than incidental acknowledgement.

The most structurally significant mismatch concerns the tension between inclusive education principles and the medical-model eligibility architectures that continue to underpin most education systems. Access to specialist support for children with ASD typically depends on diagnostic categorisation of impairment: formal identification of a disorder is required before additional resources are allocated. The terminology that enables access to suport – such

as deficit, disorder, and impairment – therefore sits in structural tension with the neurodiversity-affirming language embedded in the policy frameworks that govern how such support should be delivered. As Gierzyński's chapter in this volume demonstrates, this is not merely a technical inconsistency but a consequence of maintaining medical classification systems within normative frameworks that conceptualise neurodevelopmental difference as natural variation. These logics are not readily reconciled within existing institutional arrangements.

A second mismatch concerns the relationship between policy expectations and professional preparation. Inclusive education policies mandate participation in mainstream settings, yet initial teacher education programmes often provide limited, optional, or specialised training in inclusive practice. As a result, general classroom teachers frequently work with children with ASD without sufficient preparation, resources, or sustained professional support to implement evidence-based approaches with fidelity, whether digital or non-digital. Grudziewska's chapter on social work in the Polish context illustrates a comparable pattern in a related professional domain, where fragmentation of provision and variability in professional preparation reflect a broader systemic lag between policy commitments and implementation capacity.

A third mismatch is temporal. Evidence on effective early ASD interventions develops over extended periods; policy frameworks are revised on slower institutional cycles; and changes in higher education curricula typically occur with additional delay. The EARLY-ASD project responds to this temporal gap by embedding research-informed content within initial teacher education programmes, partially circumventing national policy reform cycles. However, this strategy is itself constrained by institutional conditions. Curriculum change in higher education depends on governance structures that are not always aligned with externally funded project timelines, and the long-term sustainability of project-generated materials cannot be assumed.

DIGITAL INNOVATION AND INCLUSION

Digital innovation has become an increasingly prominent component of early ASD education, reshaping both the tools available to educators and the ways in which intervention is conceptualised and delivered. Its significance extends beyond technical development, encompassing issues of accessibility, pedagogical mediation, and equity. Digital tools therefore cannot be regarded as neutral

additions to educational practice; they constitute active elements that may reconfigure the conditions under which inclusion is enacted.

Analysis of digital innovation in early ASD education requires distinction between several interrelated dimensions: technological affordances, pedagogical purposes, empirical evidence, and institutional conditions of implementation. These dimensions are often conflated in discussions of educational technology, which tend to emphasise innovation while under-specifying the mechanisms through which educational effects are produced.

The concept of affordances – understood as the possibilities for action that a technology enables without determining outcomes (Conole & Dyke, 2004) – provides a useful analytical entry point. Tablet-based systems, for instance, offer portability, consistent visual presentation, adjustable pacing, and reduced reliance on real-time verbal interaction. These characteristics correspond to documented features of autistic learning profiles, including strengths in visual processing and preferences for structured and predictable input. However, affordances alone do not generate educational outcomes. A digital social story delivered without pedagogical mediation or integration into communicative intent does not constitute an intervention in itself but remains an instance of passive exposure. Concerns regarding unstructured screen exposure in early childhood further complicate assumptions about the pedagogical value of digital tools (Madigan et al., 2020).

A range of technologies is currently used in early ASD education, including augmentative and alternative communication (AAC) systems, video modelling platforms, social story applications, virtual and augmented reality environments, artificial intelligence-based adaptive systems, and wearable technologies for behavioural and physiological monitoring. These technologies differ in terms of their affordances, evidential maturity, accessibility across contexts, and the professional competencies required for their effective use. Within this landscape, digital social stories remain among the most empirically established tools for early childhood intervention and constitute a central element of the EARLY-ASD project design.

The empirical evidence supporting digital social stories has expanded across multiple contexts and outcome domains. Systematic reviews indicate positive effects on social behaviour, anxiety reduction, and daily living skills in autistic children (Xue et al., 2025; Ulaşman & Sivrikaya, 2025). Costescu et al. (2025) further demonstrate that digitally mediated social stories are comparable in effectiveness to paper-based formats in teaching social norms to

adolescents with ASD. These findings suggest that intervention outcomes are more closely related to content quality, pedagogical framing, and implementation conditions than to the delivery medium itself.

A structural tension persists between the production of evidence and the pace of technological change. By the time a randomised controlled trial is completed and published – often over several years – the technology under investigation may have evolved substantially. As a result, educational practice frequently operates in conditions of partial or delayed evidence, often derived from controlled settings that differ significantly from classroom realities. This tension cannot be resolved solely through accelerated research cycles. It requires approaches that support ongoing critical evaluation of emerging technologies in situ. The EARLY-ASD project addresses this requirement through its emphasis on developing critical professional judgement within pre-service teacher education.

AI AND ADAPTIVE LEARNING

The contribution by Memiş provides a comprehensive analysis of AI-supported early ASD intervention and its methodological and ethical constraints. Despite rapid technological development, systematic reviews continue to identify limitations, including small and homogeneous samples, overrepresentation of Western and neurotypically oriented populations, prototype-stage interventions lacking ecological validation, and algorithmic systems that remain insufficiently interpretable for practitioners.

Ethical frameworks developed by WHO, UNICEF, and UNESCO for artificial intelligence in education and health – centred on transparency, accountability, equity, and privacy – establish standards that many current applications in early ASD education do not yet fully meet.

Within the EARLY-ASD project, artificial intelligence is applied to the development of adaptive digital social story content. Potential applications include individualisation of narratives, adjustment of complexity based on learner responses, and generation of culturally and linguistically responsive materials. These possibilities are accompanied by significant methodological and ethical considerations. AI is therefore treated as a conditional tool, with implementation guided by pedagogical judgement and the principle of child agency.

ACCESS, EQUITY, AND THE DIGITAL DIVIDE

Digital innovation in inclusive education must be situated within broader patterns of inequality. The digital divide – unequal access to devices, connectiv-

ity, and technical suport – has significant implications for disabled children, particularly those from socioeconomically disadvantaged backgrounds. Unequal distribution of digital resources may reproduce rather than reduce existing educational inequalities.

Soldatic et al. (2025) emphasise that meaningful digital inclusion requires intersectional and participatory approaches that account for overlapping forms of disadvantage. These dimensions are not adequately addressed through single-axis analyses of access. The EARLY-ASD project incorporates an open licensing strategy and an emphasis on cultural responsiveness in response to these concerns, although these measures cannot fully address structural inequalities in digital access and provision.

BARRIERS TO IMPLEMENTATION

Understanding the research – policy – practice gap in early ASD education requires attention not only to evidence and innovation, but also to the structural and institutional conditions that shape what can be implemented in practice. Barriers to implementation operate at multiple levels, ranging from systemic arrangements embedded in policy and funding architectures to organizational cultures and the everyday pedagogical constraints experienced by teachers. These layers interact in ways that can enable, distort, or constrain the uptake of evidence-based and inclusive practices.

This section distinguishes three interrelated categories of barriers: structural barriers embedded in policy and system design; institutional barriers located within schools and professional cultures; and pedagogical barriers experienced by individual practitioners in classroom contexts.

STRUCTURAL BARRIERS

Structural barriers to early ASD support operate at the level of the systems and institutions that organize educational provision. They are typically more durable than individual or organizational barriers because they are embedded in funding models, legislative frameworks, and accountability architectures that were not originally designed with inclusive education in mind – or were designed for narrower conceptions of inclusion than those now articulated in policy discourse.

Funding models that tie resource allocation to diagnostic classification create systemic incentives that prioritise deficit documentation. As a result, they reinforce medical-model categories even in contexts where neurodiversity-af-

firming frameworks have been formally adopted. Similarly, class sizes and staffing ratios that do not reflect the complexity of inclusive early childhood education constrain teachers' capacity to individualise practice, limiting access to time, specialist consultation, and reflective collaboration. Accountability systems organised around standardised academic achievement metrics may fail to capture – and may indirectly marginalised – the relational, communicative, and participatory dimensions of learning that are particularly significant for autistic children.

The multinational scope of EARLY-ASD makes such structural variation more visible than would be possible in a single-country study. Some partner contexts embed inclusive education within legislative frameworks supported by dedicated funding mechanisms, providing a clearer structural basis for implementation. Others maintain parallel specialist and mainstream systems with limited coordination and uneven resource distribution. In such contexts, identical pre-service training content may produce different institutional outcomes, which has implications for how transferability and impact are interpreted across settings.

INSTITUTIONAL AND PEDAGOGICAL BARRIERS

Within schools and early childhood settings, institutional barriers include organisational cultures in which inclusion is formally endorsed but inconsistently supported in practice; the absence of shared professional language for discussing ASD and neurodiversity across professional roles; and limited structures for collaboration between classroom teachers, specialist staff, speech and language therapists, and families. Locke et al. (2019) show that organisational climate and leadership behaviour are key predictors of evidence-based practice uptake in schools, suggesting that implementation is shaped as much by culture and leadership as by technical knowledge.

Pedagogical barriers at the level of individual teachers are more immediate but equally consequential. These include limited exposure to ASD-specific evidence-based practices, uncertainty in adapting mainstream pedagogies for learners with diverse sensory and processing profiles, and insufficient access to sustained coaching or mentoring. Together, these factors contribute to a persistent gap between what teachers are expected to implement and what they are able to enact in practice within the constraints of everyday classroom environments.

Digital tools introduce a specific dimension to these challenges. Teachers with limited digital confidence may experience uncertainty or resistance when

introducing technology-mediated interventions, while more digitally confident practitioners may risk over-reliance on tools as substitutes for professional judgement. The EARLY-ASD training framework addresses this dual risk by positioning digital social stories as tools that extend pedagogical repertoire rather than replace relational and interpretive aspects of teaching practice.

EMERGING LESSONS FROM THE EARLY-ASD PROJECT

The lessons presented here are provisional, derived from a project that is still ongoing rather than a completed intervention with fully auditable outcomes. They emerge from a recurring pattern of interaction between the project's design assumptions and the real conditions of pre-service teacher education across diverse national contexts. As such, they should be read not as definitive findings in a technical sense, but as analytically grounded observations that appear consistent across contextual variation encountered during implementation.

The first lesson is that pre-service teacher education remains a significantly underutilised lever for EBP implementation. Much of the implementation literature has focused on in-service professional development and organisational change, which is understandable given that this is where practice is most visible and where breakdowns are most immediately experienced. However, the EARLY-ASD experience indicates that systematic investment at the pre-service stage can establish durable foundations for evidence-informed practice. These foundations have the potential to shape professional trajectories over time and across multiple educational contexts. This does not imply that ASD-specific content should displace other priorities within teacher education curricula. Rather, it suggests that ASD- and neurodiversity-informed content should be systematically embedded within the core professional formation of all teachers, not only those pursuing specialist pathways, given that autistic children are present across all educational settings.

The second lesson is that cultural responsiveness in digital social story design cannot be treated as an additive feature introduced after core development. It is constitutive of the intervention itself. Resources that embed implicit normative assumptions about social interaction – whether derived from dominant behavioural intervention paradigms, majority cultural frameworks, or unexamined designer assumptions – risk being perceived as misaligned or even pathologising by families and children operating within different cultural contexts. In such cases, the materials may inadvertently reproduce deficit in-

terpretations of social difference. Both the empirical evidence base and ethical frameworks converge on the need for genuine cultural responsiveness, which requires substantive design work rather than superficial localisation.

The third lesson is that the research – policy – practice gap should not be understood as a singular problem with a single solution. It is better conceptualised as a constellation of interrelated mismatches: between knowledge production and structures of professional preparation; between policy commitments and eligibility architectures governing access to support; and between inclusive values and institutional cultures that shape everyday professional practice. Projects such as EARLY-ASD can meaningfully intervene in specific segments of this system, but they cannot address its entirety. They operate within broader structural conditions – legislative, financial, and cultural – that lie beyond the scope of individual initiatives. Recognising this constraint is not a limitation of ambition, but an accurate account of systemic complexity.

The fourth lesson is that the principle of "nothing about us without us" should be understood not as a normative aspiration but as a methodological requirement. Autistic children and their families must be positioned as active partners in the design of educational resources and interventions, not as consultative additions to an otherwise predefined process. This is necessary not only for ethical reasons grounded in rights-based frameworks (United Nations, 2006; Oliver, 2018), but also because knowledge produced without meaningful autistic participation is more likely to be incomplete, less contextually valid, and less sustainable in practice. While participatory co-design is difficult to operationalise within the constraints of time-limited, externally funded projects, this difficulty does not weaken the requirement itself. Instead, it highlights the need for more robust, institutionally sustained models of participation that extend beyond individual project cycles.

The fifth lesson concerns sustainability and institutional embedding. Interventions developed within funded projects can demonstrate pedagogical feasibility and short-term effectiveness, but their long-term impact depends on whether they become structurally embedded within teacher education systems, institutional quality assurance mechanisms, and curriculum frameworks. Without such embedding, even well-designed resources risk remaining project-bound innovations that disappear or lose relevance once external funding cycles end.

The EARLY-ASD experience suggests that scalability is not primarily a matter of technical replication, but of institutional uptake. This includes the extent to which higher education institutions integrate project outputs into

compulsory components of teacher education programmes, whether accreditation and quality assurance frameworks recognise ASD- and neurodiversity-informed competencies, and whether organisational conditions support continued use and adaptation of developed resources.

A further implication is that dissemination alone is insufficient. Even high-quality digital tools and training modules require institutional "hosting environments" – governance structures, staff expertise, and curriculum space – in order to persist beyond the lifespan of a project. In this sense, sustainability is not an endpoint but a design constraint that must be considered from the outset of implementation.

IMPLICATIONS

The implications drawn in this section translate the analytical and empirical discussion of the EARLY-ASD project into three interconnected domains: educational practice, policy design, and future research agendas. They articulate conditions that appear necessary for narrowing the research – policy – practice gap in early ASD education, rather than prescribing specific recommendations. Each set of implications reflects a different level of the system, yet all are informed by the same underlying premise: that sustainable change depends not only on the availability of evidence-based knowledge, but on the institutional, professional, and epistemic conditions that enable its meaningful use.

IMPLICATIONS FOR EDUCATIONAL PRACTICE AND TEACHER EDUCATION

What teachers working with young autistic children in inclusive settings require is preparation that integrates evidence-based practice (EBP) knowledge with forms of critical professional judgment that allow such knowledge to be applied discerningly – neither uniformly applied nor abandoned when contextual conditions demand adaptation. The AFIRM modules, as documented by Waligórska, Sam, and Odom (Chapter 11), demonstrate that online training can produce substantial knowledge gains at scale. However, knowledge acquisition constitutes a necessary but insufficient condition for practice change.

The EARLY-ASD project suggests that such knowledge must be embedded within broader professional formation that includes reflective practice, collaborative inquiry, and the sustained capacity to interrogate the values and assumptions shaping educational interactions with autistic children. In addi-

tion, teachers require institutional conditions that enable such capacities to be enacted in practice, including access to coaching, mentoring, and structured collaboration time with specialist colleagues. Where such supports are absent, professional knowledge is more likely to be absorbed into existing institutional routines than to transform them.

With regard to digital social stories specifically, these should be understood as pedagogical resources rather than educational outcomes in themselves. Their effectiveness depends on teachers' capacity to select, adapt, and use them in ways that are responsive to the individual child, family context, and cultural setting. Teachers who combine an understanding of the evidence base with critical awareness of the normative assumptions embedded in intervention tools – and who use such tools dialogically rather than prescriptively – occupy a qualitatively different professional position from those who are provided with digital platforms without deeper pedagogical preparation. Both resource access and professional formation are therefore necessary conditions.

IMPLICATIONS FOR POLICY AND SYSTEM DESIGN

The EARLY-ASD project makes visible a structural point: the gap between inclusive education policy commitments and their implementation cannot be resolved through declarative policy alone, nor through isolated policy instruments. It requires coordinated investment across multiple system levels, including teacher education, institutional support infrastructures, and the research systems that underpin evidence-informed practice.

Eligibility frameworks that tie access to support to diagnostic categorisation risk reinforcing medical-model logics that sit in tension with neurodiversity-affirming approaches. These frameworks require reconfiguration so that support is not contingent upon deficit-based classification, but aligned with broader principles of participation and educational equity. Similarly, professional development for inclusive education must be embedded as a mandatory and funded component of teacher education systems rather than remaining optional or episodic.

Monitoring and accountability mechanisms also require rethinking. Systems focused primarily on standardised academic outcomes risk overlooking relational, communicative, and participatory dimensions of learning that are central to the educational experiences of autistic children. From a rights-based perspective, these dimensions are not supplementary but constitutive of educational quality.

While the Erasmus+ framework provides an important mechanism for initiating curriculum innovation in higher education, its impact is constrained by project-based time horizons and by the extent to which institutionalisation depends on national policy alignment. Ensuring that project outputs travel beyond their immediate funding context requires integration into national quality assurance systems and professional competence frameworks that govern initial teacher education.

IMPLICATIONS FOR FUTURE RESEARCH

Several research gaps remain both substantial and persistent. Evidence on the effectiveness of digital social stories across culturally and linguistically diverse contexts remains limited and is often derived from studies with restricted generalisability. Similarly, the mechanisms through which pre-service training in evidence-based practices translates into sustained classroom practice are not yet fully understood, particularly beyond short-term knowledge gains.

In addition, the perspectives of autistic children and their families remain underrepresented in research that continues to study them more frequently than it studies with them. This has implications not only for ethical research practice but also for the validity and applicability of findings.

Longitudinal research following cohorts of pre-service teachers exposed to EARLY-ASD training into their early professional careers would provide valuable insight into which aspects of initial preparation are retained, which diminish over time, and which institutional conditions support sustained implementation. Furthermore, participatory research designs that position autistic individuals and families as co-researchers rather than research subjects offer a more robust epistemological basis for generating knowledge that reflects lived experience and priorities.

CONCLUSION: TOWARD SUSTAINABLE AND SCALABLE INCLUSIVE EARLY ASD SYSTEMS

The research – policy – practice gap in early ASD education is not a novel observation, and this chapter does not claim to have resolved it. What it has sought to clarify is the structure of this gap: not a singular failure of dissemination, but a layered configuration of mismatches between knowledge production, professional preparation, policy architecture, and institutional culture. This reframing shifts attention away from linear models of knowledge transfer

toward the systemic conditions that shape whether and how evidence becomes embedded in practice.

Within this configuration, the EARLY-ASD project contributes to addressing specific dimensions of the gap. It does so by strengthening pre-service teacher education, embedding evidence-based content within culturally responsive digital resources, and generating comparative insights across multiple European contexts into the conditions under which ASD-inclusive teacher education can be effectively implemented. At the same time, the project does not – and cannot – address the system in its entirety. Any claim to the contrary would underestimate the complexity of the institutional environments in which inclusive education is enacted and would therefore be analytically untenable.

Three interrelated dimensions emerge as particularly consequential for advancing more sustainable and scalable inclusive early ASD systems. The first is the knowledge dimension. Teachers, policymakers, and families require access to forms of knowledge about ASD that are not only accurate and accessible, but also critically framed – grounded in neurodiversity perspectives that resist reducing autistic difference to deficit, disorder, or behavioural management.

The EARLY-ASD project is situated within a broader and increasingly differentiated evidence base on early ASD education, encompassing clinical approaches to differential diagnosis, systematic syntheses of evidence-based intervention practices, and research on family involvement and empowerment in early intervention. The project engages with these strands not as separate or competing domains, but as interdependent dimensions of a shared field of practice. Taken together, they underscore that no single disciplinary perspective is sufficient to capture the complexity of early ASD education or to support its effective translation into practice.

The second is the structural dimension. Neither high-quality professional preparation nor sophisticated pedagogical innovation is sufficient to offset systemic constraints such as inadequate resourcing, incentive structures that privilege deficit-based categorisation, or persistent shortages in specialist support. Eligibility systems, teacher education frameworks, and quality assurance mechanisms collectively shape the conditions under which inclusion is enabled or constrained. Reform at this level extends beyond the scope of individual projects, including EARLY-ASD, yet remains indispensable for any meaningful system-wide transformation.

The third is the relational dimension, which may ultimately be the most decisive. Inclusive education is realised in the quality of everyday interactions be-

tween educators, families, and autistic children. These interactions depend on whether children are approached through frameworks of recognition, responsiveness, and participation, or through expectations of compliance with predetermined behavioural norms. From this perspective, evidence-based practices and policy frameworks derive their value only insofar as they enhance rather than displace these relational processes. The principle of "nothing about us without us" therefore functions not only as an ethical commitment but also as an epistemological condition: knowledge about effective educational systems cannot be fully generated without the meaningful participation of those whom these systems are intended to serve.

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CHAPTER 11

EARLY AUTISM INTERVENTION: EVIDENCE-BASED PRACTICES AND FOUNDATIONAL PARENTING FRAMEWORKS

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INTRODUCTION

RISING PREVALENCE AND DEMAND FOR EFFECTIVE INTERVENTION

Autism spectrum disorder (ASD) is a neurodevelopmental condition characterized by disparities in social communication and restricted, repetitive patterns of behavior, interests, and activities (American Psychiatric Association, 2013). The most recent ADDM Network data, drawn from 16 U.S. sites, found autism spectrum prevalence of approximately one in 31 children aged 8 years in 2022, translating to 32.2 per 1,000 children, with site-level variation from 9.7 (Laredo, TX) to 53.1 (California); ASD was 3.4 times more prevalent among boys (Shaw et al., 2025). The previous ADDM cycle showed prevalence of 1 in 36 children for the 2020 surveillance year (Maenner et al., 2023). Cumulative autism spectrum diagnosis by age 48 months was 1.7 times higher for children born in 2018 than those born in 2014, reflecting rising numbers in early detection. As parents of autistic children typically report initial concerns before

the child turns 18 to 24 months, early identification is a public health priority to maximize access to intervention of proven effectiveness during the period of greatest neuroplasticity (Zwaigenbaum et al., 2015).

The developmental and neurological basis for early intervention is well-established. Toddlers' developmental and neural plasticity supports the effectiveness of intervention. Services initiated in infancy and the preschool period are associated with better outcomes in language, adaptive behavior, and social development (Dawson et al., 2012; Hyman et al., 2020). Evidence from school data for over 214,000 children demonstrated that participation in early intervention before age three predicted likelihood of meeting third-grade academic standards, with the strongest effects among children requiring special education services and from under-resourced families, indicating its long-term developmental value (Stingone et al., 2026).

A meta-analysis by Daniolou and colleagues (2022) synthesizing efficacy data for early interventions across multiple modalities confirmed significant effects on adaptive behavior, cognitive function, and social communication, with the strongest outcomes associated with early start, higher intervention intensity, and strong caregiver involvement. Early intensive behavioral intervention (EIBI), the most extensively studied approach for young autistic children, was found in a Cochrane review by Reichow and colleagues (2018) to produce gains in IQ, adaptive behavior, language, and social functioning compared to control conditions, though heterogeneity in methodology requires caution in generalizing effect sizes.

The urgency of early action is supported by both outcome data and neurobiological evidence: early behavioral intervention has been associated with normalization of cortical activation patterns to social stimuli in autistic children, with EEG data showing cortical responses to faces approaching those of typically developing peers (Dawson et al., 2012; Sandbank et al., 2020).

Medical and educational standards for the management of autism emphasize the need for early, intensive, and evidence-based intervention (Hyman et al., 2020; Myers & Johnson, 2007). The identification of specific intervention techniques with empirical support has become a central task for the field, requiring a distinction between evidence-based practices (EBPs) and interventions that remain unsubstantiated or ineffective (Travers, 2017; Odom et al., 2010a, 2010b). Parents navigating a new diagnosis are particularly vulnerable to interventions promoted without a scientific basis (Salomone et al., 2015), making EBP dissemination a significant public health priority.

Despite a well-developed evidence base, EBP implementation in community settings remains inconsistent: fewer than 10% of school-based autism programs meet evidence-based criteria, and fidelity is frequently low even when EBPs are nominally in use (Dingfelder & Mandell, 2011; Hess et al., 2008; Locke et al., 2019; Stahmer et al., 2005). Practitioners typically receive only brief initial training, without the sustained coaching required for intervention fidelity (Stahmer et al., 2015).

Organizational factors, including implementation climate, leadership behavior, and structured support, have been shown to moderate implementation fidelity (Locke et al., 2021; Williams et al., 2022). Facilitators and barriers operate at individual (motivation, skills, attitudes toward EBPs), organizational (climate, leadership, resources), and system (policy, funding, workforce) levels, requiring stakeholder alignment for sustained use (Ahlers et al., 2021). Information alone does not produce practice change; coaching, feedback, and organizational support are necessary to convert knowledge into consistent, high-fidelity implementation (Fixsen et al., 2013; Ingersoll et al., 2024a; Sridhar & Drahota, 2022).

EVIDENCE-BASED PRACTICE (EBP) IN AUTISM INTERVENTION

The concept of evidence-based practice originated in the evidence-based medicine movement, which promotes the explicit integration of the best available evidence with individual clinical expertise and patient values (Sackett et al., 1996). This framework was subsequently adopted across education, psychology, and allied health services (Davies, 1999; American Psychological Association, 2006). The identification of effective practices is critical to improving outcomes, yet practitioner skill and contextual judgment remain indispensable in translating evidence into individualized care (Hume et al., 2021; Steinbrenner et al., 2020).

In the autism intervention literature, EBPs are operationalized across three distinct but interrelated formats. **Focused interventions** are operationally defined, address a single skill and are implemented as part of an intervention program (Odom et al., 2010b). Examples of popular focused interventions are prompting, reinforcement, and visual supports (Steinbrenner et al., 2020). A key conceptual distinction separates focused intervention practices from **comprehensive treatment models**, also termed comprehensive program models (Hume et al., 2021). Focused interventions are the components of educational programs and comprehensive models described below. In contrast, compre-

hensive models consist of a set of practices designed to achieve broad learning or developmental impact on the core features of autism, aiming at multiple outcome domains. Programming is organized around a conceptual framework, procedurally manualized, and implemented with substantial weekly intensity across some years (Hume et al., 2021; Odom et al., 2010b).

Manualized interventions meeting criteria (MIMCs) are approaches with sufficient procedural specification and independent empirical support to meet EBP criteria in their own right – whether focused or comprehensive. Examples include Project ImPACT (Ingersoll & Dvortcsak, 2019) and Pivotal Response Treatment (PRT; Koegel & Koegel, 2012), both also classifiable within the broader NDBI category (Schreibman et al., 2015), alongside the Early Start Denver Model (Dawson et al., 2012) and Incidental Teaching (Celiberti & Lindblad, 2019). In the NCAEP review framework (Hume et al., 2021), evidence-based practice encompasses both focused intervention practices and MIMCs.

Preceding the NCAEP review, the National Professional Development Center on Autism (NPDC) was established to address a core translation problem: how to move a growing body of intervention research into consistent, fidelity-based practice in education and early intervention contexts (Odom et al., 2013; Waligórska et al., 2019; Wong et al., 2015). The model is based on selecting focused intervention practices supported by empirical evidence for specific outcomes and age groups, guided by an EBP matrix organized by outcome domain and developmental level (Hume et al., 2021; Waligórska et al., 2019).

The NPDC model operationalizes implementation through five integrated components: (1) an EBP matrix classifying focused interventions by outcome and age group; (2) the Autism Program Environment Rating Scale (APERS) for external and self-assessment of program quality; (3) goal attainment scaling (GAS) for tracking individual learner progress; (4) AFIRM e-learning modules providing structured, practice-level training for each EBP; and (5) a structured coaching framework supporting implementation fidelity in authentic settings (Odom et al., 2013; Waligórska et al., 2019). Coaching and regular evaluation are treated not as adjuncts but as core implementation mechanisms. Research consistently demonstrates that training supplemented by coaching and feedback on results yields substantially higher fidelity outcomes than didactic instruction alone (Odom et al., 2013; Stahmer et al., 2015). Implementation science framework further situates these components within a multi-stage professional development cycle: initial training, supported implementation, fidelity moni-

toring, and formative feedback – a sequence designed to close the gap between knowledge acquisition and sustained practice change (Odom et al., 2013).

For early intervention specifically, this framework offers a principled and scalable alternative to the comprehensive models vs. eclectic practice dichotomy that has long dominated clinical debate (Odom et al., 2012). The NCAEP's review (Hume et al., 2021), extending the NPDC evidence base through 2017, confirmed that 27 of the 28 identified EBPs have evidence for the 0–5 age range, providing early intervention practitioners with an outcome-indexed selection tool. The NPDC model has been implemented across more than 200 school teams in 12 U.S. states and is being introduced internationally in Poland, Sweden, Australia, Spain, and Saudi Arabia – a reach that reflects both the scalability of its implementation framework and the cross-contextual relevance of EBPs selection for autistic children and youth.

EVIDENCE-BASED PRACTICES: SYSTEMATIC REVIEW AND DISSEMINATION

THE NCAEP SYSTEMATIC REVIEW

The third-generation NCAEP systematic review (Hume et al., 2021) is the most comprehensive review of evidence-based practices to date, extending the NPDC review (Wong et al., 2015) and the National Standards Project (National Autism Center, 2015) with consistent methodology to ensure comparability.

The NCAEP update focused on autism intervention literature published between 2012 and 2017 (integrated with the previous review drawing from 1990 onward; Wong et al., 2015). An initial search yielded 31,779 articles, of which 567 studies were included following quality appraisal (Hume et al., 2021). Combined with the 405 articles from Wong et al. (2015), a total of 972 peer-reviewed studies were synthesized. Former EBP categories were recategorized to reflect advances in research, and some manualized interventions (MIMCs) were distinguished as meeting EBP criteria.

Recognizing an EBP requires meeting quantitative thresholds. For group design evidence, a minimum of two high-quality studies conducted by two independent research groups is required; for single-case design (SCD), five high-quality studies across three independent research groups with a total of at least 20 participants (Hume et al., 2021; Odom et al., 2010b). The independent replication requirement is designed to guard against idiosyncratic find-

ings from single laboratories. Methodological quality appraisal addresses experimental design adequacy, measurement of intervention fidelity, outcome measurement procedures, and participant characteristics. This combination of accumulation thresholds, quality criteria, and independent replication requirements provides practitioners with a defensible, updatable basis for intervention selection (Hume et al., 2021).

The NCAEP review identified 28 focused intervention practices meeting EBP criteria, building on the 27 practices identified in the previous NPDC review (Hume et al., 2021; Wong et al., 2015). The 28 practices span interventions grounded in varied approaches, among others applied behavior analysis (e.g. reinforcement, prompting, extinction, discrete trial training, differential reinforcement, functional communication training, functional behavior assessment), developmental and social-communicative approaches (e.g. naturalistic interventions, peer-mediated instruction, social skills training), and augmentative and alternative communication strategies.

DISSEMINATION THROUGH AFIRM (AUTISM FOCUSED INTERVENTION RESOURCES AND MODULES)

AFIRM (Autism Focused Intervention Resources and Modules), developed at the Frank Porter Graham Child Development Institute (Sam et al., 2020), provides free online modules for each NPDC-identified EBP. Each module follows a four-lesson structure: definition, planning, implementation, and monitoring.

Sam and colleagues (2020) provided the first comprehensive evaluation of AFIRM. As of December 2018, the platform had 64,823 registered users from 178 countries, with the largest U.S. user groups being special education professionals (n = 17,089), university students (n = 12,052), and paraeducators (n = 7,568). Knowledge gains were statistically significant across all modules ($p < .001$), with a mean effect size of 0.84 and user satisfaction ratings averaging 3.51 out of 4.00. The most-completed modules – as measured by certificates issued – were antecedent-based intervention (n = 8,163), visual supports (n = 7,055), reinforcement (n = 6,142), and prompting (n = 6,033), a pattern consistent with practitioner demand for foundational behavioral and instructional strategies. Users working with the youngest children were comparatively underrepresented in the study, with only 1,927 users reporting work with the 0–2 age group versus 10,831 for ages 3–5, pointing to a dissemination gap specifically relevant to birth-to-three early intervention contexts (Sam et al., 2020).

The expanded AFIRM dataset covering the full period of operation documents knowledge gains across n = 1,060,464 module completions of the core EBP modules, with a mean effect size of 0.72 and user satisfaction averaging 3.48 out of 4.00, confirming the original pattern at substantially larger scale, as of February 2026 (AFIRM, 2026).

For the age group from birth to five years the evidence base is particularly concentrated in naturalistic interventions, prompting, reinforcement, visual supports, and parent-implemented interventions, each addressing foundational communicative and adaptive competences that support later development and are feasible to implement in early intervention (Hume et al., 2021; Steinbrenner et al., 2020). This selection is directly reflected in the AFIRM Toddler module series (AFIRM, n.d.). The series comprises six targeted modules on behavior supports, naturalistic interventions, prompting, reinforcement, visual supports as well as parent-implemented intervention. These practices were selected based on feedback from focus groups from family members and early interventionists. Parent-implemented interventions and naturalistic interventions provide the context of how early intervention providers can support family and caregivers. Reinforcement, prompting, and visual supports are foundational practices that can be used to address a variety of goals and objectives for young children. Many family members and early interventionists expressed a need for specific behavioral supports for young children.

Each of these practices is addressed in dedicated toddler-specific modules and discussed in detail in Sections 3 and 4. Briefly: naturalistic interventions embed teaching in child-preferred routines; prompting and reinforcement are operative across virtually all other EBPs; visual supports reduce demands on verbal comprehension; and parent-implemented intervention is the primary delivery framework for birth-to-three, given that parents are the ecologically valid implementing agents in this age range (Schreibman et al., 2015; Schertz & Odom, 2007; Steinbrenner et al., 2020).

FOUNDATIONAL EVIDENCE-BASED PRACTICES FOR EARLY INTERVENTION (AGES 0–5)

Focused practices: naturalistic interventions, prompting, reinforcement, and visual supports carry the strong evidence across the birth-to-five range, with high dissemination demands and feasibility in early intervention settings. For each, AFIRM knowledge gain data from the expanded dataset (AFIRM, 2026)

are reported alongside the original Sam et al. (2020) findings where applicable; effect sizes are Cohen's d (all $p < .001$).

NATURALISTIC INTERVENTIONS

Schreibman and colleagues (2015) proposed the umbrella term Naturalistic Developmental Behavioral Interventions (NDBIs) to describe a class of approaches integrating applied behavior analysis with developmental science. Defining features include implementation in natural settings (e.g., play and daily routines), reciprocity between child and adult, reliance on natural reinforcement, and a focus on developmentally appropriate targets. Within the NCAEP framework, naturalistic interventions constitute the operationalized EBP category derived from this broader class: rather than the adult-directed format of discrete trial training, instruction is embedded within child-initiated, motivating activities to promote engagement and generalization (Schreibman et al., 2015; Fuller et al., 2020). Naturalistic interventions may be delivered directly by a clinician or through a parent-mediated model, in which caregivers receive coaching to embed intervention strategies into their everyday interactions with the child (Ingersoll & Wainer, 2013; Ingersoll et al., 2024b). Because teaching occurs within familiar contexts such as play and caregiving routines, children are exposed to intervention across learning opportunities throughout the day, which supports both skill acquisition and generalization (Schreibman et al., 2015). Multiple independent research groups have developed distinct NDBI models – including Pivotal Response Treatment (PRT), the Early Start Denver Model (ESDM), Project ImPACT, JASPER, and Enhanced Milieu Teaching – reflecting a broad scientific consensus that naturalistic, developmentally informed approaches are particularly well-suited to the needs of very young children with ASD (Schreibman et al., 2015). PRT and ESDM are among the most extensively studied NDBIs for toddlers, each supported by randomized controlled trials demonstrating significant gains in communication, language, and adaptive behavior (Dawson et al., 2012; Gengoux et al., 2019; Fuller et al., 2020).

The AFIRM Naturalistic Interventions module, reflecting these principles, supports large knowledge gains across $n = 36{,}132$ certificate-track users (AFIRM, 2026): pre-test $M = 75.30$ ($SD = 18.47$), post-test $M = 88.20$ ($SD = 13.56$), $MD = 12.90$, Cohen's $d = 0.796$. Effect sizes were consistent across professional groups: early interventionists ($n = 3{,}945$, $d = 0.87$), special education teachers ($n = 4{,}864$, $d = 0.81$), and paraeducators ($n = 12{,}668$, $d = 0.78$). User evaluations were highly positive: $M = 3.53$ out of 4.00 ($n = 35{,}049$).

The dedicated Naturalistic Interventions for Toddlers module extends these resources specifically to the birth-to-three population (AFIRM, 2026): n = 3,151, pre-test M = 75.41 (SD = 22.61), post-test M = 82.74 (SD = 15.83), MD = 7.32; user survey M = 3.52 (n = 3,114, max. = 4). Knowledge gains were statistically significant, though the effect size was small (d = 0.375), markedly lower than the effect observed in the general NI module (d = 0.796). The attenuated effect likely reflects higher baseline familiarity with naturalistic strategies among some birth-to-three practitioners, who routinely work in naturalistic and home-based contexts. Nonetheless, the sustained high user satisfaction and the module's reach confirm its practical relevance as a dissemination vehicle for early interventionists working with toddlers and families.

PROMPTING

Prompting refers to stimuli (e.g. verbal cues or physical support) concurrent with instruction to guide the child toward the target response (Steinbrenner et al., 2020). Prompts vary in modality (verbal, gestural, model, physical) and in the degree of support they provide. The goals of prompting are both successful responses and gradual transfer of control, so that children eventually respond independently (Steinbrenner et al., 2020; Schreibman et al., 2015). Procedures include least-to-most, most-to-least, simultaneous, and time-delay prompting. In all procedures prompts must be planned, consistently applied, and faded with learners' progress.

Prompting is foundational to many other EBPs in the NPDC framework – including social skills training, discrete trial teaching, video modelling, and naturalistic interventions – making it a prerequisite competence for any practitioner delivering early intervention (Steinbrenner et al., 2020). The NCAEP review demonstrated evidence-base for prompting across all age groups from toddlers through young adults, with positive impact on communication, social, adaptive, cognitive, and academic domains (Hume et al., 2021; Steinbrenner et al., 2020).

The AFIRM Prompting module produced the largest knowledge gains among the core early intervention EBPs (AFIRM, 2026). Across n = 50,095 certificate-track users: pre-test M = 52.94 (SD = 21.14), post-test M = 75.12 (SD = 22.41), MD = 22.18, Cohen's d = 1.018. Effect sizes were consistently large across professional groups: early interventionists (n = 3,837, d = 1.11), special education teachers (n = 7,877, d = 1.08), and paraeducators (n = 18,445, d = 0.95). User evaluations averaged M = 3.47 out of 4.00 (n = 49,062; AFIRM, 2026).

The notably low pre-test scores ($M = 52.94$ – the lowest among the five foundational modules) reflect that despite prompting's procedural ubiquity, practitioners often implement it intuitively rather than systematically, consistent with evidence that teachers routinely use informal versions of EBPs without formal training in their procedural components (Stahmer et al., 2015). The dedicated Prompting for Toddlers module (AFIRM, 2026; $n = 1{,}866$, pre-test $M = 75.12$, $SD = 24.42$; post-test $M = 85.16$, $SD = 14.65$; $MD = 10.03$, $d = 0.498$; survey $M = 3.54$, $n = 1{,}847$) demonstrates a smaller but still meaningful effect, and notably higher pre-test scores than the general module. This result seems consistent with birth-to-three practitioners' greater familiarity with naturalistic, child-responsive support strategies, of which prompting is an example.

REINFORCEMENT

Reinforcement is the foundational mechanism through which behavior is acquired, maintained, and generalized in applied behavior analysis. As defined by the NCAEP review, reinforcement involves applying a consequence following a learner's demonstration of a skill or behavior, thereby increasing the likelihood of that response occurring in the future (Hume et al., 2021; Steinbrenner et al., 2020). Examples include verbal praise following a child's first spontaneous word approximation, access to a preferred toy contingent on a communicative gesture, social attention delivered after initiation of joint engagement, or a token awarded for task completion – each increasing the probability of behavior repetition. Beyond applied behavior analysis, reinforcement is widely recognized as the primary engine of learning in educational settings more broadly: grading systems, corrective feedback, and performance recognition are institutionalized expressions of the same principle – that consequential responses to behavior shape its future occurrence (Leeder, 2022; Lysakowski & Walberg, 1982).

In early autism intervention, the strategic use of reinforcement is central to virtually all behavioral and naturalistic approaches. The identification of effective, age-appropriate, and naturally occurring reinforcers constitutes an essential clinical competence. Differential reinforcement procedures provide an additional aspect of both skill acquisition and the reduction of challenging behaviors. These mechanisms have a well-established neurocognitive basis: activation of the dopaminergic reward system enhances encoding and consolidation of newly acquired skills, supporting durable retention and generalization (Shohamy & Adcock, 2010; Wise, 2004).

Reinforcement encompasses several procedural forms – positive reinforcement, negative reinforcement, contingent and non-contingent reinforcement, as well as token economy – each suited to different instructional contexts (Steinbrenner et al., 2020). It is a foundational EBP and an operative component in virtually every other evidence-based practice, including prompting, functional communication training, and naturalistic intervention (Steinbrenner et al., 2020). Within NDBI frameworks, the concept of natural reinforcement is particularly prominent. Reinforcers are intrinsically linked to the child's goal rather than delivered as unrelated external rewards, thereby preserving child motivation and supporting skill generalization across settings (Schreibman et al., 2015). For very young children, selecting reinforcers based on child preferences and embedding them in play and daily routines aligns the intervention with toddlers' developmental needs. The NCAEP review documented 106 studies supporting reinforcement across the full age range, including both toddlers and preschoolers (Hume et al., 2021).

The AFIRM Reinforcement module produced large knowledge gains among $n = 51{,}037$ certificate-track users: pre-test $M = 67.25$ ($SD = 19.42$), post-test $M = 83.16$ ($SD = 17.32$), $MD = 15.91$, Cohen's $d = 0.865$ (AFIRM, 2026). Effect sizes were consistently large across professional groups: early interventionists ($n = 3{,}826$, $d = 0.94$), paraeducators ($n = 18{,}334$, $d = 0.90$), and special education teachers ($n = 8{,}251$, $d = 0.85$). User evaluations were highly positive: $M = 3.54$ out of 4.00 ($n = 50{,}375$). In the initial research, reinforcement was among the top three most-certificated AFIRM modules (alongside antecedent-based intervention and visual supports), consistent with both the module's broad reach and practitioners' recognition of reinforcement as an important instructional skill (Sam et al., 2020). The Reinforcement for Toddlers module ($n = 2{,}145$; survey $M = 3.58$; AFIRM, 2026) specifically addresses the birth-to-three population, confirming the practical relevance of reinforcement-focused training for interventionists working with the youngest children and their families.

VISUAL SUPPORTS

Visual supports use pictorial information to assist autistic learners in understanding events, communicating, and managing behavior across settings (Hume et al., 2021; Wong et al., 2015). As defined by the NCAEP review, they are concrete cues that provide information about an activity, routine, or expectation, and/or support skill demonstration (Steinbrenner et al., 2020). The category is broad: a picture-based daily schedule allows a toddler to anticipate what

comes next; a first-then board visualizes a time sequence (e.g., first shoes, then playground); a choice board supports communicative requesting by presenting options; picture labels, color-coded zones, and boundary markers organize the physical environment; and graphic organizers visually scaffold cognitive tasks. These tools visualize abstract temporal, social, and communicative information, which is particularly supportive for many autistic children, who tend to rely on visual processing rather than on auditory information (Steinbrenner et al., 2020). For early intervention, visual supports are well suited to the birth-to-three population. They relate to everyday caregiving routines and can be implemented with fidelity by parents and family members.

The AFIRM Visual Supports module produced the largest knowledge gains of all five foundational EBPs described here (AFIRM, 2026). Across $n = 51{,}818$ certificate-track users: pre-test $M = 50.61$ ($SD = 19.06$), post-test $M = 74.31$ ($SD = 20.96$), $MD = 23.69$, Cohen's $d = 1.183$. Effect sizes were consistently large across all professional groups: early interventionists ($n = 3{,}626$, $d = 1.25$), special education teachers ($n = 9{,}738$, $d = 1.23$), and paraeducators ($n = 16{,}907$, $d = 1.11$). User evaluations were highly positive: $M = 3.51$ out of 4.00 ($n = 50{,}642$; AFIRM, 2026). The notably low pre-test scores ($M = 50.61$) relative to other core modules suggest that, despite the widespread use of visual supports in practice, practitioners hold substantial misconceptions about the evidence base and implementation procedures prior to training – making this module particularly impactful as a dissemination vehicle. The dedicated Visual Supports for Toddlers module extends these resources specifically to the birth-to-three population (AFIRM, 2026; $n = 2{,}045$, pre-test $M = 70.37$, post-test $M = 78.61$, $MD = 8.24$, $d = 0.429$; survey $M = 3.55$). Knowledge gains were statistically significant, though the effect size was small, likely reflecting higher baseline familiarity among birth-to-three practitioners. Nonetheless, the sustained high user satisfaction confirms the module's practical relevance for early interventionists.

PARENT-IMPLEMENTED INTERVENTIONS AS THE PRIMARY EBP FRAMEWORK FOR BIRTH-TO-THREE

EVIDENCE-BASE ACROSS YOUNG AGE GROUPS

Parent-implemented interventions (PII) constitute a distinct EBP category in which parents or primary caregivers are the principal implementers (Hume et al., 2021; Wong et al., 2015). Young children's parents are present across

the full range of naturalistic learning contexts, and the cumulative intensity of parent-child interaction far exceeds what any professional can deliver in direct service hours. Training parents to embed evidence-based strategies within daily routines multiplies intervention intensity throughout the child's day.

The evidence base for parent-implemented EBPs has grown substantially, among others for PRT, ESDM, and Project ImPACT. For PRT, Gengoux and colleagues (2019) conducted the first 24-week randomized controlled trial of a PRT package (PRT-P) combining parent training with clinician-delivered in-home intervention, comparing it against community treatment in children aged 2–5 years with autism and significant language delay ($n = 48$). Children in the PRT-P group demonstrated significantly greater improvement in functional utterances during structured parent-child observations ($d = 0.61$), on blinded clinician ratings, and on parent-reported communication measures. Also, 91% of parents achieved PRT fidelity within 24 weeks. Wang and colleagues (2024) conducted a randomized controlled trial involving 30 autistic children in special education settings. This 8-week PRT motivation component program (delivered both by professionals and by trained parents at home) produced greater improvements in all four primary language functions (requesting, labeling, repeating, responding) compared to treatment as usual, with gains maintained at follow-up and generalized to untargeted social, cognitive, and adaptive behaviors. Bozkus-Genc and Yucesoy-Ozkan (2024) demonstrated in a multiple-baseline study that a structured 6-week PRT parent training program enabled all participating parents to achieve and maintain high fidelity, with increased initiation of interaction opportunities and high program satisfaction. De Korte and colleagues (2022) explored a 14-week PRT parent group training protocol (PRT-PG) in a pilot study of 20 children aged 2–6 years, documenting significant increases in spontaneous initiations, widespread gains in clinical global functioning, improved parent-child interactional patterns, and decreased parental stress.

For Project ImPACT, Ingersoll and Wainer (2013) provided initial efficacy evidence using a multiple-baseline design across 8 preschoolers with ASD and their mothers. All parents increased their use of intervention techniques; spontaneous language gains occurred in 6 of 8 children, with parent fidelity significantly associated with child language use within session. In a subsequent RCT ($n = 64$ dyads), Ingersoll and colleagues (2024b) found a significant indirect effect at 9-month follow-up via parents' improved strategy use and children's increased intentional communication post-treatment,

documenting a plausible causal pathway from coaching through parental fidelity to child language outcomes.

The Early Start Denver Model (ESDM) is another major manualized PII approach with an extensive birth-to-five evidence base. Combining ABA strategies with a relationship-based developmental curriculum across nine domains, it is delivered within naturalistic, play-based interactions and is one of the few comprehensive models designed for both clinician and parent implementation. Dawson and colleagues (2010, 2012) showed in an RCT that two years of intensive ESDM (≈ 20 h/week) produced significantly greater gains in IQ, language, and adaptive and social behavior than community intervention. Beyond behavioral outcomes, EEG data collected post-intervention revealed that the ESDM group exhibited normalized cortical activation when viewing faces, matching typically developing peers and contrasting with the community group's object-dominant activation pattern. Cortical activation to faces correlated significantly with improved social behavior. These were the first RCT data linking early behavioral intervention to normalized patterns of brain activity, indicating that targeted social engagement can reshape cortical specialization during the neuroplastic window of early childhood.

Fuller and colleagues (2020) synthesized the cumulative ESDM evidence across 12 comparative studies ($n = 640$). The aggregated Hedges' g was 0.357 ($p = .024$), driven by cognition ($g = 0.412$, $p = .038$) and language ($g = 0.408$, $p = .011$). Effects for autism symptomology, adaptive behavior, social communication, and repetitive behaviors were non-significant, which was attributed partly to measurement insensitivity. The overall effect size was not moderated by intervention length, intensity, or study design quality. Five of the 12 studies used parent-implemented ESDM, confirming that outcomes are achievable through trained caregivers outside clinic settings.

The PII evidence base is further contextualized by the NCAEP systematic review (Hume et al., 2021; Steinbrenner et al., 2020;), which drew on 55 peer-reviewed studies, with the largest growth in the evidence base occurring in the 2012–2017 review period, which contributed 42 of those studies. The NCAEP matrix confirms PII evidence for toddlers and preschoolers across communication, social, adaptive, and challenging behavior outcome domains, and identifies two MIMCs within the category (Project ImPACT and Stepping Stones Triple P) as manualized approaches with sufficient independent evidence to meet EBP criteria in their own right (Steinbrenner et al., 2020).

This convergence across outcomes, developmental levels, and manualized delivery formats positions PII as the most comprehensively supported EBP framework in the birth-to-three range. In practice, however, coaching fidelity is inconsistent, and translating PII principles into home routines requires sustained professional support that existing service structures rarely provide (Frost & Ingersoll, 2025). Ingersoll and colleagues (2024b) showed that therapist-assisted telehealth Project ImPACT produced significantly greater parent gains than self-directed or active-control formats. Frost and Ingersoll (2025) identified parents' learning and motivational processes as pathways to sustainable implementation.

PII relevance extends beyond birth-to-three: for preschool-age children, parent-mediated components support generalization of acquired skills to home settings while building parental confidence and long-term skill maintenance (Bozkus-Genc & Yucesoy-Ozkan, 2016, 2021, 2024; Frost & Ingersoll, 2025; de Korte et al., 2022; Wang et al., 2024).

CORE ACTIVITIES IN PARENT-IMPLEMENTED APPROACHES

Parent-Implemented Intervention (PII), as defined in Section 4.1, functions as a procedural framework that integrates the broader EBP toolkit, including naturalistic interventions, prompting, reinforcement, and video modelling, rather than constituting a single technique. Practitioners deliver training in individual or group formats, in home or community settings, using modelling, coached practice, and performance feedback (Hume et al., 2021; Steinbrenner et al., 2020). The NCAEP review identified 55 studies meeting evidence criteria for PII across the full age range, with particularly strong representation at the toddler and preschool levels (13 and 42 studies, respectively), reflecting the historical concentration of parent-mediated research in early childhood (Hume et al., 2021). Two manualized interventions – Project ImPACT (Improving Parents as Communication Teachers) and Stepping Stones Triple P – met the additional criteria for Manualized Interventions Meeting Criteria (MIMCs) within the PII category, with the addition of PRT in the naturalistic intervention category (Steinbrenner et al., 2020).

Across manualized PII approaches, a consistent set of core procedures underlies intervention delivery regardless of the specific model: (a) following the child's lead to identify motivating materials and activities; (b) embedding communicative and social targets within naturally occurring routines rather than structured table-top formats; (c) using natural reinforcement – consequenc-

es that are functionally linked to the targeted behavior rather than arbitrary external rewards; (d) supporting language development through modelling, expansion, and recasting; and (e) applying systematic prompting hierarchies that are faded as independence increases. These procedural features are parallel to the NDBI framework formalized by Schreibman et al. (2015): implementation in natural settings, shared adult-child control over the activity, reliance on natural reinforcers, use of varied behavioral strategies, and selection of developmentally appropriate targets.

Specific models add their own organization of parent-implemented intervention. For example, PRT organizes these procedures around the concept of pivotal behaviors (foundational developmental skills), principally motivation, responsivity to multiple cues, self-management, and self-initiation, whose acquisition is hypothesized to produce generalized improvements across untrained developmental domains (Bozkus-Genc & Yucesoy-Ozkan, 2024; Wang et al., 2024). In practice, the PRT parent training curriculum teaches caregivers to implement six core motivational strategies: (1) gaining the child's attention before presenting a learning opportunity; (2) following the child's choice – allowing the child to select toys and activities to enhance motivation and shared control; (3) providing clear and developmentally appropriate cues related to the ongoing activity; (4) mixing easier targets with tasks not yet mastered to sustain motivation and prevent frustration; (5) reinforcing goal-directed attempts, not only correct responses, to keep motivation high while learning novel behaviors; and (6) providing natural reinforcements, directly and functionally embedded in the interaction, such as granting access to a requested toy rather than delivering an unrelated reward (Bozkus-Genc & Yucesoy-Ozkan, 2024; de Korte et al., 2022).

Project ImPACT similarly trains parents to embed intervention techniques in everyday routines to promote social engagement, language, social imitation, and play (Ingersoll & Wainer, 2013). The curriculum is organized around five fidelity dimensions (Frost & Ingersoll, 2024, 2025). The first – making play interactive – encompasses techniques for establishing and sustaining joint engagement, including positioning oneself at the child's level, following the child's focus of attention, imitating the child's actions to build reciprocity, animating play with affect and expectant waiting, and creating communicative opportunities such as placing desired items in view but out of reach. The second – modeling and expanding language – teaches parents to provide verbal labels for objects and actions at one step above the child's current language level, to expand and recast

the child's utterances to model slightly more complex forms, and to use parallel talk to narrate ongoing play without demanding a response. The third – providing opportunities for initiations – focuses on pausing expectantly after establishing engagement to create space for the child to initiate, thereby increasing the frequency of spontaneous, child-directed communicative acts rather than prompted responses. The fourth strategy – helping the child increase the complexity of initiations – introduces a range of prompting strategies, including gestural and verbal models, time delay, and partial physical guidance, used to scaffold the child's communicative attempts toward more elaborated and independent forms. The fifth dimension – pacing the interaction – teaches parents to balance turn-taking, avoid over-directing, and match the tempo of the interaction to the child's processing speed (Ingersoll & Wainer, 2013; Ingersoll et al., 2024b). Across all five dimensions, natural reinforcements delivered immediately and in direct functional relation to the child's communicative attempt are the operative learning mechanism. Access to a preferred toy following a child's request, continuation of a favored activity resulting from a social bid, or enthusiastic social attention contingent on eye contact all represent the kind of naturally embedded reinforcement that sustains motivation and continued interaction (Schreibman et al., 2015; Steinbrenner et al., 2020).

The intervention techniques described in the models are taught in a prescribed developmental sequence. The foundational responsive and child-cantered interaction skills are introduced before the more directive prompting strategies used to teach imitation and play, as parents' acquisition of earlier techniques is a prerequisite for effective use of more complex ones. In each coaching session across both models, the trainer first models the target technique with the child, the parent then practices while receiving immediate feedback, and the session concludes with a collaborative homework plan to be carried out between sessions. Both curricula were deliberately designed for community-based delivery in individual or group formats, supporting their scalability within existing early intervention service infrastructures (de Korte et al., 2022; Frost & Ingersoll, 2025; Hardan et al., 2015; Ingersoll & Wainer, 2013).

AFIRM MODULES ON PARENT-IMPLEMENTED INTERVENTION

The AFIRM Parent-Implemented Interventions (PII) module is particularly important for early intervention practice (AFIRM, 2026). Among $n = 25{,}200$ certificate-track users: pre-test $M = 61.03$ ($SD = 15.18$), post-test $M = 73.69$ ($SD = 15.41$), $MD = 12.66$, $d = 0.828$. Knowledge gains were large across all

professional groups: early interventionists (n = 1,786, d = 0.90), special education teachers (n = 3,613, d = 0.83), related service providers (n = 1,253, d = 0.95), and paraeducators (n = 8,153, d = 0.76). User satisfaction averaged M = 3.46 out of 4.00 (n = 24,696) – somewhat lower than the NI and Prompting modules, which may reflect the greater complexity and relational demands of PII relative to more procedurally bounded practices.

The pattern of effects across professional groups is informative. Related service providers, like speech-language pathologists and occupational therapists who regularly coach families, showed the largest gains among established professional groups (d = 0.95). Results seem consistent with PII being particularly central to their scope of practice and with higher motivation to acquire structured knowledge about a practice they informally use. Paraeducators showed the smallest gains (d = 0.76), consistent with results across other modules and likely reflecting both lower baseline conceptual vocabulary and a mismatch between the module's academic framing and the realities of paraprofessional practice. This limitation was explicitly identified as warranting module adaptation for this group of users (Sam et al., 2020), then realized as AFIRM for Paraeducators modules (consisting of Prompting, Reinforcements, Supporting Peer Interactions, Time Delay, Visual Cues; AFIRM, n.d.).

Family members constituted only n = 90 certificate-track users on the general PII module – strikingly low given that the total AFIRM user base included 1,301 family members at the time of the Sam et al. (2020) evaluation. Despite this underrepresentation in formal certificate completion, their effect size was large (d = 0.87) and numerically comparable to that of professional groups, suggesting that caregivers who do engage with the module gain from it substantially. This gap is itself a dissemination signal: parents may engage with modules informally or selectively, or face barriers – time constraints, literacy demands, or perceived relevance – that the current structure does not fully address. Sam and colleagues (2020) noted that a logical extension of AFIRM would be adapting module content to be more accessible and directly actionable for families, a development that would be particularly consequential for PII given its reliance on parent implementation fidelity. AFIRM does address parents directly through a dedicated Parents' Guide available within each module. With 14,413 downloads recorded by Sam et al. (2020), it ranks among the most frequently accessed resources on the platform, suggesting that caregiver-directed materials find an audience even when caregivers do not complete the formal certificate sequence. This pattern points to a meaningful dis-

tinction between structured professional learning, with its pre-test, post-test, and certificate requirements, and the more informal, task-oriented engagement that characterizes how many parents interact with EBP information. Adapting the platform to more explicitly support the latter mode, rather than treating certificate completion as the primary measure of dissemination reach among families, may better capture and expand the actual role AFIRM plays in parent education (Sam et al., 2020).

University students showed the largest gains of any group ($d = 1.01$), confirming AFIRM's substantial role in pre-service preparation. This effect reflects the steep learning curve from near-zero baseline familiarity with PII principles, and positions AFIRM as a scalable vehicle for embedding EBP knowledge in professional training pipelines well before practitioners enter the field.

The dedicated PII for Toddlers module (AFIRM, 2026; $n = 2{,}710$, pre-test $M = 72.04$, $SD = 21.45$; post-test $M = 79.93$, $SD = 12.89$; $MD = 7.89$, $d = 0.446$) yielded a smaller but significant gain, with satisfaction the highest in the dataset ($M = 3.54$, $n = 2{,}677$). The higher pre-test scores and attenuated effect size relative to the general PII module mirror the pattern seen in the NI for Toddlers module and likely reflect the same mechanism. Birth-to-three practitioners already operate within a caregiver-coaching framework by professional mandate, so the module consolidates and formalizes knowledge that is already partially present. The high satisfaction rating suggests that birth-to-three practitioners found the toddler-specific framing highly relevant and practically aligned with their work, underscoring the value of age-specific adaptation in dissemination resources for this population. The evidence reviewed in Sections 2–4 addresses structured EBP delivery; the following section examines the foundational caregiving conditions within which those interventions are embedded and from which their effectiveness partly derives.

BEYOND NEURODIVERSITY: FOUNDATIONAL CAREGIVING PRACTICES SUPPORTING EARLY SOCIAL-COMMUNICATIVE DEVELOPMENT

The outcomes of early autism intervention depend not only on structured EBPs but also on the quality of everyday caregiving. The relational context in which young children spend most of their time shapes developmental trajectories in its own right and shapes how much children can benefit from more structured learning opportunities. A converging body of developmental research on at-

tachment, parental sensitivity and involvement, emotion regulation, and supporting resilience provides an empirical basis for the centrality of everyday caregiving conditions. Five caregiving practices – responsive facilitation, diverse natural social stimulation, minimization of multimedia exposure, consistent development of cooperation skills, and predictable daily routines – support early social-communicative development when embedded in everyday life.

INTERACTIVE FACILITATION OF SOCIAL COMMUNICATION

Responsive caregiving – sensitive, timely responses to the child's communicative attempts – is foundational to social-communicative development across various developmental trajectories. Siller and Sigman (2002) followed children with autism, developmental delay, and typical development over 1, 10, and 16 years, showing that children of parents with higher behavioral synchrony, adjusting their behavior to the child's focus of attention, presented superior joint attention and language development. Joint attention, a core early competency and central target of most naturalistic interventions, depends on this reciprocal scaffolding (Green et al., 2010; Schreibman et al., 2015).

Attachment theory offers an explanatory framework for these effects. Sroufe's (2005) longitudinal study spanning 30 years from birth to adulthood demonstrated that individual differences in the quality of early infant-caregiver attachment relationships predict self-reliance, emotional regulation, and social competence. Quality of early attachment was shown to be largely a product of the history of parental interactions, establishing that sensitive responsiveness shapes the developmental trajectory rather than merely reflecting it.

Research indicates multiple biological mechanisms underlying the significance of parental responsiveness in the parent-child dyad. Episodes of behavioral synchrony between mothers and infants are accompanied by synchronized cardiac rhythms, establishing a direct link between interaction quality and physiological coupling (Feldman et al., 2011). Feldman (2012) also demonstrated the integration of micro-level social behaviors (gaze, vocal, affective, and touch modalities) with physiological processes and hormonal response within the oxytocin system, which is the hormonal basis for parental, romantic, and filial attachment. Oxytocin levels are stable over time within individuals, mutually influence partners, and are transmitted through coordinated social behavior (Feldman, 2012). Azhari and colleagues (2019) showed, using fNIRS hyperscanning, that greater parenting stress is associated with reduced brain-to-brain synchrony during joint activity in

the prefrontal cortex, a region implicated in mentalizing and social cognition. Quiñones-Camacho and colleagues (2021) extended this finding by demonstrating that broader adversity simultaneously attenuates both behavioral and neural parent-child synchrony. Hyperscanning research positions neural synchrony as one of the mechanisms through which dyadic interaction shapes children's social-emotional and cognitive development (Alonso et al., 2024). For autistic children and their parents, these findings carry translational potential: interventions that foster bio-behavioral synchrony through attuned parent-infant interactions may support the same neurohormonal pathways that underlie typical social-communicative development. The correspondence between bio-behavioral synchrony and responsive caregiving confirms that parental attunement is both an active ingredient of PII and a target of parent coaching (Frost & Ingersoll, 2025; Ingersoll & Wainer, 2013).

Enhancing parental responsiveness has been subject to numerous studies. In a meta-analysis of 70 intervention studies (n = 1,503 for attachment outcomes; n = 7,636 for sensitivity outcomes), Bakermans-Kranenburg et al. (2003) showed that behaviorally targeted sensitivity interventions were more effective than broad, diffuse approaches – with the most effective programs using a moderate number of sessions (d = 0.33 for sensitivity; d = 0.20 for attachment security). This 'less is more' finding has direct implications for how parent coaching should be designed: targeted, behavioral, and time-limited, rather than expansive and psychoeducationally broad. Converging evidence from parent training research more broadly supports this view: meta-analytic review found that programs incorporating direct parent practice with the child and immediate performance feedback yielded the strongest effects (Kaminski et al., 2008). The findings confirm that active, behavioral skill-building, not informational breadth, is the operative mechanism of change.

PROVISION OF DIVERSE NATURAL SOCIAL STIMULATION

The face and voice are primary social stimuli from infancy; typical development entails progressive neural specialization for social information. NDBIs harness this mechanism by delivering instruction within natural, interactive social contexts where the communicative interaction itself is a therapeutic ingredient (Schreibman et al., 2015).

Varied, responsive social stimulation from both parents and extended family members provides the input on which natural social learning depends. Starting from parents – Grossmann and colleagues (2008) examined the dis-

tinct contributions of mothers and fathers. Based on four longitudinal studies tracking children from infancy to young adulthood, authors proposed that paternal support during joint play, particularly in the context of challenge and frustration tolerance, is a uniquely significant predictor of what they termed 'secure exploration': confident, attentive, and resourceful engagement with cognitive tasks. While maternal attachment predicts emotional security and regulation, paternal sensitive support predicts the quality of exploration, competence, and problem-solving from toddlerhood through adolescence. Similarly in a systematic review of 24 longitudinal studies, paternal engagement predicted reduced behavioral problems in boys, reduced psychological problems in young women, improved cognitive development, decreased delinquency, and reduced economic disadvantage in low-income families (Sarkadi et al., 2008). These findings confirm that father involvement is not supplementary to early intervention, but rather forms an independent developmental foundation. Cowan and Cowan (2019) further argued that co-parenting cooperation, paternal involvement, and couple relationship quality are interrelated predictors of child outcomes, and that integrated interventions addressing all three domains produce stronger effects than single-domain programs. For families of autistic children, where parental stress is elevated and co-parenting coherence is a known implementation variable (Piro-Gambetti et al., 2023), this integration has particular clinical relevance.

The developmental significance of varied social stimulation is further supported by the literature on resilience and positive childhood experiences. Luthar and colleagues (2000) established that resilience is best understood as a dynamic process marking positive adaptation within the context of significant adversity, sustained not only by internal traits but also by quality relationships and social supports. Contextual resources, including the quality of caregiver-child relationships and social networks, function as protective factors that buffer developmental risk (VanderWeele et al., 2025). For autistic children, who face both neurodevelopmental vulnerabilities and elevated rates of anxiety and potential adverse experiences, the quality of social stimulation has protective significance beyond its immediate communicative function (McRae et al., 2018). Research demonstrates that varied social environments provide access to distinct protective processes (Barnhart et al., 2022; Ungar et al., 2013). For early autism intervention, this framework implies that EBPs cannot be the sole focus. The caregiving ecology, including social stimulation, family cohesion, and community resources, likely mediates the impact of any specific intervention.

Bauer et al. (2021) synthesized evidence on social support mobilization for children's mental health across 33 studies. Authors found that the most effective programs for improving children's mental health through social support were those that explicitly activated social support mechanisms, building relational skills, strengthening peer connections, and engaging family networks, rather than simply providing information or psychoeducation. The parallel with early autism intervention seems direct: parent coaching should be effective to the degree that it builds genuine relational competence and embeds supportive social interaction into everyday routines, not merely to the degree that it transmits procedural knowledge.

Bethell et al. (2019) provided large-scale population-level evidence for this proposition. Using data from 6,188 adults, the authors showed that positive childhood experiences, defined as supportive interpersonal experiences with family, friends, and school community, showed dose-response associations with adult depression and mental health, independent of adverse childhood experience (ACE) exposure. Adults reporting six to seven positive childhood experiences had 72% lower adjusted odds of depression or poor mental health compared to those reporting zero to two; OR = 0.28. OR/odds ratio represents a statistic that indicates how much more (or less) likely an outcome is in one group compared to another, where OR > 1 indicates increased likelihood and OR < 1 indicates decreased likelihood. These findings support the active promotion of positive relational experiences, including varied social stimulation, as a developmental priority for young children.

MINIMIZATION OF MULTIMEDIA EXPOSURE

Major pediatric organizations have established age-sensitive screen time limits based on converging developmental evidence. The World Health Organization prohibits sedentary screen use before age 2 and recommends no more than 1 hour of exposure for ages 2–4 (Iacobucci, 2019; Willumsen & Bull, 2020). The American Academy of Pediatrics advises against screen media for children under 18 months (excluding video calls) and emphasizes co-viewed, high-quality content for older toddlers (Chassiakos et al., 2016; Munzer et al., 2026; Strasburger et al., 2013). French pediatric guidance follows Tisseron's (2021) 3-6-9-12 framework: no screens before age 3; no personal handheld gaming before age 6; no unsupervised internet before age 9; no solo internet before age 12, prioritizing parental co-engagement so that digital media does not displace responsive interaction and play (Picherot et al., 2018).

Significant gaps exist between international guidelines and actual practice. A global meta-analysis revealed that only 24.7% of infants and 35.6% of preschoolers meet recommended limits, meaning 64.4% routinely exceed them (McArthur et al., 2022). In the U.S., screen use for children under 2 averaged 1 hour 3 minutes, while those aged 2–4 averaged 2 hours 8 minutes – double the recommended limit – with usage climbing to 3 hours 48 minutes in lower-income households (Mann et al., 2025). Canadian data mirrors this trend, with 93% of 2- to 4-year-olds exposed to screens for 2.5 hours daily (Putnick et al., 2023).

Exceeding screen time guidelines is associated with substantially elevated odds of developmental attenuation: OR = 1.81 for language and cognitive development, OR = 1.60 for social-communication skills, OR = 1.41 for physical health, and OR = 1.29 for emotional maturity (Kerai et al., 2022). Screen time systematically displaces peer play, with consequences in educational skills and social functioning persisting through age 8 (Gath et al., 2026; Putnick et al., 2023). Exposure during infancy negatively affects the maturation of brain networks in emotion-processing and cognitive-control circuits (Huang et al., 2024). Background screen use during meals impairs vocabulary and cognitive scores (Yang et al., 2024). Each additional daily hour of viewing increases the odds of emotional dysregulation by 1.2-2.0 (Hinkley et al., 2014).

Longitudinal evidence from a large prospective cohort study (n = 2,441 children followed at 24, 36, and 60 months) demonstrates a directional (not merely correlational) relationship between screen exposure and developmental outcomes. Madigan et al. (2019) found that higher screen time at 24 months predicted significantly lower scores on a standardized developmental screener at 36 months. Similarly, higher screen time at 36 months predicted lower developmental scores at 60 months, after controlling for child sex, maternal education, parenting behavior, physical activity, and sleep. The reverse pathway – lower developmental scores predicting increased screen time – was not statistically significant, indicating that screen time precedes rather than merely reflects developmental delay. Children who exceeded approximately 17 hours of screen use per week showed the strongest associations with poor performance across the communication, fine motor, problem-solving, and personal-social domains. These findings seem particularly important for autism-risk contexts, where baseline developmental vulnerability may interact with screen exposure.

Evidence from a systematic review and meta-analysis of 42 studies (N = 18,905 children) further clarifies the mechanisms through which screen use affects language acquisition, demonstrating that quantity, quality, and age at onset all in-

dependently predict child language outcomes (Madigan et al., 2020). A greater quantity of screen use (both foreground screen time and background television) was associated with lower language skills. Younger age at screen onset also predicted lower language outcomes. The proposed mechanism underlying the quantity effect is displacement: when young children engage with screens, they do so at the expense of social interactions that shape language acquisition.

Parental smartphone use during caregiving interactions (described as technoference, McDaniel & Radesky, 2018) constitutes a distinct risk to early social-communicative development. A scoping review of 12 studies identified parental absorption in the device as the primary mechanism disrupting sensitive, timely responding (Braune-Krickau et al., 2021). In parallel with the Still-Face Paradigm, infants of digitally absorbed mothers displayed negative affect, self-comforting, and reduced maternal gaze mirroring, indicating that habitual technoference activates infant stress-response systems (Braune-Krickau et al., 2021). Technoference is associated with less responsive caregiving; parents' stress induces a self-reinforcing cycle of digital absorption and detachment (Munzer et al., 2026). For children already showing atypical social attention, these disruptions diminish facilitation of social initiative and orientation.

McDaniel and Radesky (2018) followed 183 parent couples with children aged 0–5, documenting a transactional cycle: technology interference predicted more child externalizing behavior, which increased parenting stress, which in turn increased technology interference. Effects were most consistent for withdrawal behavior, suggesting technoference promotes internalized disengagement rather than only overt dysregulation. These findings seem important both for general upbringing and for families of autistic children, where baseline caregiver stress is elevated and parental responsiveness is an important intervention variable (McRae et al., 2018; Siller & Sigman, 2002).

Taken together, these findings carry three implications for early intervention practice. First, screen exposure in the first three years has a directional detrimental effect on development – not merely a correlational one (Madigan et al., 2019). Second, the primary mechanism of harm is displacement of responsive caregiver-child interaction (McDaniel & Radesky, 2018) – the same interactive quality that NDBIs seek to restore. Third, the risk is systemic: parental overload triggers technoference, leading to excessive, passive screen use as the path of least resistance for families under pressure (Munzer et al., 2026). These findings support integrating screen use guidance into early intervention programs as a modifiable environmental risk factor.

CONSISTENT DEVELOPMENT OF CHILD COOPERATION SKILLS

A child's capacity to cooperate with caregiver, tolerate transitions, and participate in shared activities plays a dual role in early intervention: they are simultaneously a developmental target of EBP-based programs and a prerequisite for participation in more intensive structured learning. Without functional compliance with proposals, most interactions are discontinued and erratic. The development of cooperation skills is therefore not merely a behavioral management objective but a foundational practice for interaction readiness. In general parenting, this dynamic supports responsive caregiving. When children develop reliable cooperation skills, the frequency and intensity of coercive or erratic interaction cycles decreases, which in turn reduces parental stress and frees attentional and emotional resources for responsive, sensitive engagement (Weber et al., 2019). Supporting children's cooperation is therefore not only an intervention target but also a pathway to improving the quality of life of family members and their relations.

Cooperation skills have many facets, including behavioral and emotional self-regulation. The developmental importance of self-regulatory capacity is well-established empirically. Kochanska and colleagues (2000) followed children from 9 months to 4.5 years, demonstrating that effortful control (the ability to inhibit a dominant response in order to perform a subdominant one) shows meaningful continuity across early childhood. This dimension was both predicted by caregiving quality, particularly maternal responsiveness, and in turn shaped cooperation skills. Children with higher effortful control exhibited greater social competence, moral development, and cooperation. The relationship between effortful control and social competence was also moderated by the quality of the parent-child relationship: warm, responsive caregiving amplified the developmental benefits of higher self-regulatory capacity. Eisenberg and colleagues (2010) confirmed that individual differences in self-regulatory capacities are fairly stable after the first year or two of life, relate inversely to externalizing problems, and are shaped by both genetic and environmental factors, with caregiving quality among the most consistently documented environmental contributors.

Supporting cooperation skills is not primarily about suppressing behavior but about shaping it – teaching children through consistent parental response what works and what does not work in their social world. When a caregiver acknowledges a child's distress, names the emotion, and nonetheless calmly

upholds a limit ("I see you're upset, and it's still time to put shoes on"), they are providing the clarity supporting rule-governed behavior while preserving the relational warmth that makes that guidance meaningful (Havighurst et al., 2022). Consistency matters: if a child's refusal to cooperate sometimes results in parental yielding, it strengthens the exact behavior parents want to stop (Mingebach et al., 2018). Meta-analytic evidence on the specific parenting behaviors that shape child cooperation indicates that consistently maintaining a position (rather than yielding to reluctance) is the operative mechanism (Kaminski et al., 2008; Leijten et al., 2019). Recognizing cooperative behavior and consistent responding supports adjustment (Kaminski et al., 2008; Leijten et al., 2019). As children learn through the repetition of outcomes, concerted action develops when cooperative behavior is consistently recognized and non-cooperative behavior does not achieve its goal. For children, the predictability of outcomes is not a peripheral concern but a core need: unpredictable parental responding is specifically associated with increased opposition, whereas consistent, contingent responding builds the cooperation history that reduces avoidance over time (Mingebach et al., 2018). This logic is structurally identical to the reinforcement principles that constitute a foundational EBP across all age groups (Steinbrenner et al., 2020): the shared contingency clarity between naturalistic parenting and structured intervention reflects the same underlying mechanism of learning.

In the naturalistic parenting context, household chore engagement provides an evidence-based platform for improving cooperation skills and executive functioning in everyday life. Tepper and colleagues (2022) found that self-care and family-care chores independently predicted regulatory control, including working memory and inhibition, in children. The mechanism is task-structural: chores require planning, sustained attention, inhibition of irrelevant actions, and task-switching – the components central to executive functioning. Beyond executive functioning, chore engagement in early childhood has been linked to the development of cooperation, responsibility, and independence across cultural contexts (Dunn et al., 2014; Paradise & Rogoff, 2009). Children who participate in everyday family activities, including household tasks, demonstrate higher levels of prosocial behavior (Paradise & Rogoff, 2009).

Among preschoolers, Xia and colleagues (2025) found that the developmental benefit of chore involvement was moderated by parental scaffolding – specifically, by graduated support intensive at task onset and progressively withdrawn as children demonstrated competence, while emotional support

remained constant throughout. This graduated withdrawal is structurally analogous to EBP prompting hierarchies, illustrating how everyday caregiving and evidence-based practice share a common sequential logic: create the conditions for success, acknowledge the effort, and progressively withdraw support.

MAINTENANCE OF PREDICTABLE DAILY ROUTINES

Predictable daily routines are among the most accessible and powerful environmental supports a family can provide (Hosokawa et al., 2023; Sytsma et al., 2001). For autistic children in particular, their role goes well beyond simple scheduling, supporting a sense of safety, and supporting causal and temporal reasoning. Routines are defined as observable, repetitive behaviors that directly involve the child and at least one adult in an interactive or supervisory role and that occur with predictable regularity in the child's daily or weekly life (Sytsma et al., 2001). In practice, this encompasses the full texture of family life: morning wake-up sequences, mealtimes, hygiene, transitions between activities, bedtime rituals, and weekend leisure patterns. What these diverse contexts share is the quality of predictability: the child knows what comes next, what is expected, and what the adult will do. For young autistic children, for whom unpredictability is a documented source of distress, this predictability functions not only as a comfort but as a developmental resource (McRae et al., 2018).

From a behavioral perspective, Sytsma and colleagues (2001) articulated two mechanisms through which routines support child development. First, they improve the predictability of the environment's stimuli: when activities unfold in a familiar, expected sequence, children can anticipate what is about to be asked of them and orient their behavior accordingly, without elevated stress or avoidance. Second, routines support consistent social cooperation patterns: children who repeat positive interactions within stable settings gradually transfer their competencies to broader contexts. Both mechanisms carry weight for autistic children, for whom unpredictability is a documented source of anxiety (McRae et al., 2018): routine-building is therefore a form of environmental accommodation rather than merely a behavioral convenience.

The characteristic preference for sameness in autism represents an opportunity in this context: autistic children are, in a sense, primed to benefit from well-structured routines, because consistent environments reduce the cognitive and emotional load associated with transitions and unexpected changes. McRae and colleagues (2018) noted that structured, but not rigid, caregiv-

er-established routines may actively buffer against the child's tendency to develop less adaptive rituals independently. When parents provide a warm, organized daily structure, they channel the child's need for sameness toward functional, socially integrated patterns rather than leaving that need to be expressed through idiosyncratic, potentially limiting self-generated repetitions. Structured routines are distinct from rigid ones: moderate, flexibly adapted routine levels appear most beneficial, whereas both chronically chaotic and excessively rigid home environments carry their own developmental risks (McRae et al., 2018).

The empirical literature on family routines confirms their broad protective value. Hosokawa and colleagues (2023) examined 717 families through path analysis and found that family routines predicted lower internalizing and externalizing problems and higher prosocial behavior. The effects were partially mediated by family relationship quality: greater family cohesiveness, expressiveness, and reduced conflict. The mediation pathway is clinically informative: routines not only directly regulate children's behavior, but they also stabilize the relational climate within which that behavior develops (Hosokawa et al., 2023). In toddlers specifically, routines are believed to foster smoother transitions, support the development of independence and a sense of security, and moderate impulsivity and overactivity (Sytsma et al., 2001) – a developmental profile that maps directly onto the needs of neurodiverse children entering early intervention. For autistic children, who are disproportionately vulnerable to anxiety in unpredictable environments and whose internalizing symptom burden tends to be elevated, a home climate shaped by predictable patterns and warm family cohesiveness is doubly protective (McRae et al., 2018).

Independently, parents who establish regular routines report greater ease in adjusting to their caregiving role, higher satisfaction, and stronger feelings of parental competence (McRae et al., 2018). Conversely, parents experiencing higher levels of psychological distress are less able to maintain predictable household structures (McRae et al., 2018) – a transactional relationship that confirms the importance of supporting parental well-being as part of early intervention, not only as a secondary consideration. The routines-wellbeing pathway runs in both directions: a more regulated home structure reduces demands on parental executive functioning and emotional resources, creating conditions under which warm and responsive caregiving is easier to sustain.

The connection between everyday family routines and formal EBP implementation is direct and practical. Visual supports (e.g. picture-based daily

schedules, first-then boards, transition cards) are one of the most extensively evidenced EBPs in the NCAEP 2020 review (Steinbrenner et al., 2020; Hume et al., 2021) and in AFIRM dissemination data (AFIRM, 2026; $n = 51{,}818$, $d = 1.183$ – the largest effect size of any core EBP module). Their function is precisely to make the sequence of daily activities visually explicit and therefore predictable for autistic children. It renders routine structure in a form that is maximally accessible to children on the autism spectrum. Visual supports thus represent a direct operational bridge between everyday caregiving routines and structured EBPs implementation: a picture schedule of the morning routine is simultaneously a caregiving practice and an evidence-based autism intervention. When parents embed this kind of support into daily life, it results in synchrony of foundational parenting practice (a predictable schedule) and evidence-based intervention (visual supports).

IMPLEMENTATION SCIENCE CONSIDERATIONS

THE RESEARCH-TO-PRACTICE GAP IN PARENTS' PSYCHOEDUCATION AND SOCIOCULTURAL CONTEXT

Current parental psychoeducation is partly compounded by social trends and the appeal of caregiving practices and interventions marketed as innovative but lacking empirical support (Egami, 2024; Salomone et al., 2015; Travers, 2017). For early intervention this research-to-practice gap has an additional dimension: parents are the principal agents in birth-to-three programs. The intervention depends on parent-implemented practices, reflecting the quality of parental psychoeducation within culturally-available information and service systems.

Parental responsiveness – the capacity to perceive, interpret, and respond contingently to child signals – is the primary mechanism through which secure attachment develops and self-regulatory capacity is established in the first year of life (Braune-Krickau et al., 2021; McRae et al., 2018). Its development and validation are undermined by structural and social disparities between professional and parental roles and related education. Across OECD countries, job-related characteristics are the primary determinant of adult participation in non-formal education, grossly outweighing personal and family-related motivations (OECD, 2022). In Poland, 77.4% of non-formal educational activities undertaken by adults in 2016 were work-related, with parenting and child

development entirely absent in any educational subject areas (GUS, 2018). In the United States, federal workforce training expenditure under WIOA (~$3.7 billion, FY2024) exceeds by nearly an order of magnitude the resources allocated to the MIECHV parenting home-visiting program (Health Resources and Services Administration, 2024; U.S. Department of Labor, 2023; ~$444 million, FY2024). This asymmetry reflects a broader policy orientation across Western economies: major adult learning frameworks (including the European Skills Agenda, the US Workforce Innovation and Opportunity Act, and Canada's Skills for Success) frame adult learning exclusively around labor market competitiveness and workforce adaptability, with parenting competence absent from their defined skill sets and performance indicators (European Commission, 2020; U.S. Department of Labor, 2014; Employment and Social Development Canada, 2022).

This institutional gap is intensified by shifting social landscapes that decrease the intergenerational transmission of caregiving skills. The modern trend toward lower fertility rates reduces the frequency of natural learning opportunities within the nuclear family (OECD, 2024). Consequently, contemporary parents enter their roles with significantly less hands-on experience in sibling caregiving compared to previous generations – an adjustment challenge documented across cultural contexts (Lang et al., 2024; Saether et al., 2023). Furthermore, prioritizing career and financial stability over family formation (CBOS, 2025; Minkin & Horowitz, 2023; Parker & Minkin, 2023), as reflected in the steady postponement of parenthood across high-income countries (OECD, 2024), may discourage investment in parenting skills. As the intergenerational transmission of parenting practices weakens (Conger et al., 2009), these trends may dilute caregiving competence in the general population – a concern that has prompted calls for evidence-based population-level parenting support as a social policy imperative (Doyle et al., 2022). Consequently, some parents of neurodivergent children may enter the intervention process without the foundational caregiving competencies that effective PII delivery requires, as revealed in varied baseline parenting skills (Nevill et al., 2018).

One systemic response to this gap could be the integration of evidence-based parenting content into school curricula. Adolescent preparation for parenthood has an established precedent in family life programs; however, it has been discontinued over time (e.g., Australian Education Act, 2013; Education Act, 1998; Ministry of National Education, 2025). Prevailing media narratives on parenthood are rarely based on developmental science at the level of specificity

needed (Morris et al., 2021). A curriculum grounded in research, i.a. reviewed in this chapter could cover: (a) contingent responsiveness and attachment formation as the behavioral foundation of early social learning (Braune-Krickau et al., 2021, Dunst & Kassow, 2008); (b) joint attention and language facilitation through natural social interaction and minimized screen exposure (Madigan et al., 2020, Munzer et al., 2026); (c) structure and predictability as environmental regulators of child behavior and emotional regulation (Hosokawa et al., 2023; Sytsma et al., 2001); (d) developing cooperation and response to instruction i.a. through age-appropriate household responsibilities (Tepper et al., 2022; Xia et al., 2025); (e) shaping resilience through varied socio-emotional experiences with other family members and friends (Hosokawa & Katsura, 2024, Wu et al., 2025).

Such content is neither clinically specialized nor autism-specific: it reflects general developmental principles applicable to all caregivers. As supportive parenting is a skill requiring deliberate practice rather than adjustment alone (McRae et al., 2018), universal school-based exposure provides the realistic population-level mechanism for building pre-intervention parenting competence. For parents of neurodivergent children, the same competencies serve as the functional prerequisites for PII fidelity; for the general population, they reduce the burden of erratic or unresponsive caregiving (Morris et al., 2021; VanderWeele et al., 2025).

ENSURING SYSTEMATIC INTEGRATION: CONTEXTUAL FACTORS AFFECTING IMPLEMENTATION IN EARLY INTERVENTION, CAREGIVING, AND EDUCATION

The research-to-practice gap in early autism intervention manifests on three levels. Practitioners enter the field without adequate pre-service preparation in EBPs and rarely receive sustained coaching to ensure fidelity (Stahmer et al., 2015). Organizations differ substantially in implementation climate, leadership engagement, and structural readiness (Locke et al., 2021; Williams et al., 2022). Families receive inconsistent psychoeducation following diagnosis and are exposed to social media amplification of interventions marketed as innovative, regardless of their empirical basis (Salomone et al., 2015; Travers, 2017).

Individual-level determinants of EBPs use include practitioner attitudes alongside organizational factors such as implementation leadership and climate (Locke et al., 2019). Locke and colleagues (2019) found practice-specific effects: significant attitude effects emerged for discrete trial training but not

for PRT or visual schedules. Williams et al. (2022) replicated this pattern: principal leadership predicted implementation climate, which in turn predicted fidelity to PRT but not simpler interventions, suggesting that organizational supports matter most for complex, multi-component approaches such as NDBIs. Stahmer et al. (2015) found that reaching moderate PRT fidelity required 8–20 hours of training under research conditions, confirming that organizational investment in sustained coaching is a prerequisite, not an add-on.

Resources on EBPs such as AFIRM deliver standardized EBP content at scale, with significant knowledge gains documented by Sam et al. (2020). However, it provides introductory procedural knowledge. Organizational support (e.g. mentoring and coaching) is required to convert that knowledge into sustained, high-fidelity practice (Steinbrenner et al., 2020). Coaching, defined as direct practice observation with specific feedback in authentic contexts, is the implementation ingredient most consistently associated with fidelity gains (Rush & Shelden, 2011). This works for professionals and parents alike. Frost and Ingersoll (2025) identify both learning mechanisms (skill acquisition) and motivational mechanisms (self-efficacy, commitment) through which coaching facilitates sustainable parental implementation. RCT evidence confirms that therapist-assisted telehealth coaching, unlike self-directed formats, achieves meaningful improvements in parent strategy use and child language outcomes (Ingersoll et al., 2024b).

A sufficient baseline competence at the implementer level, termed implementation readiness (Fixsen et al., 2013; Scaccia et al., 2015) carries distinct implications across the three contexts considered in this chapter. In parenting, baseline caregiver responsiveness is an active prognostic variable rather than a mere background condition. Siller and Sigman (2002) demonstrated that pre-intervention parental synchronization predicted gains in joint attention and language over 16 years. In an RCT, maternal insightfulness at baseline moderated treatment effects on synchronization (significant and moderate-to-large for insightful mothers, null for non-insightful), indicating that responsive interaction capacity is a prerequisite, not merely a target (Siller et al., 2013). Bozkus-Genc and colleagues (2024) confirm this at intervention entry: parents with low baseline sensitivity/responsiveness and high directiveness required foundational interaction quality to be addressed before technique-specific fidelity could develop. In early intervention contexts, Ingersoll et al. (2024) identified that community providers from multiple disciplinary backgrounds typically do not develop the competencies required to implement NDBIs effectively at

the pre-service level. In educational contexts, Stahmer and colleagues (2023) found that implementation climate and leadership scores were uniformly low across California school personnel, with the poorest attitudes among those working closest to autistic students. The results align with the observation that introducing EBP-specific training without first building baseline readiness produces knowledge gains without practice change (Stahmer et al., 2015).

Addressing baseline competence before deploying technique-specific training remains rarely formalized in current implementation models. An example of this approach is the evaluation scale utilized in the NPDC model – The Autism Program Environment Rating Scale (APERS; Odom et al., 2018). The APERS evaluates programming quality to inform subsequent EBPs implementation. By mapping actual programming quality across 10–11 domains on a 1–5 scale, it functions as a structured measure of a specific team's zone of proximal implementation development. The resulting feedback defines a pathway that supports both foundational program features and the introduction of targeted EBPs (Odom et al., 2013; Odom et al., 2018; Waligórska et al., 2019). This sequenced, readiness-informed approach to implementation is fully operationalized within the NPDC model. The NPDC model provides a replicable multi-level framework integrating programming quality evaluation (APERS), EBPs matrix to inform the choice of relevant practices, and EBPs e-learning – AFIRM modules (Waligórska et al., 2019). Coaching within the model is standardized through a dedicated manual (Kucharczyk et al., 2012) and progressively transfers capacity to local teams, creating self-sustaining infrastructure.

CONCLUSIONS

Cumulative meta-analytic evidence confirms the effectiveness of early intervention for autism. Daniolou and colleagues (2022) found significant effects on adaptive behavior, cognitive function, and social communication, with outcomes strongest when intervention began early, was delivered at higher intensity, and actively involved parents. The Cochrane review by Reichow and colleagues (2018) documented gains in IQ and adaptive behavior for early intensive behavioral intervention. ESDM specifically demonstrated significant advantages in IQ, language, and adaptive behavior in a two-year RCT (Dawson et al., 2010). Increasing evidence indicates that early intervention reshapes neural activity (Dawson et al., 2012; Calderoni et al., 2016).

The implication for service systems is clear: identification before 24 months, followed by prompt access to evidence-based early intervention improves the probability of favorable developmental outcomes (Daniolou et al., 2022; Maenner et al., 2023; Shaw et al., 2025; Zwaigenbaum et al., 2015). Early screening, reduction of the diagnostic odyssey experienced by families (Zwaigenbaum et al., 2015), and expansion of caregiver-mediated evidence-based service models within the birth-to-three period (Frost & Ingersoll, 2025; Hume et al., 2021) represent the highest-leverage points for population-level impact.

The 28 NCAEP-identified EBPs (27 confirmed for birth-to-five) provide a comprehensive, up-to-date foundation for early intervention planning (Hume et al., 2021). The NPDC model offers a structured operational framework for their systematic implementation across settings and age groups (Hume et al., 2021; Waligórska et al., 2019). Expanded AFIRM data (detailed in Sections 3–4) confirm large knowledge gains and high user satisfaction across all five core early intervention modules, establishing this free, openly accessible platform as a scalable mechanism for EBP dissemination. Future research should examine AFIRM utilization across cultural contexts, its integration with coaching frameworks, and the potential of toddler-specific modules as parent-directed learning resources.

The five foundational caregiving practices reviewed in Section 5 – responsive facilitation, diverse social stimulation, screen minimization, cooperation skill development, and predictable daily routines – represent an empirically grounded and population-accessible complement to structured EBPs. They share core procedural features with manualized interventions: reciprocity, natural reinforcement, and embedding targets in meaningful interaction (Schreibman et al., 2015). This structural congruence supports their integration into everyday caregiving and positions them as prerequisites for EBP delivery. The empirical case for this integration extends well beyond autism-specific literature. Responsive and consistent caregiving, as the interactive core shared by foundational caregiving skills and evidence-based practices, predicts developmental outcomes across the whole population of young children, not only those with neurodevelopmental differences. Research consistently identifies early caregiver relationships as among the strongest predictors of adult flourishing, outperforming material and educational variables (Braune-Krickau et al., 2021; VanderWeele et al., 2025). This bridges autism-specific parent coaching and universal parenting support. Since the foundational caregiving competences are prerequisites for optimal development across neurotypes, their population-level demand warrants a population-level response (Doyle et al., 2022).

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CHAPTER 12

INTERVENTIONS TO IMPROVE PHYSICAL FUNCTIONING IN CHILDREN WITH AUTISM SPECTRUM DISORDERS: A REVIEW OF THE RESEARCH

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INTRODUCTION

Autism spectrum disorders (ASD) constitute a heterogeneous group of neurodevelopmental conditions in which, alongside variability in social communication and behavioural patterns, increasing attention is being paid to the presence of motor deficits. These include delays in both gross and fine motor development, as well as difficulties in motor planning, coordination, and sensorimotor integration. Such limitations may significantly affect a child's level of physical activity, social participation, and overall quality of daily functioning. In recent years, there has been growing interest in therapeutic interventions aimed at improving motor skills in children with ASD, including movement-based therapies, coordination training, physical activity–based interventions, and sensory integration approaches. The aim of the present study is to review current research on interventions targeting the improvement of motor functions in children with ASD, with particular emphasis on their impact on activity and participation.

MATERIALS AND METHODS

The review was conducted in accordance with established guidelines for systematic literature reviews, drawing on the principles outlined in the PRISMA Statement (Moher et al., 2009) and general frameworks for research synthesis (Cooper, 2017).

A search for eligible studies was conducted in the MEDLINE, CINAHL, and PubMed databases based on the following key words: autism spectrum disorder, interventions, physical activity, motor development, physiotherapy methods.

The review included selected scientific studies addressing interventions aimed at enhancing motor skills in children with ASD. The analysis encompassed publications reporting experimental studies, randomized controlled trials, as well as systematic reviews and meta-analyses. Studies examining various forms of therapeutic interventions were considered, including movement-based therapy, aquatic training, physical activity programs, and early developmental interventions.

Articles published between 2020 and 2026 were included in the analysis. The selection of studies was purposive and limited to full-text articles published in English. Final selection included 8 papers, by Draudvilienė, et al (2024), Feng et al. (2026), Franz et al. (2022), Marzouki et al. (2022), Sousa et al. (2025), Staunton et al (2025), Vodáková et al. (2022), Wu et al. (2024).

The analysis was conducted regarding the type of intervention applied (e.g., aquatic training, general developmental exercises, physiotherapy) as well as the reported outcomes, with particular focus on changes in gross motor skills, motor coordination, and physical fitness. The findings were subjected to qualitative analysis for the purpose of categorization.

THE RESULTS OF COMPARATIVE ANALYSIS

A total of 232 children with ASD participated in 5 empirical studies (Draudvilienė et al (2024); Marzouki et al., (2022); Sousa et al., (2025); Staunton et al (2025); Vodáková et al. (2022) and 743 cases were analysed in literature review studies classified for analysis by Feng et al. 2026; Franz et al. 2022, and Wu et al. 2024).

The findings indicate that, in individuals with ASD, the motor and cognitive domains are strongly interrelated.

In the study by Feng et al. (2026) *Effectiveness of exercise interventions on gross motor skills in children with autism spectrum disorder: a system-*

atic review and meta-analysis, a broad approach to interventions was adopted. The analysis encompassed both land and water-based sports, as well as modern technology-assisted therapeutic modalities (e.g., exergaming or virtual reality). In contrast, the study by Staunton et al. (2025) *Development of a Goal Attainment Scale (GAS) outcome measure for clinical interventional studies in paediatric autism*, did not examine a specific intervention, rather, it focused on the development of a measurement tool (Goal Attainment Scaling). These differences are reflected in the nature of the two studies: the former takes the form of a systematic review and meta-analysis synthesizing results from multiple intervention studies, whereas the latter is a methodological study aimed at the development and validation of a clinical assessment tool.

The aim of the study by Feng et al. (2026) was to evaluate the effectiveness of various forms of physical activity in improving gross motor skills in children with ASD, whereas Staunton et al. (2025) concentrated on creating a standardized yet flexible method for assessing therapeutic outcomes. Both studies included populations of children with ASD, however, in the meta-analysis this population was more heterogeneous (encompassing different age groups and levels of functioning depending on the included studies), whereas in the GAS study it comprised participants from clinical trials with diverse profiles of functioning.

The scope of analysed outcomes also differed substantially between the studies. Feng et al. (2026) primarily focused on objectively measurable aspects of gross motor function, such as coordination, balance, and overall physical fitness, additionally considering (in some studies) social and emotional aspects. In contrast, Staunton et al. (2025) adopted an individualized approach, incorporating therapeutic goals tailored to each child, which could pertain to adaptive functioning, communication, social skills, or motor abilities.

Differences are also evident in the measurement methods. The meta-analysis utilized standardized motor tests applied across the included studies, enabling quantitative analysis and comparison of effects between interventions. Whereas, in the GAS approach therapeutic goals are defined individually, and their attainment is evaluated on a scale which measures individual experiences against personalised goals, allowing for a more flexible and context-sensitive assessment of progress.

Consequently, the two studies generate different types of results. Feng et al. (2026) provide quantitative, aggregated data across various interventions,

indicating significant improvements in gross motor function, particularly in the case of regular and structured programs, with potential additional social and behavioural benefits. In contrast, Staunton et al. (2025) demonstrate that GAS facilitates the assessment of individual therapeutic changes, often not detectable using standard instruments, thereby increasing the sensitivity of outcome assessment.

Both approaches have their respective strengths and limitations. The meta-analysis by Feng et al. (2026) is characterized by a high level of evidence and the ability to generalize findings, however, it is limited by the heterogeneity of the analysed studies and reduced personalization of conclusions. Conversely, GAS offers a highly individualized and clinically flexible approach but involves a degree of subjectivity and is not intended for direct evaluation of the effectiveness of specific interventions, but rather for their monitoring.

In the study by Wu, et al. (2024) *The effect of physical exercise therapy on autism spectrum disorder: a systematic review and meta-analysis*, a broad conceptualization of intervention was adopted, encompassing a variety of exercise modalities used as an adjunct to standard rehabilitation. The nature of the study corresponds to a systematic review and meta-analysis, enabling the evaluation of outcomes across multiple randomized controlled trials.

The aim of the study was to provide a comprehensive assessment of the effectiveness of physical activity in reducing ASD symptoms and to determine the extent to which intervention parameters, such as intensity, duration, and frequency, influence therapeutic outcomes. The analysis included a population of children and adolescents with a diagnosis of ASD, thereby capturing a wide spectrum of clinical functioning characteristic of this disorder.

The range of analysed outcomes was multidimensional, encompassing both motor development and social functioning, as well as stereotypical behaviours and cognitive abilities. Standardized clinical instruments and functional tests were employed as measurement tools, allowing for quantitative analysis and comparison of results across studies. Additionally, subgroup analyses were conducted, facilitating the identification of potential moderators of therapeutic effectiveness.

The findings indicate that physical exercise therapy leads to significant improvements in the severity of ASD symptoms, including reductions in stereotypical behaviours and enhancements in social functioning and cognitive abilities. Positive effects on motor development were also observed. However,

these effects were not uniform and varied depending on the characteristics of the intervention.

A major strength of the study lies in the inclusion of exclusively randomized controlled trials and the application of rigorous quality assessment criteria, which enhance the reliability of the findings. The large cumulative sample size and the analysis of various intervention parameters are also noteworthy. Nevertheless, significant heterogeneity among the included studies, variability in exercise protocols, and the limited ability to definitively determine the optimal "dose" of physical activity constitute important limitations.

Similar limitations are also evident in the meta-analysis by Feng et al. (2026), where the broad range of included interventions, from traditional sports to technology-assisted modalities, further increases the heterogeneity of analysed outcomes and complicates precise comparisons across studies.

At the same time, both works demonstrate substantial complementarity. The meta-analysis by Wu et al. (2024) focuses on the overall effectiveness of physical exercise therapy (PET) in reducing ASD symptoms and improving social, cognitive, and behavioural functioning, with particular emphasis on intervention parameters such as intensity and frequency. In contrast, Feng et al. (2026) place a more specific emphasis on the development of gross motor skills and differences between types of physical activity, providing more targeted data on specific movement-based interventions.

Consequently, the study by Wu et al. (2024) primarily addresses the question of whether physical activity as an intervention is effective in ASD and under what conditions, whereas Feng et al. (2026) extend this perspective by identifying which forms of physical activity are most effective with respect to specific domains of functioning, particularly gross motor skills. The integration of findings from both meta-analyses therefore allows for a more comprehensive understanding of the role of physical activity in ASD therapy, both at the level of overall intervention efficacy and in terms of their specificity and underlying mechanisms.

In the study by Franz et al. (2022) *Early intervention for very young children with or at high likelihood for autism spectrum disorder: An overview of reviews. on early intervention in children with autism spectrum disorder (ASD)*, a broad approach was employed to synthesize the available scientific evidence. The study takes the form of an overview of reviews, encompassing systematic reviews and meta-analyses, and thus includes a range of therapeutic approaches, particularly naturalistic developmental behav-

ioural interventions as well as developmental and behavioural interventions. The nature of the study is therefore oriented toward the integration of existing knowledge.

The aim of the study was to determine which interventions are supported by scientific evidence and to evaluate the quality of this evidence in relation to improvements in the developmental functioning of children diagnosed very early or identified as being at high risk for ASD. The study population included children up to 36 months of age, both with a confirmed diagnosis of ASD and those at high likelihood of developing the disorder. Given the adopted methodology, this population was heterogeneous and dependent on the studies included in the analysed reviews.

The scope of analysed outcomes encompassed broadly defined developmental measures, including cognitive functioning, communication, social functioning, and behaviours. The authors placed particular emphasis on distinguishing between outcomes directly related to the intervention and more distal, generalized developmental changes. Measurement methods were heterogeneous and included both standardized developmental assessment tools and intervention-specific measures, which significantly affected the comparability of results across studies.

The main findings indicate that developmental behavioural interventions, including naturalistic intervention models, may lead to improvements in selected domains of child functioning. The strongest effects were observed in areas directly targeted by the intervention, whereas findings related to more generalized developmental changes were less consistent.

The strengths of the study include its comprehensive scope and the application of a rigorous methodology based on Cochrane guidelines, which enhances the credibility of the conclusions. Additionally, the inclusion of methodological quality assessment of the reviews and the evaluation of risk of bias in primary studies represent important elements strengthening the analysis. Limitations arise primarily from the substantial heterogeneity of the included studies, encompassing differences in study design, types of interventions, therapy intensity, and measurement instruments. Furthermore, inconsistencies in the quality of evidence and potential sources of bias were identified, which limit the ability to formulate definitive clinical recommendations.

The study by Sousa et al. (2025), *Early Neurodevelopmental Milestones in Children With Autism Spectrum Disorder: A Retrospective Observational Study*, aimed to demonstrate that early diagnosis and early intervention in au-

tism spectrum disorder (ASD) are critical for improving cognitive functioning, social competencies, and adaptive functioning.

Sousa et al. (2025), draws on the framework of the American Psychiatric Association, which reports that the vast majority of children diagnosed with ASD present with at least one additional neurodevelopmental disorder, with estimates exceeding 95% of diagnosed individuals. Typically, ASD is diagnosed after the age of three years. In the study cohort, the mean age at diagnosis was 34 months, which is considerably later than the period during which key developmental stages occur.

Early identification of signs of neurodevelopmental disorders is therefore of crucial importance for children with ASD. One of the earliest symptoms prompting caregivers to seek professional evaluation is speech regression, which is commonly observed in children with ASD. Speech regression was defined as the loss of at least five previously acquired words within a period of three months.

The study had a retrospective observational design. It compared the rate of attainment of developmental milestones in 127 children later diagnosed with ASD with normative data from the general population without diagnosed neurodevelopmental disorders. The study included children born between 2016 and 2022, and the observation period covered the first 34 months+-10 months of life (IQR = 49 months). Collected data included family history, prenatal and demographic variables, comorbidities, age at referral, age at ASD diagnosis, and early clinical manifestations. The most common reason for referral was language impairment (41,7% of children in question), while the most frequent comorbidity was global developmental delay (46%, demonstrated by sensory processing disorder (92.9) identified at later stage of the study. No exclusion criteria were applied to eliminate participants from the dataset.

The assessed indicators comprised six developmental milestones: social smiling, independent sitting, walking (first steps), first words, first sentences (defined as consisting of at least two words), and daytime sphincter control. Statistically significant differences were identified between normative and delayed attainment of these milestones in children with ASD.

The results showed that the attainment of social smiling and independent sitting did not deviate from normative expectations in the majority of children. The first notable deviations emerged with the onset of independent walking, which was delayed relative to population norms in 38.6% of participants. The greatest deviations from normative developmental values were observed

in language-related milestones. Delayed acquisition of first words occurred in 62.6% of participants, while first sentences were delayed in 96.8% of the cohort; notably, 73% of children had not achieved this skill at all by the time of analysis. A substantial proportion of children (85.2%) also exhibited difficulties in attaining sphincter control, with 64.8% not achieving this milestone.

The mean Global Development Quotient (GDQ) was significantly lower in children with delayed attainment of sphincter control compared to those who achieved this milestone within the normative age range. Motor development outcomes were closely associated with delays in achieving independent walking, whereas delayed attainment of social smiling was correlated with delays in social development. Overall, the findings indicate a strong association between delayed milestone attainment and reduced global developmental quotient, as well as impairments across specific domains, including social development, auditory processing, speech and language development, and hand–eye coordination.

An experimental study by Draudvilienė et al. (2024), *Two Physiotherapy Methods to Improve the Physical Condition of Children with Autism Spectrum Disorder*, provides a valuable extension to the findings of previous research. The aim of the study was to evaluate the effects of two simple physiotherapy programs on balance, coordination, and motor function in children diagnosed with autism spectrum disorder (ASD).

The study was conducted on a specific and well-defined sample of 30 children aged 4–6 years with a diagnosis of ASD, who were divided into three groups: two intervention groups and one control group. Children in the first intervention group participated in a basic gym-based training program, which included balance beam exercises, ball activities, catching and striking tasks, as well as exercises incorporating various obstacles. Children in the second group took part in a program based on computer games delivered via interactive boards, performed on balance platforms or unstable surfaces specifically prepared for training. A total of fifteen training sessions were conducted, with three sessions per week. Each child underwent three functional tests both before the intervention and after its completion.

Post-intervention assessments demonstrated that children who participated in the interactive board–based rehabilitation program achieved the most favourable outcomes and the greatest improvement (improvement index = 1.58). This finding may suggest that game-based therapy is more engaging for children with ASD, thereby enhancing motivation, effort, and participation in physical activity.

However, statistically significant improvements were observed only in coordination, balance, and reaction time, whereas no significant changes were noted in parameters such as speed, agility, and strength. This likely reflects the absence of targeted exercises addressing these specific domains throughout the duration of the program, which limits the ability to draw definitive conclusions regarding these outcomes. Children with ASD who participated in the standard gym-based exercise program also demonstrated substantial improvement (progress index = 1.51). Post-test results indicated marked gains in speed, agility, balance, coordination–particularly of the upper body–as well as muscular strength. Gym-based exercises also had a significant impact on improving postural control, which, as indicated in previous studies, is associated with repetitive behaviours in children with ASD. From a psychological perspective, however, gym sessions appeared to be more demanding in terms of motivation and sustained engagement in the exercises.

Although the difference in outcomes was more favourable in the group receiving the interactive game–based intervention, this difference did not reach statistical significance. In comparison with the control group, both intervention programs yielded beneficial effects; the control group demonstrated only minimal progress (0.35 on the applied scale), indicating negligible or no improvement.

Both the study by Marzouki et al. (2022), *Effects of Aquatic Training in Children with Autism Spectrum Disorder*, and the study by Vodáková et al. (2022), *The Effect of the Halliwick Method on Aquatic Skills in Children with Autism Spectrum Disorder*, address the impact of aquatic training and the water environment on children with autism spectrum disorder (ASD).

In both studies, particular emphasis was placed on the influence of the physical properties of water on the body, as well as on the adaptive capacities of participants, as key factors distinguishing aquatic-based interventions from land-based training.

A common outcome domain in both studies was gross motor function in children with ASD. However, the scope of assessed outcomes differed. Marzouki et al. (2022) additionally evaluated behavioural and social functioning, coordination abilities, and emotional regulation, whereas Vodáková et al. (2022) focused primarily on swimming skills and adaptive functioning in the aquatic environment. Inclusion criteria across the studies were largely comparable.

Both studies included participants with a formal diagnosis of ASD based on criteria established by either by APA (Diagnostic Statistical Manual of Mental

Disorders (DSM-V)) in Marzouki et al (2022) or the ICD by the World Health Organization in Vodáková et al. (2022), who were capable of communicating with instructors and whose legal guardians provided informed consent. Additional inclusion criteria applied only in the study by Marzouki et al. included the absence of medications that could interfere with study outcomes, as well as the absence of significant functional, orthopaedic, or behavioural limitations. A key difference between the studies was the age of participants: in the study by Vodáková et al. (2022), participants were aged 7–12 years, whereas in the study by Marzouki et al. (2022), children were aged 6–7 years.

Both studies incorporated the Halliwick method as part of the intervention; however, in the study by Vodáková et al. (2022), it constituted the sole training approach applied to all participants. In contrast, the study by Marzouki et al. (2022) included two intervention groups and one control group. One intervention group received a combination of the Halliwick method and Technical Aquatic Training (TAT), while the second intervention group participated in Game-based Aquatic Training (GAT), consisting of individual and cooperative movement-based games as well as structured social interactions.

The intervention based exclusively on the Halliwick method consisted of nine 60-minute sessions conducted once weekly, including two introductory sessions and seven intervention sessions. In contrast, the intervention in the study by Marzouki et al. (2022) comprised sixteen 50-minute sessions conducted twice weekly.

Outcomes were assessed using pre- and post-intervention testing. Vodáková et al. (2022) was inspired by their literature review, which found indications that the Halliwick method, combined with the aquatic environment in a 7-week individualized program, leads to substantial improvements in gross motor function (including balance, speed, agility, and coordination), aquatic skills (such as breath control and swimming ability), and psychological adaptation in children with ASD. These findings came from earlier study by Yilmaz, et al. 2004. In their own research Vodáková et al. (2022) reports that during the 9 week programme, they performed, the most pronounced improvements were observed amongst the 7 study participants between the fourth and fifth therapy sessions. Additionally, significant improvements were noted in postural control, which was also identified as the most variable parameter across participants due to its relative difficulty. Overall, the abovementioned studies from 2004 and 2022 indicate that, in individuals with ASD, the motor and cognitive domains are closely related.

CONCLUSIONS

The study by Feng et al. (2026) *Effectiveness of exercise interventions on gross motor skills in children with autism spectrum disorder: a systematic review and meta-analysis*, indicates that a wide range of physical activity modalities, including land-based sports, aquatic interventions, and technology-assisted approaches, have a significant and positive impact on the development of gross motor skills in children with autism spectrum disorder (ASD). Regular and structured training programs lead to improvements in coordination, balance, and overall physical fitness, and in many cases also yield secondary benefits in social functioning and behavioral regulation. These findings suggest that physical activity should constitute an essential component of comprehensive therapy for children with ASD, particularly in the context of motor deficits.

At the same time, there is increasing recognition that traditional standardized measurement tools are not always sufficiently sensitive to capture individual progress in children undergoing therapeutic interventions. In this context the study by Staunton et al. (2025) *Development of a Goal Attainment Scale (GAS) outcome measure for clinical interventional studies in paediatric autism,*, presents the development and application of Goal Attainment Scaling (GAS) as a flexible tool for evaluating therapeutic outcomes. GAS enables the definition of personalized therapeutic goals and the assessment of their attainment, allowing for more precise monitoring of changes in areas such as communication, social functioning, and motor skills. This approach better reflects the heterogeneous nature of ASD and the diverse needs of patients.

The juxtaposition of these two approaches highlights the complementary nature of contemporary ASD research. On the one hand, the meta-analysis by Feng et al. (2026) provides robust evidence regarding the effectiveness of specific movement-based interventions, addressing the question of "what works." On the other hand, Staunton et al. (2025) offer a tool that addresses the question of "how to measure outcomes," particularly in a way that accounts for individualized goals and developmental trajectories. The integration of these perspectives, effective interventions and valid assessment methods, appears crucial for the further advancement of clinical practice and research in ASD.

The meta-analysis by Wu, et al. (2024) *The effect of physical exercise therapy on autism spectrum disorder: a systematic review and meta-analysis*, demonstrates that PET represents an effective and valuable form of support in the treatment of ASD in children and adolescents. Regular implementation of

movement-based interventions leads to significant improvements in behavioral symptoms, social functioning, and cognitive and motor abilities, underscoring the importance of physical activity as a component of comprehensive therapy.

At the same time, the findings suggest that the effectiveness of interventions depends on their specific characteristics, including intensity, duration, and frequency, highlighting the need for further research aimed at optimizing therapeutic programs. Despite limitations related to the heterogeneity of the analyzed studies, the available evidence supports the inclusion of physical activity in standard therapeutic strategies for ASD, both in terms of improving clinical functioning and enhancing quality of life.

Moreover, the review by Franz et al. (2022) *Early intervention for very young children with or at high likelihood for autism spectrum disorder: An overview of reviews. on early intervention in children with autism spectrum disorder (ASD)*, indicates that early interventions in children with ASD can yield meaningful developmental benefits. However, the magnitude and generalizability of these effects depend on multiple methodological and clinical factors. The most compelling evidence pertains to interventions targeting specific skills, whereas their impact on overall functioning remains less conclusive. The variability in research methodologies and the quality of available data underscore the need for further well-designed studies employing consistent and valid measurement tools.

The study by Draudvilienė et al. (2024), *Two Physiotherapy Methods to Improve the Physical Condition of Children with Autism Spectrum Disorder*, presented two intervention methods that are relatively simple to implement at home and widely accessible. This creates the opportunity to integrate therapeutic exercises into daily routines. The findings demonstrate that even basic forms of physical activity can effectively improve motor skills, balance, and coordination in children with ASD.

The study by Sousa et al. (2025), *Early Neurodevelopmental Milestones in Children With Autism Spectrum Disorder: A Retrospective Observational Study*, demonstrated that an increasing body of evidence from both retrospective and prospective studies supports the conclusion that behavioral symptoms of ASD can be detected during the earliest stages of development. Statistically, the majority of children with ASD exhibit delayed attainment of milestones related to speech and sphincter control. From a clinical perspective, delays in independent walking are also significant in a substantial subgroup of children. Recognizing deviations from normative developmental trajectories may en-

hance early diagnosis, enabling the implementation of early, individualized interventions tailored to the needs of both the child and the family. Evidence consistently shows that early intervention significantly improves developmental outcomes in children with ASD, and monitoring milestone attainment may serve as a valuable tool in early detection.

The findings further indicate that the greatest benefits from intervention were observed in children with lower baseline motor abilities, limited prior experience in aquatic activities, and more pronounced behavioral difficulties, with the most substantial improvements noted in children with early childhood autism. Intervention programs were individually adapted to the needs of each child.

These results are consistent with findings reported by Marzouki et al. (2022), *Effects of Aquatic Training in Children with Autism Spectrum Disorder*, which demonstrated that both aquatic training approaches had a positive impact on gross motor function and coordination in children with ASD. Notably, improvements in activities such as running and jumping were observed after only 8 weeks of training. Aquatic interventions also showed positive effects on overall physical fitness, including speed, balance, flexibility, coordination, cardiorespiratory endurance, agility, and muscular strength, as well as on skills requiring body control (e.g., catching and throwing a ball, kicking, pushing, and jumping). The greatest improvements were observed in children with motor difficulties.

Additionally, improvements in emotional regulation, emotional control, and repetitive behaviors were observed across all groups. However, many of the behavioral and emotional benefits appeared to be temporary, suggesting that continuity or extended duration of aquatic interventions may be necessary to achieve sustained effects. Social interaction during training contributed to a reduction in behavioral difficulties in children with ASD.

Despite engagement in non-aquatic physical activities by the control group, no improvements in gross motor function were observed, which may indicate the unique influence of the aquatic environment on psychomotor performance in children with ASD. This effect may be partially explained by the higher density and buoyancy of water compared to air. Both TAT (Technical Aquatic Training) and GAT (Game-based Aquatic Training) proved effective not only in improving motor and physical performance but also in enhancing social, emotional, and behavioral functioning. These interventions can be implemented alongside other therapeutic and rehabilitation programs, with flexibility for individual or group-based adaptation.

In both the studies by Marzouki et al. (2022) and Vodáková et al. (2022), post-intervention assessments demonstrated significant improvements in the measured parameters. However, differences in assessment tools used across studies limit direct comparability of the results.

The available evidence indicates that, although early intervention is a critical component of ASD therapy, the current state of knowledge does not allow for definitive conclusions regarding the superiority of specific therapeutic approaches. The inclusion of such comprehensive and synthetic analyses in the research discourse enriches the understanding of intervention effectiveness by incorporating considerations of evidence quality, which is essential for the advancement of clinical practice and the development of therapeutic guidelines.

Therapeutic interventions for children and adolescents with ASD are interdisciplinary and holistic, promoting the development of the child's potential and supporting daily functioning and independence. Motor skills have a significant role in performing daily activities, determining the individual's ability to engage in everyday situations. Physical exercise is a recommended intervention for improving motor skills in children with ASD. Structured physical activity, including sports and swimming, has a significant impact on health condition by improving cardiorespiratory parameters, positively affecting the musculoskeletal system, and enhancing basic motor skills.

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CHAPTER 13

A CASE STUDY OF SOCIAL COMPETENCE IN A CHILD WITH EMOTIONAL DYSREGULATION AND EXECUTIVE FUNCTIONING DIFFICULTIES

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INTRODUCTION

Difficulties in socioemotional functioning during childhood may reflect diverse developmental trajectories, including possible neurodevelopmental conditions. The present study examines a 7-year-old girl referred for assessment due to parental concerns regarding emotional and behavioral regulation, particularly in the home environment[1]. The mother reports frequent and intense emotional outbursts in situations involving frustration or unmet expectations, accompanied by withdrawal and difficulty calming down, especially when the child is tired or hungry. While such difficulties are less evident in structured settings such as school, they have also been observed in other group contexts. Taken together, this pattern highlights the need for a comprehensive assessment of the child's socioemotional functioning.

The aim of this study is to examine the child's social competence profile across four domains: theory of mind, social information processing, executive functioning, and emotional regulation.

The study is structured as follows: first, the theoretical framework guiding the assessment is presented. Next, the methodology, including participant description, instruments, and procedure is outlined. This is followed

[1] This study was conducted as part of the requirements for the Certificat en Orthopédagogie Clinique at UCLouvain.

by the presentation of results across the assessed domains. Finally, findings are discussed in relation to existing literature on social competence in child development.

THEORETICAL BACKGROUND

Social competence is commonly conceptualized as a multidimensional construct encompassing cognitive, emotional, and behavioral components that enable effective functioning in social contexts. It refers to a set of social, emotional, and cognitive resources that children use to achieve their goals and interact effectively with others (Kostelnik, Gregory, Soderman, & Whiren, 2012). Within this perspective, socioemotional competence may be understood as the ability to successfully engage in social interactions, supported by both self-awareness (understanding one's own emotions, motives, and behaviors) and other-awareness (understanding others' emotions, thoughts, and intentions) (Laevers, 1998). Contemporary approaches emphasize the interdependence of emotional and social processes, highlighting the central role of emotions in shaping social behavior and interactions (Denham, 2007; Halberstadt, Denham, & Dunsmore, 2001; Lemerise & Arsenio, 2000).

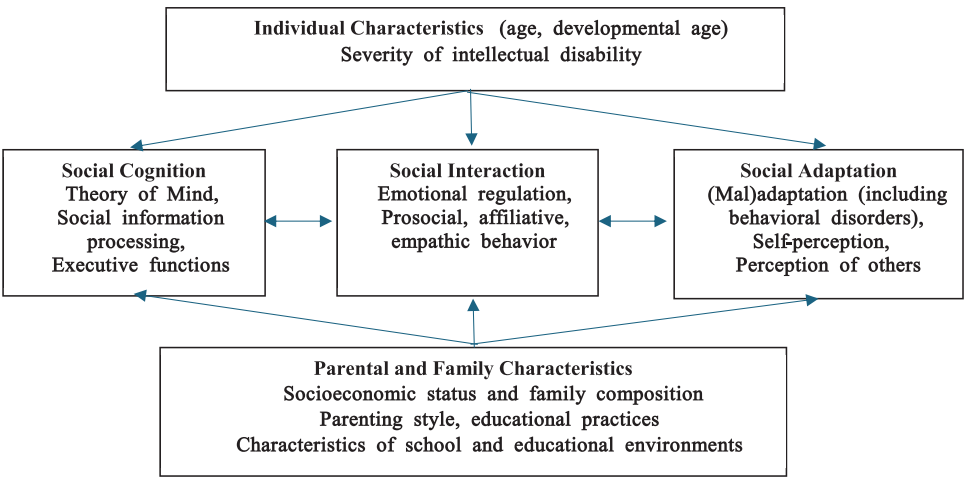
In order to comprehensively examine the child's functioning, the selection of assessment domains in the present study was guided by the heuristic model of social competence proposed by Nader-Grosbois (2011), inspired by Yeates et al. (2007). This model conceptualizes social competence as a multidimensional construct integrating social cognition, emotional regulation, social interaction, and social adaptation, while also considering the influence of individual and environmental factors. The present study focuses on four key domains derived from this model: theory of mind, social information processing, executive functioning, and emotional regulation.

Theory of mind refers to the ability to attribute mental states to others and to understand behavior in terms of these mental states. According to Flavell (1999), this ability encompasses both affective components (e.g., emotions and desires) and cognitive components (e.g., beliefs, intentions, and knowledge). The development of theory of mind is gradual and continues beyond early childhood. While many competencies emerge during the preschool and early school years, research suggests that theory of mind is not fully consolidated in children aged six to eight and continues to develop into adolescence (Baron-Cohen, O'Riordan, Jones, Stone, & Plaisted, 1999; Calero, Salles, Semel-

man, & Sigman, 2013; Dumontheil, Apperly, & Blakemore, 2010). Deficits in theory of mind have been consistently documented in individuals with autism spectrum disorder (ASD) (Baron-Cohen, 1995).

Figure 1

Heuristic model of social competencies



Source: Nader-Grosbois, 2011, inspired by Yeates et al. (2007).

Social information processing refers to the sequence of mental operations involved in generating a behavioral response during social interactions. According to Crick and Dodge (1994), these operations include the encoding of social cues, their interpretation, clarification of goals, response generation, and response selection. This process is influenced by prior experiences, social schemas, and situational factors, and becomes more efficient with development.

Executive functions constitute a set of cognitive processes necessary for goal-directed behavior, including inhibitory control, working memory, and cognitive flexibility (Diamond, 2013). These processes are essential for adaptive functioning, particularly in situations requiring behavioral regulation and flexible adjustment to changing demands. Deficits in executive functioning have been associated with various neurodevelopmental conditions, including attention-deficit/hyperactivity disorder (ADHD) and ASD.

Emotional regulation refers to the processes by which individuals influence the experience, timing, and expression of their emotions (Gross, 2015). These

processes enable individuals to monitor and modulate emotional responses in accordance with situational demands (Cole, Michel, & O'Donnell-Teti, 1994). Emotional regulation develops progressively throughout childhood and plays a crucial role in social adaptation. Difficulties in this domain are frequently observed in children with ASD (Berkovits, Eisenhower, & Blacher 2017).

METHOD

PARTICIPANTS

The participant was a 7-year-old Polish-speaking girl attending the second grade of the Polish section of the European School in Brussels. She was the third child in a family of three daughters. Her older sister had been diagnosed with Asperger syndrome, which contributed to the caregiver's concerns regarding possible autism spectrum traits in the participant.

The participant was born at full term (40 weeks of gestation) following an uncomplicated pregnancy. Her general health was reported as good, and she was not taking any medication. She had been diagnosed with sensory integration difficulties, including sensitivity to tactile stimuli (e.g., clothing), loud sounds, and strong odors. Her early motor and language development were reported as typical. She had previously undergone speech therapy to improve articulation of specific speech sounds.

In terms of academic functioning, the participant demonstrated overall satisfactory school performance despite reported difficulties in reading and mathematics. Socially, she was described as well functioning: she engaged in peer interactions, formed close friendships, followed rules, and showed empathic and prosocial behavior. She also demonstrated a high level of independence in daily activities and time management. Her interests included imaginative play, storytelling, listening to books, painting, constructing cardboard models, and playing board games.

INSTRUMENTS

The *Strengths and Difficulties Questionnaire* (SDQ; Goodman, 2001) was used to assess the participant's behavioral functioning. The Polish version of the instrument was used in the present study. It is a validated measure for children aged 4–17 years and includes five subscales: emotional problems, conduct problems, hyperactivity, peer problems, and prosocial behavior. A total diffi-

culties score is calculated by summing all subscales except prosocial behavior. The questionnaire consists of 25 items rated on a three-point scale. In this study, an extended version including an impact supplement was completed by the participant's mother.

L'Inventaire de la Théorie de l'Esprit – version francophone (ToMi-vf; Houssa, Mazzone, & Nader-Grosbois, 2014), which is the French adaptation of the *Theory of Mind Inventory* (*ToMi*; Hutchins, Prelock, & Bonazinga, 2010), was used in the present study. For the purposes of this research, the French version was translated into Polish. It is a parent-report measure assessing children's theory of mind in everyday contexts. It includes 30 items rated on a five-point scale. Based on prior research, three factors are distinguished: cognitive (e.g., beliefs, intentions, knowledge), socio-emotional (e.g., emotions, desires, shared attention), and a factor related to beliefs and intentions guiding behavior.

L'Échelle d'adaptation sociale chez l'enfant (EASE; English translation of the title: *Social Adaptation Scale for Children*; Comte-Gervais, Giron, Soares-Boucaud, & Poussin, 2008) was used in the present study. A Polish translation of the instrument was used for the purposes of this research. The instrument is a semi-structured parent questionnaire consisting of 50 items divided into ToM and No-ToM subscales. Items are rated on a 3-point scale. The difference between the two subscales may indicate delays in theory of mind development.

La Batterie de tâches de théorie de l'esprit (ToM Task Battery; Nader-Grosbois, & Houssa, 2016), the French adaptation of the *Theory of Mind Task Battery* (Hutchins, Prelock, & Chace, 2008), was used in the present study. A Polish translation of the instrument was used for the purposes of this research. This is a performance-based assessment of theory of mind in children, consisting of nine tasks and includes 9 tasks (15 questions) assessing emotion recognition, perspective taking, false belief understanding, and inference of mental states. Tasks are presented in increasing order of difficulty using illustrated vignettes. Memory control questions are also included.

The Faux Pas Test for Children (Baron-Cohen et al., 1999) assesses the ability to detect social faux pas in short stories. A Polish translation of the test was used in the present study. Participants answer comprehension, identification, detection, and false belief questions. Correct detection requires accurate responses to all questions. In this study, Polish translation of the instrument was used.

The *Assessment of Children's Emotion Skills* (ACES; Schultz, Trentacosta, Izard, Leaf, & Mostow, 2004) measures emotion recognition in children aged 5–8 years across three subscales: facial expressions, social situations, and social

behaviors. It includes photographs and vignettes depicting prototypical and ambiguous emotional cues. Responses are used to compute accuracy and attribution bias scores. A Polish translation of the instrument was used in the present study.

The *Domino Test for Socioemotional Understanding* (DOT^{SEMU}; Papieska, Spilt & Laevers, 2018) is a performance-based measure of socioemotional understanding in children aged 8–10 years. It assesses encoding and interpretation of social cues through two tasks: social understanding (narrative description of image sequences) and emotional understanding (identification of emotions in context).

The Childhood Executive Function Inventory (CHEXI; Thorell, & Nyberg, 2008) is a parent- and teacher-report questionnaire assessing executive functions in children aged 4–12 years. It consists of 26 items rated on a Likert scale and is commonly interpreted in terms of two factors: working memory and inhibition. The Polish version of the instrument (Pyrtek, Adamczyk-Sowa, & Badziński, 2019) was used in the present study.

L'Inventaire de régulation émotionnelle (ERC-vf; Nader-Grosbois, 2013), the French version of *the Emotion Regulation Checklist* (ERC; Shields & Cicchetti, 1995), was used in the present study. A Polish translation of the instrument was used for the purposes of this research. It is a parent-report instrument assessing emotion regulation and dysregulation in children aged 3–12 years. It consists of 24 items rated on a 4-point Likert scale and yields two subscales: emotion regulation and emotion dysregulation.

The Autism Spectrum Quotient – Child version (AQ-Child; Auyeung, Baron-Cohen, Wheelwright, & Allison, 2008) is a 50-item parent-report questionnaire measuring autistic traits in children aged 4–11 years across five domains: social skills, attention switching, attention to detail, imagination, and communication. Items are rated on a 4-point Likert scale, with higher scores indicating more pronounced autistic traits. A Polish version of the instrument (Auyeung et al., 2008; Pisula, Rynkiewicz, & Łucka, 2010)), was used for the purposes of this research.

PROCEDURE

This case study followed a multi-method assessment approach combining direct testing of the participant with parent-report questionnaires and interviews.

The assessment was conducted over several sessions spread across a period of two months. During the first session, the participant completed a battery of

standardized tasks assessing theory of mind, emotional competence, and socioemotional understanding. Specifically, the Theory of Mind Task Battery (Nader-Grosbois & Houssa, 2016), the Assessment of Children's Emotion Skills (ACES; Schultz et al., 2004), and the Domino Test for Socioemotional Understanding (DOT^{SEMU}; Papieska et al., 2018) were administered.

In parallel, the participant's mother completed a series of questionnaires evaluating the child's socioemotional and behavioral functioning. These included the Strengths and Difficulties Questionnaire (SDQ; Goodman, 2001), the Theory of Mind Inventory (ToMi-vf; Houssa et al., 2014), the Social Adjustment Scale for Children (EASE; Comte-Gervais et al., 2008), the Emotion Regulation Checklist (ERC-vf; Nader-Grosbois, 2013), and the Autism Spectrum Quotient – Child version (AQ-Child; Auyeung et al., 2008), administered in response to concerns regarding possible autistic traits.

In a subsequent session, the mother participated in an interview and completed the Childhood Executive Function Inventory (CHEXI; Thorell & Nyberg, 2008), which assesses executive functioning, including working memory and inhibitory control.

Finally, in a later session, the participant completed the Faux Pas Test for Children (Baron-Cohen et al., 1999), which evaluates the ability to detect socially inappropriate statements and provides an additional measure of theory of mind.

All assessments were conducted in a calm environment and proceeded without major difficulties. The participant was generally cooperative, maintained eye contact, and remained engaged in most tasks, particularly those involving visual materials and interactive responses. Tasks with higher verbal demands appeared more challenging, as her attention tended to decrease over time.

RESULTS

THE STRENGTHS AND DIFFICULTIES QUESTIONNAIRE (SDQ)

The participant's scores on the SDQ fell within the average range for emotional problems, conduct problems, hyperactivity, peer problems, and prosocial behavior. The total difficulties score was also within the normative range. However, the impact supplement indicated that the participant's mother perceived significant emotional difficulties in daily life. These included frequent and intense emotional outbursts that were difficult to regulate and had a noticeable impact on the child's functioning at home and on family dynamics.

Table 1
Comparison of SDQ Scores Between the Case Study Participant and a British Community Sample (Ages 4–17)

	case study participant	**close to average**	**slightly elevated / slightly lowered**	**high/low**	**very high/ very low**
emotional problems	1	0–3	4	5–6	7–10
conduct problems	1	0–2	3	4–5	6–10
hyperactivity	4	0–5	6–7	8	9–10
peer problems	0	0–2	3	4	5–10
prosocial behaviour	8	8–10	7	6	0–5
total difficulties	6	0–13	14–16	17–19	20–40
Impact supplement	2	0	1	2	3–10

Source: Self-generated

THE THEORY OF MIND INVENTORY (TOMI-VF)

Results on the Theory of Mind Inventory indicated generally high scores across cognitive, socioemotional, and belief-related factors. Most items in the cognitive factor were rated between 15.5 and 20, suggesting well-developed abilities in understanding others' thoughts and knowledge. Lower scores were observed for items requiring understanding of more complex intentions. Similarly, scores in the socioemotional factor were predominantly high, indicating adequate abilities in emotion recognition, shared attention, and sensitivity to others' needs. However, some items reflecting pragmatic social understanding (e.g., tailoring communication to influence others) received lower ratings. The belief-related factor also showed high scores across items, suggesting well-developed understanding of beliefs and intentions guiding behavior.

Overall, parental reports indicated that theory of mind abilities are present and observable in everyday functioning, although some specific aspects appear less developed.

THE SOCIAL ADJUSTMENT SCALE FOR CHILDREN (EASE)

Compared to the study by Comte-Gervais et al. (2008), the participant's score is similar to the mean score of younger typically developing children. The difference between participant's scores on the two subscales is 8. This is the largest difference compared to the results reported in previous studies. As in the group of typically developing children, this difference is much smaller than in groups of children with developmental difficulties. This may suggest that the participant of the study shows a slight delay in the development of ToM.

Table 2

Comparison of the Case Study Participant's Scores With Mean Scores Obtained in Previous Studies Using the EASE (Hughes et al., 1998; Comte-Gervais et al., 2008)

	1998 group témoin	**1998 group expérimental**	**2008: enfants au dev. typiques**	**Participant**
TOM Yes	33.9	22.9	32	31
TOM No	37.1	29.1	35.5	39
TOM No – TOM Yes	3.3	6.2	3.5	8

Note. The 1998 study included typically developing children (*M* age = 4.5 years, *N* = 22) and children diagnosed with pervasive developmental disorders (PDD) (*M* chronological age = 7.4 years, *M* mental age = 4.4 years, *N* = 21). The 2008 study included typically developing children (*M* age = 6 years, *N* = 327).

THE THEORY OF MIND TASK BATTERY

The participant performed well on most tasks of the Theory of Mind Task Battery, successfully completing tasks assessing emotion recognition, perspective taking, first- and second-order false beliefs, and emotion inference based on desires, reality, and beliefs. Only one task: inferring actions based on perception, was completed incorrectly.

THE FAUX PAS TEST FOR CHILDREN

The participant successfully identified nearly all faux pas. Difficulties occurred only in one item, where confusion between character names affected performance. Some attentional fluctuations were also observed during the task.

THE ASSESSMENT OF CHILDREN'S EMOTION SKILLS (ACES)

The participant scored higher than the comparison group across all subscales.

Table 3

Comparison between case study participant's scores and scores from the study by Trentacosta and Izard (2007)

	Facial expessions	**Social situations**	**Social behaviours**
Comparison group	11,94	5,99	4,58
Case study participant	13	9	8

Note. The sample consisted of preschool children (N = 193, M age = 6.09 years).

Analysis of incorrect responses showed a tendency to confuse sadness and happiness. Anger was frequently misinterpreted as sadness, and fear was occasionally misinterpreted as sadness or happiness. For ambiguous items, the participant showed an attribution bias toward sadness and anger, with sadness being the most frequently selected emotion.

THE DOMINO TEST FOR SOCIOEMOTIONAL UNDERSTANDING (DOT^{SEMU})

In the first story, the participant produced a limited description, scoring 2 points for relevant content. She did not explicitly refer to emotions, intentions, or relationships between characters, focusing mainly on describing visible actions rather than constructing a coherent social narrative. However, she correctly identified emotions in Item 2, scoring 7 out of 9.

In the second story, the participant demonstrated partial understanding of relationships between events and characters. She identified some emotional reactions but did not fully integrate contextual information when explaining emotions. She obtained 2 points for the description and 7 points for emotional understanding.

Overall, performance suggested adequate emotion recognition but limited ability to integrate contextual and mental-state information into coherent social interpretations.

THE CHILDHOOD EXECUTIVE FUNCTION INVENTORY (CHEXI)

The participant obtained high scores on both subscales: working memory: 51 and inhibition: 56. These scores exceeded normative values reported for typically developing children and children with ADHD in comparison studies, suggesting notable difficulties in executive functioning, particularly in working memory, inhibitory control, planning, and task persistence.

Table 4

Comparison Between Case Study Participant's Scores and Mean Scores Reported in Catale et al. (2013)

	ADHD Group		Control Group		Participant
	Belge	Suédois	Belge	Suédois	
Working memory	46.44	45.79	23.60	22.05	51
Inhibition	42.00	43.13	26.20	20.66	56

Souces: self-generated

THE EMOTION REGULATION CHECKLIST (ERC-VF)

The participant's score for emotion regulation was 23, indicating some ability to regulate emotions in everyday interactions. However, the emotion dysregulation score was high (39), indicating frequent emotional lability, impulsivity, frustration, and difficulty modulating emotional responses.

THE AUTISM SPECTRUM QUOTIENT – CHILD VERSION (AQ-CHILD)

The participant's total AQ-Child score was 57. Compared to normative data, her scores on most subscales were higher than those of typically developing children but lower than those observed in children diagnosed with Asperger syndrome or high-functioning autism. The exception was the imagination subscale, which was similar to typically developing peers.

Tabel 5

Comparison Between the Scores of the Case Study Participant and the Scores from the Study by Auyeung et al. (2008)

	Social skills	Attention switching	Attention to detail	Imagination	Communication	AQ-Child total
Control group	6.10	10.30	8.50	5.50	5.50	37.70
AS/HFA	23.40	24.70	13.70	17.90	24.90	104.70
Participant	9	17	13	5	14	57.00

Note. The control group consisted of typically developing girls ($N = 618$; M age of the group, including boys = 9.82). The AS/HFA group consisted of girls diagnosed with Asperger syndrome/high-functioning autism ($N = 36$; M age of the group, including boys and children with an ASD diagnosis = 7.58).

DISCUSSION

The results of this case study present a mixed profile of strengths and difficulties across socioemotional, cognitive, and executive functioning domains.

First, performance on standardized theory of mind tasks (Theory of Mind Task Battery and Faux Pas Test) indicates generally well-developed basic and advanced theory of mind abilities. The participant demonstrated competence in recognizing emotions, understanding beliefs, and interpreting social scenarios involving false beliefs. These findings are consistent with parental reports from the ToMi-vf, which also suggested adequate everyday theory of mind functioning.

However, results from EASE, ACES, and DOT^{SEMU} suggest that theory of mind abilities may not be fully generalized to more complex or context-dependent social situations. In particular, difficulties were observed in integrating contextual cues, understanding pragmatic aspects of communication, and constructing coherent interpretations of social interactions. This discrepancy between structured test performance and more naturalistic tasks may indicate that cognitive understanding of mental states does not always translate into applied social reasoning.

The ACES results further revealed a tendency toward emotional misattribution, particularly confusing sadness with other negative emotions such as anger and fear. The observed bias toward attributing sadness in ambiguous situations may reflect both individual emotional tendencies and environmental influences, such as family attitudes toward emotional expression.

Executive functioning results (CHEXI) indicate marked difficulties in working memory and inhibitory control. These deficits may contribute to challenges in maintaining attention, following multi-step instructions, and regulating behavior in complex or demanding tasks. Such limitations may also partly explain inconsistencies observed in socioemotional processing, as executive functions play a critical role in supporting higher-order cognitive and social processes.

Emotion regulation results (ERC-vf) suggest a dual profile, with relatively preserved basic emotion regulation abilities but significant emotion dysregulation. The participant appears capable of recognizing and communicating emotions, yet struggles with controlling emotional intensity, particularly in situations involving frustration or unmet expectations. This is consistent with parental reports of frequent emotional outbursts and difficulty recovering from negative emotional states.

Finally, AQ-Child results indicate the presence of elevated autistic traits relative to typically developing peers, particularly in domains related to social communication and attention switching, while imagination appears relatively preserved. This profile aligns with observations of adequate imaginative play alongside difficulties in interpreting social cues, understanding humor, and inferring intentions.

Overall, the findings suggest a heterogeneous developmental profile characterized by relatively strong basic theory of mind and emotion recognition abilities, contrasted with difficulties in applying these skills in complex social contexts, along with weaknesses in executive functioning and emotion regulation. These combined factors may contribute to the emotional and social challenges reported by the caregiver in everyday life.

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CHAPTER 14

UNMASKING THE HIDDEN ADVERSARY. LONELINESS AMONGST PERSONS WITH INTELLECTUAL DISABILITIES IN FOUR COUNTRIES- NORTHERN IRELAND, POLAND, ROMANIA AND SWEDEN[1]

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INTRODUCTION

There is a growing interest among researchers and other stakeholders in the phenomenon of loneliness (Jefferson et al., 2023). Macdonald et al. (2018) note that the empirical study of loneliness can be traced back to Sheldon's (1948) classic investigation of older adults' experiences of family life in the United Kingdom. Since that initial study, research on loneliness has expanded to encompass a diverse range of population groups, including young people, immigrants, women, the unemployed, and individuals with disabilities. An increasing body of evidence indicates that people with intellectual disabilities are at increased risk of loneliness and social isolation compared to individuals without intellectual disabilities (Emerson et al., 2021; Merrells et al., 2019). For instance, Emerson et al. (2021, p. 6) highlight that individuals with disabilities "should be considered to be at increased risk of exposure to loneliness and that this exposure may be an important mediator for their lower wellbeing." Meanwhile, Macdonald et al. (2018), in a UK-based study, reported that disabled people were at increased risk of experiencing emotional loneliness and social isolation compared to non-disabled people. Similarly, a systematic review by Petroutsou et al. (2018) found that 45% of adults with intellectual disabilities reported experiencing loneliness, diminished enjoyment of their social lives, and concomitant symptoms of depression, across the lifespan. Similar findings regarding elevated levels of loneliness among individuals with intellectual disabilities have been documented in studies conducted in multiple countries.

Crucially, loneliness has been shown to have substantial negative effects on quality of life. It has been associated with adverse health outcomes (Hawkley & Cacioppo, 2010; Zavaleta et al., 2014), and chronic experiences of loneliness have been demonstrated to have detrimental impacts on both physical and mental health (Matthews et al., 2019). In addition to health implications, loneliness is linked to negative educational outcomes, including lower educational attainment, higher rates of school dropout, and increased risk of unemployment (Jefferson et al., 2023). Similar consequences have also been documented when it comes to persons with disabilities, and specifically intellectual disabilities. A systematic review by Petroutsou et al. (2018) shows three key factors impact on and contribute to loneliness for people with intellectual disability, namely: negative attitudes of the general community, limited opportunities for social interaction, and the impacts of intellectual and behavioural impairment.

Although evidence indicates a higher prevalence of, and increased risk for, loneliness among individuals with intellectual disabilities, research exploring the underlying mechanisms and effective strategies to address loneliness remains limited (Robinson & Idle, 2023).

From a disability studies perspective, loneliness in later life should be understood as part of a broader social process rather than as a private emotional problem. When early childhood systems fail to enable participation, they effectively teach children that access to relationships is conditional, fragile, or unavailable. Such experiences can shape identity, reduce trust in others, and weaken opportunities for sustained friendship and community membership. The result is a life-course accumulation of isolation in which loneliness reflects not personal deficit, but the long shadow of exclusionary institutions.

The aim of this chapter is not to provide a comprehensive, in-depth comparative analysis of loneliness among individuals with intellectual disabilities across the countries included. Rather, it seeks to present an overview of the current situation, with particular emphasis on the prevalence of loneliness, its causes, its consequences, and the measures being implemented to address the issue. To achieve this, the chapter focuses on several key aspects: the current state of loneliness among individuals with intellectual disabilities within each country, the factors contributing to loneliness, its impacts, the strategies employed to mitigate it, and the actions needed to effectively tackle loneliness in this population.

NORTHERN IRELAND

In Northern Ireland, loneliness is already a substantial public-health and social-policy issue for children with and without learning disabilities (the term used in UK policy and practice contexts to refer to what is internationally described as intellectual disability). In 2024/25, 17.9% of adults reported feeling lonely at least some of the time, and those in more deprived areas were more likely to show signs of loneliness (Executive Office of Northern Ireland, 2026). For children with learning disabilities, friendships are critical and are predominantly forged in school with less opportunities to forge friendships beyond the school environment (Brown et al., 2024). While reliable Northern Ireland-specific data on children's time outside the home is limited, evidence on young adults is suggestive. Mencap (2016) reported that 1 in 3 young adults with learning disabilities spent less than 1 hour outside of their home on a typ-

ical Saturday. While the Northern Ireland-specific statistical picture is less developed, which is itself a problem, the available Northern Ireland and the United Kingdom evidence strongly suggests that loneliness is likely to be more concentrated, more chronic and more structurally produced in this population group than in the wider population.

In Northern Ireland, the more recent pattern is one of persistence rather than sharp year-on-year escalation. Loneliness remains stuck at a high level: 17.9% reported loneliness at least some of the time in 2024/25 (a self-report measure), and the 2024/25 Health Survey using the UCLA loneliness scale found 25%, similar to 2023/24. Therefore, the concern is not only that loneliness is rising; it is that it is becoming an entrenched background condition for a significant minority of the population. Consequently, loneliness has become a more acute inequality issue within disability over time (Office for National Statistics, 2021). Among people with learning disabilities, COVID-19 appears to have been an accelerant for loneliness. Lockdowns and social distancing measures reduced opportunities for growing, maintaining and sustaining friendships and relationships, and there is still a concern that the impact of the COVID-19 pandemic has not been fully understood for this population of children. Mencap's (2022) post-pandemic evidence points to enduring reductions in community presence, reduced day opportunities, less social care, and worsening mental health. In this sense, loneliness has shifted from being a longstanding inclusion issue to a more visible health and rights issue. Importantly, policy concern has clearly intensified. Since 2019, there have been stronger calls in Northern Ireland for a formal loneliness strategy (Quinn et al., 2020); in 2025, consultations with people with learning disabilities and their carers placed social integration, relationships, citizenship and community support more centrally (Department of Health Northern Ireland, 2025). These signals highlight policy salience even where specific, measurable evidence about loneliness is sparse.

The root causes are best understood as biopsychosocial and structural rather than interpersonal. Biological and health-related factors include major health inequalities, earlier mortality, avoidable deaths, poorer access to preventive care, and more complex long-term conditions. Poor physical health can reduce mobility, stamina, confidence and participation; untreated pain, sensory issues and mental ill health can further narrow social functioning (Women and Equalities Committee, 2024). Psychological factors such as exclusion, bullying, stigma, low confidence, anxiety, depression and rejection make relationships harder to sustain. Mencap's pandemic research identified negative effects on mental health,

discrimination and bullying as recurring themes in loneliness experiences (Mencap, 2022). Social and environmental factors limit opportunities, while structural issues like poverty, poor housing, discrimination and ineffective services reinforce loneliness and restrict connection (Rickard & Donkin, 2018).

For any individual, loneliness affects far more than just mood. It is associated with poorer wellbeing, depression, anxiety, lower confidence, poorer quality of life and reduced physical health outcomes. Emerson et al. (2021) found loneliness had a particularly strong association with poor wellbeing among disabled people. General loneliness evidence in Northern Ireland also links loneliness to poorer physical and mental health and greater health-service use. For people with learning disabilities, there are also important rights and citizenship considerations. Loneliness should not be understood solely as an affective state, but as a marker of exclusion from the ordinary conditions of life, including friendship, intimacy, employment, leisure, choice, community belonging and visibility within public spaces. As noted by Merrells et al. (2019), physical presence within the community does not necessarily equate to meaningful integration or social acceptance.

The consequences also extend to families and carers. Carers often carry the emotional and practical burden of compensating for missing community supports. Mencap (2022) found widespread sadness, loneliness and reduced leaving-home among relatives with learning disabilities, while Northern Ireland evidence from carers' organisations shows loneliness is also common among carers themselves. Two brief lived-experience examples help to illustrate the human cost. One participant in research by Mencap described their life during lockdown as a "prison", with limited contact causing suicidal feelings (Mencap, 2022). Sense's (2024) research with people with complex disabilities likewise highlights that over half feel lonely some, often or all of the time, with participants describing wanting more meaningful friendships and everyday social contact. Rather than positioning social isolation as a primary context for loneliness, these accounts point to a more fundamental exclusion from ordinary social life and community participation.

In Northern Ireland generally, there has been some political movement but not yet a fully realised loneliness strategy. In 2024 the Northern Ireland Assembly heard a Motion to develop a Loneliness Strategy (Northern Ireland Assembly, 2024). The Action Group on Loneliness Policy in Northern Ireland (Quinn et al., 2020) have continued to press for a cross-departmental response, and the Northern Ireland Social Care Council launched an updated social work

resource on loneliness in 2025. For people with learning disabilities specifically, the "We Matter" draft service model is probably the most important current policy development in Northern Ireland (Department of Health Northern Ireland, 2025). Although it is not framed solely around loneliness, its emphasis on health and wellbeing, citizenship, meaningful lives, community support, housing, carers and mental health creates a platform for tackling the conditions that produce loneliness. The draft disability strategy likewise signals an inclusion-based direction. There are also practice examples, for example, Mencap Northern Ireland's (2017) Link Me project, which explicitly addresses isolation and loneliness among older adults with learning disabilities by supporting participation in local activities and community inclusion. The report suggests such tailored, relational support can make a meaningful difference.

From the literature, it is clear that Northern Ireland needs a formal cross-departmental loneliness strategy that explicitly includes people with learning disabilities across their lifespan, as a priority population. The absence of this is now conspicuous, especially given that England, Scotland and Wales have already developed national responses. Northern Ireland also needs better measurement. At present, the evidence base is fragmented. Loneliness data are available for the general population and some disabled groups, but there is no strong routine Northern Ireland dataset that tracks loneliness specifically among people with learning disabilities across age, severity, living arrangements, deprivation, ethnicity, service use and geography.

Responses to loneliness need to move beyond "befriending", as evidence suggests loneliness is not solved by abstract social contact alone. Policy direction in Northern Ireland should combine relational interventions with structural ones: improved access to health services, inclusive day opportunities, transport access, supported employment, accessible housing, better transitions, reasonable adjustments, digital inclusion, and consistent community-based social care. Loneliness should be specifically built into learning disability health equality strategy. Annual health checks, mental health support, primary care access, and community LD services should all include explicit recognition of loneliness and social connection as a health issue. Third sector organisations such as Mencap, who campaign for simple adjustments such as including mental health in annual health checks, should be included in developing responses to loneliness.

Finally, policy and service design should be co-produced. Recent UK learning disability evidence stresses "nothing about us without us", and the We Matter consultation notes co-production with advocacy groups.

Co-production is a key consideration because loneliness is closely tied to dignity, identity and belonging – that is, people with learning disabilities are key to shaping workable solutions.

The evidence indicates that loneliness among people with learning disabilities should not be regarded as a marginal concern, but rather as a manifestation of wider systemic exclusion. In Northern Ireland, the issue is evident within general population loneliness data and the broader structural disadvantages experienced by disabled people; however, learning disability-specific measurement remains underdeveloped. Across the UK, the evidence is clearer: people with learning disabilities and disabled people are more likely to be lonely, the consequences are significant for mental and physical health, and the drivers are rooted in inequalities across health, work, housing, transport, stigma and social care.

LONELINESS IN POLAND

First, it is worth clarifying the meaning of the word "loneliness" in the Polish language. The English term loneliness dominates. It is understood as both the lack of social relationships and subjective feelings of isolation, as well as the absence of emotional bonds. This term carries negative, problematic connotations. Sometimes the Polish language also uses the term osamotnienie, which could be translated as solitude or isolation, but does not convey this meaning literally. Osamotnienie is a psychological-social state encompassing feelings of rejection, exclusion, or abandonment by parents and/or peers, as well as the lack of satisfying emotional bonds with others. It can occur as conscious isolation or as a temporary state. Interestingly, in English, the concept of solitude has rather positive connotations. In Polish, there is no concept to describe "good", positive loneliness. An objective indicator of loneliness can be the number of people living alone. In Poland in 2024, this amounted to over 5.5 million. This constitutes one-third of households in Poland (Eurostat, n.d.).

It is very difficult to identify objective indicators of the subjective feeling of loneliness, as it is declarative in nature. Nevertheless, the data indicate that this problem affects a significant portion of society. According to the Generation Institute's report (Instytut Pokolenia, 2022), 53% of adult Poles experience feelings of loneliness (measured by the Revised UCLA Loneliness Scale, R-UCLA, with scores above the population average of 42.16), 39% report often or sometimes feeling abandoned, and 35% declare having no one

to whom they could turn for help. Among youth and young adults, the scale of the phenomenon is even greater – 65% of men aged 25–34 and 57% of men under 24 score above average on the R-UCLA scale (Instytut Pokolenia, 2022). Recent data from the Centre for Public Opinion Research (Centrum Badania Opinii Społecznej [CBOS]) complement this picture: the majority of adult Poles (89%) declare that they prefer to spend their free time in the company of others, while only 9% claim to feel best when alone (Badora, 2024). A more detailed CBOS analysis of loneliness frequency shows that 4% of Poles feel lonely always or very often, while 52% do not declare feelings of loneliness at all (Centrum Badania Opinii Społecznej, 2024). The apparent divergence between the two sources reflects methodological differences: the R-UCLA scale captures subjective loneliness across a continuum, while the CBOS measure focuses on self-declared frequency of loneliness, which yields more conservative estimates.

The problem of loneliness thus affects not only older people, but increasingly also youth and young adults. Conclusions from research on "Loneliness of Generation Z" – Samotność pokolenia Z (Wrzos et al., 2023) present a picture of lonely Polish youth: 65% of young Poles aged 13–28 declare experiencing loneliness regularly, with 32% feeling it often and 33% sometimes. Research also shows that almost 17% of young people have no one with whom they can share their problems. The Instytut Pokolenia report (2022) provides further demographic detail: men score higher on average than women on the R-UCLA scale (mean of 42.99 vs. 41.45), and the gap is most pronounced among young adults. The director of the Institute summarised these findings with the observation that loneliness in Poland disproportionately affects young men. The problem of loneliness also significantly affects youth with disabilities. Research results (Giryński, 2004) indicate that people with intellectual disabilities, to a greater extent than people without intellectual disabilities, experience loneliness in interpersonal relationships. Poorly satisfying interactions occur both in contacts with peers, as well as with parents and other significant people.

Currently, the character of Polish society remains family-oriented, though this is changing, which will be further explained. Indicators regarding family social capital are high and remain at a similar level (high and average indicator nearly 70% in both 2015 and 2018). Social and neighborhood capital fares lower (high and average level, 50% in 2015 and 54% in 2018). Association capital performs the worst in Poland – its presence is negligible (a few percent of respondents) (Główny Urząd Statystyczny, 2020). Being a member of an

extended family provides the opportunity to benefit from support offered by relatives and in-laws. On the other hand, it also requires continuous maintenance of presence in the extended family, which involves both participation in various family occasions and reciprocating actions aimed at satisfying needs expressed by relatives. Poland is currently undergoing many social transformations. In the context of family life, we can point to, among other things, the weakening of family bonds and communication, prolonged working hours of parents, an increase in single-person households and families with one child, while simultaneously maintaining a strongly rooted role of the family. Thus, we are dealing with a kind of chaos and clash of values (younger generations vs. older generations).

Universal factors contributing to the growth of loneliness are also civilizational factors, including the development of new technologies. These include individualism and consumerism, the weakening of social capital outside the family, the superficiality of social relationships, the replacement of direct relationships with online contacts, "loneliness in the network" and "loneliness in the crowd", as well as phenomena such as ghosting and addiction to social media. In a report by the European Commission's Joint Research Centre, Schnepf et al. (2024) noted that the risk of developing loneliness may be associated with important life events, such as separation from a partner, family conflict, one's own illness or that of a close person, or job loss. It was also emphasized that the risk of loneliness increased with the COVID-19 pandemic and the period of isolation, with media even speaking of an "epidemic of loneliness".

The consequences of loneliness are manifold. Holt-Lunstad et al. (2010), after analyzing 148 studies on social relationships and overall health, concluded that the feeling of isolation has a mortality effect comparable to that of smoking up to 15 cigarettes a day, and a more recent meta-analysis confirmed loneliness as an independent predictor of premature mortality (Holt-Lunstad et al., 2015). Consequences of loneliness for physical health include elevated stress levels (cortisol), increased risk of heart disease and stroke, and reduced immunity. Loneliness also negatively affects mental health. In longitudinal studies by Matthews et al. (2019), it turned out that social isolation in childhood was associated with later feelings of loneliness in young adults. The feeling of loneliness, in turn, was positively associated with behavioral disorders, suicide attempts, ADHD, and most strongly with anxiety and depression. More lonely young adults more often engaged in health-risky behaviors such as smoking and often avoided physical activity. They were also

characterized by lower life satisfaction and often used maladaptive coping strategies for dealing with problems.

In Poland, loneliness rarely constitutes a separate goal of public policy; it more often appears in the context of mental health, aging societies, and family policy. An example can be the National Program for the Protection of Mental Health (subsequent editions through 2030), which assumes the development of a community-based model of psychiatric care, various forms of social support, and counteracting stigmatization, which indirectly addresses the consequences of loneliness. Also important is the development of Mental Health Centers and the system of psychological and psychiatric care for children and adolescents, which is intended to facilitate access to support close to the place of residence.

At the local level, programs to counteract social isolation of older people are implemented, including the activities of senior clubs, universities of the third age, programs of the "active senior" type, or initiatives of intergenerational volunteering. Also important are the activities of non-governmental organizations and social campaigns, such as initiatives to counter depression and loneliness or programs of community support and self-help groups.

Unlike Great Britain or Japan, Poland does not yet have a separate "ministry of loneliness"; however, this problem increasingly appears in public and expert debate. Recognition of loneliness as an important priority of social policy should be associated with the inclusion of loneliness indicators in monitoring mental health strategies as well as family and youth policies. It is also advisable to create national and local programs to counteract social isolation, analogous to anti-depression programs.

An important direction of action is strengthening peer bonds by supporting schools in creating spaces conducive to building authentic relationships, including through peer tutoring, integration classes, group work, and programs counteracting exclusion. In parallel, emotional education and social competencies should be developed by introducing into school and academic education programs that shape communication skills, building relationships, recognizing emotions, and asking for help, with particular attention to boys and young men. An important area of intervention is also responsible use of technology. In this regard, educational campaigns on "digital hygiene" and balancing online and offline relationships are needed, as well as initiatives using the internet for real social integration, such as local support groups, face-to-face meetings, and volunteering activities. No less important is the development of local communities and meeting places. This requires investing in cultural centers, neighbor-

hood centers, libraries, and youth and senior clubs as spaces for building social bonds. It is also crucial to support volunteering, intergenerational initiatives, and mentoring programs connecting younger and older generations.

ROMANIA

According to Kiss (2013), the history of psychopedagogy in Romania was marked by the transition from the communist model (1948–1989), which often neglected well-being in relation to the desideratum of economy and productivity, to a modern interdisciplinary science (since 1990) aimed at social and professional inclusion. During the totalitarian period, people with intellectual and developmental disabilities (IDD) were often marginalized or "hidden" in institutions, which founded a culture of isolation. Today, although the legislative framework has changed and the Pre-university Education Law no. 198/2023 (Legea nr. 198/2023) provides a modern perspective on services for students with IDD, the loneliness of young adults with IDD remains a major barrier to the normalization of their lives.

The problem of social isolation is a national one. According to data from the Autoritatea Națională pentru Protecția Drepturilor Persoanelor cu Dizabilități (ANPDPD, 2024), at the end of 2023 approximately 923,578 people with disabilities were registered in Romania, a significant part of which are young adults with IDD. Their condition is aggravated at the time of transition from the protection system. According to the SOS Children's Villages study (SOS Satele Copiilor România, 2020), during the period 2014–2017, 13,151 young people left the protection system, of which 22.4% were young people with a degree of disability. Loneliness is manifested by the lack of support networks. Data indicate that 3 out of 4 young people with disabilities come from residential services, and of these, 60% do not achieve an independent life, but are transferred directly to residential centers for adults, perpetuating a vicious circle of segregation.

If during the totalitarian period isolation was dictated by institutionalization policies, today loneliness is the product of a human capital gap. According to the SOS Satele Copiilor România (2020) study, the rate of young people who are not in employment, education or training (NEET) is 34% among those who have left the system, compared to 18.9% in the general population. This trend shows that isolation has transformed from a physical one to a socioeconomic one, where the young person with IDD, although present in the community, remains invisible and devoid of meaningful interactions.

According to Verza & Verza (2011), young people with IDD suffer from functional limitations, especially in communication, which prevent them from adapting quickly to the flow of social information. Fragile verbal communication becomes a major barrier in establishing relationships. According to the SOS Satele Copiilor România (2020) study, preparation for independent living is often theoretical and not practical. Young people leave the system without the skills to navigate complex social relationships, without social support, which leads them to social withdrawal. Lack of trust in others, caused by the absence of parental affection and traumas in the system, fuels isolation.

The consequences of loneliness are devastating on an emotional and economic level. According to Verza & Verza (2011), isolation leads to total disorientation for both the young person and the family. According to SOS Satele Copiilor România (2020), 22.7% of young people leaving the system live in severe material deprivation. Only 70% assess their health as good (compared to 98% in the general population), loneliness being correlated with neglect of chronic diseases. The lack of a circle of friends exposes these young people to major risks, such as trafficking networks or exploitation, out of a desperate desire to belong.

The impact of loneliness on young people and adults with intellectual and developmental disabilities in Romania is determined by a complex interaction between communication barriers and structural personality traits, in the absence of a stimulating environment. According to Verza & Verza (2011), intellectual disability represents a global insufficiency that affects the ability to orient and adapt, generating a profile marked by a tendency towards self-isolation. Bodea Hațegan (2016) emphasizes that language has a vital social function, allowing the establishment of proximity bonds, but young people with IDD often present fragile and incoherent communication that deprives them of the tools necessary for interaction. This isolation is aggravated because the social environment does not include them in a permanent communication system, leading to a decrease in skills below the minimum level of social adaptation. The lack of specific transition services to adulthood turns loneliness into a structural barrier, with young people with IDD facing a massive risk of socio-economic exclusion. Although Roșan (2015) and Gherguț (2023) advocate for scientifically validated interventions and inclusive education, in reality, independent living preparation services are often "theoretical", leaving young people without practical social navigation skills.

The long-term consequences of the lack of post-protection monitoring and support services are devastating for the individual's mental health and autonomy. Prolonged isolation leads to states of social disorientation, undermining recovery and compensation efforts. Recent studies (SOS Satele Copiilor România, 2020) indicate that, due to the absence of transitional housing and ineffective monitoring (4 out of 10 young people being lost from records after leaving the system), many adults with IDD end up being transferred back to adult residential centers. This systemic failure perpetuates a pattern of institutional segregation, where loneliness becomes a chronic state of dependency, depriving these young people of a fundamental sense of belonging or "homeliness."

SWEDEN

Loneliness constitutes a growing societal concern with significant consequences for the health, social participation, and educational experiences of children and young people, particularly for individuals with disabilities. A substantial body of research consistently demonstrates that persons with disabilities, especially those with intellectual disabilities, face a heightened risk of loneliness compared to the general population (Emerson et al., 2021; Macdonald et al., 2018; Merrells et al., 2019). In Sweden, recent data indicate that approximately 8% of the population aged 16 years and above report experiencing loneliness, with a similar proportion indicating that they do not have a close friend. When disaggregated by age, 5% of young people aged 16–29 report being lonely (Public Health Agency of Sweden, 2024). Although this proportion may appear modest, it is noteworthy given that this age group is typically associated with relatively high levels of social activity. Furthermore, approximately 13% of young people report lacking someone with whom they can share their thoughts and feelings (Public Health Agency of Sweden, 2025). Among persons with disabilities, the situation is more pronounced; approximately 14% report not having a close friend, which is roughly double the proportion observed in the general population (Public Health Agency of Sweden, 2024). Similarly, among school-aged children (11–15 years), one in six reports often or always feeling lonely, while around 10% indicate that they are unable to discuss their problems with friends (Public Health Agency of Sweden, 2025). Although reliable national statistics for students with intellectual disabilities in Sweden remain limited, it is reasonable to assume, based on existing international research, that the prevalence of loneliness within this group is likely to be higher.

In Sweden, loneliness is conceptualized and categorized into three distinct forms: involuntary loneliness, existential loneliness, and social loneliness (Public Health Agency of Sweden, 2024). Involuntary loneliness refers to a subjective and negative emotional state that arises from a discrepancy between an individual's desired and actual level of social relationships. Existential loneliness, by contrast, is understood as a deeper and more profound experience, characterized by a sense of disconnection from others and from one's broader sense of existence; it is often associated with challenging life circumstances, experiences of loss, or the end of life. Social loneliness, in turn, is defined as the absence or insufficiency of a social network and meaningful interpersonal relationships. However, for the purposes of this chapter, loneliness is understood primarily in terms of involuntary loneliness.

A range of factors have been identified as contributing to loneliness. A literature review conducted by the Public Health Agency of Sweden (2024) highlights several risk factors associated with loneliness. Although these factors may not be entirely specific to the Swedish context, they nonetheless provide valuable insight into its underlying causes. Identified risk factors include physical and mental health challenges, individual-level barriers such as personality traits and ineffective coping strategies, as well as social and environmental factors, including bullying, unsafe family environments, and the loss of loved ones. In addition, individuals with disabilities may face particular challenges in establishing and maintaining friendships. These difficulties are often compounded by negative societal perceptions and stigma associated with disability, which can further increase the risk of loneliness. Within the school context, a recent Swedish study demonstrates that loneliness may be influenced by academic demands, as well as by the educational and physical environment. It also emphasizes that disability – whether in interaction with school-related demands or independently – can constitute a significant factor contributing to experiences of loneliness (Strindberg, 2025).

Loneliness has a wide range of negative consequences for individuals. A literature review by the Public Health Agency of Sweden (2025) identifies several adverse outcomes associated with loneliness, including mental health problems, an increased risk of depression and anxiety, increased risk of suicidal thoughts and behaviours, and an overall increased risk of mortality. In the educational context, loneliness negatively affects students' schooling. Research shows an association between loneliness and negative educational outcomes (Jefferson et al., 2023). A Swedish study indicates that loneliness is

associated with negative experience of school (Strindberg, 2025), and a negative impact on academic performance is reported by Friends (2023). These effects may be even more pronounced among students with intellectual disabilities. Given that such students may already encounter challenges related to learning, the experience of loneliness can further limit their ability to actively participate in educational activities. Consequently, loneliness may exacerbate existing difficulties, which adversely affects both their well-being and their academic performance.

In response to the growing concern of loneliness, particularly involuntary loneliness, the Swedish government has undertaken efforts both to deepen understanding of the phenomenon and to implement targeted measures to address it. As part of these efforts, the Public Health Agency of Sweden was commissioned in 2024 to map existing research on involuntary loneliness and its consequences, both in general and among specific groups, including persons with disabilities and older adults. The overview included 12 Swedish studies conducted between 2020 and 2024, with a majority focusing on loneliness among older populations and just one on persons with disabilities. Nevertheless, the review identified several interventions that may contribute to reducing involuntary loneliness in these studies. These include digital and animal-assisted interventions, behavioural therapy, support groups, social competence training, mindfulness, digital support, and psychoeducational interventions (Public Health Agency of Sweden, 2024). In terms of governmental action to address loneliness, Sweden has introduced a national strategy aimed at reducing loneliness and fostering a sense of community for the period 2025–2029. By titling the national strategy "Standing Together," the strategy emphasizes that combating loneliness is a shared societal responsibility involving stakeholders from the public and private sectors, as well as civil society. The overarching goal is to "achieve a society with equal opportunities for social relationships" (Public Health Agency of Sweden, 2025, p. 4). Recognizing that certain groups such as persons with disabilities face greater barriers to social participation, the strategy adopts an equity-oriented perspective. By focusing on the equalization of opportunities, it underscores that all individuals, regardless of their circumstances, should have equal access to an active social life. To this end, the strategy outlines three sub-goals: (i) ensuring that social spaces are accessible to all, (ii) reducing barriers to social participation, and (iii) decreasing the number of individuals experiencing long-term loneliness.

To achieve these goals, three primary approaches are proposed: (i) enhancing legitimacy and reducing stigma, (ii) raising awareness, and (iii) fostering collaboration for joint solutions. With regard to the latter, the strategy reiterates the importance of coordinated action among stakeholders and clearly delineates their respective roles in addressing loneliness.

While these initiatives represent an important step forward, their effectiveness will depend on sustained implementation and ongoing evaluation. Although a population-wide approach is valuable, it is equally important to maintain a clear and explicit focus on groups that are disproportionately affected by loneliness, such as individuals with disabilities, particularly those with intellectual disabilities. A multi-stakeholder approach, as articulated in the national strategy, is especially critical in this regard. Collaboration among key sectors – including education, healthcare, and social services – is essential, as these are central arenas in which loneliness manifests and affects the daily lives of individuals with intellectual disabilities. Coordinated and sustained efforts across these domains are therefore necessary to achieve meaningful and long-term positive outcomes.

Finally, an important prerequisite for effectively addressing loneliness among persons with intellectual disabilities in Sweden is the availability of reliable data and further research. At present, there is a lack of comprehensive and reliable statistics on the prevalence of loneliness within this population and across different age groups within the population. Such data are crucial to understanding the scope and distribution of the issue, and for informing both policy and targeted measures. Moreover, there is a notable absence of Swedish research specifically examining loneliness among individuals with disabilities generally, and intellectual disabilities. Addressing this gap should be considered a priority in future research efforts.

CONCLUSION

Based on the descriptions of the issue of loneliness in the four different countries, some conclusions can be drawn. Whilst loneliness is a phenomenon experienced by the wider population, it is an even greater problem when it comes to persons with disabilities, especially persons with intellectual disabilities. They tend to be at increased risk of experiencing loneliness and, in practice, experience loneliness at significantly higher levels than the general population. While loneliness has been and is still in many regards a hid-

den adversary, it gained some visibility during the COVID-19 period, with the closing down of schools, limited social interaction due to restricted mobility, and social distancing.

It is increasingly being recognised and discussed in the post-COVID years; however, much remains to be done in terms of deepening understanding and effectively addressing the issue of loneliness in the wider population and among risk groups such as persons with different disabilities. Although conceptualisations may differ slightly across countries, the root causes of loneliness are multi-faceted, ranging from biopsychological to structural factors. Importantly, there appears to be convergence in viewing loneliness as a societal issue that negatively impacts individuals' health and well-being, as well as their educational and social lives.

Whilst some countries have made clear political efforts to address loneliness more generally, others have included it as an issue within broader disability policy, particularly in relation to persons with intellectual disabilities. However, in contexts where government measures have been introduced, there remains a need to clearly articulate and implement provisions that specifically address loneliness among persons with disabilities, especially those with intellectual disabilities, bearing in mind both their heightened risk and lived experience of loneliness.

Addressing loneliness among persons with intellectual disabilities must be a multi-sectoral, multi-stakeholder endeavour, involving all relevant actors and essential service providers, including education, health, and social care services. Moreover, for such efforts to yield meaningful and sustainable outcomes, they should involve co-production with advocacy groups. Failure to do so would limit the ability to fully understand and respond to the interests and needs of persons with intellectual disabilities.

Another significant challenge is the lack of reliable statistics on loneliness among persons with disabilities, particularly those with intellectual disabilities, across all countries. Available data are sparse at best. In addition, there is an urgent need for more focused research on loneliness in this population, as relatively little research currently examines this issue. Targeted policies and measures would benefit substantially from stronger evidence and data. There is, therefore, a clear need to address this research gap. Crucially, such research should also adopt an interdisciplinary approach, reflecting the complex intersections between education, health, and social care in understanding and addressing loneliness among persons with intellectual disabilities.

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Inclusive Education and Neurodiversity: Theory, Research and Practice

In a world where education places a strong emphasis on performance and competition among learners, some neurodivergent individuals may experience feelings of isolation and frustration. This is why it is essential to better train ourselves in inclusive pedagogy and in taking neurodiversity into account in order to improve our support practices for these individuals.

From review notes by: Prof. Obrillant Damus, Professor at the State University of Haiti, Associate Professor at the University of Sherbrooke, Canada.

The heart of the book is its insistence on three adamantine supports: DIGNITY, EMPATHY, and SUSTAINABLE INCLUSION. Among many noteworthy accomplishments of this book is its perfect unwavering pitch. Having early on established these bulwarks, the book never wavers. The four dedicated editors – Madalińska-Michalak, Odrowąż-Coates, Siedler, and Kalkan - employ all their skills to ensure that each entry follows the path laid out originally.

From review notes by: Prof. Mark Bernheim, Miami University, USA.

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