Department for Education

Behavioural and social communication interventions for children and young people with SEMH and autism: a rapid evidence review

Research report

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Executive summary

Background

This report is informed by the definition of SEMH set out in the SEND Code of Practice. Nevertheless, the report's findings are relevant in the context of the new areas of development proposed in the recent Schools White Paper and SEND Reform Consultation document: Putting Children and Young People First.

The Special Educational Needs and Disabilities (SEND) Code of Practice (DfE/DoH, 2015) defines Social, Emotional and Mental Health (SEMH) needs as a broad category of emotional, behavioural and social difficulties that may affect learning, participation and wellbeing. In the SEND Code of Practice (DfE/DoH, 2015), autism is identified under the Communication and Interaction area of need. Autism is a neurodevelopmental condition characterised by differences in social communication and interaction, alongside restricted or repetitive patterns of behaviour, interests or sensory responses (American Psychiatric Association, 2022).

SEMH needs and autism represent a substantial proportion of identified needs within mainstream schools in England. They may and do frequently co-occur with other developmental or learning needs, resulting in complex, heterogeneous profiles. The behavioural and social communication difficulties associated with autism and SEMH needs can have a negative impact on pupils' ability to access learning, engagement and attainment. Therefore, evidence-informed interventions are critical to improving outcomes and enabling autistic children and young people, and those with SEMH needs to achieve their full potential.

This report synthesises the available evidence on interventions and strategies designed to improve behavioural and social communication outcomes for autistic children and young people and those with SEMH needs in mainstream education. This report is part of a wider review of evidence to support children and young people with SEND in mainstream education settings published in 2025. While previous publications in this series have focused on the identification of children with SEND, and reported on interventions targeting academic outcomes (that is, reading, writing, maths, science, and general attainment), this report reviews evidence around approaches to support behavioural and social communication outcomes specifically for autistic pupils and those with SEMH needs.

Approach

The evidence was gathered through a rapid evidence assessment (REA), with a literature search designed to identify key findings on the effectiveness of interventions and strategies used to support autistic children and young people, as

well as those with SEMH needs, that are relevant to educators in mainstream settings.

Key Findings

This REA identified 73 systematic reviews examining support and intervention strategies that mainstream educators can use to address behavioural and social communication outcomes for autistic children and young people, and those with SEMH needs.

Of the systematic reviews identified in our search, the majority focused on autistic pupils (61 reviews) and 12 papers focused on children and young people with SEMH. Text boxes with summary of findings for each type of support and intervention strategies appear at the end of each of the sections in the report. Further tables summarising different strategies and the evidence identified in this REA can be found in the Appendix.

Across the evidence base, a range of approaches show positive effects, particularly on short-term, observable behaviours. Peer-mediated interventions were found to improve social engagement and communication for many autistic pupils, especially in early years and primary settings. Structured behavioural supports such as activity schedules, Check In Check Out, and Daily Behaviour Report Cards are associated with small to moderate improvements in classroom behaviour, particularly for pupils with Attention Deficit Hyperactivity Disorder (ADHD) or those at risk of emotional and behavioural difficulties. Physical activity interventions are linked to reductions in challenging behaviour and improvements in self-regulation, with stronger effects for more intensive and sustained programmes. Naturalistic developmental behavioural interventions, play-based approaches, LEGO therapy, structured social skills programmes, video-based interventions, and some technology-based tools also demonstrate positive but variable effects, particularly for social-emotional functioning, emotion recognition, and on-task behaviour.

However, impact is highly contingent on implementation quality, dosage, practitioner training, and contextual fit. Intervention intensity varies substantially across models and appears to be related to outcomes. Effectiveness is also moderated by child age, profile of need, and design features such as peer training and fidelity to established protocols. While some approaches, such as video modelling, demonstrate effectiveness in specific domains, their maintenance, generalisation, and social validity are often poorly assessed. This means that it is not possible to conclude whether positive outcomes of the approaches persist over time or whether they can be generalised across other settings, pupils, or activities. Most studies focus on short-term behavioural indicators, with limited evidence regarding sustained

behavioural or social communication changes, relational inclusion, or broader academic or psychosocial outcomes.

The research base varies in both quality and methods. Inconsistencies in intervention design, outcome measurement, and reporting limit generalisability. Many studies do not meet rigorous methodological standards, and there is limited evidence on long-term impact in mainstream classroom contexts. Due to the rapid nature of this review and its focus on systematic reviews and meta-analyses, newer or practitioner-led approaches may not have been captured in this report.

Conclusions

In summary, no single intervention is universally effective in addressing behavioural and social communication needs for all autistic pupils or pupils with SEMH needs. Successful practice depends on careful matching of intervention type, intensity, and delivery conditions to pupil needs, alongside adequate training and reliable outcome monitoring. Future research should prioritise robust study designs and investigate whether effects are maintained over time and generalise beyond the intervention context. There is also a need to examine how outcomes may vary depending on settings and pupil characteristics in mainstream schools.

Introduction

The recent Schools White Paper and SEND Reform Consultation document: Putting Children and Young People First, sets out the intention to establish an expert panel to support the DfE to refresh the areas of need set out in the SEND Code of Practice to better reflect the key areas of child development - renaming them 'areas of development'. It is proposed that the new areas of development should be: Executive Function, Motor and Physical; Sensory; Speech, Language and Communication; Social and Emotional. The DfE are continuing to work with experts on the definitions of these five Areas of Development.

The proposed change to the labelling of SEMH to Social and Emotional will bring SEMH in line with the other areas of development which do not lend themselves to specific clinical intervention. It will bring clarity, supporting effective collaboration and appropriate boundaries between what educators should lead and respond to, and where support should be led by health professionals with the collaboration of schools, as with other medical and clinical issues such as epilepsy or diabetes.

Although this report is informed by the definition of SEMH set out in the SEND Code of Practice, the report's findings are relevant in the context of the proposed new areas of development.

Introduction to SEMH

In the 2024/25 academic year in England, approximately 1.44 million pupils with identified special educational needs (SEN) were educated in mainstream state-funded primary and secondary schools. This includes around 1.17 million pupils receiving SEN support, and a further 271,000 pupils with an Education, Health and Care (EHC) plan. As of 2025, 23.6% of pupils (279,230 pupils) receiving SEN support have Social, Emotional and Mental Health (SEMH) needs identified as their primary need, alongside 16% (71,304 pupils) with an EHC plan (DfE, 2025).

SEMH needs refer to a wide range of emotional, behavioural, and social challenges that can impact learning, engagement and participation, mental health, and wellbeing. As defined in the SEND Code of Practice (DfE/DoH, 2015), SEMH does not refer to a specific diagnosis but to a broad category of need that may be expressed through externalising behaviours (for example aggression, oppositionality) or internalising behaviours (for example, anxiety, withdrawal), often in combination. For example, one pupil may present with persistent defiance and disruption, while another may appear quiet and disengaged, yet both may be experiencing underlying emotional distress.

Additionally, SEMH needs frequently co-occur with other learning or developmental needs, including language or communication difficulties (Hentges et al., 2021),

literacy difficulties (Pickren et al., 2024; Hurry et al., 2018), and autism (Chandler et al., 2016; Maskey et al., 2013), which can lead to a complex profile of strengths and challenges which require comprehensive assessment and support. In line with the needs-based perspective adopted by the SEND Code of Practice (DfE/DoH, 2015), this report recognises the importance of identifying and responding to individual profiles rather than focusing solely on behaviours or diagnostic labels. However, awareness of the distinct characteristics of conditions that fall under the SEMH category, such as ADHD, anxiety, or depression, can support a better understanding of how they present in educational settings. These are described briefly in the following paragraphs.

Some children with SEMH needs may experience a range of underlying mental health difficulties. According to NHS Digital survey data in England, around one in twelve (8.1%) children and young people aged 5 to 19 years were identified as having an emotional disorder, including anxiety or depression (Sadler et al., 2018). Prevalence was substantially higher among those with recognised special educational needs, at 20.3%. Anxiety disorders accounted for 7.2% of this group with conditions such as generalised anxiety disorder (GAD), social anxiety disorder (SAD), obsessive-compulsive disorder (OCD), and post-traumatic stress disorder (PTSD) often affecting school participation and performance. These disorders manifest through a variety of symptoms, including emotional, behavioural, and physiological changes (Albano et al., 2003), and require sensitive recognition and support from educational professionals. Anxiety is particularly prevalent in neurodivergent populations, including autistic children and young people, where comorbid rates are significantly elevated (Barlattani et al., 2023; Bougeard et al., 2024; Kent & Simonnoff, 2017).

Mood disorders such as major depression and bipolar disorder also affect a smaller but significant proportion of school-age children, with rates increasing through adolescence (Kessler et al., 2001; Spoelma et al., 2023; WHO, 2024). These conditions may present as persistent low mood, loss of motivation, emotional volatility, or suicidal ideation (Elliott & Smiga, 2003; Lee et al., 2019; Sagar et al., 2012). They frequently intersect with school disengagement, poor academic outcomes, and social difficulties (Lin et al., 2021). Again, prevalence is higher among children with neurodevelopmental conditions, particularly autism (Hudson et al., 2019; Postorino, et al., 2016).

It should be noted that not all children with mental health difficulties such as anxiety or depression will have special educational needs. These difficulties do not automatically meet the threshold for SEND under the SEND Code of Practice, which requires that difficulties lead to a need for special educational provision, which may not always be the case for these children and young people.

Attention Deficit Hyperactivity Disorder (ADHD) is characterised by persistent challenges with inattention, hyperactivity, and impulsivity (defined as action taken without foresight; Lange et al., 2010). These pupils may exhibit externalising behaviours (for example, hyperactivity, oppositionality) or internalising symptoms (for example, anxiety, low self-esteem), particularly when ADHD co-occurs with other conditions.

The development and expression of SEMH needs are influenced by a range of interacting factors, including biological vulnerability, school experience, trauma exposure, discrimination, and the presence of other special educational needs or disabilities. Without timely identification and support, SEMH needs can escalate and contribute to long-term adverse outcomes, such as academic underachievement, exclusion, and reduced participation in education, employment, or training (Arnold & Baker, 2013; Hurry et al., 2018; Martin-Denham, 2020; Nye et al., 2016). It is therefore important that schools and early years settings adopt a proactive, evidence-informed approach to the early identification and educational support of SEMH needs, framed by collaboration with families and specialist services.

Introduction to Autism

In England, the prevalence of autism has been increasing. According to the Department for Education's data (DfE, 2025) for the academic year 2024/25, 9.7% of pupils receiving SEN support have autism as their primary need, up from 4.7% in 2015/16. Autism is the most common type of need among pupils with an EHC plan, accounting for 33.6% of all cases. This represents a significant portion of the pupil population requiring additional support. The term 'disorder' reflects an outdated medical model of disability, and many autistic people, parents and carers, and researchers alike reject the word 'disorder' (Cook, 2022). Therefore, throughout this review, "autism" will be used in place of "Autistic Spectrum Disorder (ASD)" to be in keeping with the neurodiversity-affirming approach. Additionally, recent studies found that autistic people and other close stakeholders prefer identity-first language, particularly in the UK (see Kenny et al., 2016). Therefore, we will also adopt this language in the report.

The Diagnostic and Statistical Manual of Mental Disorders (APA, 2022) classifies autism as a neurodevelopmental disorder and specifies two main criteria for diagnosis. The first is persistent difficulties in social communication and interaction (for example reduced social-emotional reciprocity, atypical nonverbal communication, and difficulties forming and maintaining relationships). Autistic individuals may find it difficult to communicate or understand others, particularly when interpreting non-literal (figurative) language and social cues. Social communication difficulties are evident early in development. For example, difficulties in joint attention (that is, the ability to show interest, share a focus of attention, and

follow gaze) are generally considered an early indicator of autism. There may be inappropriate responses or misinterpretations in communication and a limited use of social smiles or gestures. The second criterion is restrictive and repetitive patterns of behaviour, interests, or sensory responses (for example repetitive movements or speech, insistence on sameness, intense fixated interests, or unusual responses to sensory input; American Psychiatric Association, 2022).

The profile of autism is highly heterogeneous, with the type and severity of needs varying considerably between individuals. For example, some autistic children and young people may have difficulties with verbal communication, while others may have good oral communication and language skills but poor social communication skills. Co-occurring conditions are common, such as epilepsy, speech and language difficulties, dyslexia or ADHD (for example Bougeard et al., 2024; Tager-Flusberg & Dominick, 2011). Autistic children and young people may also have mental health difficulties. For example, ADHD is reported in 50 to 70% of autistic individuals, and anxiety is also highly prevalent, with some studies reporting rates of up to 84% (White et al., 2009). Thus, it is necessary to understand the different strengths and challenges faced by individual autistic learners to support their needs appropriately.

It is also important to note that our understanding of autism has changed as research has advanced. Due to the challenges in reliably distinguishing between autism, Asperger's syndrome, and Pervasive Developmental Disorder (PDD), and concerns about the usefulness of these separate categories, the latest edition of the DSM (American Psychiatric Association, 2022) has removed Asperger's syndrome and PDD, instead conceptualising autism as a spectrum. In addition, the requirement for speech delay for autism diagnosis has also been eliminated; instead, difficulties in reciprocal conversation are recognised as a potential indicator of impaired social-emotional reciprocity. The criteria for stereotyped behaviours have been expanded to include hyper- or hypo-reactivity to sensory input. As with earlier definitions, onset must occur in early childhood, and symptoms must be severe enough to impair daily functioning. While our REA is designed to ensure findings are relevant and meaningful, it is important to note that some of the language in the sources may be outdated, as some studies included in this REA were published before the current DSM update. Some examples are the use of "functioning" (high-functioning, low-functioning) labels, severity labels (including mild, profound, severe, moderate), and Asperger's, all of which are now outdated. While we aim to report findings accurately, we will also highlight instances where language or perspectives may be outdated.

Supporting behavioural and social communication outcomes

This REA investigates support and interventions that address behavioural and social communication outcomes for autistic children and young people, as well as those

with SEMH needs. Behaviour and social communication are central components of child development and are also important to allow children and young people to engage and participate in education meaningfully. These skills develop over time through repeated exposures between the child and their environment and are shaped by cognitive and emotional factors.

In educational and developmental science, behaviour is typically defined as observable actions and responses that arise from the interaction between the individual and their environment. Behaviour is influenced by environmental and social contexts, as well as a child's neurodevelopmental profile as articulated in social learning theory and ecological models of development (Bandura, 1977; Bronfenbrenner, 1979). Within educational contexts, behaviour encompasses not only overt acts such as disruption or withdrawal, but also engagement, on-task behaviour, self-regulation, peer interaction, and responses to adult instruction.

For autistic pupils and those with SEMH needs, behavioural presentation is also often closely intertwined with social communication differences. In autism, core diagnostic features include differences in social communication and interaction (American Psychiatric Association, 2022), and these differences can directly influence classroom behaviour through misunderstandings, anxiety, sensory overload, or difficulty interpreting social expectations. Similarly, in pupils described as having SEMH needs, difficulties in emotion regulation and interpersonal relationships frequently co-occur with language and communication challenges (Clifford et al., 2020; Hollo et al., 2014). For example, children with or at risk for SEMH needs may have poorer student-teacher relationships and peer relationships and interactions than typically developing peers (Magg, 2006; Williford et al., 2017). This can lead to challenges with group-based activities or sharing (Ettekal & Ladd, 2014). Externalising behaviours are associated with difficulty in developing friendships and greater peer stigma (Rubin et al., 2018). These difficulties in relationships can then lead to predominantly negative interactions among children and adults (at both home and schools), which could further exacerbate negative experiences.

Social communication skills, such as joint attention, pragmatic language, perspective-taking, and conversational reciprocity, are integral components of classroom participation. Children who are described as having behavioural difficulties may also have poorer quality relationships (Humphrey et al., 2011**;** Lewis et al., 2016). Improvements in these domains can also reduce behaviours that are interpreted as disruptive or disengaged by increasing a pupil's capacity to understand expectations, negotiate social situations, and seek support appropriately (Simonsen et al 2012; Timler et al., 2005). From a whole classroom and ecological perspective, behaviour is embedded within the wider learning environment, and interventions that modify interaction patterns, communication clarity, and peer

dynamics may shift behavioural outcomes even when they do not directly target behaviour as the primary endpoint.

A substantial body of research indicates that some children, including autistic pupils and those identified with SEMH needs, may experience differences or delays in aspects of this developmental pathway. In autism, differences in social communication, sensory processing, and flexibility are well documented and form part of current diagnostic criteria. Pupils described as having SEMH needs may experience persistent difficulties with emotion regulation, impulse control, anxiety, or relational trust. These difficulties may lead to differences in different behavioural outcomes observed in educational settings. For example, children with externalising difficulties may demonstrate greater levels of developmentally inappropriate behaviour such as hyperactivity, inattention, disobedience, impulsivity, and disruption (Daley et al., 2014; Doepfner et al., 2004). These children may also show difficulties following directions or completing work in a timely manner (DuPaul & Stoner, 2014).

A lack of participation and engagement can lead to poorer academic performance, absences or exclusions from school (Sprague & Walker, 2000). Longitudinal research shows that early emotional and behavioural difficulties are associated with later academic and social outcomes, particularly where support is inconsistent or poorly matched to need (Hammer et al., 2017; McLeod et al., 2004; Propper, 2015). Longer-term outcomes may also be affected, including unemployment (Healey, Knapp, & Farrington, 2004) and mental health (Sourander et al., 2005).

Within school contexts, behaviours that are framed as disruptive, oppositional, withdrawn, or socially inappropriate are often responses to perceived demands, uncertainty, sensory overload, or stress and frustration (for example Hebron & Humphrey, 2014; Moilanen et al., 2010). In both autism and SEMH, behavioural expression frequently reflects attempts to regulate distress, gain predictability, secure attention, or avoid overwhelming situations. For example, children who have reading difficulties (Morgan, Farkas, Tufis, & Sperling, 2010) or poorer academic performance (McIntosh, Flannery, Sugai, Braun, & Cochrane, 2008) are more likely to display behaviour difficulties than those who experience academic success.

Behaviour challenges may therefore be understood as a product of unmet needs rather than purposeful non-compliance. Therefore, supporting these needs can help improve meaningful participation in learning and the education environment. Here, skills such as emotion regulation, attention control, flexibility, and socially appropriate communication support access to the curriculum, reciprocal classroom relationships, and sustained engagement in classroom activity. Longitudinal evidence indicates that early behavioural and self-regulatory skills predict later academic attainment and social adjustment (Moffitt et al., 2011; Blair and Raver, 2015). From this perspective, interventions targeting behavioural outcomes are fundamentally concerned with

strengthening capacities that underpin participation and inclusion rather than simply reducing challenging acts.

It is important to avoid locating these behavioural and communication difficulties solely within the child. Developmental research increasingly conceptualises behaviour and social functioning as emerging from dynamic interactions between individual characteristics and environmental contexts. From this perspective, difficulties arise not simply because a child lacks a skill, but because there is a mismatch between the child's profile and the demands, expectations, or affordances of their environment. The same pupil may therefore function very differently across settings, tasks, or relationships.

It is also important to note that support and intervention approaches should be carefully considered and should engage the point of view of the individual child as far as possible. Interventions that focus narrowly on observable behaviour or social communication may encourage masking or suppression, particularly among autistic pupils (Hull et al., 2017). Here, an intervention may appear successful in changing the behaviour of the child, but there may still be underlying stress or cognitive load. Masking can also lead to poor mental health outcomes for autistic individuals (Cook et al., 2021; Evans et al., 2024). Further, the goal of an intervention is to support the child by increasing engagement and participation. Therefore, it is important to distinguish between outcomes that are genuinely pupil-led and those that are imposed by adults, where reducing a behaviour or improving social skills reflect adult priorities rather than the child's own goals or wellbeing. A developmental, context-sensitive approach requires explicit consideration of whose outcomes are being prioritised and whether change reflects improved participation and agency, rather than mere conformity to normative expectations.

Aims

In 2025, our research team, in collaboration with the Department for Education, published a set of reports that reviewed the evidence base for support and intervention approaches targeting academic outcomes (for example maths, reading, science, and general attainment). However, our initial literature search yielded studies that investigated a much wider range of non-academic outcomes, supporting pupils' social, emotional, motor, mental health, and behavioural needs. This report aims to add value to our previous work by conducting a comprehensive review of the available evidence related to interventions to support pupils with SEND that address behavioural and social communication needs. Here, we focus particularly on autistic children and young people and those with SEMH needs, aligning with findings in the literature.

In this synthesis, behavioural outcomes are understood broadly as those relating to participation, engagement, regulation, and social functioning within educational

settings. Interventions that strengthen social communication are included when there is a plausible, theoretically-grounded pathway to improved behavioural participation, consistent with developmental and ecological models of child functioning.

Our research questions are as follows.

1. What are the most effective universal and targeted strategies, approaches, or adaptations for supporting autistic children and young people and those with SEMH needs to address behavioural needs?

    a. What is the most appropriate level of delivery (universal, targeted or specialist) for each of these interventions?

    b. What specific age groups are targeted by these interventions?

2. What types of approaches/interventions do autistic children and young people or those with SEMH needs, respond best to?

3. What are the gaps in the available evidence base, and what are the implications for future research requirements?

Methods

To address these research questions, a Rapid Evidence Assessment (REA) was conducted following Cochrane rapid review guidance (Garritty et al., 2024). This REA followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement when selecting relevant articles.

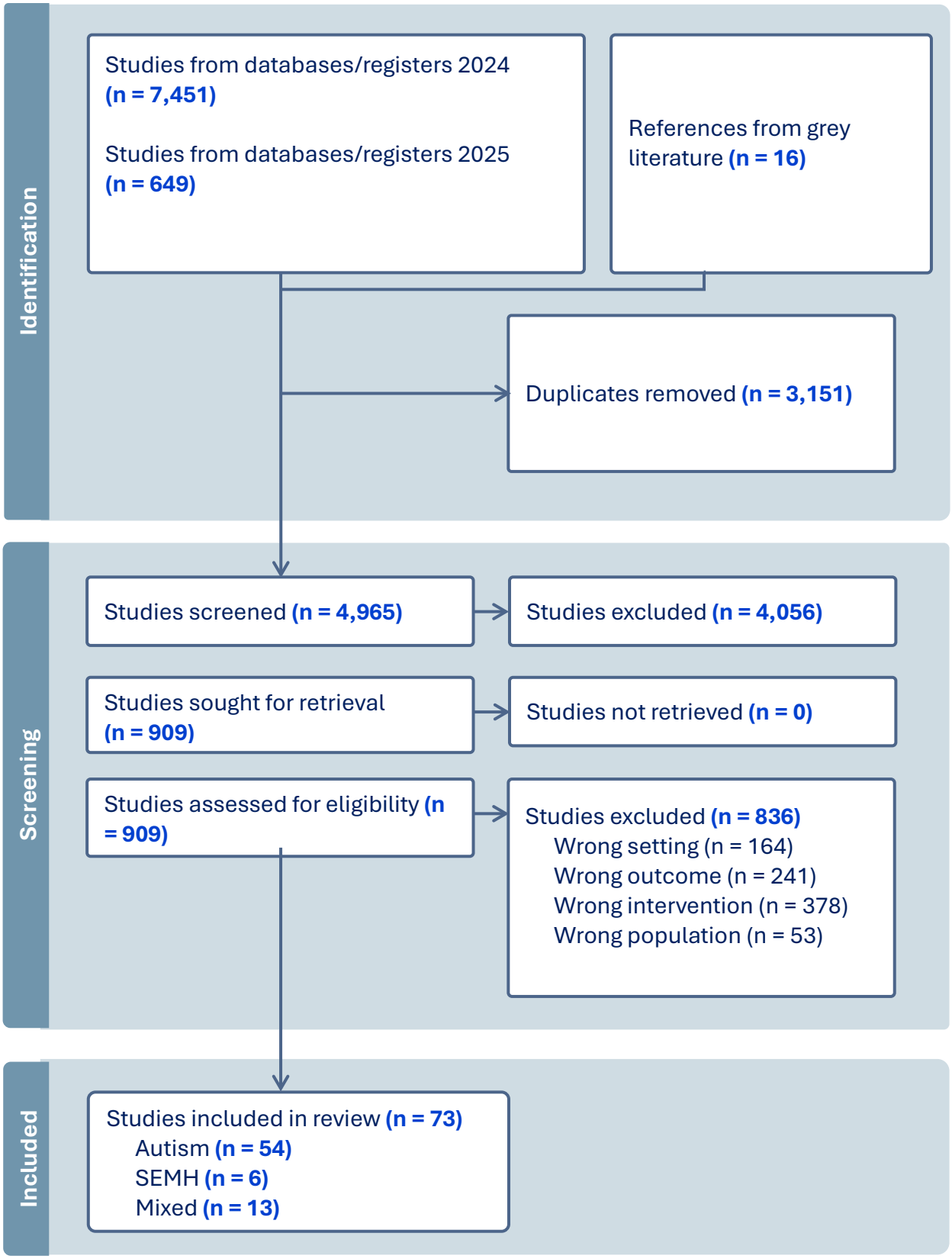
We conducted a targeted search of two academic databases (Scopus: PsychINFO and EBSCO: ERIC) as well as grey literature using specific keywords related to the research questions (see our technical report for a table of search terms). We identified systematic reviews and meta-analyses published in English between 2014 and 2025, focusing on children and young people aged 0 to 25 with identified autism or SEMH needs in mainstream educational settings. Included studies evaluated intervention and support practices that are feasible in UK classrooms, excluding medical, home-based, or highly resource-dependent interventions (for example beyond what is typically available in a mainstream classroom, such as animals, robotics and virtual reality). Additionally, interventions and strategies were included if they could be delivered by a mainstream educator without specialist qualifications. For example, although Cognitive Behavioural Therapy (CBT) is often implemented for autistic pupils and those with SEMH, it is delivered by a trained mental health professional and therefore would be excluded from this REA. Studies reporting measurable behavioural outcomes or social communication outcomes were included.

Initial database searches conducted in Autumn 2024 yielded 7,451 potential records across the five SEND areas. The identified records were pooled into the Covidence systematic review management platform, where 2865 duplicate entries were removed, resulting in 4,587 unique records. A further 16 were identified by searching the grey literature.

An updated search was conducted in November 2025 for the purposes of this current report, which resulted in a further 649 potential records. After duplicates were removed, this resulted in title and abstract screening of 363 papers.

Titles and abstracts of the 4,965 studies were independently reviewed by two researchers, with exclusions applied sequentially based on the predefined eligibility criteria. Any disagreements regarding the eligibility of specific studies were resolved through consultation with a third reviewer to ensure consistency and rigour. A total of 909 potentially eligible studies investigating behavioural or social communication outcomes in autistic children and young people and those with SEMH needs were identified and their full text was screened against the new inclusion criteria. After full-text review of the 909 eligible studies, 73 studies were included for data extraction and reporting. These processes are outlined in a PRISMA flow diagram in Figure 1.

Figure 1. PRISMA Flow Diagram for Rapid Systematic Review



Data from each study were then extracted by trained members of the team. We extracted descriptive information regarding the characteristics of each study as well as information about support strategies from the included papers where available.

Our search efforts focused on high-quality and relevant research, and prioritised peer-reviewed studies with robust methodologies. All studies identified in the final sample are either systematic reviews or meta-analyses. We used the Assessing the Methodology Quality of Systematic Reviews tool 2 (AMSTAR2) (Shea et al., 2017) to evaluate the quality of these studies. Findings suggest that the evidence base was mixed according to this tool. Most studies were rated as demonstrating high or moderate confidence in the results, with some rated as low due to a ‘critical flaw’ (detailed in our previously published Technical Report). The typical critical flaw was that many studies did not conduct a formal risk of bias assessment using a recognised tool (for example ROBINS-I, Cochrane Risk of Bias).

For a full account of our methodology, including search terms, inclusion, and exclusion criteria, extraction variables, and quality appraisal, see the Technical Report.

Findings

The following sections synthesise the findings from the reviews identified in our search that focus on support and intervention strategies suitable for use by mainstream education professionals.

Support for pupils with SEND can be provided at different levels, starting with universal strategies delivered to all pupils through evidence-based 'quality first' teaching approaches. Universal provision consists of evidence-based pedagogical approaches and may be delivered as whole-class teaching, small groups, or even individual activities. When universal approaches are not enough to meet pupils' educational needs, targeted support can be offered, tailored to individual needs, and implemented in small groups or through one-to-one interventions. Finally, if this second level of targeted intervention is still not effectively addressing the needs of pupils, support can be offered at the third level, which consists of specialist support that may involve external professionals such as Speech and Language Therapists, or coordinated multi-agency support (for example through an EHC Plan). This graduated approach to support children's educational needs is well established in the UK educational context (for example see SEND Code of Practice, 2015). Similar models are also used in the US educational context, such as response-to-intervention models (Fuchs & Fuchs, 2006) and multi-tiered systems of support (McIntosh & Goodman, 2016), in which children who do not progress with effective universal treatment are offered more individualised and targeted support. This section will first report on support at the universal level, which involves instructional approaches and classroom support, and then discuss support that is more targeted.

When reporting on intervention and support strategies in this REA, we sometimes refer to effect sizes reported in the studies we reviewed. Effect sizes range from 0 to 1 and indicate how much an approach or intervention differs from the baseline, beyond just whether it works. A small effect (around 0.2) means a modest improvement, a medium effect (around 0.5) suggests moderate improvement or progress, and a large effect (0.8 or more) indicates a strong impact on behaviour and/or communication outcomes.

Additionally, evidence can come from various study designs, each differing in the strength and level of reliability they offer. Single-case designs provide strong evidence of within-individual consistency, making them valuable for understanding how interventions work in specific cases. However, their findings may not be widely generalisable (in other words, applicable to other individuals and/or settings). In contrast, group-design studies such as randomised controlled trials offer more generalisable results across larger populations but may overlook important individual differences in how pupils respond to interventions. Ideally, a strong body of evidence should include multiple types of study designs.

We also refer to standardised assessments or outcome measures versus researcher-created or bespoke outcome measures. Standardised assessments are

norm-referenced tools that have been trialled on large, representative samples to establish reliability (consistency of scores) and validity (that the test actually measures what it claims to measure). These allow for comparison of a pupil's performance with a representative sample of age-matched peers, providing an estimate of whether a pupil is performing above, at, or below expected levels. By contrast, researcher-created or bespoke measures are tailored to the exact targets of an intervention or teaching programme, for example, a bespoke word-definition task featuring the precise vocabulary items taught and practised. Although research-developed measures tend to be more sensitive to incremental progress pupils make over short instructional periods, they lack the normative data and extensive pupil psychometric testing of standardised tools.

It should be noted that some of the techniques reviewed in this section of our REA are applied behaviour analysis (ABA) or are traditionally grounded in ABA theory. The term ABA intervention refers to treatment approaches that: (a) are implemented systematically following the principles of applied behaviour analysis; (b) are applied as early as possible in the child's life, preferably before the age of 3 years; (c) are usually provided in a student-teacher ratio of one-to-one before being used across different settings and contexts; (d) are individualised, comprehensive, and target a great number of skills; (e) incorporate skills that are targeted following a hierarchy based on typical development; and (f) are used in conjunction with programmes educating parents.

Although research (including findings from this REA) has shown positive outcomes for some of these techniques (for example Makrygianni, 2018), it should be noted that some approaches are controversial among educators and autistic individuals. For example, it has been argued that improved outcomes observed with these approaches may result from masking because of negative reinforcement, which is also linked to mental health issues later in development (for research on autistic experiences with ABA, see Anderson, 2023). Further, in England, local authorities may not fund these interventions as part of EHC plans. While we aim to accurately report the data found in our systematic search, we also will keep our recommendations relevant and meaningful based on the most up-to-date understanding and research around autism.

Universal Approaches

A range of inclusive instructional strategies and classroom design approaches can support autistic children and young people, as well as those with SEMH needs, at this universal level. The approaches identified in our REA include physical activity, yoga, and mindfulness.

Physical activity interventions

Five reviews in this REA explored the impact of physical interventions, including yoga and mindfulness, on children with various neurodevelopmental conditions.

Physical interventions (also referred to as exercise interventions or physical activity) have been defined as “activities resulting in energy expenditure that are planned, structured, and repetitive, and purposely completed to target the development of skills used for exercise, including motor and sport skill development, or social skills (Healy et al., 2018, p. 819). These interventions encompass a wide range of physical activities, including but not limited to jogging, running, horseback riding, martial arts, yoga, dance, and swimming. Although a primary goal of physical interventions is to improve physical fitness, a range of secondary goals is also commonly targeted (Healy et al., 2018). These include the development of motor, social, cognitive, and behavioural skills.

One framework for understanding how physical interventions influence cognition and behaviour centres on neurochemical and neurological changes in the brain. Exercise has been shown to elevate levels of the neurotransmitters norepinephrine and dopamine, which are associated with improvements in processing speed, working memory, planning, and problem-solving (Wigal et al., 2012). Exercise also activates key brain regions, particularly the prefrontal cortex and hippocampus, both of which are closely linked to cognitive function and emotion regulation. By increasing blood flow and oxygen supply to the brain, exercise promotes the secretion of brain-derived neurotrophic factor, which supports neuronal growth and survival and further enhances cognitive performance (Wang et al., 2025). It is also thought that repetitive physical activity promotes adaptive changes in the nervous system, enhancing neuroplasticity and synaptic efficiency (Wang et al., 2025). These neuroplastic changes are believed to improve the brain's regulation of motor control, flexibility, and higher-order planning abilities.

Beyond the neurological mechanisms, it has also been suggested that physical interventions can positively impact social skills and behaviour through the environment they provide (Wang et al., 2025). Structured physical activities offer a valuable social context in which children may learn and practise social skills and coping strategies, making the intervention setting itself an important therapeutic component. Factors contributing to this include the nature of physical activity, which naturally encourages appropriate play behaviour and promotes meaningful interaction with peers, siblings, and instructors.

Of the four reviews in our REA, one focused on cognitive and behavioural outcomes in children with ADHD (Suarez-Manzano et al., 2018), two investigated a broad range of outcomes, including cognitive, social, and behavioural domains in autistic pupils (Park et al., 2021; Sorensen & Zarrett, 2014), while one focused exclusively on behavioural outcomes in autistic pupils (Bremer et al., 2016). Although these

studies collectively examined a wide variety of outcomes, the discussion below will focus on behavioural findings, in keeping with the focus of this REA.

Suarez-Manzano et al. (2018) aimed to synthesise 16 studies investigating the effects of physical activity on cognition and behaviour in young people with ADHD aged 6 to 18 years. Physical activity across these studies included walking or running on treadmills, cycling on an ergometer, yoga, table tennis, and water-based activities. Behaviour was most commonly measured across the identified studies using parent and teacher reports, such as the Child Behaviour Checklist, which assesses internalising and externalising symptoms. The authors found little evidence that short-term or one-off sessions of physical activity interventions improved behaviour. However, sustained interventions of at least 5 weeks were associated with behavioural improvements. Notably, regardless of the type of exercise, no negative associations between physical activity and either cognition or behaviour were found.

Bremer et al. (2016) aimed to synthesise 13 studies examining the impact of exercise interventions on behavioural outcomes in autistic children and young people aged 3 to16 years. Exercise interventions across these studies included jogging, horseback riding, martial arts, yoga, dance, and swimming. Behavioural outcomes were grouped into three primary categories: stereotypic behaviour, cognition and attention (including on-task behaviour and academic responding), and social-emotional behaviour (including adaptive skills, social skills, and problem behaviours). Overall, the authors found that exercise can be an effective behavioural intervention for autistic children and young people. They did find that specifically, horseback riding and martial arts produced the greatest results, with moderate to large effect sizes. The authors also highlighted a notable lack of research on exercise type, intensity, and dosage, though they suggested that higher dosage and longer overall study duration were associated with greater and longer-lasting behavioural improvements.

Park et al. (2021) aimed to examine the benefits of physical activity interventions for autistic young people ranging from 4 to 22 years. Limiting their search to single-case design studies, their review included 14 studies that featured a range of physical activity interventions, including swimming, kickball, yoga, dance, jogging, walking, and stretching. Outcomes were categorised into what the researchers termed as ‘problem behaviour’ (for example aggression), academic engagement, compliance, and physical activity performance. In terms of findings, a large effect size was associated with the impact of physical activity interventions on problem behaviour, with reductions in problem behaviour and increases in appropriate behaviour observed during the school day during the period of time where the intervention took place. While no differences in effectiveness were found in relation to setting, interventions implemented by non-teachers (for example researchers) produced greater effects than those implemented by teachers, and sports-related skills interventions produced greater effects than general exercise. The studies included in

this review did not report sufficient information to determine a minimum or optimal intervention dosage.

Sorensen and Zarrett (2014) investigated the benefits of physical activity for autistic children and young people aged 4 to 21 years across multiple areas of functioning, including health, self-regulation, and cognitive performance. They identified 19 studies in total. Of these, 15 examined self-regulation as an outcome. Within this, nine studies found that stereotyped and repetitive behaviours decreased with increases in physical activity, with greater improvements associated with jogging than walking, suggesting that more intensive exercise may be more impactful than low-intensity exercise. Beyond stereotyped behaviour, studies also reported improvements in vocalisations, self-management, and social-emotional functioning, though one study that examined prosocial behaviour found no significant effects. In terms of overall findings, the strongest empirical support was identified for benefits related to self-regulation. The authors also identified prompting, modelling, praise, and structured teaching as highly effective intervention mechanisms when delivering physical activity interventions.

Across these four reviews, there is consistent evidence that physical activity interventions can be effective for autistic children and young people and those with ADHD, particularly in reducing problem behaviour and stereotyped and repetitive behaviours and improving social-emotional functioning and self-regulation. Bremer et al. (2016) and Park et al. (2021) both found large effect sizes associated with reductions in problem behaviour in autistic populations, while Sorensen and Zarrett (2014) found the strongest support for benefits related to self-regulation. For ADHD, Suarez-Manzano et al. (2018) found that while acute physical activity interventions showed little impact on behaviour, longer interventions of at least five weeks were associated with meaningful behavioural improvements, and importantly, no negative associations between physical activity and behaviour were found.

In terms of why certain interventions are more effective, the type, intensity, dosage, and duration of physical activity all appear to be important moderating factors. Sorensen and Zarrett (2014) suggested that more intensive exercise, such as jogging, produced greater improvements than low-intensity activity, such as walking, while Bremer et al. (2016) found that horseback riding and martial arts yielded the greatest effects, and that higher dosage and longer study duration were associated with more lasting improvements. Park et al. (2021) similarly found that sports-related interventions outperformed general exercise, and that interventions delivered by non-teachers produced greater effects than those delivered by teachers, suggesting that the implementer may also play a role. However, all four reviews noted considerable variability across studies and highlighted a lack of research on exercise type, intensity and dosage, meaning the precise mechanisms driving effectiveness remain unclear and warrant further investigation. Although physical exercise can commonly be implemented in mainstream schools through Physical Education classes or recess, it was not clear whether some activities (for example yoga) could be

implemented into daily classroom routines. Further research is needed to examine the extent to which physical activity might be possible in classroom settings.

Yoga- and mindfulness-based interventions

Semple (2019) reviewed eight studies examining yoga- and mindfulness-based interventions for autistic children and adolescents, ranging in age between 3 and 17 years. No systematic reviews addressing yoga- and mindfulness-based interventions for children with SEMH were identified in this REA.

Yoga-based and movement-based interventions included structured yoga programmes and mind-body activities that combined physical postures, breathing exercises, relaxation, and guided verbal instruction. These ranged from intensive multi-month programmes delivered several times per week with home practice (Radhakrishna, 2010; Radhakrishna et al., 2010), to brief daily classroom-based sessions over 16 weeks (Koenig et al., 2012), to shorter group-based movement programmes delivered twice weekly over four weeks (Chan et al., 2013). There was also a study that used a multimodal programme integrating yoga with dance and music, which was delivered over eight weeks in a group format (Rosenblatt et al., 2011). These interventions were typically delivered by trained yoga instructors, therapists, or programme facilitators in clinical or community settings, and in school-based models by teachers or trained school staff within classroom contexts. Across these yoga-related interventions, reported positive outcomes included improvements in communication and imitation skills, increased tolerance of sitting and adult proximity, better motor control, enhanced self-control, and reductions in irritability, hyperactivity, social withdrawal, and broader behavioural difficulties.

Mindfulness-based interventions focused more explicitly on attention regulation and emotional control and included structured meditation practices and group-based mindfulness programmes, sometimes combined with yoga and parallel parent training. Delivery ranged from intensive daily or twice-daily individual practice over several months (Singh et al., 2011a; 2011b), typically supported by trained facilitators or researchers, to weekly 90-minute group sessions over approximately nine weeks delivered by clinicians trained in mindfulness-based approaches (de Bruin et al., 2015). In general, mindfulness interventions were associated with reductions in aggressive behaviour and emotional dysregulation, as well as improvements in social responsiveness, social communication, quality of life, and aspects of flexible thinking.

Although the reviewed studies reported encouraging improvements in areas such as behaviour, communication, and self-regulation, Semple (2019) states that the overall evidence is inconclusive. This is because the studies were generally small, often did not include proper comparison groups, and used different measures to assess outcomes. In many cases, improvements were based primarily on parent or teacher reports rather than independent assessment.

Physical Activity, Yoga, and Mindfulness-Based Interventions Summary

- Physical activity can positively impact behavioural outcomes in autistic children and young people, and those with ADHD. Sustained physical activity interventions appear more effective than short-term or one-off interventions.
- Physical activity is associated with reductions in problem and repetitive behaviours and improvements in self-regulation and social-emotional functioning.
- Higher intensity and structured activities appear to be associated with greater improvements, though optimal type and dosage remain unclear.
- Yoga- and mindfulness-based interventions show promising but inconclusive effects, including improvements in communication and emotional regulation and reductions in behavioural difficulties.
- Further research is needed to establish the most effective intensity, type, and duration of physical activity to maximise behavioural benefits.

Targeted

Addressing behavioural and social communication needs for autistic pupils or those with SEMH needs often requires explicit, individualised strategies. In this section, we review several findings that address targeted support. Although many of these approaches are targeted to the individual needs of the pupils, some can also be implemented in classroom settings at the universal level. This is indicated where relevant. The approaches identified in our REA include activity schedules, behavioural interventions, check-in systems, creative arts, naturalistic developmental behavioural interventions, video-based interventions, and technology.

Activity Schedules

Two reviews in our REA reported on the use of activity schedules to improve on-task behaviour, independent transitions, appropriate peer play, and following schedules for autistic pupils aged 3 to 21 years. No reviews addressing the use of activity schedules for children with SEMH needs were identified in our REA.

Activity schedules are sequences of visual stimuli or cues (for example photographs, pictures, line drawings, or words) representing different tasks or activities for a child to complete (for example a daily routine; McClannahan & Krantz, 1999). The design of the activity schedule should be developmentally appropriate, and systematic instruction in using the activity schedule can be provided by teachers via manual

guidance, full physical prompts, and prompt fading when less guidance is needed. Activity schedules can be presented to the whole class (for example the day's routine is presented in the front of the class in a series of pictures) or individually in a binder, notebook, notecards, or via a computer app (MacDuff et al., 1993; McClannahan & Krantz, 1999; Cihak, 2011; Stromer et al., 2006). Activity schedules can help reduce sensory processing demands by presenting information visually, facilitate transitions and decrease tantrums during transitions by providing predictability, and can also promote independence by offering children activity choices (Copeland & Hughes, 2000; McClannahan & Krantz, 1999).

Genc-Tosun et al. (2023) reviewed seven single-case studies examining the use of activity schedules for improving appropriate behaviours, operationalised as on-task behaviours, activity transitions, appropriate peer-play, and following schedules in autistic pupils aged 3 to 17 years. This systematic review found that activity schedules were effective in improving these behaviours across studies. Additionally, activity schedules can be considered an evidence-based practice according to the criteria recommended by What Works Clearinghouse (2017).

Knight et al. (2015) also reviewed the use of activity schedules to improve on-task behaviour, play skills, transition behaviour, percentage of task completion, and daily life skills for autistic pupils aged 3 to 21 years across 16 studies. The review found that the use of activity schedules led to improvements in each of these domains in a variety of environments (that is, classroom, home, and self-contained classrooms). There was some evidence from two studies in this review that suggested that younger autistic children (that is, aged 6 and younger) may need explicit training or reinforcement to gain improvements. Photographic activity schedules were compared to video picture schedules in three studies in this review, but findings indicate that both are effective. However, some studies report that pupils showed a preference for video picture schedules.

Activity Schedules Summary

- Activity schedules appear to effective for improving several behavioural outcomes, such as on-task behaviour, transitions, following schedules, and task completion for autistic pupils.
- These approaches can be delivered individually or to the whole class.
- Different presentation formats can be equally effective, but it is important to support pupils in learning how to use them, and to consider their preferences when designing activity schedules.

Peer-mediated interventions

Nine reviews in our REA reported on peer-mediated interventions (PMIs) or the use of peer networks to address various social and behavioural outcomes. Eight of these

reviews focused on autistic children and young people. PMIs are structured approaches in which typically developing peers are trained to initiate, prompt and sustain interactions with autistic pupils or those with difficulties with social interactions. The approach draws on social learning theory and modelling principles (Bandura, 1977). It is grounded in the premise that social participation can be strengthened through scaffolded peer interaction within inclusive settings, with adults responsible for training peers, modelling strategies, providing feedback and monitoring fidelity. Although framed as peer-led, adult facilitation is central in most implementations. PMIs can be delivered to the whole class at the universal level, but they can also include more targeted components, such as specific peer training, or specific goals may be assigned to different pairs or groups. Across the reviews in this REA, PMIs were most frequently implemented in early years and primary school contexts, with some extension into adolescence.

Aldabas (2020) synthesised 12 school-based single-case studies involving autistic children aged 3 to 14 years and reported improvements in social behaviour in 11 of the 12 included studies. Four studies also documented gains in communication skills. Social outcomes were typically operationalised as frequency of initiations, responses, turn-taking, joint engagement or time spent interacting with peers, measured through structured observation in classroom or play settings. While effects were generally positive, one study reported no improvement in social behaviour, and the strength of the effect varied across participants and formats, indicating that responsiveness is not uniform. However, it was not possible to determine from the review which contexts or participant characteristics lead to better outcomes. Similarly, Hungate et al. (2017) and Zagona and Mastergeorge (2018), reviewing peer-mediated interventions for young autistic children, found consistent increases in social interaction and peer engagement across studies.

Blewitt et al. (2021) reviewed 19 studies investigating specialist interventions in early childhood education and care (ECEC) settings for children aged 0 to 5 years with a range of mental health and developmental difficulties, including anxiety, ADHD, and autism. Four studies investigated peer-mediated interventions for autistic children in inclusive ECEC settings. These interventions all focused on peer imitation, aiming to improve the length and reciprocity of social interactions. Daily or weekly small-group models such as leader imitation groups and *Circle of Friends* (Newton et al., 1996; Shotton, 1998) were associated with increases in successful social initiations and responses, peer imitation, proximity, and appropriate play, although effects were not always sustained and did not consistently improve broader social interaction. Buddy-based approaches such as *Play Stay and Talk* (Goldstein et al., 1992) and *Buddy Game* were also examined. In these programmes, peers are trained to use specific strategies to increase engagement with the target peer (for example Play: participating in the same activities, sharing toys, or doing what the buddy is doing. Stay: maintaining proximity and being present with the playmate with autism. Talk: commenting on ongoing play, using the partner's name, or asking questions). These

approaches increased positive initiations of interactions, reciprocal exchanges, and social bids, with some evidence of generalisation to free play contexts.

Similarly, van der Meulen et al. (2018) investigated emotional peer support across 23 studies for pupils with SEND including autistic pupils and those with SEMH, visual difficulties and learning difficulties aged 2 to18 years. There were four types of specific interventions examined across studies: circle of friends, peer buddying, peer networks, and social lunch clubs. Overall, studies reported positive outcomes in increased social interactions social acceptance, enhanced self-esteem, and empathy for the pupils with SEND and their peer supporters. There was also some limited evidence that students formed genuine friendships beyond the peer support groups.

Martinez et al. (2019), focusing on single-case research involving young autistic children, reported improvements in social competence indicators, particularly initiations and reciprocal exchanges, when peers received explicit instruction and adults provided ongoing feedback. Importantly, the review noted that outcomes were weaker or less stable when peer training was limited or adult facilitation was reduced, suggesting that implementation quality directly influences impact.

Reviews focusing on specific subgroups or adaptations further illustrate variation in outcomes of these interventions. O'Donoghue et al. (2020) examined PMIs for children who are minimally verbal and found increases in communicative behaviours when interventions incorporated structured prompting and modelling strategies. However, gains were frequently context-specific, with limited evidence of generalisation beyond trained activities or partners. Ragaglia et al. (2024), reviewing primary school-based PMIs within an International Classification Functioning-informed framework, reported improvements in participation and peer engagement, but emphasised substantial heterogeneity in dosage, outcome measures and fidelity reporting across studies.

Evidence of the effectiveness of PMIs from older age groups shows similar patterns but with greater variability. Babb et al. (2020), in a meta-analysis of social skills (for example eye contact, proximity to others, conversational acts, initiations, asking follow-up questions, responses, commenting, others-focused conversation, and engagement) interventions for autistic adolescents, reported small to moderate pooled effects, including for interventions incorporating peer components. However, peer-mediated elements were often embedded within broader social skills programmes, limiting clarity regarding the independent contribution of peer processes. Follow-up data across studies were inconsistently reported.

Across reviews, PMIs most consistently support observable social interaction outcomes for autistic children and young people, including increased initiations, responses, joint engagement and communicative acts. There is also some evidence that PMIs can be effective for children and young people with other SEMH needs, such as anxiety and ADHD. However, much evidence derives from single-case experimental designs. Although these designs are valuable in intervention research,

they limit the generalisation of findings to other populations or children with varying profiles. Further, measurement approaches across studies included in reviews rely heavily on direct observation and event recording, with comparatively fewer studies incorporating extended follow-up, generalisation, independent standardised measures or longer-term social inclusion indicators. Where follow-up data were reported, they were typically short-term.

It is important to note that several contextual factors appear to shape outcomes. PMIs are typically delivered multiple times per week over several weeks or months, although none of the reviews establish clear dose-response thresholds (Aldabas, 2020; Martinez et al., 2019; Ragaglia et al., 2024). Delivery during recess, play or other naturalistic contexts is common, reflecting an assumption that embedding intervention within everyday peer activity promotes generalisation. However, empirical confirmation of sustained generalisation beyond intervention settings is limited (Martinez et al., 2019; Ragaglia et al., 2024). Across reviews, adult involvement is consistently identified as necessary, including structured peer training, modelling, feedback and fidelity monitoring (Aldabas, 2020; Martinez et al., 2019; van der Meulen et al., 2018, Zagona & Mastergeorge, 2018). Variation in peer preparation, communication profile of target pupils, intervention intensity and setting (classroom versus unstructured contexts) contributes to heterogeneity in outcomes.

In summary, the review evidence indicates that PMIs are associated with improvements in short-term social engagement and communication for many autistic pupils in inclusive school settings, particularly in early years and primary contexts. Effects are generally positive but variable, strongest for directly observed interaction outcomes, and less clearly established for maintenance, generalisation or broader behavioural and academic indicators. Implementation quality, peer training intensity and sustained adult facilitation appear central to impact.

Peer-Mediated Interventions Summary

- PMIs are generally effective in supporting observable social interaction outcomes for many autistic children and young people, including increased initiations, responses, joint engagement and communicative acts.
- There is some evidence that PMIs can also support outcomes for children with SEMH needs. However, the evidence is less conclusive on whether these approaches work for all autistic children and those with SEMH needs.
- Adult involvement is key, including structured peer training, modelling, feedback and fidelity monitoring.
- The optimal "dose" of these interventions is not clear, however most interventions last at least several weeks.

- Positive outcomes of PMI may depend on the context. Further research is needed to establish the most effective intensity, type, and duration of PMIs to maximise benefits.

Behavioural Interventions

Three studies in this REA investigated different behavioural interventions. Behavioural interventions seek to define, evaluate and change behaviour through reinforcement and structured support, and are grounded in cognitive and behavioural theory (Moore et al., 2019; Tourjman et al., 2022). The most established model in this domain is Applied Behaviour Analysis, which underpins programmes such as Early and Intensive Behaviour Intervention (EIBI), the UCLA Young Autism Project, and the Programme for the Education and Enrichment of Relational Skills (PEERS) (Laugeson et al. 2009). ABA is based on theories of learning and behaviour with the goal of understanding different behaviours in different contexts. ABA programmes typically seek to improve behaviour and communication often by using reinforcement to increase desired behaviours and reduce those that interfere with learning. For example, the EIBI programme promotes learning and behavioural change through breaking down activities into step-by-step processes and offering rewards to encourage motivation. EIBI usually involves five key steps; first educators assess the child's strengths and difficulties, second, they develop an individualised programme with clear goals, third, the programme is implemented with teaching methods (for example explicit teaching), fourth, skills are regularly measured to ensure the programme is working, and finally educators should evaluate progress and implement any changes if needed. This programme is often delivered intensively at 20 to 40 hours per week over the course of multiple years. It is usually delivered by a professional trained in ABA or educators may deliver this programme under the supervision of a trained professional.

The PEERS programme is a social skills training programme for autistic children and young people. The PEERS programme involves delivery of structured didactic lessons using "buzzwords" to highlight targeted social skills, role playing, opportunities to rehearse behaviours, homework assignments, and training for parents in supporting their children with these skills (for a comprehensive review of the PEERS, see Laugeson et al., 2009).Evangalou et al. (2025) reviewed eight studies examining interventions targeting various social skills for young autistic children aged 3 to 7 years. Three studies reviewed focused on an extension of the PEERS (Corsello, 2005; Fisher et al., 2021) and one on EIBI. The early interventions implemented in the studies varied in duration, ranging from 8 weeks to one school year (the average duration was about 7 months). The review found that these intervention programmes improved some aspect of participants' social skills. Specifically, the EIBI programmes resulted in improvements in commenting behaviours (for example commenting in the context of shared book reading and

social interactions), and the PEERS and PEERS extension programmes resulted in improvements in social responsiveness, the frequency and intensity of social behaviours, social cognition, social engagement, and social motivation. There was also a reported reduction in overall social difficulties, repetitive behaviours and interests, and problem behaviours in one study. There was also some evidence of generalisation and maintenance, with some gains retained 4 to 6 weeks post-intervention. However, no significant improvements in social awareness or communication were found.

Rivera et al. (2018) reviewed 40 single-case studies investigating school-based interventions for autistic adolescents aged 10 to 21 years to reduce a range of what they refer to as 'challenging behaviour', which included: property destruction, aggression, stereotypy and restrictive behaviours, elopement, disruptive behaviour (that is, participant engaging in behaviours that interrupt the instruction or the learning of peers), self-injurious behaviour, and non-compliance. Across studies, the most common type of challenging behaviour reported was disruptive behaviour, and the most common function of challenging behaviour was escape from demands. A few participants engaged in challenging behaviour to access tangible items or attention. Additionally, fourteen participants exhibited challenging behaviour that was sustained by multiple reinforcing contingencies.

Interventions were grouped into five categories: function-based, reinforcement-based, antecedent-based, punishment-based, and multicomponent approaches. In function-based interventions, challenging behaviours are replaced with appropriate behaviours that serve the same purpose. For example, if a child shouts to gain attention, they are taught to raise their hand instead, and this appropriate behaviour is then consistently rewarded with attention. . Reinforcement-based interventions reinforced alternative behaviours but were not explicitly linked to behavioural function. Antecedent-based interventions modified environmental conditions before behaviour occurred, for example through visual schedules. Multicomponent interventions combined elements from more than one category. Punishment-based interventions, which added or removed stimuli following challenging behaviour to reduce it, were included in the review, though they were only used as part of a multicomponent intervention and never alone. Information about the characteristics and components of individual interventions was not provided in the review. Overall, the review found strong or moderate evidence from eight studies supporting the use of antecedent-based interventions, and three studies supporting reinforcement-based interventions in the school setting. However, based on the criteria in the What Works Clearinghouse Handbook Standards (2017), the authors concluded that there is insufficient research to establish these interventions as evidence-based practices.

Finally, Montgomery et al. (2014) reviewed thirty-eight single case studies investigating strategies aimed at reducing challenging behaviour in autistic children and young people aged 3 to 21 years. The interventions reviewed were classified as one of seven types of approaches. Stimulus-based procedures were interventions

that modify conditions before behaviour occurs, for example through prompting, stimulus control, or conditioning to influence behaviour. Instruction based procedures were interventions that explicitly teach new, appropriate behaviours, such as functional communication or self-management skills. Reinforcement or punishment-based procedures that that change what happens after behaviour, including extinction (withholding reinforcement), reinforcement strategies to increase desired behaviour, and punishment procedures to reduce challenging behaviour. System level and other approaches included Interventions that modified broader environmental or organisational factors. Finally, some approaches were insufficiently specified or did not fit clear categories. The challenging behaviours targeted in these approaches included stereotyped, repetitive, and self-stimulatory behaviour was the most commonly targeted challenging behaviour (20 studies), followed by physical and verbal aggression and property destruction (12 studies), self-injurious behaviour (11 studies), and disruption (8 studies). Overall, the review found that each type of approach produced large reductions in challenging behaviour and thus could not conclude whether one approach is superior to the others. However, the found that studies which included a functional assessment prior to intervention produced more positive results.

Behavioural Interventions Summary

- Research indicates that behavioural interventions may improve specific social and behavioural outcomes for autistic children and adolescents, particularly in relation to commenting, social engagement, and reductions in disruptive behaviour.
- Some gains appear to generalise and be maintained in the short term, and antecedent and reinforcement-based strategies show moderate support in school contexts.
- Effects are variable across domains, with limited evidence for improvements in broader social awareness and communication.
- The overall methodological quality and reporting are insufficient to classify these approaches as firmly evidence-based under established standards.

Check-in systems

Four reviews in this REA investigated different types of check-in systems to improve various behavioural outcomes in children and young people with SEMH needs and autistic pupils.

Check-in, Check-out (CICO) is a targeted behavioural intervention developed within multi-tiered prevention frameworks. It is intended for pupils who require additional support beyond universal provision but do not require intensive, individualised intervention. The model combines structured adult contact with regular performance

feedback across the school day. Pupils check in each morning with a designated staff member, receive lesson-by-lesson feedback aligned to school-wide expectations via a Daily Progress Report (DPR), and check out at the end of the day. Progress data are routinely reviewed to inform decisions about continuation, adaptation or fading of support, and the DPR is typically shared with parents to strengthen home-school communication. Implementation commonly involves a designated coordinator and systematic review of daily performance data (Hawken et al., 2014).

The evidence base for CICO, synthesised by Hawken et al. (2014), includes 28 studies conducted primarily in elementary and secondary school settings with pupils identified as at risk for emotional and behavioural disorders. Across group-design studies, effects were small on average. Single-subject studies demonstrated variable but generally positive outcomes. Improvements were most often observed in measures such as office discipline referrals, daily progress report points, and observable classroom behaviour. The review does not, however, identify a single context or subgroup for whom CICO is consistently most effective. Some studies suggest stronger findings in elementary settings (in other words, primary schools) than in secondary schools, and others note differences according to behavioural function, but overall the literature documents variability in responsiveness rather than clear, generalisable moderators. Effects are therefore evident for some pupils, but modest at group level and not uniform across individuals.

Bruhn et al. (2013), in a broader review of targeted interventions within multi-tiered behavioural prevention models, examine targeted supports including CICO, Behaviour Education Program variants, and related structured mentoring and monitoring approaches. Across these studies, interventions were commonly associated with reductions in problem behaviour, decreases in office discipline referrals, and increases in academic engagement. However, fewer than half of the reviewed studies reported the integrity of universal provision. This limits confidence in attributing outcomes solely to the targeted intervention, as improvements may reflect the interaction between targeted and universal behavioural supports. Bruhn et al. also report variation in responsiveness by behavioural function in some studies, with stronger outcomes observed where behaviour was attention-maintained than where it was task-avoidance driven.

Daily Behaviour Report Cards (DBRCs), sometimes referred to as Daily Report Cards or Home–School Notes, operate through a closely related behavioural logic but are most frequently implemented at classroom level. The evidence base is concentrated in populations of primary school-aged children with diagnosed or clinically elevated ADHD. Iznardo et al. (2017) synthesised seven group-design studies (total N = 272; mean age 7.9 years), most of which relied on teacher-rated ADHD symptom scales, with two studies using systematic direct observation. The meta-analysis identified small but statistically significant reductions in teacher-rated ADHD symptoms. Effects were larger when measured through systematic direct

observation, though based on fewer studies, indicating that outcome estimates are sensitive to measurement approach.

Pyle and Fabiano (2017), reviewing single-case DBRC studies involving children with ADHD in elementary classroom settings, similarly report generally positive effects across cases. However, estimated effects varied depending on the specific behavioural target (for example disruptive behaviour versus academic engagement), study quality, and classroom context. This indicates that responsiveness is influenced not only by intervention design but by how outcomes are defined, recorded, and reinforced in practice.

Across both CICO and DBRC literatures, implementation features appear central to reported impact. These include clarity of behavioural targets, consistency of daily monitoring, alignment between goals and reinforcement, and routine use of data to guide decisions. At the same time, the outcomes most frequently measured are short-term behavioural indicators, such as disciplinary referrals, daily point totals, and teacher ratings. While relevant to school practice, these metrics provide limited insight into longer-term academic attainment, relational inclusion, or broader psychosocial outcomes, which are not systematically examined in the reviewed studies.

Overall, CICO and DBRCs represent structured targeted behavioural supports associated with small to moderate improvements in observable classroom behaviour for some pupils, particularly those with ADHD or identified as at risk for emotional and behavioural difficulties. The evidence suggests that impact is variable and closely linked to implementation of quality, functional fit, and integration within wider behavioural systems. The current literature is strongest in relation to short-term behavioural change and less informative regarding sustained academic or psychosocial outcomes.

Check-in Systems Summary

- Check-in systems such as Check-in, Check-out and Daily Behaviour Report Cards can be effective in improving observable classroom behaviour for children and young people with SEMH needs, including ADHD.
- According to research, it is important to ensure the system is a good functional fit for the pupil, that delivery is consistent, and that the system is integrated into wider school behavioural policies.
- However, it is not clear whether these outcomes are short-term or whether they can be sustained over time.

Creative arts-based interventions

Art Therapy

Two reviews in our REA investigated the use of art therapy. This is a psychological therapy that uses art materials and the creative process as the primary mode of communication within a therapeutic relationship (British Association of Art Therapists, 2014). It involves the use of drawing, painting, clay, collage, or digital media in the presence of a trained art therapist, with the artwork forming part of the therapeutic process (Bosgraaf et al., 2020). Visual image-making is considered a natural and developmentally appropriate way for children to express and explore experiences that may be difficult to put into words (Rubin, 2010). Art therapy has been used with children experiencing emotional, behavioural, developmental, or psychosocial difficulties across clinical and educational settings (Karkou, 2010).

Vogel et al. (2025) conducted a systematic review to examine whether art therapy is effective for autistic children and adolescents aged 4 to 12 years, with a focus on a range of social, behavioural, and motor outcomes. Seven intervention studies were included in the review. The interventions varied considerably in modality and delivery. Four studies delivered art therapy individually (Chou et al., 2016; Koo & Thomas, 2019; Sabet & Abadi, 2021; Schweizer et al., 2020), whereas three implemented group-based programmes (D'Amico & Lalonde, 2017; Epp, 2008; Schleien et al., 1995). Individual approaches included abstract art sessions using drawing, painting, clay, or collage (Koo & Thomas, 2019), structured painting therapy (Sabet & Abadi, 2021), and self-guided multi-modality art where children selected materials and themes (Schweizer et al., 2020). Group-based programmes included structured social skills drawing groups (Epp, 2008), multi-modality sessions incorporating mask making, mind mapping, paper making, use of mirrors to practise facial expressions, and collaborative art activities (D'Amico & Lalonde, 2017), as well as museum-based manipulative art activities requiring recreation of artworks using shared material (Schleien et al., 1995). Most interventions were delivered by trained art therapists, although some were delivered by researchers. It is possible that these interventions could be delivered by mainstream teachers as well, but it is unclear whether any initial training would be needed. Intervention duration ranged from six weeks to nine months, with sessions delivered from once per month to three times per week, lasting between 30 minutes and two hours.

Across studies, improvements were reported in social domains such as communication, interpersonal relationships, and social behaviour. Behavioural outcomes showed reductions in hyperactivity/inattention and improvements in assertion and cooperation in group-based interventions. Motor outcomes were assessed in two studies, with improvements reported in fine motor skills, balance, and flexibility following structured painting therapy. Importantly, Vogel et al. (2025) emphasised that small sample sizes, heterogeneous outcome measures, varied diagnostic criteria used in the studies, lack of long-term follow-up and limited

methodological rigour require cautious interpretation. Hence, although all studies reported positive effects of art therapy, the authors emphasised that the quality of evidence was limited and that conclusions regarding effectiveness must be applied with caution.

Moula (2020) conducted a systematic review examining the effectiveness of school-based art therapy for children aged 5 to 12 years. Six studies were included, involving 247 children with a range of needs, including anxiety, behavioural difficulties, oppositional behaviours, learning difficulties, disruptive behaviour, and long-term health conditions such as asthma.

Two broad types of intervention were identified. First, structured art therapy, often incorporating cognitive-behavioural elements (Rosal, 1993; Zaheri et al., 2013; Khadar et al., 2013a; Khadar et al., 2013b; Beebe et al., 2010). These programmes included activities such as progressive muscle relaxation, guided imagery, drawing challenging situations, mask-making, sculpting symbolic representations of emotions (for example anger), storytelling, poetry, and reflective discussion. In contrast, non-directive art therapy, delivered in Regev and Guttmann (2005) and one arm of Rosal (1993), allowed children to select materials freely (for example drawing, painting, clay, collage) and engage in open-ended creation followed by group discussion. In contrast, non-directive (child-led) art therapy (Regev & Guttmann, 2005; Rosal, 1993) allowed children to choose materials such as paint, clay, or collage and decide independently what to create, followed by reflective group discussion. These programmes focused more broadly on self-expression rather than specific behavioural or emotional targets. All interventions were delivered in small groups within primary schools by trained art therapists. Sessions lasted 40-60 minutes, were typically delivered weekly, and ran for between 7 and 25 weeks. Structured, goal-focused interventions were more consistently associated with reductions in anxiety and disruptive behaviour, improvements in coping skills and emotional expression, and more positive attitudes towards school. In contrast, the longer non-directive programme targeting children with learning difficulties (Regev & Guttmann, 2005) did not demonstrate significant improvements in self-concept or social outcomes. Some benefits in structured programmes were maintained for up to six months, although follow-up data were limited.

However, Moula (2020) highlighted several weaknesses in the evidence. Most studies were small and did not use strong research designs (for example many children were not randomly assigned to groups). Important details about how children were allocated to groups or whether any dropped out were often unclear. Different studies measured different outcomes, making comparison difficult. In some cases, the authors' conclusions were stronger than the results clearly supported. Most studies relied on parent or teacher reports, and thus, children's own views were rarely included. Moula (2020) concluded that, although there is evidence that art therapy is effective in improving outcomes such as quality of life, anxiety, self-concept, and behavioural difficulties, improvements in methodological quality and

adherence to standardised reporting guidelines are needed to strengthen the evidence base.

Music Therapy

Three studies in our REA investigated the use of music therapy. Music therapy refers to the structured use of music to support developmental and educational outcomes. this includes formal music therapy delivered by trained therapists and broader music-based programmes used in schools. Core methods include improvisation, recreative approaches (singing or playing songs), receptive listening, and composition (Stegemann et al., 2019; Gardstrom et al., 2015). In practice, children may engage in active activities such as singing, drumming, and movement-based rhythm games, or in guided listening to support emotion regulation (Mrázová & Celec, 2010; Grocke & Wigram, 2006). Educational applications aim to enhance attention, social interaction, and learning, drawing on music's capacity to engage cognitive and socio-emotional processes (Altenmüller & Schlaug, 2013).

Dias et al. (2025) conducted a scoping review to examine the effects of music therapy for autistic children aged 3 to 12 years. Interventions varied according to therapeutic approach (for example improvisational, structured rhythmic, family-centred), format (individual or group), setting (clinic, school, home), and duration (from 3 sessions to programmes lasting up to 8 months).

Interventions broadly fell into three types. First, improvisational music therapy, the most common approach, involved the therapist using live singing and simple musical instruments (such as drums, keyboards, or percussion) to respond directly to the child's actions, sounds, or movements (for example Bieleninik et al., 2017; Carpente, 2017; Sharda et al., 2018; Mössler et al., 2019). For example, if a child tapped a drum or vocalised, the therapist would mirror or extend that sound musically to encourage back-and-forth interaction. The aim was to support shared attention, eye contact, turn-taking, and emotional connection. Second, some studies used structured musical activities, including action songs with gestures, singing with movement, imitation games, group music-making, and planned opening and closing songs (for example Ghasemtabar et al., 2015; LaGasse, 2014; Rabeyron et al., 2020). These activities were designed to teach specific social skills such as waiting for a turn, copying others, or responding to verbal instructions. Third, several interventions included parent involvement, where parents took part in sessions and were supported to use musical play at home to strengthen communication and relationships (for example Charoenphol et al., 2019; Thompson, 2018). Most programmes were delivered by trained music therapists in clinics, schools, psychiatric centres, therapeutic day schools, universities, or family homes (for example Bieleninik et al., 2017; LaGasse, 2014; Magraner & Valero, 2016; Thompson, 2018). Sessions were typically 30-60 minutes, delivered weekly, and lasted from 5 weeks to 8 months, with some school-based cases involving more intensive input (for example 70 sessions; Zorba et al., 2020). Across studies, the

main outcomes targeted were social communication skills. Reported improvements included increased eye contact, better turn-taking, longer shared attention, improved emotional expression, and gains in verbal and non-verbal communication. Some studies reported that these improvements were maintained for several months after the intervention ended.

Many of the studies reviewed by Dias et al. (2025) were small-scale case studies or quasi-experimental designs without random assignment or control groups. Moreover, outcome measures varied considerably, making comparisons difficult. Blinding was uncommon, and in some studies, improvements were based on parent or teacher reports rather than independent assessment. Although one of the included studies is a large international randomised trial that included 364 children, it did not find significant reductions in overall autism symptom severity compared to enhanced standard care (Bieleninik et al., 2017). Hence, although the findings show a positive impact on social communication outcomes in autistic children, these methodological gaps do not permit definitive conclusions.

Schwartz et al. (2017) examined the use of contingent background music as a behavioural intervention. In this approach, music is delivered only when a predetermined target behaviour occurs and is withdrawn when the behaviour stops. For example, music may be played while a participant is engaged appropriately or on task and removed when off-task, stereotypic, or disruptive behaviour occurs. In this way, music functions as a consequence or reinforcer designed to increase desired behaviours and decrease maladaptive behaviours. The studies reviewed were conducted in schools, classrooms, vocational settings, homes, and clinical or training environments, and interventions were implemented by teachers, clinicians, or researchers using instrumental or preferred music delivered through speakers or audio devices. Sessions were often brief, commonly around 15–20 minutes.

The outcomes examined across studies included task engagement, task performance (such as accuracy and work output), and reductions in vocal stereotypy, aberrant behaviour, and self-injurious behaviour. Measurement typically involved direct observation and frequency or duration recording across experimental conditions. Overall findings were mixed but generally indicated positive effects on task engagement and performance, alongside reductions in some maladaptive behaviours. Effects appeared to be linked to the use of music presented contingently on behaviour, with some studies incorporating preferred music to enhance responsiveness. Although results were promising, the evidence base was characterised by variability in procedures, limited systematic reporting of implementation features, and reliance on small-scale designs

Creative Arts-Based Interventions Summary

- Research indicates that art therapy is associated with improvements in social communication, relationships, emotional expression, anxiety, and

behaviour in autistic children and young people, as well as those with a range of needs (for example anxiety, behavioural difficulties).

- Music therapy is associated with improvements in social communication (for example eye contact, shared attention, turn-taking, emotional expression) in autistic children and young people, and some music-based approaches may also improve task engagement and reduce challenging behaviours.
- Effectiveness appears to depend on intervention design and delivery, with structured, goal-focused approaches showing more consistent outcomes than less structured approaches.
- There is limited research on the long-term impact of these interventions, and the available evidence appears to be limited in terms of its quality, and more research is needed to understand the effectiveness of these approaches.

Naturalistic developmental and play-based interventions

Another approach identified in our REA is referred to as naturalistic developmental behavioural interventions (NDBIs). These are a play-based and social interventions targeting autistic children's behavioural skills: joint attention, adaptive behaviour, social and communication skills, engagement, and play skills. Eight reviews in our REA examined some form of NDBIs.

NDBIs are a group of autism interventions derived from Applied Behaviour Analysis (ABA) and developmental psychology (Schreibman et al., 2020). They target developmentally appropriate goals that are meaningful and functional for the child and encourage the child's spontaneous responses and initiations through child-led activities. NDBIs emphasise learning in natural learning environments, through play and children's daily routines as opposed to structured or isolated environments (Tiede & Walton, 2019).

Although specific NDBIs differ, there are common general concepts and procedures (Schreibman et al., 2020). NDBIs were derived from clinical research laboratories, recognising the need for naturalistic treatments, increased focus on strategies to enhance child motivation, and improved generalisation of learned skills. By combining ABA and developmentally based intervention strategies, NDBIs guide the development of individualised goals for each child. Core principles include the use of Intervention manuals specifying intervention procedures, assessment of treatment fidelity, ongoing progress monitoring, structured environmental arrangements to facilitate child initiation, and the use of natural reinforcement and other motivation-enhancing strategies (Schreibman et al., 2020).

The synthesis in our REA shows the use of various NDBIs, outlined below.

Early start Denver model

The Early Start Denver Model (ESDM) was reported on in three reviews in our REA as a play-based intervention to improve autistic children's social and communication skills (Gibson et al., 2021); adaptive behaviour skills (Tiede & Walton, 2019) and evidence-based practice for social skills interventions (Dean & Chang, 2021).

ESDM is a specific developmental curriculum for toddlers aged 12-36 months and 48-60 months that defines the skills to be taught and a specific set of teaching procedures. Skills targeted include cognitive and language abilities, social interaction, reduction in the severity of autism symptoms, and overall behaviour and adaptive skills (Rogers & Dawson, 2010).

ESDM was employed in studies for adaptive behaviour outcomes, with the resulting composite effect size estimate as non-significant (Tiede & Walton, 2019). Given the low number of studies reporting outcomes in this domain, this finding suggests that NDBI procedures may be less effective for targeting adaptive behaviour skills.

Overall, studies across these reviews report positive outcomes in social skills, language development, and communication skills for autistic pupils.

JASPER (Joint attention, symbolic play, engagement and regulation)

The joint attention, symbolic play, engagement, and regulation (JASPER) intervention was the most frequently reported NDBI across papers included in the reviews and was assessed in three reviews in our REA (Gibson et al., 2021; Tiede & Walton, 2019; Waddington et al., 2021).

JASPER was first developed and evaluated by Kasari et al. (2006). It specifically focuses on teaching autistic children joint attention, play skills, and some aspects of communication and requesting skills (Kasari et al., 2010). JASPER is grounded in principles from ABA but applies them in a more naturalistic, play based context. It typically begins with brief use of discrete trial training, where skills are broken into small components and practised through repetition to prime the target behaviour. This is followed by child led interaction, where the educator builds on the child's interests and activities. The educator models and expands language, responds contingently to the child's communication, provides corrective feedback where needed, and uses strategies such as shared attention, eye contact, and environmental structuring to sustain engagement and support learning. It is considered a relatively low-intensity intervention, as it involves only 30- to 60-minute sessions per week for one to three months and can be administered by trained clinicians, parents, and educators in clinical, home-based, and educational settings (Kasari et al., 2010).

Waddington et al. (2021) examined the effects of JASPER on joint attention and play skills in children aged 43-56 months using parent and educator-reported measures. The intervention was conducted in a number of settings, including preschools,

childcare centres, clinics, early intervention classrooms, and home settings. The intervention was administered by a range of adults, including teachers and/or teaching assistants, parents, childcare staff, and graduate researchers. The intervention frequency ranged from two to 10 times per week. The session duration ranged from 15 minutes to one and a half hours.

Across reviews, JASPER showed significant improvements for at least one outcome related to joint attention, joint engagement, play and language skills compared to control groups (Waddington et al., 2021). It also produced the largest and most consistent effect sizes for social engagement (Tiede & Walton, 2019).

JASPER was found to be less effective for targeting adaptive behaviour skills (Tiede & Walton, 2019). JASPER showed significantly greater improvements in at least one outcome related to child joint attention, joint engagement, play skills and language skills compared to the comparison group, and parents and educators were mostly able to use JASPER techniques (Waddington et al., 2021). However, specifically for joint attention outcomes, the effect sizes with JASPER were small in magnitude. Joint attention was the only outcome for which increased intervention hours were significantly associated with a greater effect size, which may provide evidence for the validity of this measure, even if effects are small (Tiede & Walton, 2019).

SCERTS (Social communication, emotional regulation and transactional support)

The SCERTS model was developed by Prizant et al. (2003) to support autistic individuals' social communication, emotion regulation and transactional support. . This approach involves an initial assessment of a child's ability to maintain regulated states of arousal across contexts. This involves identifying the factors that support or disrupt emotional regulation and recognising the signals the child uses to indicate when support is needed. Following this assessment, developmentally appropriate goals are set across each component. For example, a social communication goal might target turn taking, while an emotional regulation goal could focus on developing sensory motor strategies to support transitions. Transactional support goals then focus on adapting the environment and adult responses, for example by using visual supports, structuring routines, and modifying interaction styles to better scaffold the child's communication and regulation. These supports should be flexible and responsive across different learning and social environments and also adaptable to the changing needs of the child. For a more in-depth overview of this approach, see Prizant et al. (2003).

Juhee et al. (2022) examined the effectiveness of SCERTS in supporting the developmental skills of autistic children aged 16 months to 7 years. Only one of the six studies reviewed was conducted in a mainstream setting and implemented by a teacher. The remaining five studies were implemented in special care centres, individual homes and community centres. The findings suggest that SCERTS may

be an effective approach for promoting children's social communication skills, and implementers (educators, caregivers, researchers, and speech and language therapists) were able to achieve an adequate level of intervention fidelity through training. The study findings were limited in drawing conclusions about the impact of SCERTS on children's language, restricted repetitive behaviours, emotion regulation, adaptive behaviour, play, cognitive skills, academic competence, and motor skills, due to conflicting findings within the limited evidence.

Evangalou et al. (2025) reviewed studies examining interventions targeting various social skills for autistic children aged 3 to 7 years. One large-scale study in their review examined the SCERTS model and found improvements in social communication, emotion regulation, and other skills, such as motor, visual-motor imitation, and self-care skills, for autistic children.

LEGO therapy

LEGO therapy is a naturalistic play-based intervention and a therapeutic medium for autistic children to improve their social competence (LeGoff, 2004). It is designed to improve social competence, communication, and inclusion by promoting collaborative play, turn-taking, sharing, problem-solving, and verbal and nonverbal communication (Lindsay et al., 2017). It is typically delivered in small groups with children taking on structured roles that require cooperation and interaction, thereby creating natural opportunities for social learning among children and youth.

Three reviews reported LEGO therapy in our REA. Only Lindsay et al. (2017) reviewed studies exclusively on LEGO play. In the other two reviews (Dean & Chang, 2021; Gibson et al., 2021), LEGO therapy studies were included with other interventions, which makes it difficult to isolate the specific contribution of LEGO therapy to the reported outcome. Hence, we only report the findings of Lindsay et al. (2017) below.

Lindsay et al. (2017) evaluated the effects of LEGO therapy in autistic children and adolescents aged 5 to 16 years. The LEGO therapy targeted adaptive behaviour, autism-related behaviours, belonging (inclusion), play skills, coping, family relationships and reductions in solitary play. The therapy sessions were conducted in varied settings, including clinics, mainstream and special education schools, homes and community settings. The administrators of the therapy sessions varied across studies, with sessions conducted by clinicians, educators (teachers or teaching assistants), parents, community coordinators/volunteers or robots. The sessions were typically administered in group or mixed (individual and group) formats. The session duration ranged from four weeks to three years, with a frequency of once a week and a session duration of 20 to 90 minutes. The materials for the therapy session were LEGO construction materials (blocks/sets). The outcomes of the LEGO therapy varied across the studies. However, studies (n=14) reported at least one improvement in the targeted social and communication skills.

Pivotal response treatment (PRT)

In three reviews, Pivotal Response Treatment (PRT) was employed as an intervention. However, none of the reviews exclusively presented evidence on PRT and its effectiveness. PRT was the most frequently reported play-based intervention (Gibson et al., 2021). It was also reported as a school-based social skills intervention (Dean & Chang, 2021) or evidence-based practice for social and communication and adaptive behaviour skills (Tiede & Walton, 2019). PRT addresses core or pivotal areas of autism, helping children make significant improvement in behaviour, communication and social interactions (Koegel & Koegel, 2019). It aims to improve children's motivation in learning by offering choice, interspersal task variation and use of natural rewards to encourage target behaviour. These help practitioners to reduce disruptive behaviour with the use of antecedent interventions and create environments in which autistic pupils are valued members.

Reciprocal imitation training (RIT)

Another NDBI employed in studies was Reciprocal Imitation Training (RIT). RIT teaches autistic children's imitation skills during play (elicited and spontaneous imitation skills) (Ingersoll, 2010). RIT was not assessed exclusively in any of the reviews but was reported as a play-based intervention (Gibson et al., 2021) and as targeting joint attention skills (Tiede & Walton, 2019).

Other play-based interventions

Gibson et al. (2021) evaluated 388 studies with the aim of mapping play-based interventions targeting social and communication outcomes for autistic children aged two to seven years. Of the included studies, the majority employed ESDM, JASPER, and Pivotal Response Treatment (PRT). Other play-based interventions included Advancing Social Communication and Play (ASAP), Developmental, Individual Differences, Relationship-based (DIR/Floortime), Reciprocal Imitation Training, LEGO therapy, Preschool Autism Communication Trial (PACT), Project IMPACT (Improving Parents as Communication Teachers), among others.

These interventions employed behaviourist, computer-based, robot-assisted, virtual reality, augmentative and alternative communication (AAC), video modelling, early intensive intervention, social skills group, art and outdoor activity, play therapy, activity schedule, collaboration-based and mixed approaches and strategies. Studies targeted multiple skills including, social play skills, early developmental communication skills, social communication, social cognition, language, relational skills and communication skills.

In many studies, the interventionist was not specified. Where reported, interventions were delivered by mixed professionals/interdisciplinary teams or by professionals from psychology, speech and language therapy, education, behaviour therapy, and arts or creative therapies. In many studies, parents/carers, teachers, and teaching assistants/paraprofessionals were involved. The interventions varied in terms of their

delivery style. In feedback-based approaches, the practitioner provides tailored feedback to the target child and/or their interaction partner (parent, peer or a professional) during or after play. Child-led intervention allows the child to engage in free play or follow the child's lead (for example using techniques to expand upon utterances or prolong shared attention when something has caught a child's interest). Adult-led interventions are highly structured, and the adult in control determines the target and type of play. Guided intervention allows the child freedom within the limits of a structure, or a combination of adult-led and child-led play. Interestingly, technology-based approaches tended to be more adult-directed, perhaps requiring a greater level of adult control to facilitate their use, than child-led or guided.

To examine potential differences in effectiveness across the intervention models reviewed above, Tiede and Walton (2019) conducted a meta-analysis comparing established NDBI models for autistic children under six years of age. Outcomes included expressive and receptive language, composite and nonverbal IQ, adaptive behaviour, core symptoms of autism (social communication and restricted, repetitive behaviour), social engagement, joint attention and play.

The included intervention models in the studies were JASPER, ESDM, Early Social Interaction Project (ESI), Focus Parent Training Program, Joint Attention and Imitation skill-building (JA/Imitation), Learning Experiences Alternative Program (LEAP), Parent Training, Pivotal Response Training, Reciprocal Imitation Training (RIT). The majority of the interventions were implemented in community settings or labs. The interventionists varied between educators, research staff and caregivers. The professional hours (professional involvement in the intervention) of the interventions varied from the lowest six hours of JASPER to highest 1581 hours of ESDM. ESDM and LEAP had the highest number of professional hours than other interventions.

Studies showed largest and most consistent effect sizes for social engagement (Tiede & Walton, 2019). As previously discussed, JASPER studies predominated the domains of joint attention (and social engagement and play). Similar results were found from other intervention models, tentatively suggesting that NDBI models may improve skills in these domains (Tiede & Walton, 2019). From the findings, most reviewed studies suggested that SCERTS may be an effective approach for promoting children's social communication skills, and implementers (educators, caregivers, researchers, speech and language therapists) were able to achieve an adequate level of intervention fidelity through training (Juhee et al., 2022).

Naturalistic developmental and play based (NDBIs) summary

Recommendations are drawn from our REA for practitioners and researchers to select NDBIs that are most suitable to address the specific behavioural and social communication needs of autistic pupils in mainstream classrooms.

Our REA synthesises NDBIs for children under 7 years (for example JASPER, SCERTS, play-based interventions) and for children and adolescents up to 16 years (for example LEGO therapy and social skills interventions). For targeting autistic children's and those with SEMH's behavioural and social communication skills, practitioners are recommended to select NDBIs based on individual interests and developmental ages. While some models are more commonly employed and reported in studies (for example JASPER and ESDM), there is less evidence on how other NDBI models (for example PRT and RIT) impact specific behavioural and social communication outcomes for autistic children across different age groups.

When selecting NDBI models, practitioners can consider feedback-based approaches as these are found to adopt play-based approaches which are child-led (Gibson et al., 2021). The choice of settings and spaces (context) is also a major consideration to ensure that children are happy and willing to engage in the prescribed intervention (Gibson et al., 2021). NDBIs core principle is for the interventions to take place in naturalistic environments to ensure children are in familiar and comfortable settings/spaces (Schreibman et al., 2020). However, ESDM interventions were mainly conducted in community and lab-based settings (Tiede & Walton, 2019) rather than children's natural and familiar school environment. While SCERTS led to positive social communication outcomes, the majority of the studies (n=5/6) were in special care centres with only one in mainstream preschool/kindergarten (Juhee et al., 2022). On the other hand, JASPER was implemented in a variety of settings (with five studies in school settings) (Waddington et al., 2021). Similarly, LEGO therapy, some play-based interventions and EBP were implemented in a variety of settings including mainstream schools (Dean & Chang, 2021; Gibson et al., 2021; Lindsay et al., 2017). Therefore, in choosing the type of NDBI, it is important that practitioners choose models and design interventions that can be conducted in mainstream settings in spaces that are natural, familiar and comfortable for the children.

Our REA shows variation in intervention intensity (dosage) across models, which can affect the effectiveness of interventions for the targeted skills. Models such as JASPER led to positive social engagement (Tiede & Walton, 2019) with comparatively less intense therapy. Interestingly, for joint attention, increased intervention hours were significantly associated with a greater effect size for JASPER (and a few other interventions) (Tiede & Walton, 2019). This reiterates the relevance and precision of intervention intensity (dosage) to meet targeted outcomes/skills. However, other models, such as ESDM, require a longer time frame and more hours. For example, the Group-Early Start Denver Model (G-ESDM) was delivered to preschool-age autistic pupils for one year (Dean & Chang, 2021). Assessing the professional hours, JASPER was implemented with six professional hours versus 113 hours in ESI (highest reported) (Tiede & Walton, 2019). Professional hours of intervention for ESDM and adaptive behaviour outcomes

ranged from 12 to 1,581 hours (highest), with ESDM and LEAP requiring the highest number of hours (Tiede & Walton, 2019).

Therefore, before selecting a type of NDBI, we suggest practitioners and professionals give careful consideration for the alignment in the intervention dosage to meet the targeted behavioural outcomes/skills for the individual child. To support practitioners, the recommended intervention procedures for NDBI models (Schreibman et al., 2020) can help determine the intensity (dosage), feasibility (frequency and duration of sessions) and expertise of the interventionists (specialised professionals, teachers, teaching assistants or paraprofessionals) to apply the intervention in mainstream settings to meet the targeted outcomes/skills successfully.

Given the variability in involvement of peers in NDBI (social interventions), further research is recommended to evaluate peer training protocols and examine the extent of peer training and participation in optimising social outcomes for autistic pupils (Dean & Chang, 2021). In addition, authors reiterate the importance of observation protocols to provide consistent measurement of social outcomes (for example engagement and initiations) (Dean & Chang, 2021). Practitioners and schools may find low-tech measurement tools (paper, pencil and stopwatch) convenient due to simplicity and relatively low cost. However, the need for ongoing training to use these tools is recognised to ensure practitioners are able to use the tools reliably to measure social behaviour outcomes. While high-tech instruments can be more reliable and efficient than low-tech instruments, the cost and technical support may be barriers that need consideration. Lastly, the evidence shows lack of consistency in training for practitioners in administering social skills interventions in inclusive classrooms (Dean & Chang, 2021). Adequate training for practitioners is essential to ensure they have adequate skills set to meet the targeted aims of evidence-based practices to aid inclusion and best support for autistic pupils.

Naturalistic Developmental Behavioural Interventions Summary

- Research finds that NDBIs are suitable interventions for different developmental ages for pupils with autism and pupils with SEMH needs to address behavioural areas such as social communication (for example JASPER, Reciprocal Imitation Training), or a wider array of functioning, including communication, cognitive, motor and adaptive behaviour (for example ESDM).
- Some models are more commonly employed and reported in studies (for example JASPER and ESDM). There is less evidence on how other NDBI models (for example PRT and RIT) impact specific behavioural and social communication skills for autistic children in different age groups.
- In choosing different NDBI models practitioners can consider feedback-based approaches as these are found to adopt play-based approaches

which are child-led NDBI models suitable for natural settings in mainstream schools.

- Research shows variation in intervention intensity (dosage) across models, which can affect the effectiveness of interventions for the targeted skills.
- Adequate practitioners' training is needed for interventions in mainstream settings.

Social skills interventions

Eight reviews included in our REA evaluated interventions that aimed at improving some aspect of social skills or social communication in autistic children and those with SEMH needs.

Evangalou et al. (2025) reviewed eight studies examining interventions targeting various social skills for autistic children aged 3 to 7 years old. Five interventions used the SCERTS model (reviewed in the NDBI section), Early Achievements for Education Settings (EA-ES) (Schreibman et al., 2015; Tiede and Walton, 2019), Developmental Individual Difference (DIR) model, and the Advancing Social-Communication and Play programme (ASAP), a structured adaptation of JASPER (Boyd et al., 2018; Corsello, 2005; Dykstra et al., 2012). The early interventions implemented in the studies varied in duration, ranging from 8 weeks to one school year (the average duration was about 7 months). Seven studies found that these intervention programmes improved participants' social skills. Specifically, the results showed small changes in social communication using the DIR Model; the EA-ES intervention significantly improved joint attention, spontaneous verbal expressions, and nonverbal communication. The final study examining ASAP reported no significant effects on children's social skills.

Hungate et al. (2017) reviewed 48 studies focused on improving language, communication, and social skills for autistic children aged 6 to 17 years. They identified several different approaches targeting these skills, including self-management, peer-mediated interventions, modelling, social narratives, scripting, visual supports, technology-based interventions, pivotal response training, and naturalistic interventions. Self-management, scripting, and naturalistic interventions will be discussed in this section, while the others are reported in their respective sections of this REA. Self-management strategies typically involved some form of explicit guidance in awareness and monitoring of behaviour. They typically included reinforcements such as tokens or checklists. Self-management strategies were reviewed in 13 of the studies and were found to be effective in improving communication and social interactions for autistic children. Scripting was reviewed in nine studies and was found to be effective for social communication and interactions. This strategy typically involved developing a verbal or written script about a target skill or situation. It is used to guide pupils in using appropriate language or in

initiating certain interactions by acting as a prompt. Finally, naturalistic interventions were reviewed in eight of the studies and were found to be effective in improving social communication and interactions. These interventions primarily involved child-led interactions to teach functional skills in natural settings. They typically incorporated the creation of motivating contexts, modelling of play behaviours, reinforcement of conversational exchanges, and the use of naturally occurring reinforcers.

Dean and Chang (2021) reported on interventions for school-based social skills interventions in inclusive settings in 18 studies for autistic pupils aged 15 months to 16 years. The targeted skills were social outcomes: initiations, responses, engagement, vocalisation, quality of play, turn-taking, and gaining attention. Engagement and initiations were the most measured social outcomes. Studies measured the extent to which a child was mutually engaged with peer/s (joint engagement), or the extent to which a pupil was alone or with an adult (solitary). All social interventions were held on school campuses and took place in inclusive environments (preschool, kindergarten, elementary, middle, or high school). The practices included were antecedent-based interventions, peer-mediated interventions, pivotal response training (PRT), video modelling and structured play groups. In addition, some studies used peer-mediated instruction in combination with another type of approach (for example video modelling plus peer-mediation). Other studies used comprehensive manualised intervention packages that included a variety of approaches, such as social skills training, peer-mediated interventions, visual support, modelling, and reinforcement. Interventions varied in dose and duration, ranging from six weeks to one academic year. Shorter-duration interventions consisted of one to two sessions per week over six to eight weeks. Intervention sessions ranged from 30 to 70 in most studies. The longest intervention was a year-long, Group-Early Start Denver Model (G-ESDM) delivered to preschool-age autistic pupils.

A variety of approaches were used to increase social engagement and interactions between autistic pupils and their typically developing peers, although the extent to which peers were involved varied. Some studies included training protocols as part of the intervention to teach peers specific strategies to support their autistic peers. The training for these school-based interventions was mainly provided by researchers. A majority of the studies used research staff as primary intervention agents, and school practitioners received limited or no training. There was considerable variance in the amount of staff training, ranging from 1-hour didactic training to year-long coaching support. However, some studies included school personnel training as an active component of the intervention.

Participants' social behaviour was observed in authentic school settings and recorded using systematic observation instruments. Studies (n=10) observed participants during unstructured social periods, including break time, recess or lunch. Studies observed participants in the classroom during circle time, learning centre

time or during group work. One study observed participants across multiple settings, including recess and centre time. The observation instruments ranged from low-tech (paper, pencil, and stopwatch) to high-tech (videorecording).

The findings from the review suggest that school-based social interventions have been effective in improving social outcomes for autistic pupils in inclusive settings. Post-intervention improvement was detected in engagement outcomes for preschool, elementary, middle, and high school pupils. Of the ten studies that observed participant engagement, seven studies were able to capture a post-intervention increase in joint engagement. Six studies detected a decrease in solitary engagement. Observation measures in the reviewed studies detected a post-intervention increase in initiations and responses.

In an umbrella review of meta-analyses, Zeng et al. (2022) reviewed 30 meta-analyses investigating interventions that addressed social skill development for children and young people aged 6 to 17. Most studies included only participants with a diagnosis of ASD (69%), with the remainder involving mixed samples comprising individuals with ASD or other types of needs including SEMH needs. Meta-analyses reviewed specific social intervention approaches such as peer mediated interventions, video modelling, and Social Story interventions and overall found that a variety of these approaches could be effective in improving various social skills. However, Zeng et al. (2022) did not describe specific outcomes in detail. Several meta-analyses also examined broader school based social skills interventions (for example individualised positive behaviour support informed by functional behaviour assessment) and reported positive effects on social development outcomes for children with ASD. In addition, some meta-analyses indicate improvements in social skills from interventions not explicitly targeting social outcomes, such as technology aided instruction and intervention.

Similarly, Sutton et al. (2019) reviewed 22 studies and Camargo et al. (2014) reviewed 19 studies investigating various social skills interventions that could be implemented in an education-setting for autistic children aged 3 to 12 years. Interventions included verbal-prompting, visual scripts direct instruction, social stories, modelling, role play, peer-mediated interventions, and the use of social clubs based on interest. For example, an intervention that included prompting, modelling, visual scripts and peers involved training target participants to use a script phrase for different play themes. Their typically developing peers were then trained to follow instructions to interact with the participants using a peer instruction script card. Least to most prompt was used to prompt participants to use the script. For an in-depth description of these interventions, see Camargo et al. (2014). Overall, these reviews found positive effects of these interventions on various social skills including Initiation behaviours, response behaviours, initiation and reciprocal interactions. However, these interventions were typically resource-intensive and often were implemented outside of the classroom such as a resource room or a separate empty room.

Sterrett et al. (2017) reviewed a number of different types of interventions aimed at improving social skills for autistic children and young people aged 4 to 11 years. This review also found that direct instruction of social skills (for example joining play, positioning the body during conversation, responding to peers), followed by opportunities to apply these skills in social contexts with peers also improved social initiations, responses to peers, peer engagement, and reciprocal interactions. Additionally, multicomponent, whole day approaches that combined environmental supports, structured teaching, and ongoing facilitation of peer interactions with individualised social skills instruction across daily routines were also found to improve these outcomes. However, interventions that included a peer-mediated component appeared to be most consistently effective in improving peer engagement, social initiations, responses to peers, and reciprocal interaction.

Blewitt et al. (2021) reviewed 19 studies investigating specialist interventions in Early Childhood Education Centres (ECEC) settings for children up to 5 years of age with a range of mental health and developmental difficulties, including anxiety, ADHD, and autism. Interventions delivered by early childhood educators who received some form of training and focused on strengthening any aspect of children's social or emotional competence. Training commonly involved some form of direct instruction or coaching from a specialist or researcher, but also included other methods, such as direct feedback or the use of a manual. However, the most effective form of training was practice-based coaching. The review categorised interventions into four groups: (1) instruction embedded into daily routines and activities, (2) direct skill instruction, (3) peer-mediated interventions (discussed in the peer-mediated interventions section), and (4) individualised assessment-based approaches.

Instruction embedded into daily routines and activities

Six of the studies examined instructional approaches embedded in daily routines and activities. These interventions included naturalistic communication-promoting strategies embedded into daily routines in regular classrooms and in Early Head Start classrooms: commenting and labelling, modelling, imitating, expanding, positive feedback, joint attention, responding to children's initiations, and asking questions. For example, the PoWR Strategy was used in one study, which involved providing opportunities for communication (Po), waiting for the child's communication (W), and responding to the child's communication (R) (Fox et al., 1997; Roberts, Bailey, & Nychka, 1991). The frequency and number of social communications and expressive communication for children increased with these interventions; however, the studies did not find evidence that these improvements were maintained over time or generalised to the regular classroom.

Direct skill instruction

In three studies, explicit social skills instruction was delivered in combination with a peer-mediated play-based component, in which autistic pupils were trained on social skills in small groups with their typically developing peers. The training focused on

initiating and maintaining play using storybooks, role-play, puppetry, and communication boards. These were followed by twelve teacher-supported play sessions. The autistic pupils showed improvements in the number and length of interactions with their peers. These improvements were maintained at follow-up. Another study in this review suggested that explicit social skills training with peer interactions may decrease negative reactions in children with developmental delays. The Play Time/Social Time approach also resulted in improved social skills in one study for autistic children, those with SEMH needs, and others with a range of different needs. This approach consists of social skills lessons focused on six skills: sharing, requesting to share, persistence, organising play, agreeing, and helping others or asking others for help, with structured play in pairs. Overall, structured social skills teaching paired with guided peer interaction appears beneficial for proximal peer engagement outcomes.

Three trials evaluated teacher-mediated 1-to-1 social-communication interventions for autistic children in early-years settings. Brief, intensive joint attention training delivered twice daily for eight weeks increased children's initiation of joint attention with teachers and improved joint engagement with parents, with some effects sustained at a 12-month follow-up; however, there were no broader gains in language or social functioning. A smaller RCT of the Joint Attention and Symbolic Play/Engagement and Regulation Intervention (JASPER) found improvements in classroom joint attention and supported engagement, while a larger cluster trial of a year-long manualised programme showed no group differences in observed social communication or play skills, although children were more engaged in routine classroom activities. Overall, targeted joint attention interventions appear effective for increasing proximal joint attention behaviours, but evidence for wider or generalised developmental impact is limited.

Individualised assessment-based approaches

Finally, a review by Blewitt et al. (2021) identified two studies that utilised behavioural assessment to inform the intervention approach. These approaches typically consist of functional assessments to identify the antecedent and the consequence of undesirable behaviour. In one large trial with children at risk of ADHD, adding individualised, assessment-based components across home and preschool to parent education did not yield additional benefit beyond parent education alone. However, a second RCT found improvements in social skills and engagement and reduced problem behaviours using the Prevent – Teach – Reinforce for Young Children (Dunlap et al., 2010).

In another review of 20 studies investigating social skills training interventions, Mirzaei et al. (2020) examined the conditions under which these interventions work best to improve social skills in autistic children and adolescents aged 6 to18 years. Of these twenty studies, five demonstrated efficacy of the intervention as well as generalisation and maintenance. The common intervention conditions in these

studies included the use of evidence-based strategies (that is, modelling, parental participation, and peer involvement), the repeated use of trained skills in the natural environment and consideration of individual needs and interests of the child. Thus, these components should be considered in social skills interventions for autistic children and young people.

Social Skills Interventions Summary

- Across reviews, most interventions improved social communication and interaction outcomes for autistic children and young people and those with SEMH needs.
- Interventions such as peer mediated approaches, self-management, scripting, naturalistic interventions, and structured social skills training were consistently associated with improvements, particularly when they incorporated modelling, reinforcement, and child led or meaningful contexts.
- However, effects were often modest, variable, and sometimes limited to proximal skills (for example joint attention), with weaker evidence for generalisation and maintenance.
- Interventions delivered in naturalistic or school settings, especially those involving peers and embedded in everyday activities, tended to support engagement and interaction; however, many studies relied on researcher led delivery with limited training for school staff.

Social stories

Five reviews in our REA reported on the use of social stories. Social stories were first developed by Carol Gray and Joy Garand (1993) and are defined as "individualised short stories that describe situations, concepts, or social skills designed to increase the quality or quantity of social interactions of individuals having ASD with others" (Karal & Wolfe, 2018, p. 44). Their goal is to share relevant information about where and when a given situation takes place, who is involved, what is occurring, and why. For example, social stories can be about understanding day-to-day situations or more complex concepts like safety. They are presented in written or visual form, including photographs or pictures, and typically written from the individual's perspective using first-person language. According to Gray, social stories should consist of three key components: descriptive sentences, which describe the salient features of a specific social situation (for example “The bell rings when recess is finished”); directive sentences, which outline the desired behavioural responses from the individual within that social context (for example “I will stand in line"); and perspective sentences, which describe the feelings of both the individual and others

within the target social situation (for example “My teacher will be happy to see all the children in line”; Gray & Garand, 1993).

When first developed, there was no clear underlying theoretical framework associated with social stories (Gray & Garand, 1993, as cited in Jones & Bawazir, 2017). The rationale was later grounded in cognitive characteristics associated with autism, particularly difficulties with theory of mind, referring to the ability to understand perspectives different from one's own, and weak central coherence, referring to a bias towards processing details rather than the broader context (Happé, 1999, as cited in Jones & Bawazir, 2017). From this perspective, social stories aim to explain and clarify ambiguous social situations, rendering them more comprehensible for autistic individuals. It should be noted that the use of theory of mind as a mechanism for explaining deficits in autism has been heavily critiqued (Long et al., 2025). More recent attempts to establish a theoretical framework have drawn on a broader range of perspectives. Social learning theory, which emphasises understanding and learning behaviour through observation, has been proposed as one underpinning mechanism, with the stories themselves serving as a vehicle for observational learning (Jones & Bawazir, 2017).

Karal and Wolfe (2018) aimed to examine the literature addressing the efficacy of social stories for improving social interactions in autistic pupils aged 3 to 13 years. They identified 12 single-subject, data-based experimental studies. Social interaction was broadly defined to include social engagement, socially appropriate behaviour, communication skills, social communication, and prosocial behaviour. Overall, they found a moderate mean effect size for the efficacy of social stories on social interaction, with four studies finding large effects, four finding moderate effects, and four finding no significant effects. The authors noted that studies which followed Gray's criteria for developing social stories showed greater effects than those that did not, and that studies finding large effects tended to include visual components alongside written text. They concluded that social story interventions can have a positive impact on the social interactions of autistic pupils, though found no evidence to support a specific format or method of implementation as consistently more effective. Similarly, Hungate et al. (2017) found that across eight studies, social stories and the use of social narratives led to improvements in social interaction and communication, particularly in perspective-taking skills autistic children and young people aged 6 to 17 years.

Sani Bozkurt and Vuran (2014) aimed to examine and analyse studies that used social stories to teach social skills to autistic children aged 0 to 15 years. They included 22 experimental single-subject design studies, covering both studies that used social stories alone and those that combined social stories with additional interventions. The studies focused predominantly on verbal communication and social interaction skills, with some examining reductions in inappropriate behaviour and a small number looking at non-task behaviour. The effectiveness across all studies was inconsistent. There was some evidence to suggest that social stories

combined with additional interventions are more effective than social stories alone. While the authors concluded that social stories can be considered effective, they cautioned that their overall effectiveness remains questionable.

In a review of meta-analyses, Zeng et al. (2022) reported that Social Stories interventions showed variable effectiveness, with effect sizes ranging from small to large across social, communication, and challenging behaviour outcomes in autistic children aged 6 to 17. However, detail was not provided on what the specific outcomes for each study were.

McGill and Busse (2015) aimed to provide a quantitative review of social story interventions using meta-analysis, report single-case effect sizes, and identify moderating variables on intervention outcomes for autistic children aged 2 to 15 years. They included 27 single-case research design studies, of which 12 provided sufficient data for calculating effect sizes. Behaviour was defined as physically aggressive behaviour, verbal behaviours, stereotypic behaviour, and multiple behaviours. The unweighted mean effect size was 1.67 and the weighted mean was 0.79, indicating small to large effects for decreasing problem behaviours. Several moderating variables were identified: school-based settings produced greater effects than home-based settings, interventions delivered by researchers produced greater effects than those delivered by teachers or parents, and interventions of three weeks or less produced larger effects than longer interventions. Notably, large effects were found specifically for interventions targeting verbal behaviours and those delivered by researchers. Despite these findings, the authors concluded that there is insufficient evidence to support social stories as an evidence-based primary intervention for decreasing problem behaviours in autistic children.

Across these reviews, the evidence for the efficacy of social story interventions for autistic children is mixed. Karal and Wolfe (2018) found a moderate mean effect size for social stories on social interaction, while Sani Bozkurt and Vuran (2014) reported inconsistent overall effectiveness, and noted that social stories combined with additional interventions outperformed social stories delivered alone. McGill and Busse (2015) similarly found small to large effects for reducing problem behaviour but concluded that evidence was insufficient to support social stories as a primary evidence-based intervention. Hungate et al. (2017) report evidence of effectiveness, but do not report the size or magnitude of the effects. Across all three reviews, considerable variability in outcomes was noted, with moderating factors such as adherence to Gray's (2010) guidelines for constructing social stories, inclusion of visual components, intervention setting, who delivered the intervention, and treatment duration all appearing to influence effectiveness.

Social Stories Summary

- Overall evidence for social story efficacy is mixed, with effect sizes ranging from negligible to large across all three reviews.

- None of the three reviews provided sufficient evidence to recommend social stories as a standalone evidence-based intervention.
- Social stories appear most effective for improving social interaction and reducing verbal problem behaviours, with effectiveness enhanced when combined with additional interventions.
- Moderating factors such as adherence to Gray's criteria, inclusion of visual components, intervention setting, and who delivers the intervention all influence outcomes.

Video-based interventions

Five reviews in our REA also synthesised evidence of video-based interventions (VBI), targeting social skills for autistic pupils' and pupils with emotional behavioural disorders. Video-based instruction is an umbrella term for instructional techniques that present learners with video footage designed to teach a skill (that is, a targeted behaviour/task) (Clinton et al., 2016; Prelock, 2013). It applies the concepts of Bandura's social learning theory, in other words individuals learn through observation and reinforcement. VBI interventions included in this REA targeted (a) functional living skills in autistic adolescents and young adults (12 to 32 years) (Syriopoulou-Delli & Sarri, 2021); (b) social behaviours (prosocial behaviours) in children and adolescents (5 to 18 years) with emotional behavioural disorders (and autism) (Clinton, 2016); (c) social initiation skills in autistic children and adolescents (3 to 16 years) (Kabashi & Kaczmarek, 2017); and (d) social communication skills (Hungate et al., 2017) for autistic children aged 6 to 17 years.

Studies report different types of VBI: video modelling (VM), video self-modelling (VSM) and others. Of these interventions, VM and VSF are the most implemented and reported in reviews. The evidence shows that VM seems to be a more promising form of VBI for promoting social initiation skills than VSF with twelve of the 14 studies (86%) showed positive results (that is, all participants succeeded in increasing social initiations) (Kabashi & Kaczmarek, 2017). The evidence on different types of VBI and their effectiveness are synthesised and presented individually.

Video modelling (VM)

"Video modelling is the use of video to instruct an individual on desired skills or behaviours by viewing someone demonstrating those skills or behaviours. The video model can take several forms including watching an adult, peer, oneself (also known as video self-modelling), or an animation. This instructional approach is designed to teach new or improve existing skills or behaviours" (Prelock, 2013 p. 3270). In video modelling (VM), the child watches another adult or peer demonstrating the desirable skills. However, in video self-modelling, the child watches him/herself in the video demonstrating the targeted skills.

Hungate et al. (2017) found that across 26 studies, modelling and video modelling led to improvements in social interaction and communication for school-aged autistic children. Syriopoulou-Delli and Sarri (2021) also reviewed many studies that used video modelling for teaching autistic adolescents and young adults, functional living skills (including social skills). Video modelling was typically implemented using additional strategies, including corrective feedback, praise, error correction, voice-over instructions, structured reward system and verbal/gestural prompts. Syriopoulou-Delli and Sarri, (2021) found VBIs were found to be effective in teaching a variety of functional living skills such as social skills, including verbal behaviour (for example requesting materials, asking for information, engagement in spontaneous social questioning and commenting during natural activities), and non-verbal behaviour (e.g. eye contact, observing the affective behaviours of others). The effectiveness of video modelling specifically was not measured in comparison to other forms of VBI.

Clinton et al. (2016) reported mixed evidence for video-based interventions targeting prosocial skills. Overall, 56 per cent of included studies indicated a favourable effect, whereas 43 per cent were unable to determine effectiveness. Most studies, 16 of 19, employed video self-modelling with children and adolescents aged 5 to 18 years with emotional behavioural disorders or autism. Of the six video self-modelling studies specifically targeting social initiations, three reported no improvement, and overall effectiveness was low and highly variable. By contrast, video modelling appeared more effective than video self-modelling: 56 per cent of studies demonstrated a strong or moderate treatment effect for social behaviours, compared with 43 per cent rated as questionable or unreliable. However, this conclusion should be treated cautiously, as only 15% of the included studies used video modelling.

Similarly, Kabashi and Kaczmarek (2017) reported that video-based interventions were effective for improving social initiation skills, including initiations, comments, question asking, play behaviours, social amenities, requests and broader social engagement. In their review of 14 studies using video modelling to teach social initiation, 13 were conducted in school settings and one in the home; despite variation in participants' age and baseline social communication skills, 36 of 40 participants showed increased target behaviours, and 12 of 14 studies reported positive effects for all participants. Taken together, these findings indicate that video modelling is a promising, though not uniformly effective, approach to promoting social initiation skills.

Kabashi & Kaczmarek (2017) was the only review that reported on the number and length of video vignettes used in VM studies. The number varied from one to three scenarios per participant, one scenario per play set or condition to three different scenarios for each of the target behaviours. The length of video vignettes ranged from 20 to 90 seconds, depicting various models displaying the target behaviours. Video vignettes used familiar adults as models or depicted peers emitting target behaviours to adults or sibling/peers engaging in play scenarios. In majority of

studies, participants viewed videos on a TV or laptop in the same setting as the activity session. Most studies had participants viewing the video only once per session, however, in some studies participants viewed the video twice or three consecutive times. Four studies used two to five activity sessions per day of 5 min each, with 5 to 8 min intervals between sessions; two studies used three 4-min to four 3-min play conditions per session and one study provided five opportunities for the participant to display the target behaviours per session. The activity sessions consisted of participants practicing the skills observed in the video for the first 10 min of their playtime, in a 15 min playground time, in a 30-min play activity, or for 30 min in three different activities. Participants' abilities (skills) and age levels varied and appeared to be factors affecting the efficacy of VSM. None of the 3-year-olds improved social initiation skills and only 66% (12 of the 18 participants) increased the targeted skills in the six studies (Kabashi & Kaczmarek, 2017). This suggests that although VSM is an effective strategy for promoting social initiations in some children, consideration in its use should be given to children’s entry ages and functioning levels.

In Mulcahy et al. (2024)’s review on the effectiveness of assistive technology for supporting students with specific learning disabilities, speech/language impairments, emotional difficulties, and attention deficit hyperactivity disorder (ADHD; , video modelling was examined primarily as a targeted intervention delivered to individual pupils or small groups within classroom settings. Approaches included video modelling, video self-modelling, and video-based social skills training delivered via tablets or mobile devices (for example O’Brien & Wood, 2011; Blood & Johnson, 2011; Clees & Greene, 2014; Wills & Mason, 2014). In practice, pupils watch short video clips demonstrating a clearly defined behaviour, such as raising a hand, following instructions, cooperating in group tasks, or requesting help appropriately. In video self-modelling, pupils watch themselves successfully performing the target behaviour. Sessions are typically brief (5-25 minutes) and repeated over several weeks, delivered by teachers or support staff. Video modelling showed relatively strong and consistent effects for behavioural outcomes. Studies demonstrated increases in on-task behaviour, cooperative participation, compliance, and reductions in disruptive behaviour (O’Brien & Wood, 2011; Blood & Johnson, 2011; Clees & Greene, 2014). Withdrawal designs showed positive outcomes, with behaviour improving during intervention phases and returning toward baseline when withdrawn (Wills & Mason, 2014). Compared with universal classroom technologies, video modelling produced clearer and more immediate behavioural gains. Its effectiveness likely relates to several features: behaviours are modelled visually and concretely; language demands are reduced; repetition supports learning; and pupils can observe successful performance. However, most studies were small-scale single-case designs, and few examined long-term maintenance or transfer to new settings.

Two other types of VM emerged from the analysis: (1) point-of-view VM and (2) video self-prompting (VSP). Studies in the review by Syriopoulou-Delli and Sarri, 2021 included point-of-view video modelling (POV-VM). POV-VM, aims to reduce additional irrelevant stimuli in the learning environment for the child/ren. The camera angle is presented at the participant's eye level and shows only what the participant might see within the context of the targeted activity, skill or context (that is, from his or her own viewpoint) (Tetrault & Lerman, 2010). Depending on the target skill, the participant might view a specific setting or a pair of hands completing a task. Researchers in the POV-VM studies also used additional strategies (for example verbal or gesture prompts and error correction). The additional strategies were implemented when an incorrect response or no response occurred after the participant watched the video or when the participant was distracted from watching the video. One study compared VM to video-self prompting (VSP), with participants using VSP reaching mastery criterion in fewer sessions than participants using self-mediated video modelling (Syriopoulou-Delli & Sarri, 2021).

Video-modelling with other components

In a small number of studies across these reviews, VM was combined with other strategies and components to meet the target outcomes. For example, in VM package studies reviewed by Syriopoulou-Delli and Sarri, (2021) researchers used additional strategies, for example video feedback, structured reward system, voiceover instruction, role play and feedback, error correction, verbal/gestural prompts, the system of least prompts, and least to most prompts). All participants increased their scores of functional living skills (for example setting the table, cooking, folding clothes, cleaning, personal hygiene) after the treatment sessions and the implementation of VM package. In addition, participants showed improvement in the percentage of steps completed correctly after implementation of the video prompting package with the additional strategies.

Similarly, studies reviewed in Kabashi and Kaczmarek (2017) employed additional strategies such as reinforcement, self-management, prompting, Picture Exchange Communication System (PECS), video feedback, video feedback plus visual and verbal prompting, verbal prompting, peer-mediated instruction, and social stories presented in a Microsoft PowerPoint and with prompts. One study used integrated social stories into VSM. Six studies were conducted in school settings and two at home. Although the severity of autism and language abilities varied in the participating children, and all children displayed limited to no social initiation skills upon entry, all 18 participants improved social initiations skills after supplementing VBI with additional strategies. All eight studies that used VM or VSM within a treatment package demonstrated positive findings. Therefore, combining these two forms of VBI with other strategies in a multifaceted treatment package can lead to preferable outcomes. However, the studies do not reveal the extent to which VBI, as only one aspect of the intervention, contributed to the outcomes (Kabashi & Kaczmarek, 2017).

Overall, VBI is found to be an effective intervention for promoting *social skills*, with use of different types of VBI for autistic (and emotional behavioural disorders) children, adolescents and adults. VM shows higher efficacy and effectiveness for promotion of social and social initiation skills than VSF. This is important for practitioners to consider when choosing between these two types of VBI intervention to meet the targeted social skills outcomes.

Similarly, VM combined with packages and strategies also showed positive outcomes for targeted social skills in autistic children (Kabashi & Kaczmarek, 2017; Syriopoulou-Delli & Sarri, 2021). This was also the case for other video-based approaches using various other strategies (feedback and computer-based instruction) in promoting social initiation skills (Kabashi & Kaczmarek, 2017). Since, often studies employ additional strategies in VBI, it is recommended that additional strategies are explicitly acknowledged as part of the intervention to distinguish whether VBI was independently effective and/or with strategies or package (Clinton, 2016). Therefore, we suggest practitioners maintain formal plans and records to acknowledge VM packages and additional strategies to help extend the evidence for effective VBI. This will support practitioners and professionals to replicate and adapt VBI in different contexts and settings as suitable (independent VM or combined package and strategies).

Our REA also raises consideration for practitioners of the interplay of child characteristics (children's age) and abilities (severity of autism, base-level target skills at the start of the intervention) in choosing the suitable VBI. Despite varying severity of autism, language abilities and limited/no social initiation skills at entry, VBI with additional strategies showed improvement in autistic children's social initiation skills (Kabashi & Kaczmarek, 2017). On the contrary, with VSM, participants' ability (skills) and age impacted the efficacy of VSM. None of the 3-year-olds showed improvement in social initiation skills and only 66% (12 of the 18 participants) increased the targeted skills in the six VSM studies (Kabashi & Kaczmarek, 2017). Therefore, in choosing and designing an effective VBI, care and attention need to be given to these independent variables identified in our REA, since they can impact the efficacy of VBI. Therefore, for younger children and adolescents, VM (with packages and additional strategies) may be more suitable than VSF (children viewing themselves in the videos).

Our REA also raises important consideration for the VBI design (video vignettes), implementation (setting, timing, frequency and duration) of video-based sessions. Kabashi & Kaczmarek (2017) reported variations in design and implementation within studies (Kabashi & Kaczmarek (2017). Therefore, we suggest practitioners take careful consideration of children's age, ability, interest and feasibility (settings, spaces to show the videos, types of videos and video models) to ensure VBI is effective in meeting the targeted skills.

Video-Based Interventions Summary

- VBI is effective for promoting social skills, social initiation skills and prosocial behaviours for autistic (and emotional behavioural disorders) children, adolescents and adults.
- Video modelling (VM) and video modelling with packages (and strategies) are more effective than video-self modelling (VSM).
- Variables such as child characteristics: age, ability (base-level skills upon entry) and severity of the autism need consideration in selecting VBI.
- Careful consideration is recommended for VBI designs and implementation.

Targeted digital interventions

Targeted technology interventions are defined as assistive or digital systems designed to support individuals with specific disabilities in reaching higher levels of functioning (Lancioni, 2017). These may include speech-generating devices, microswitches, memory aids, video prompting, virtual reality systems, and specialised software tailored to individual needs (Erdem, 2017; Ardai et al., 2022). Such interventions are typically implemented one-to-one or in small groups and focus on improving specific behavioural, cognitive, social, motor, academic, or daily living skills (Moreno et al., 2021; Park et al., 2019). The emphasis is on personalised, structured support to address identified functional needs.

Xu et al. (2026) conducted a meta-analysis of 28 experimental studies to examine whether digital interventions improve developmental outcomes for autistic children and adolescents under 18 years of age. Across these studies, there were 1,360 participants, most of whom (1,222) with autism as their primary diagnosis.

The studies included a range of different digital interventions. The most common were computer-based programmes (14 studies), delivered through desktop or laptop computers. These programmes typically involved structured software with interactive tasks, animated characters, visual supports and repeated practice. Examples include Junior Detective (Beaumont & Sofronoff, 2008), the Secret Agent Society computer-based programme (Beaumont et al., 2021), and Let's Face It! (Tanaka et al., 2010), which focused on helping children recognise faces and emotions. These programmes were generally designed to strengthen social understanding through game-like activities and guided feedback.

Four studies evaluated tablet- or smartphone-based interventions, usually delivered via iPads or mobile applications (for example Parsons et al., 2019; Voss et al., 2019). These approaches also used interactive tasks and visual prompts but were designed to be more portable and used flexibly across home or school settings. Three studies used DVD-based interventions, such as the Transporters DVD (Williams et al.,

2012), which used video modelling to teach emotion recognition and social conventions. Six studies examined virtual reality (VR) interventions (for example Ip et al., 2018; Maskey et al., 2019), where children practised skills in simulated environments that recreated social situations. One study investigated a mixed reality intervention (Vukićević et al., 2019). The length and intensity of interventions varied considerably. Sessions ranged from 5 to 100 minutes, and programmes ran for between 6 and 90 sessions. This shows that there was no single model of delivery across studies.

Most interventions focused on improving social-emotional skills, such as recognising emotions, responding appropriately in social situations, and reducing behaviours that interfere with interaction. Other areas included language and communication (for example, vocabulary and expressive language), thinking and attention skills, daily living skills (such as safety or self-help), and physical or motor skills.

Xu et al. (2026) found that digital interventions were linked to improvements for autistic children and young people. The strongest effects were seen in social-emotional outcomes, which showed greater gains compared to language, cognitive, physical, or other areas. In contrast, effects were smaller for daily living skills, and this area was only targeted by one study. This makes it difficult to draw firm conclusions about the impact of digital interventions on daily living skills. Overall, the findings suggest that digital interventions appear particularly promising for supporting social-emotional development in autistic children and adolescents, though evidence is more limited for other developmental areas.

Scheibel et al (2023) conducted a meta-analysis examining the effectiveness of I-Connect, a technology-based self-monitoring intervention designed to increase on-task behaviour in pupils with and at risk for disabilities. The review synthesised findings from six single-case design studies (Wills & Mason, 2014; Clemons et al., 2016; Rosenbloom et al., 2016; Beckman et al., 2019; Rosenbloom et al., 2019; Romans et al., 2020), involving 14 pupils aged 9 to 15 years. Participants were receiving special educational support and included autistic pupils, as well as pupils with emotional and behavioural difficulties and other learning needs.

I-Connect is a freely available mobile or desktop app that prompts pupils at scheduled intervals to reflect on and record whether they are on task during academic activities. Pupils typically received 20-45 minutes of training before independently using the app. Training involved explanation, modelling and practice to ensure accurate self-monitoring. Monitoring sessions were generally short, most commonly around 10 minutes, though sessions ranged from 10 to 30 minutes. Pupils were prompted to record their behaviour at regular intervals, most often every 30 seconds, with intervals ranging from 15 to 60 seconds. The intervention was delivered in both special education classrooms and inclusive general classrooms, and was typically implemented on a one-to-one basis, with teachers supporting training and early use of the app.

In all six studies, the introduction of I-Connect was associated with increases in on-task behaviour. Improvements were consistent across participants, suggesting that technology-supported self-monitoring can effectively enhance classroom engagement for pupils receiving additional support. However, most participants were male, and evidence is limited for female pupils. Although an increase in on-task behaviour was clear, there is less evidence regarding whether these improvements translate into broader academic outcomes, such as improved work quality or sustained learning.

Across the included reviews, targeted technology interventions were generally associated with positive outcomes for autistic children and young people, particularly in social-emotional functioning and classroom engagement. Digital programmes showed the strongest and most consistent effects for outcomes such as emotion recognition, social understanding, and on-task behaviour, while evidence for improvements in language, cognitive skills, or daily living skills was more limited. Although findings are broadly promising, considerable variability in intervention design, delivery format, intensity, and outcome measurement were noted across studies, suggesting that effectiveness depends on the specific skill targeted and how the technology is implemented in practice.

Targeted Technology Interventions Summary

- Targeted technology interventions were generally associated with positive outcomes for autistic children and young people, particularly in social-emotional functioning and classroom engagement.
- The strongest effects were observed for emotion recognition, social understanding, and on-task behaviour, with more limited evidence for language, cognitive, or daily living outcomes.
- Effectiveness varied across studies and appeared to depend on the specific skill targeted and the way the technology was implemented.

Discussion of Findings and Conclusions

Evidence gaps and implications for practice

When interpreting the findings summarised in this report, schools and educators should do so with caution, considering the quality of the evidence base and its limitations.

Across intervention types, several reviews were based on single-case studies (for example Aldabas, 2020; McGill & Busse, 2015; Mulcahy et al., 2024; Pyle & Fabiano, 2017; Scheibel et al., 2023). This type of design can limit the generalisability of the findings due to the small sample size and the difficulty of replicating or extending intervention effects beyond the individual cases reported in such studies (Kratochwill et al., 2013).

The reviews highlighted additional limitations related to the methodological rigour of the studies reported. There was considerable variation in intervention intensity and duration (for example Tiede & Walton, 2019; Bremer et al., 2016; Dean & Chang, 2021), making it difficult to identify clear guidance regarding the optimal dosage required to achieve the expected level of effectiveness for the different interventions. In several studies, interventions were delivered or supervised by specialists such as behavioural therapists, speech and language therapists, art therapists, educational psychologists, occupational therapists, mindfulness or yoga practitioners (Bremer et al., 2016; Dean & Chang, 2021; Dias et al., 2025; Moula, 2020; Semple, 2019; Tiede & Walton, 2019; Vogel et al., 2025). This suggests that schools may require additional financial resources to replicate these intervention models with fidelity. It is unclear whether such an intervention will have comparable effects if they are delivered by teachers without equivalent training or supervision.

In many studies, fidelity metrics were not consistently reported (Bruhn et al., 2013; Dean & Chang, 2021). Hence, it is difficult to judge whether the limited effectiveness reflected limitations of the intervention itself or its delivery. Maintenance of gains and generalisation of benefits beyond the targeted skills were rarely reported (for example Wattanawongwan et al., 2022; Blewitt et al., 2021). In addition, many of the included studies relied on researcher-developed or bespoke outcome measures (for example Bremer et al., 2016; Dean & Chang, 2021; Moula, 2020; Tiede & Walton, 2019) that were closely linked with the specific skills targeted, which may have inflated the effectiveness estimates of some interventions. This means that the reported effectiveness of some interventions may be overestimated and therefore difficult to interpret or compare.

Several reviews included studies characterised by small sample sizes and unclear allocation procedures across intervention groups. In many cases, there was limited transparency regarding how children were assigned to intervention or comparison

conditions, making it difficult to determine whether pre-existing group differences may have influenced the outcomes. Moreover, the majority of studies relied primarily on parent or teacher reports as outcome measures, with limited consideration of pupils' own perspectives or input. As a result, conclusions about how engaging, acceptable or motivating these interventions are for children remain constrained. Pupil voice is critical for determining the ecological validity (for example how generalisable research findings are to real-world settings and everyday life) and likely sustainability of interventions in classroom and whole-school contexts. These methodological limitations were observed across several domains such as music therapy (Dias et al., 2025), art therapy (Moula, 2020; Vogel et al., 2025), yoga and mindfulness interventions (Semple, 2019), and peer-mediated interventions (Bremer et al., 2016; Dean & Chang, 2021).

Conclusions

Our review identified a total of 73 systematic reviews dedicated to the support and intervention strategies that mainstream educators can use to support behavioural and social communication outcomes for autistic children and young people and those with SEMH needs. Although this REA sought to include reviews investigating interventions for children and young people with SEMH, the majority of papers focused on autistic children and young people or specific needs such as ADHD or emotional and behavioural disorders (EBD) rather than a wider range of SEMH needs.

Peer mediated interventions are associated with improvements in short-term social engagement and communication for many autistic pupils (and sometimes their peer supporters as well), particularly in early years and primary contexts. Effects are generally strongest for directly observed interaction outcomes and are more variable for maintenance, generalisation, and wider academic or behavioural indicators. Similarly, the use of activity schedules and structured targeted behavioural supports such as Check-In Check- Out systems and Daily Behaviour Report Cards are linked to small to moderate improvements in observable classroom behaviour, particularly for pupils with ADHD or those at risk of emotional and behavioural difficulties. In both literatures, implementation features appear central to impact, including clarity of targets, consistency of monitoring, alignment between goals and reinforcement, and sustained adult facilitation. However, outcomes are typically short-term behavioural metrics, with limited attention to long-term academic attainment, relational inclusion, or psychosocial functioning.

The evidence on physical activity interventions likewise indicates positive but heterogeneous effects across different pupils and contexts. Across autism and ADHD populations, physical activity is associated with reductions in problem behaviour and stereotyped or repetitive behaviours, and improvements in social-

emotional functioning and self-regulation. Larger effects are reported for more intensive, longer duration, or sport-based interventions, with some indication that implementer characteristics may moderate outcomes. For ADHD, sustained interventions appear more beneficial than short-term or one-off activities. Nonetheless, considerable variability across studies and limited specification of type, intensity, and dosage constrains conclusions about mechanisms and optimal design. While many activities could be incorporated into mainstream school contexts, including through physical education or recess, the feasibility of integrating certain approaches into daily classroom routines remains underexplored.

For early years and primary-age children, naturalistic developmental behavioural interventions, play-based approaches, and social interventions show positive effects on behavioural and social communication outcomes, although impact varies by model, dosage, and setting. Some approaches, such as JASPER and ESDM, are more frequently studied, while others, including PRT and RIT, have more limited evidence base in relation to specific skills and age groups. Intervention intensity ranges widely across models, from relatively brief professional input to high dose, long duration programmes, and this appears to influence targeted outcomes such as joint attention and adaptive behaviour. Given this variability, careful consideration of dosage, feasibility, and practitioner expertise is essential, particularly where delivery in mainstream settings is intended. Although core principles emphasise naturalistic environments, several models have predominantly been implemented in community, laboratory, or specialist settings, raising questions about transferability to everyday classroom contexts.

Across social interventions more broadly, including LEGO therapy, structured social skills programmes, and video-based interventions, outcomes are generally positive but heterogeneous. Effectiveness appears moderated by child age, baseline skill level, autism severity, and specific design features. For example, video modelling with additional strategies shows stronger evidence for improving social initiation than video self-modelling for younger children. Similarly, peer involvement varies considerably across interventions, and the extent and quality of peer training may influence social outcomes. Implementation features such as setting, duration, frequency, adherence to intervention protocols, and practitioner training are recurrent determinants of impact.

The evidence for social stories is mixed, with moderate to small effects reported and stronger outcomes where stories are combined with additional strategies or delivered with fidelity to established criteria. Technology-based interventions are broadly promising, particularly for social emotional functioning, emotion recognition, and on-task behaviour, but show less consistent evidence for language, cognitive, or adaptive outcomes. Substantial heterogeneity in design and delivery limits firm conclusions about optimal formats.

Taken together, the REA suggests that no single model is universally optimal for all pupils. Instead, effective practice requires careful matching of intervention type, intensity, and delivery conditions to individual pupil characteristics and targeted skills, alongside adequate practitioner training and reliable outcome measurement. The literature remains strongest for short term changes in specific social communication behaviours and less developed in relation to sustained, generalised, and classroom embedded outcomes, indicating a need for further research in mainstream educational contexts with educators delivering the interventions.

In terms of the quality of the research base, Wattanawongwan et al. (2022) evaluated the quality of 41 of single-case studies investigating the use of a range of social communication interventions (video-based instruction, AAC, peer-mediated intervention, behaviour skills training, and social skills training) for autistic adolescents and adults aged 12-39. Using the What Works Clearinghouse basic standard review (Kratochwill & Levin, 2010; USDE, 2019), the researchers conclude that video-modelling met the criteria to be considered an evidence-based practice in improving social interaction and behavioural regulation outcomes. However, they also highlight common aspects across studies that did not meet high standards. Importantly, they found that maintenance, generalisation, and social validity were poorly addressed in most studies. This implies that although many of these studies may report positive outcomes, further work is needed to establish the strength of the evidence base, particularly in whether outcomes are maintained beyond the intervention period, whether they can be generalised to a wider population of autistic children, and whether the intervention outcomes and procedures are meaningful for children and educators.

Inconsistencies in outcome reporting and intervention design across studies limit the generalisability of some findings. Furthermore, due to the rapid nature of this review and our focus on systematic reviews and meta-analyses, it is possible that some tools or interventions currently in use, particularly newer, unpublished, or practitioner-led approaches, may not have been captured. These omissions reflect the current state of the evidence base, not necessarily the effectiveness of those approaches. Future research should prioritise robust study designs, focus on behaviour and communication outcomes linked to educational access and attainment, and include mainstream educator perspectives.

Overall, while a growing number of tools and strategies are available, the evidence base is variable, with some approaches supported by robust findings and others showing limited or inconsistent evidence. Additionally, many approaches require further validation. Future research should focus on strengthening the reliability and consistency of this evidence base, with clear implication mechanisms guiding classroom applicability of these support strategies and interventions in diverse educational contexts.

References

*Indicates references retrieved from the rapid search

Albano, A. M., Chorpita, B. F., & Barlow, D. H. (2003). Childhood anxiety disorders. *Child Psychopathology*, *2*, 279-329.

*Aldabas, R. (2020). Effectiveness of peer-mediated interventions (PMIs) on children with autism spectrum disorder (ASD): A systematic review. *Early Child Development and Care, 190*(10), 1586–1603. https://doi.org/10.1080/03004430.2019.1580275

Altenmüller, E., & Schlaug, G. (2013). Neurologic music therapy: The beneficial effects of music making on neurorehabilitation. *Acoustical Science and Technology, 34*(1), 5–12.

American Psychiatric Association [APA]. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Anderson, L. K. (2023). Autistic experiences of applied behavior analysis. *Autism, 27*(3), 737-750.

*Anthony, N., & Wooten, C. (2021). Using Technology-Based Interventions to Improve the Social-Communication Skills of Adolescents with Autism Spectrum Disorder (ASD). *Journal of the American Academy of Special Education Professionals*, *122*, 132. https://doi.org/10.64546/jaasep.471

Ardai, E., Vámos, T., Papp, G., & Berencsi, A. (2022). Virtual reality therapy in special needs education: From therapy to inclusion. *Gyermeknevelés Tudományos Folyóirat, 10*(2–3), 259–271. https://doi.org/10.31074/gyntf.2022.3.259.271

Arnold, C., & Baker, T. (2012). Transitions from school to work: Applying psychology to'NEET'. *Educational & Child Psychology, 29*(3), 67–80.

*Babb, S., Raulston, T., McNaughton, D., Lee, J., & Weintraub, R. (2021). Social interaction interventions for adolescents with autism: A meta-analysis. *Remedial and Special Education, 42*(5), 343-357. https://doi.org/10.1177/0741932520956362

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Barlattani, T., D'Amelio, C., Cavatassi, A., De Luca, D., Di Stefano, R., Di Berardo, A., ... & Pacitti, F. (2023). Autism spectrum disorders and psychiatric comorbidities: a narrative review. *Journal of Psychopathology*. https://doi.org/10.36148/2284-0249-N281

Beaumont, R., & Sofronoff, K. (2008). A multi-component social skills intervention for children with Asperger syndrome: The Junior Detective Training Program. *Journal of Child Psychology and Psychiatry, 49*(7), 743–753. https://doi.org/10.1111/j.1469-7610.2008.01920.x

Beaumont, R., Rotolone, C., & Sofronoff, K. (2015). The Secret Agent Society social skills program for children with high-functioning autism spectrum disorders: A comparison of two school variants. *Psychology in the Schools, 52*(4), 390–402. https://doi.org/10.1002/pits.21831

Beckman A., Mason B. A., Wills H. P., Garrison-Kane L., Huffman J. (2019). Improving behavioral and academic outcomes for students with autism spectrum disorder: Testing an app-based self-monitoring intervention. *Education and Treatment of Children, 42*(2), 225–244. https://doi.org/10.1353/etc.2019.0011

Beebe, A., Gelfand, E. W., & Bender, B. (2010). A randomised controlled trial to test the effectiveness of art therapy for children with asthma. *Journal of Allergy and Clinical Immunology, 126*(2), 263–266. https://doi.org/10.1016/j.jaci.2010.03.019

Bieleninik, L., Geretsegger, M., Mössler, K., Assmus, J., Thompson, G., Gattino, G., Elefant, C., Gottfried, T., Igliozzi, R., Muratori, F., Suvini, F., Kim, J., Crawford, M. J., Odell-Miller, H., Oldfield, A., Casey, Ó., Finnemann, J., Carpente, J., Park, A.-L., & TIME-A Study Team. (2017). Effects of improvisational music therapy vs enhanced standard care on symptom severity among children with autism spectrum disorder: The TIME-A randomized clinical trial. *JAMA, 318*(6), 525–535. https://doi.org/10.1001/jama.2017.9478

Blair, C., & Raver, C. C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Annual Review of Psychology, 66*, 711–731. https://doi.org/10.1146/annurev-psych-010814-015221

*Blewitt, C., O'Connor, A., May, T., Morris, H., Mousa, A., Bergmeier, H., Jackson, K., Barrett, H., & Skouteris, H. (2021). Strengthening the social and emotional skills of pre-schoolers with mental health and developmental challenges in inclusive early childhood education and care settings: A narrative review of educator-led interventions. *Early Child Development and Care, 191*(15), 2311–2332. https://doi.org/10.1080/03004430.2019.1704283

Blood, E., Johnson, J.W., Ridenour, L., Simmons, K., & Crouch, S. (2011). Using an iPod Touch to Teach Social and Self-Management Skills to an Elementary Student with Emotional/Behavioral Disorders. *Education and Treatment of Children 34*(3), 299-321. https://dx.doi.org/10.1353/etc.2011.0019.

Bosgraaf, L., Spreen, M., Pattiselanno, K., & van Hooren, S. (2020). Art therapy for psychosocial problems in children and adolescents: A systematic narrative review on art therapeutic means and forms of expression, therapist behaviour

and presumed mechanisms of change. *Frontiers in Psychology,* 11, 584685. https://doi.org/10.3389/fpsyg.2020.584685

Bougeard, C., Picarel-Blanchot, F., Schmid, R., Campbell, R., & Buitelaar, J. (2024). Prevalence of autism spectrum disorder and co-morbidities in children and adolescents: A systematic literature review. *Focus*, *22*(2), 212-228. https://doi.org/10.3389/fpsyt.2021.744709

Boyd, B. A., Watson, L. R., Reszka, S. S., Sideris, J., Alessandri, M., Baranek, G. T., .Crais, C.R., Donaldson, A., Gutierrez, A., Johnson, L., ⎓ & Belardi, K. (2018). Efficacy of the ASAP intervention for preschoolers with ASD: A cluster randomized controlled trial. *Journal of Autism and Developmental Disorders, 48*(9), 3144-3162. https://doi.org/10.1007/s10803-018-3584-z

*Bremer, E., Crozier, M., & Lloyd, M. (2016). A systematic review of the behavioural outcomes following exercise interventions for children and youth with autism spectrum disorder. *Autism, 20*(8), 899-915.

British Association of Art Therapists. (2014). *Art therapy information.* https://www.baat.org

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design.* Harvard University Press.

*Bruhn, A. L., Lane, K. L., & Hirsch, S. E. (2013). A review of tier 2 interventions conducted within multitiered models of behavioral prevention. *Journal of Emotional and Behavioral Disorders, 22*(3), 171-189.

Carpente, J. A. (2017). Investigating the effectiveness of developmental, individual-difference, relationship-based (DIR) improvisational music therapy on social communication for children with autism spectrum disorder. *Music Therapy Perspectives, 35*(2), 160–174. https://doi.org/10.1093/mtp/miw013

*Camargo, S. P. H., Rispoli, M., Ganz, J., Hong, E. R., Davis, H., & Mason, R. (2014). A review of the quality of behaviorally-based intervention research to improve social interaction skills of children with ASD in inclusive settings. J*ournal of autism and developmental disorders, 44*(9), 2096-2116. https://doi.org/10.1007/s10803-014-2060-7

Chan, A. S., Sze, S. L., Siu, N. Y., Lau, E. M., & Cheung, M. (2013). A Chinese mind–body exercise improves self-control of children with autism: A randomized controlled trial. *PLoS ONE, 8*(7), e68184. https://doi.org/10.1371/journal.pone.0068184

Chandler, S., Howlin, P., Simonoff, E., O'sullivan, T., Tseng, E., Kennedy, J., ... & Baird, G. (2016). Emotional and behavioural problems in young children with autism spectrum disorder. *Developmental Medicine & Child Neurology, 58*(2), 202-208.

Charoenphol, N., Chiengchana, N., & Tayrattanachai, N. (2019). The effects of parent–child interactive music therapy on sentence verbalization in a child with autism spectrum disorder: A case study. *Malaysian Journal of Music, 8*, 86–95.

Chou, W.-C., Lee, G. T., & Feng, H. (2016). Use of a behavioral art program to improve social skills of two children with autism spectrum disorders. *Education and Training in Autism and Developmental Disabilities, 51*(2), 195–210.

Cihak, D. F. (2011). Comparing pictorial and video modeling activity schedules during transitions for students with autism spectrum disorders. *Research in Autism Spectrum Disorders, 5*(1), 433-441.

Clees, T. J., & Greene, E. B. (2014). Discriminative stimulus social skills training: The effects of video-based exemplars of teacher requests on the compliance of students with behavioral disorders. *Journal of Special Education Technology, 29*(2), 1-15. https://doi.org/10.1177/016264341402900201

Clemons L. L., Mason B. A., Garrison-Kane L., Wills H. P. (2016). Self-monitoring for high school students with disabilities: A cross-categorical investigation of I-connect. *Journal of Positive Behavior Interventions, 18*(3), 145–155. https://doi.org/10.1177/1098300715596134

Clifford, S., Hudry, K., Elsabbagh, M., & Charman, T. (2020). Temperament and the development of social–emotional difficulties in children with neurodevelopmental conditions. *Journal of Child Psychology and Psychiatry, 61*(6), 1–10. https://doi.org/10.1111/jcpp.13160

*Clinton, E. (2016). A meta-analysis of video modeling interventions for children and adolescents with emotional/behavioral disorders. *Educational Research Quarterly, 40*(2), 67–86. https://files.eric.ed.gov/fulltext/EJ1166705.pdf

Clinton, E., Galletta, A., & Zanton, J. (2016). Overview and critical components of video-based instruction for students with disabilities. *Technology and Disability, 28*(3), 91–100. https://doi.org/10.3233/TAD-160447

Cook, B., & Purkis, Y. (2022). *The autism and neurodiversity self-advocacy handbook: Developing the skills to confidently advocate for yourself and others*. Jessica Kingsley Publishers.

Cook, J., Hull, L., Crane, L., & Mandy, W. (2021). Camouflaging in autism: A systematic review. *Clinical Psychology Review*, *89*, 102080.

Copeland, S. R., & Hughes, C. (2000). Acquisition of a picture prompt strategy to increase independent performance. *Education and Training in Mental Retardation and Developmental Disabilities, 35*(3), 294-305.

Corsello, C. M. (2005). Early intervention in autism. *Infants & Young Children, 18*(2), 74-85.

D'Amico, M., & Lalonde, C. (2017). The effectiveness of art therapy for teaching social skills to children with autism spectrum disorder. *Art Therapy, 34*(4), 176–182. https://doi.org/10.1080/07421656.2017.1384678

Daley, D., Van der Oord, S., Ferrin, M., Danckaerts, M., Doepfner, M., Cortese, S., ... & European ADHD Guidelines Group. (2014). Behavioral interventions in attention-deficit/hyperactivity disorder: a meta-analysis of randomized controlled trials across multiple outcome domains. *Journal of the American Academy of Child & Adolescent Psychiatry, 53*(8), 835-847.

*Dargue, N., Adams, D., & Simpson, K. (2022). Can characteristics of the physical environment impact engagement in learning activities in children with autism? A systematic review. *Review Journal of Autism and Developmental Disorders, 9*(2), 143-159. https://doi.org/10.1007/s40489-021-00248-9

de Bruin, E. I., Blom, R., Smit, F. M. A., van Steensel, F. J. A., & Bögels, S. M. (2015). MYmind: Mindfulness training for youngsters with autism spectrum disorders and their parents. *Autism, 19*(8), 906-914. https://doi.org/10.1177/1362361314553279

*Dean, M., & Chang, Y. C. (2021). A systematic review of school-based social skills interventions and observed social outcomes for students with autism spectrum disorder in inclusive settings. *Autism, 25*(7), 1828–1843. https://doi.org/10.1177/13623613211012

Department for Education [DfE] & Department of Health [DoH]. (2015). *Special educational needs and disability code of practice: 0 to 25 years.* https://www.gov.uk/government/publications/send-code-of-practice-0-to-25.

Department for Education [DfE]. (2025). *Special educational needs in England: January 2025.* Department for Education. https://www.gov.uk/government/statistics/special-educational-needs-in-england-january-2025

*Dias, N. A. S., Cipullo, M. A. T., & Jurdi, A. P. S. (2025). The effect of music therapy in children with autism: A scoping review. *Psicologia em Estudo, 30,* e60243. https://www.scielo.br/j/pe/a/YW8LMV3PPZbm8pZJVCMsBQk/

Dunlap, G., Iovannone, R., Wilson, K. J., Kincaid, D. K., & Strain, P. (2009~~10~~). Prevent-teach-reinforce: A standardized model of school-based behavioral intervention. *Journal of Positive Behavior Interventions*, *12*(1), 9-22. https://doi.org/10.1177/1098300708330880

DuPaul, G. J., & Stoner, G. (2014). *ADHD in the schools: Assessment and intervention strategies.* Guilford Publications.

Dykstra, J. R., Boyd, B. A., Watson, L. R., Crais, E. R., & Baranek, G. T. (2012). The impact of the Advancing Social-communication And Play (ASAP) intervention

on preschoolers with autism spectrum disorder. *Autism, 16*(1), 27-44. https://doi.org/10.1177/1362361311408933

Elliott, G. R., & Smiga, S. (2003). Depression in the child and adolescent. *Pediatric Clinics of North America, 50*(5), 1093–1106.

Epp, K. M. (2008). Outcome-based evaluation of a social skills program using art therapy and group therapy for children on the autism spectrum. *Children & Schools, 30*(1), 27–36. https://doi.org/10.1093/cs/30.1.27

Erdem, R. (2017). Students with special educational needs and assistive technologies: A literature review. *The Turkish Online Journal of Educational Technology, 16*(1), 128–146.

*Evangelou, C., Pappa, A., Gkanis, I., Iatraki, G., & Soulis, S. G. (2026). Towards developing early intervention programmes supporting social skills for autistic children in early childhood: A systematic review. *European Journal of Special Needs Education, 41*(1), 1-19. https://doi.org/10.1080/08856257.2025.2491193

Evans, J. A., Krumrei-Mancuso, E. J., & Rouse, S. V. (2024). What you are hiding could be hurting you: Autistic masking in relation to mental health, interpersonal trauma, authenticity, and self-esteem. *Autism in Adulthood*, *6*(2), 229-240.

Fisher, W. W., Piazza, C. C., & Roane, H. S. (Eds.). (2021). *Handbook of applied behavior analysis.* Guilford Publications.

Fox, L., Dunlap, G., & Philbrick, L. A. (1997). Providing individual supports to young children with autism and their families. *Journal of Early Intervention, 21(*1), 1-14. https://doi.org/10.1177/105381519702100101

Fuchs, D., & Fuchs, L. S. (2006). Introduction to response to intervention: What, why, and how valid is it?. *Reading Research Quarterly, 41*(1), 93-99.

Gardstrom, S., Sorel, S., & Wheeler, B. (2015). *Music therapy methods.* In B. Wheeler (Ed.), Music Therapy Handbook. Guilford Press.

Garritty, C., Hamel, C., Trivella, M., Gartlehner, G., Nussbaumer-Streit, B., Devane, D., ... & King, V. J. (2024). Updated recommendations for the Cochrane rapid review methods guidance for rapid reviews of effectiveness. *BMJ, 384*, e076335.

*Genc-Tosun, D., Yucesoy-Ozkan, S., & Dalgin, O. (2023). How do the activity schedules impact the individuals with Autism Spectrum Disorder? A systematic review and meta-analysis. *Journal of Theoretical Educational Science, 16*(1), 1-19.

Ghasemtabar, S. N., Hosseini, M., Fayyaz, I., Arab, S., Naghashian, A., & Poudineh, Z. (2015). Music therapy: An effective approach in improving social skills of

children with autism. *Advanced Biomedical Research, 4,* 157. https://doi.org/10.4103/2277-9175.161584

*Gibson, J. L., Pritchard, E., & de Lemos, C. (2021). Play-based interventions to support social and communication development in autistic children aged 2–8 years: A scoping review. *Autism & Developmental Language Impairments*, *6*. https://doi.org/10.1177/1362361319836371.

Goldstein, H., Kaczmarek, L., Pennington, R., & Shafer, K. (1992). Peer-mediated intervention: Attending to, commenting on, and acknowledging the behavior of preschoolers with autism. *Journal of Applied Behavior Analysis, 25*, 289–305. https://doi.org/10.1901/jaba.1992.25-289

*Granieri, J. E., Mulcahy, C. A., Grosso, M., & Mattson, J. M. G. (2025). Inclusion Practices for Elementary Autistic Students: A Systematic Review. *Inclusion*, *13*(2), 63-86. https://doi.org/10.1352/2326-6988-13.2.63

Gray, C. A., & Garand, J. D. (1993). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior, 8*(1), 1-10. https://doi.org/10.1177/108835769300800101

Grocke, D., & Wigram, T. (2006). *Receptive methods in music therapy: Techniques and clinical applications for music therapy clinicians, educators and students*. Jessica Kingsley Publishers.

Hammer, D., Melhuish, E., & Howard, S. J. (2017). Do aspects of social, emotional and behavioural development in the pre-school period predict later cognitive and academic attainment?. *Australian Journal of Education, 61*(3), 270-287.

Happé F. (1999). Autism: cognitive deficit or cognitive style?. *Trends in cognitive sciences, 3*(6), 216–222. https://doi.org/10.1016/s1364-6613(99)01318-2

*Hawken, L. S., Bundock, K., Kladis, K., O'Keeffe, B., & Barrett, C. A. (2014). Systematic review of the check-in, check-out intervention for students at risk for emotional and behavioral disorders. *Education and Treatment of Children, 37*(4), 635-658.

Healey, A., Knapp, M., & Farrington, D. P. (2004). Adult labour market implications of antisocial behaviour in childhood and adolescence: Findings from a UK longitudinal study. *Applied Economics, 36*(2), 93-105.

Healy, S., Nacario, A., Braithwaite, R. E., & Hopper, C. (2018). The effect of physical activity interventions on youth with autism spectrum disorder: A meta-analysis. *Autism Research, 11*(6), 818-833.

Hebron, J., & Humphrey, N. (2014). Mental health difficulties among young people on the ~~autisticspectrum~~autistic spectrum in mainstream secondary schools: A comparative study. *Journal of Research in Special Educational Needs, 14*, 22–32. doi:10.1111/j.1471-3802.2012.01246.x

Hentges, R. F., Devereux, C., Graham, S. A., & Madigan, S. (2021). Child language difficulties and internalizing and externalizing symptoms: A meta-analysis. *Child Development, 92*(4), e691-e715. https://doi.org/10.1111/cdev.13540

Hollo, A., Wehby, J. H., & Oliver, R. M. (2014). Unidentified language deficits in children with emotional and behavioral disorders: A meta-analysis. *Exceptional Children, 80*(2), 169-186. https://doi.org/10.1177/00144029140800020

Hudson, C. C., Hall, L., & Harkness, K. L. (2019). Prevalence of depressive disorders in individuals with autism spectrum disorder: A meta-analysis. *Journal of Abnormal Child Psychology, 47*(1), 165-175. https://doi.org/10.1007/s10802-018-0402-1

*Hughes, N. K., & Schlösser, A. (2014). The effectiveness of nurture groups: a systematic review. *Emotional and Behavioural Difficulties*, *19*(4), 386–409. https://doi.org/10.1080/13632752.2014.883729

Hull, L., Petrides, K. V., Allison, C., Smith, P., Baron-Cohen, S., Lai, M. C., & Mandy, W. (2017). “Putting on my best normal”: Social camouflaging in adults with autism spectrum conditions. *Journal of Autism and Developmental Disorders, 47*(8), 2519-2534.

Humphrey, N., Kalambouka, A., Wigelsworth, M., Lendrum, A., Deighton, J., & Wolpert, M. (2011). Measures of social and emotional skills for children and young people: A systematic review. *Educational and Psychological Measurement, 71*(4), 617-637.

*Hungate, M., Gardner, A. W., Tackett, S., & Spencer, T. D. (2019). A convergent review of interventions for school-age children with autism spectrum disorder. *Behavior Analysis: Research and Practice, 19*(1), 81–93. https://doi.org/10.1037/bar0000090

Hurry, J., Flouri, E., & Sylva, K. (2018). Literacy difficulties and emotional and behavior disorders: Causes and consequences. *Journal of Education for Students Placed* at Risk, 23(3), 259-279.

Ingersoll, B. (2010). Pilot randomized controlled trial of Reciprocal Imitation Training for teaching elicited and spontaneous imitation to children with autism. *Journal of Autism and Developmental Disorders, 40*(9), 1154–1160. https://doi.org/10.1007/s10803-010-0966-2

Ip, H. H., Wong, S. W., Chan, D. F., Byrne, J., Li, C., Yuan, V. S., Lau, K. S. Y., & Wong, J. Y. (2018). Enhance emotional and social adaptation skills for children with autism spectrum disorder: A virtual reality enabled approach. *Computers & Education*, 117, 1–15. https://doi.org/10.1016/j.compedu.2017.09.010

*Iznardo, M., Rogers, M. A., Volpe, R. J., Labelle, P. R., & Robaey, P. (2020). The effectiveness of daily behavior report cards for children with ADHD: A meta-analysis. *Journal of Attention Disorders, 24*(12), 1623–1636. https://doi.org/10.1177/1087054717734646

*Kabashi, L., & Kaczmarek, L. A. (2017). Evaluating the efficacy of video-based instruction (VBI) on improving social initiation skills of children with autism spectrum disorder (ASD): A review of literature. *Review Journal of Autism and Developmental Disorders*, 61–81. https://doi.org/10.1007/s40489-016-0098-5.

*Karal, M. A., & Wolfe, P. S. (2018). Social story effectiveness on social interaction for students with autism: A review of the literature. *Education and Training in Autism and Developmental Disabilities, 53*(1), 44-58. https://doi.org/10.1177/215416471805300105.

Karkou, V. (2010). *Arts therapies in schools: Research and practice.* Jessica Kingsley Publishers.

Kasari C., Freeman S., Paparella T. (2006). Joint attention and symbolic play in young children with autism: A randomized controlled intervention study. *Journal of Child Psychology and Psychiatry*, 47*(6)*, 611–620. https://doi.org/10.1111/j.1469-7610.2005.01567.x

Kasari, C., Gulsrud, A. C., Wong, C., Kwon, S., & Locke, J. (2010). Randomized controlled caregiver-mediated joint engagement intervention for toddlers with autism. *Journal of Autism and Developmental Disorders, 40*, 1045–1056. https://doi.org/10.1007/s10803-010-0955-5

Kenny, L., Hattersley, C., Molins, B., Buckley, C., Povey, C., & Pellicano, E. (2016). Which terms should be used to describe autism? Perspectives from the UK autism community. *Autism: The International Journal of Research and Practice, 20*(4), 442–462. https://doi.org/10.1177/1362361315588200

Kent, R., & Simonoff, E. (2017). Prevalence of anxiety in autism spectrum disorders. In S. W. White, B. B. Maddox, & C. A. Mazefsky (Eds.), *Anxiety in children and adolescents with autism spectrum disorder* (pp. 5–32). Academic Press.

Kessler, R. C., Avenevoli, S., & Merikangas, K. R. (2001). Mood disorders in children and adolescents: an epidemiologic perspective. *Biological Psychiatry, 49*(12), 1002-1014.

Khadar, M. G., Babapour, J., & Sabourimoghaddam, H. (2013a). The effect of art therapy based on painting therapy in reducing symptoms of oppositional defiant disorder (ODD) in elementary school boys. *Procedia – Social and Behavioral Sciences, 84*, 1872–1878. https://doi.org/10.1016/j.sbspro.2013.07.051

Khadar, M. G., Babapour, J., & Sabourimoghaddam, H. (2013b). The effect of art therapy based on painting therapy in reducing symptoms of separation

anxiety disorder (SAD) in elementary school boys. *Procedia – Social and Behavioral Sciences, 84*, 1697–
1703. https://doi.org/10.1016/j.sbspro.2013.07.016

*Knight, V., Sartini, E., & Spriggs, A. D. (2015). Evaluating visual activity schedules as evidence-based practice for individuals with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 45*(1), 157-178.

Koegel, L. R., & Koegel, K. L. (2019). The history and basic components of pivotal response treatment. In R. L. Koegel & L. K. Koegel (Eds.), *Pivotal response treatment for autism spectrum disorders* (pp. 3–16). Paul H. Brookes Publishing Company.

Koenig, K. P., Buckley-Reen, A., & Garg, S. (2012). Efficacy of the Get Ready to Learn yoga program among children with autism spectrum disorders: A pretest–posttest control group design. *American Journal of Occupational Therapy, 66*(5), 538–546. https://doi.org/10.5014/ajot.2012.004390

Koo, J., & Thomas, E. (2019). Art therapy for children with autism spectrum disorder in India. *Art Therapy, 36*(4), 209-214.
https://doi.org/10.1080/07421656.2019.1644755

*Kossyvaki, L., & Papoudi, D. (2016). A review of play interventions for children with autism at school. *International Journal of Disability, Development and Education*, *63*(1), 45-63. https://doi.org/10.1080/1034912X.2015.1111303

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-Case Intervention Research Design Standards. *Remedial and Special Education, 34*(1), 26-38. https://doi.org/10.1177/0741932512452794

Krishnakumar, P., & Geeta, M. G. (2006). Clinical profile of depressive disorder in children. *Indian Pediatrics, 43*, 521–526.

Ladd, G. W., Ettekal, I., Kochenderfer-Ladd, B., Rudolph, K. D., & Andrews, R. K. (2014). Relations among chronic peer group rejection, maladaptive behavioral dispositions, and early adolescents' peer perceptions. *Child Development, 85*(3), 971-988. https://doi.org/10.1111/cdev.12214

LaGasse, A. B. (2014). Effects of a music therapy group intervention on enhancing social skills in children with autism. *Journal of Music Therapy, 51*(3), 250–275. https://doi.org/10.1093/jmt/thu012

Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Campodonico, F., & Alberti, G. (2017). Use of a Smartphone for Leisure and Communication by People with Blindness and Motor Disabilities. *Journal of Visual Impairment & Blindness, 111*(2), 181-186. https://doi.org/10.1177/0145482X1711100211

Lange, K. W., Reichl, S., Lange, K. M., Tucha, L., & Tucha, O. (2010). The history of attention deficit hyperactivity disorder. *ADHD Attention Deficit and Hyperactivity Disorders, 2*(4), 241-255. https://doi.org/10.1007/s12402-010-0045-8

Laugeson, E. A., Frankel, F., Mogil, C., & Dillon, A. R. (2009). Parent-assisted social skills training to improve friendships in teens with autism spectrum disorders. *Journal of autism and developmental disorders*, *39*(4), 596-606. https://doi-org/10.1007/s10803-008-0664-5

Lee, H. J., Kim, S. H., & Lee, M. S. (2019). Understanding mood disorders in children. In *Frontiers in psychiatry: Artificial intelligence, precision medicine, and other paradigm shifts* (pp. 251-261). Singapore: Springer Singapore.

LeGoff, D. B. (2004). Use of LEGO© as a therapeutic medium for improving social competence. *Journal of Autism and Developmental Disorders, 34*(5), 557–571. https://doi.org/10.1007/s10803-004-2550-0

*Lequia, J., Wilkerson, K. L., Kim, S., & Lyons, G. L. (2015). Improving transition behaviors in students with autism spectrum disorders: A comprehensive evaluation of interventions in educational settings. *Journal of Positive Behavior Interventions, 17*(3), 146-158. https://doi-org./10.1177/10983007145487

Lewis, G. J., Asbury, K., & Plomin, R. (2016). Externalizing problems in childhood and adolescence predict subsequent educational achievement but for different genetic and environmental reasons. *Journal of Child Psychology and Psychiatry, 58*(3), 292–304. https://doi.org/10.1111/jcpp.12655

Lin, Y. J., Tseng, W. L., & Gau, S. S. F. (2021). Psychiatric comorbidity and social adjustment difficulties in children with disruptive mood dysregulation disorder: A national epidemiological study. *Journal of affective disorders*, *281*, 485-492. https://doi.org/10.1016/j.jad.2020.12.039

*Lindsay, S., Hounsell, K. G., & Cassiani, C. (2017). A scoping review of the role of LEGO® therapy for improving inclusion and social skills among children and youth with autism. *Disability and Health Journal, 10*(2), 173–182. https://doi.org/10.1016/j.dhjo.2016.10.010.

Long, E. L., Catmur, C., & Bird, G. (2025). The theory of mind hypothesis of autism: A critical evaluation of the status quo. *Psychological Review*. Advance online publication. https://doi.org/10.1037/rev0000532

Maag, J. W. (2006). Social skills training for students with emotional and behavioral disorders: A review of reviews. *Behavioral Disorders, 32*(1), 4-17. https://doi.org/10.1177/019874290603200l0

MacDuff, G. S., Krantz, P. J., & McClannahan, L. E. (1993). Teaching children with autism to use photographic activity schedules: Maintenance and

generalization of complex response chains. *Journal of Applied Behavior Analysis, 26*(1), 89-97. https://doi.org/10.1901/jaba.1993.26-89

Magraner, J. S. B., & Valero, G. B. (2016). Music therapy in the school context: A case study of a child with autism spectrum disorder. *Revista Electrónica de LEEME, 37*, 1–19. https://doi.org/10.3592/JES.2024.1.13

Makrygianni, M. K., Gena, A., Katoudi, S., & Galanis, P. (2018). The effectiveness of applied behavior analytic interventions for children with Autism Spectrum Disorder: A meta-analytic study. *Research in Autism Spectrum Disorders, 51*, 18-31. https://doi.org/10.1016/j.rasd.2018.03.006

Martin-Denham, S. (2020). *An investigation into the perceived enablers and barriers to mainstream schooling: The voices of children excluded from school, their caregivers and professionals* (Project report). University of Sunderland.

*Martinez, J. R., Waters, C. L., Conroy, M. A., & Reichow, B. (2019). Peer-mediated interventions to address social competence needs of young children with ASD: Systematic review of single-case research design studies. *Topics in Early Childhood Special Education, 40*(4), 217-228. https://doi-org/10.1177/0271121419839136

*Martinez, J. R., Werch, B. L., & Conroy, M. A. (2016). School-based interventions targeting challenging behaviors exhibited by young children with autism spectrum disorder: A systematic literature review. *Education and training in autism and developmental disabilities, 51*(3), 265-280. https://doi-org/10.1177/215416471605100

Maskey, M., Rodgers, J., Grahame, V., Glod, M., Honey, E., Kinnear, J., Labus, M., Milne, J., Minos, D., McConachie, H., & Parr, J. R. (2019). A randomised controlled feasibility trial of immersive virtual reality treatment with cognitive behaviour therapy for specific phobias in young people with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 49, 1912–1927. https://doi.org/10.1007/s10803-018-3861-x

Maskey, M., Warnell, F., Parr, J. R., Le Couteur, A., & McConachie, H. (2013). Emotional and behavioural problems in children with autism spectrum disorder. J*ournal of Autism and Developmental Disorders, 43*(4), 851-859. https://doi.org/10.1007/s10803-012-1622-9

McClannahan, L. E., & Krantz, P. J. (1999). *Activity schedules for children with autism: Teaching independent behavior.* Woodbine House.

*McGill, R. J., Baker, D., & Busse, R. T. (2015). Social Story™ interventions for decreasing challenging behaviours: A single-case meta-analysis 1995–2012. *Educational Psychology in Practice, 31*(1), 21-42. https://doi.org/10.1080/02667363.2014.975785

McIntosh, K., & Goodman, S. (2016). *Integrated multi-tiered systems of support: Blending RTI and PBIS.* Guilford Press.

McIntosh, K., Flannery, K. B., Sugai, G., Braun, D. H., & Cochrane, K. L. (2008). Relationships between academics and problem behavior in the transition from middle school to high school. *Journal of Positive Behavior Interventions, 10*(4), 243–255. https://doi.org/10.1177/1098300708318961

*Mckeithan, G. K., & Sabornie, E. J. (2019). Interventions for secondary students with high functioning autism in general education settings: A descriptive review. *Exceptionality, 27*(2), 81-100. https://doi-org/10.1080/09362835.2017.1359607

*McKeithan, G. K., & Sabornie, E. J. (2020). Social–behavioral interventions for secondary-level students with high-functioning autism in public school settings: A meta-analysis. *Focus on Autism and Other Developmental Disabilities, 35*(3), 165-175. https://doi.org/10.1177/10883576198903

McLeod, J. D., & Kaiser, K. (2004). Childhood emotional and behavioral problems and educational attainment. *American Sociological Review, 69*(5), 636-658.

*Mirzaei, S. S., Pakdaman, S., Alizadeh, E., & Pouretemad, H. (2020). A systematic review of program circumstances in training social skills to adolescents with high-functioning autism. *International journal of developmental disabilities, 68*(3), 237–246. https://doi.org/10.1080/20473869.2020.1748802.

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, R., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences, 108*(7), 2693-2698.

Moilanen, K., Shaw, D., & Maxwell, K. (2010). Developmental cascades: Externalizing, internalizing, and academic competence from middle childhood to early adolescence. *Development & Psychopathology, 22*, 635–653. doi:10.1017/S0954579410000337

*Montgomery, J., Martin, T., Shooshtari, S., Stoesz, B. M., Heinrichs, D. J., North, S., ... & Douglas, J. (2014). Interventions for challenging behaviours of students with autism spectrum disorders and developmental disabilities: A synthesis paper. *Exceptionality Education International, 23*(1). https://doi.org/10.5206/eei.v23i1.7701

Moore, D. A., Richardson, M., Gwernan-Jones, R., Thompson-Coon, J., Stein, K., Rogers, M., Garside, R., Logan, S., & Ford, T. J. (2019). Non-pharmacological interventions for ADHD in school settings: An overarching synthesis of systematic reviews. *Journal of Attention Disorders, 23*(3), 220-233.

Morgan, P. L., Farkas, G., & Wu, Q. (2012). Do poor readers feel angry, sad, and unpopular?. *Scientific Studies of Reading, 16*(4), 360-381.

*Morgan, L. J., Rubin, E., Coleman, J. J., Frymark, T., Wang, B. P., & Cannon, L. J. (2014). Impact of social communication interventions on infants and toddlers with or at-risk for autism: A systematic review. *Focus on Autism and Other Developmental Disabilities*, *29*(4), 246-256. https://do.org/1177/108835761453983

*Morris, P. O., Hope, E., & Mills, J. P. (2022). The non-fitness-related benefits of exergames for young individuals diagnosed with autism spectrum disorder: A systematic review. *Research in Autism Spectrum Disorders, 94*, 101953.

Mössler, K., Gold, C., Aßmus, J., Schumacher, K., Calvet, C., Reimer, S., Iversen, G., & Schmid, W. (2019). The therapeutic relationship as predictor of change in music therapy with young children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 49*(7), 2795–2809. https://doi.org/10.1007/s10803-017-3306-y

*Moula, Z. (2020). A systematic review of the effectiveness of art therapy delivered in school-based settings to children aged 5–12 years. *International Journal of Art Therapy, 25*(2), 88–99. https://doi.org/10.1080/17454832.2019.1699757

Mrázová, M., & Celec, P. (2010). A systematic review of randomized controlled trials using music therapy for children. *The Journal of Alternative and Complementary Medicine, 16*(10), 1089–1095.

*Mulcahy, C. A., Camacho, K. A., & Fenty, N. S. (2024). A Systematic Review of Research on Technology Use Among Students with High Incidence Disabilities. *Exceptionality, 32*(3), 149–167. https://doi.org/10.1080/09362835.2023.2285272

*Munsell, E. G., & Coster, W. J. (2021). Scoping review of interventions supporting self-management of life tasks for youth with high functioning ASD. *Exceptionality, 29(*2), 81-94. https://doi.org/10.1080/09362835.2018.1480949

*Murza, K. A., Schwartz, J. B., Hahs-Vaughn, D. L., & Nye, C. (2016). Joint attention interventions for children with autism spectrum disorder: a systematic review and meta-analysis. *International journal of language & communication disorders*, *51*(3), 236-251.https://doi.org/10.1111/1460-6984.12212

Newton C., Taylor G. & Wilson D. (1996) Circles of friends: an inclusive approach to meeting emotional and behavioural needs. *Educational Psychology in Practice 11*, 41–48.

Nielsen, J. B., & Holck, U. (2020). Synchronicity in improvisational music therapy: Developing in an intersubjective field with a child with autism spectrum disorder. *Nordic Journal of Music Therapy, 29*(2), 112–131. https://doi.org/10.1080/08098131.2019.1680571

*Ninci, J., Neely, L. C., Burke, M. D., Rispoli, M., Vannest, K. J., Willson, V., & Ulloa, P. (2020). A meta-analysis of single-case research on embedding interests of individuals with autism spectrum disorder. *Remedial and Special Education, 41*(5), 296-308. https://doi.org/10.1177/0741932519841692

Nye, E., Gardner, F., Hansford, L., Edwards, V., Hayes, R., & Ford, T. (2016). Classroom behaviour management strategies in response to problematic behaviours of primary school children with special educational needs: Views of special educational needs coordinators. *Emotional and Behavioural Difficulties, 21*(1), 43-60. https://doi.org/10.1080/13632752.2015.1120048

O'Brien, C., & Wood, C. L. (2011). Video Modeling of Cooperative Discussion Group Behaviors with Students with Learning Disabilities in a Secondary Content-Area Classroom. *Journal of Special Education Technology, 26*(4), 25-40.

*O'Donoghue, M., O'Dea, A., O'Leary, N., Kennedy, N., Forbes, J., & Murphy, C. A. (2021). Systematic review of peer-mediated intervention for children with autism who are minimally verbal. *Review Journal of Autism and Developmental Disorders, 8*(1), 51-66. https://doi.org/10.1007/s40489-020-00201-2

*Park, E.-Y., Kim, W.-H., & Blair, K.-S. C. (2021). Effectiveness of interventions involving physical activities for individuals with Autism Spectrum Disorder: A meta-analysis. *Education and Training in Autism and Developmental Disabilities, 56*(3), 354–367. https://www.jstor.org/stable/27077974

Parsons, S., Yuill, N., Good, J., Brosnan, M., Austin, L., Singleton, C., Bossavit, B., & Barnabear, . (2016). What technology for autism needs to be invented? Idea generation from the autism community via the ASCmeI.T. App (Version 1). University of Sussex. https://hdl.handle.net/10779/uos.23460437.v1

Pickren, S. E., Torelli, J. N., Miller, A. H., & Chow, J. C. (2024). The relation between reading and externalizing behavior: A correlational meta-analysis. *Annals of Dyslexia, 74*(2), 158-186.

Postorino, V., Vicari, S., & Mazzone, L. (2016). Mood disorders and autism spectrum disorder. In V. Postorino & L. Mazzone (Eds.), *Psychiatric symptoms and comorbidities in autism spectrum disorder* (pp. 1–19). Springer.

Prelock, P. (2013). Video modeling/video self-modeling. In F. R. Volkmar (Ed.), *Encyclopedia of autism spectrum disorders* (pp. 3270–3275). Springer, New york, NY. https://doi.org/10.1007/978-1-4419-1698-3_809

Prizant, B. M., Wetherby, A. M., Rubin, E., & Laurent, A. C. (2003). The SCERTS model: A transactional, family-centered approach to enhancing communication and socioemotional abilities of children with autism spectrum disorder. *Infants & Young Children, 16*(4), 296–316. https://doi.org/10.1097/00001163-200310000-00004

Propper, C. (2015). Childhood behavior problems and academic outcomes in adolescence: longitudinal population-based study. *Journal of the American Academy of Child & Adolescent Psychiatry, 54*(5), 360-368.

*Pyle, K., & Fabiano, G. A. (2017). Daily report card intervention and attention deficit hyperactivity disorder: A meta-analysis of single-case studies. *Exceptional Children, 83*(4), 378-395. https://doi.org/10.1177/001440291770637

Rabeyron, T., Del Canto, J. P. R., Carasco, E., Bisson, V., Vrait, F. X., Berna, F., & Bonnot, O. (2020). A randomized controlled trial of 25 sessions comparing music therapy and music listening for children with autism spectrum disorder. *Psychiatry Research, 293*, 113377. https://doi.org/10.1016/j.psychres.2020.113377

Radhakrishna, S. (2010). Application of integrated yoga therapy to increase imitation skills in children with autism spectrum disorder. *International Journal of Yoga, 3*(1), 26–30.

Radhakrishna, S., Nagarathna, R., & Nagendra, H. R. (2010). Integrated approach to yoga therapy and autism spectrum disorders. *Journal of Ayurveda and Integrative Medicine, 1*(2), 120–124.

*Ragaglia, B., Trovato, I., & Bulgarelli, D. (2024). Peer-Mediated Social Skills Interventions in Primary School Settings for Autistic Children in the Light of the ICF Bio-psycho-social Model. A Systematic Review. *Journal of Autism and Developmental Disorders, 56*(3), 1-24. https://doi.org/10.1007/s10803-024-06604-y

Regev, D., & Guttmann, J. (2005). The psychological benefits of artwork: The case of children with learning disorders. *The Arts in Psychotherapy, 32*(4), 302–312. https://doi.org/10.1016/j.aip.2005.02.001

*Rivera, G., Gerow, S., & Kirkpatrick, M. (2018). A review of school-based interventions to reduce challenging behavior for adolescents with ASD. *Journal of Developmental and Physical Disabilities, 31*(1), 1-21. https://doi.org/10.1007/s10882-018-9626-9

Roberts, J. E., Bailey Jr, D. B., & Nychka, H. B. (1991). Teachers' use of strategies to facilitate the communication of preschool children with disabilities. Journal of early intervention, 15(4), 358-376. https://doi.org/10.1177/105381519101500405

Rogers, S. J., & Dawson, G. (2010). *Early Start Denver Model for young children with autism: Promoting language, learning, and engagement*. The Guilford Press.

Romans S. K., Wills H. P., Huffman J. M., Garrison-Kane L. (2020). The effect of web-based self-monitoring to increase on-task behavior and academic

accuracy of high school students with autism. *Preventing School Failure, 64(*3), 249–260. https://doi.org/10.1080/1045988X.2020.1732282

Rosal, M. L. (1993). Comparative group art therapy research to evaluate changes in locus of control in behavior disordered children. *The Arts in Psychotherapy, 20*(3), 231–241.

Rosenblatt, L. E., Gorantla, S., Torres, J. A., Yarmush, R. S., Rao, S., Park, E. R., & Levine, J. B. (2011). Relaxation response–based yoga improves functioning in young children with autism: A pilot study. *Journal of Alternative and Complementary Medicine, 17*(11), 1029–1035.

Rosenbloom R., Mason R. A., Wills H. P., Mason B. A. (2016). Technology delivered self-monitoring application to promote successful inclusion of an elementary student with autism. *Assistive Technology, 28*(1), 9–16. https://doi.org/10.1080/10400435.2015.1059384

Rosenbloom R., Wills H. P., Mason R., Huffman J. M., Mason B. A. (2019). The effects of a technology-based self-monitoring intervention on on-task, disruptive, and task-completion behaviors for adolescents with autism. *Journal of Autism and Developmental Disorders, 49*(12), 5047–5062. https://doi.org/10.1007/s10803-019-04209-4

Rubin, J. A. (2010). *Introduction to art therapy: Sources and resources (2nd ed.).* Routledge.

Rubin, K. H., Bukowski, W. M., & Laursen, B. (2018). *Handbook of peer interactions, relationships, and groups* (2nd ed.). Guilford Press.

Sabet, S., & Abadi, Z. C. H. (2021). The effect of art therapy on motor skills of children with autism. International *Journal of Applied Behavioural Sciences, 8*(4), 27–34. https://doi.org/10.22037/ijabs.v8i4.33684

Sagar, R., Pattanayak, R. D., & Mehta, M. (2012). Clinical profile of mood disorders in children. *Indian Pediatrics, 49(*1), 21–24.

*Sani Bozkurt, S., & Vuran, S. (2014). An analysis of the use of social stories in teaching social skills to children with autism spectrum disorders. *Educational Sciences Theory and Practice, 14*(5), 1875-1892. https://doi.org/10.12738/estp.2014.5.1952

Schleien, S. J., Mustonen, T., & Rynders, J. E. (1995). Participation of children with autism and nondisabled peers in a cooperatively structured community art program. *Journal of Autism and Developmental Disorders, 25*(4), 397–413. https://doi.org/10.1007/BF02179375

*Scheibel, G., Zimmerman, K. N., & Wills, H. P. (2023). Increasing On-Task Behavior Using Technology-Based Self-Monitoring: A Meta-Analysis of I-Connect.

Journal of Special Education Technology, 38(2), 146-160. https://doi.org/10.1177/01626434221085554.

Schreibman, L., Dawson, G., Stahmer, A. C., et al. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45*, 2411–2428. https://doi.org/10.1007/s10803-015-2407-8

Schreibman, L., Jobin, B. A., & Dawson, G. (2020). Understanding NDBI. In Y. Bruinsma, M. B. Minjarez, L. Schreibman, & A. C. Stahmer (Eds.), *Naturalistic developmental behavioral interventions for autism spectrum disorder* (pp. 3–20). Brookes Publishing Co.

*Schwartz, R. W., Ayres, K. M., & Douglas, K. H. (2017). Effects of music on task performance, engagement, and behaviour: A literature review. *Psychology of Music*, *45*(5), 611-627. https://psycnet.apa.org/doi/10.1177/0305735617691118

Schweizer, C., Knorth, E. J., van Yperen, T. A., & Spreen, M. (2020). Evaluation of 'Images of Self,' an art therapy program for children diagnosed with autism spectrum disorders (ASD). Children and Youth Services Review, 116, 105207. https://doi.org/10.1016/j.childyouth.2020.105207

*Semple, R. J. (2019). Yoga and mindfulness for youth with autism spectrum disorder: Review of the current evidence. *Child and Adolescent Mental Health, 24*(1), 12–18. https://doi.org/10.1111/camh.12295

Sharda, M., Tuerk, C., Chowdhury, R., Jamey, K., Foster, N., Custo-Blanch, M., Tan, M., Nadig, A., & Hyde, K. (2018). Music improves social communication and auditory–motor connectivity in children with autism. *Translational Psychiatry, 8*(1), 231. https://doi.org/10.1038/s41398-018-0287-3

Shea, B. J., Reeves, B. C., Wells, G., Thuku, M., Hamel, C., Moran, J., Moher, D., Tugwell, P., Welch, V., Kristjansson, E., & Henry, D. A. (2017). AMSTAR 2: A critical appraisal tool for systematic reviews that include randomized or non-randomized studies of healthcare interventions, or both. *BMJ, 358*, j4008. https://doi.org/10.1136/bmj.j4008

Shotton, G. 1998. A circles of friends approach with socially neglected children. *Educational Psychology in Practice, 14*(1), 22–25. https://doi-org.libproxy.ucl.ac.uk/10.1080/0266736980140103

Simonsen, B., Fairbanks, S., Briesch, A., Myers, D., & Sugai, G. (2012). Evidence-based practices in classroom management: Considerations for research to practice. *Education and Treatment of Children, 35*(3), 351–380.

Singh, N. N., Lancioni, G. E., Manikam, R., Winton, A. S. W., Singh, A. N. A., Singh, J., & Singh, A. D. A. (2011a). A mindfulness-based strategy for self-

management of aggressive behavior in adolescents with autism. *Research in Autism Spectrum Disorders, 5*(3), 1153–1158.

Singh, N. N., Lancioni, G. E., Singh, A. D. A., Winton, A. S. W., Singh, A. N. A., & Singh, J. (2011b). Adolescents with Asperger syndrome can use a mindfulness-based strategy to control their aggressive behavior. *Research in Autism Spectrum Disorders, 5*(3), 1103–1109.

*Sorensen, C., & Zarrett, N. (2014). Benefits of physical activity for adolescents with autism spectrum disorders: A comprehensive review. *Review Journal of Autism and Developmental Disorders, 1*(4), 344-353.

Sourander, A., Multimäki, P., Nikolakaros, G., Haavisto, A., Ristkari, T., Helenius, H., Parkkola, K., Piha, J., Tamminen, T., Moilanen, I., Kumpulainen, K., & Almqvist, F. (2005). Childhood predictors of psychiatric disorders among boys: A prospective community-based follow-up study from age 8 years to early adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(8), 756–767.

Spoelma, M. J., Sicouri, G. L., Francis, D. A., Songco, A. D., Daniel, E. K., & Hudson, J. L. (2023). Estimated prevalence of depressive disorders in children from 2004 to 2019: A systematic review and meta-analysis. *JAMA Pediatrics, 177*(10), 1017-1027.

Sprague, J., & Walker, H. (2000). Early identification and intervention for youth with antisocial and violent behavior. *Exceptional Children, 66*(3), 367-379.

Stegemann, T., Geretsegger, M., Phan Quoc, E., Riedl, H., & Smetana, M. (2019). Music therapy and other music-based interventions in pediatric health care: An overview. *Medicines, 6*(1), 25. https://doi.org/10.3390/medicines6010025

*Sterrett, K., Shire, S., & Kasari, C. (2017). Peer relationships among children with ASD: Interventions targeting social acceptance, friendships, and peer networks. *International review of research in developmental disabilities, 52*, 37-74. https://doi.org/10.1016/bs.irrdd.2017.07.006

Stromer, R., Kimball, J. W., Kinney, E. M., & Taylor, B. A. (2006). Activity schedules, computer technology, and teaching children with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities, 21*(1), 14–24.

*Suarez-Manzano, S., Ruiz-Ariza, A., De La Torre-Cruz, M., & Martinez-Lopez, E. J. (2018). Acute and chronic effect of physical activity on cognition and behaviour in young people with ADHD: A systematic review of intervention studies. *Research in Developmental Disabilities, 77*, 12-23. https://doi.org/10.1016/j.ridd.2018.03.015

*Sutton, B. M., Webster, A. A., & Westerveld, M. F. (2019). A systematic review of school-based interventions targeting social communication behaviors for

students with autism. Autism, 23(2), 274-286. https://doi.org/10.1177/13623613177535

*Syriopoulou-Delli, C. K., & Sarri, K. (2021). Video-based instruction in enhancing functional living skills of adolescents and young adults with autism spectrum disorder and their transition to independent living: A review. *International Journal of Developmental Disabilities, 68*(6), 788–799. https://doi.org/10.1080/20473869.2021.1900504

*Tachibana, Y., Miyazaki, C., Ota, E., Mori, R., Hwang, Y., Kobayashi, E., ... & Kamio, Y. (2017). A systematic review and meta-analysis of comprehensive interventions for pre-school children with autism spectrum disorder (ASD). *PloS one*, *12*(12), e0186502. https://doi.org/10.1371/journal.pone.0186502

Tanaka, J. W., Wolf, J. M., Klaiman, C., Koenig, K., Cockburn, J., Herlihy, L., Brown, C., Stahl, S., Kaiser, M. D., & Schultz, R. T. (2010). Using computerized games to teach face recognition skills to children with autism spectrum disorder: The Let's Face It! program. *Journal of Child Psychology and Psychiatry, 51*(8), 944–952. https://doi.org/10.1111/j.1469-7610.2010.02258.x

*Tansley, R., Parsons, S., & Kovshoff, H. (2022). How are intense interests used within schools to support inclusion and learning for secondary-aged autistic pupils? A scoping review. European Journal of Special Needs Education, 37(3), 477-493. https://doi.org/10.1080/08856257.2021.1911520

Tetrault, A. S., & Lerman, D. C. (2010). Teaching social skills to children with autism using point-of-view video modeling. *Education and Treatment of Children, 33*(3), 395–419. http://www.jstor.org/stable/42900076

Thompson, G. A. (2018). Long-term perspectives of family quality of life following music therapy with young children on the autism spectrum: A phenomenological study. *Journal of Music Therapy, 54*(4), 432–459. https://doi.org/10.1093/jmt/thx013

*Tiede, G., & Walton, K. M. (2019). Meta-analysis of naturalistic developmental behavioral interventions for young children with autism spectrum disorder. *Autism, 23*(8), 2080–2095. https://doi.org/10.1177/1362361319836371

Timler, G. R., Vogler-Elias, D., & McGill, K. F. (2005). Strategies for promoting generalization of social communication skills in preschoolers and school-age children with autism. *Topics in Language Disorders, 25*(1), 58–71.

Torra Moreno, M., Canals Sans, J., & Colomina Fosch, M. T. (2021). Behavioral and cognitive interventions with digital devices in subjects with intellectual disability: A systematic review. *Frontiers in Psychiatry, 12,* Article 647399. https://doi.org/10.3389/fpsyt.2021.647399

Tourjman, V., Louis-Nascan, G., Ahmed, G., DuBow, A., Cote, H., Daly, N., Daoud, G., Flood, J., Gagnier-Maradola, E., Gignac, M., Graziosi, G., Mansuri, Z., &

Sadek, J. (2022). Psychosocial interventions for attention deficit/hyperactivity disorder: a systematic review and meta-analysis by the CADDRA guidelines work GROUP. *Brain Sciences, 12*(8), 1023.

UNICEF. (2021). *The state of the world's children 2021: On my mind—Promoting, protecting and caring for children's mental health.* UNICEF. https://www.unicef.org/reports/state-worlds-children-2021

*van der Meulen, K., Granizo, L., & Del Barrio, C. (2021). Emotional peer support interventions for students with SEND: A systematic review. *Frontiers in Psychology*, 12, 797913.

*van der Worp-van der Kamp, L., Pijl, S. J., Bijstra, J. O., & van den Bosch, E. J. (2014). Teaching academic skills as an answer to behavioural problems of students with emotional or behavioural disorders: a review. *European journal of special needs education*, *29*(1), 29-46. https://doi.org/10.1080/08856257.2013.830444

*Vogel, S. W., Mullins, K. L., & Kumar, S. (2025). Art therapy for children and adolescents with autism: A systematic review. *International Journal of Art Therapy, 30*(2), 113–122.

Voss, C., Schwartz, J., Daniels, J., Kline, A., Haber, N., Washington, P., Tariq, Q., Robinson, T. N., & Wall, D. P. (2019). Effect of wearable digital intervention for improving socialization in children with autism spectrum disorder: A randomized clinical trial. JAMA Pediatrics, 173(5), 446–454. doi:10.1001/jamapediatrics.2019.0285

Vukićević, S., Đorđević, M., Glumbić, N., Bogdanović, Z., & Đurić Jovičić, M. (2019). A Demonstration Project for the Utility of Kinect-Based Educational Games to Benefit Motor Skills of Children with ASD. *Perceptual and Motor Skills, 126*(6), 1117-1144. https://doi.org/10.1177/0031512519867521

*Waddington, H., Reynolds, J. E., Macaskill, E., Curtis, S., Taylor, L. J., & Whitehouse, A. J. (2021). The effects of JASPER intervention for children with autism spectrum disorder: A systematic review. *Autism, 25*(8), 2370–2385. https://doi.org/10.1177/136236132110191

*Walker, V. L., Carpenter, M. E., Lyon, K. J., & Button, L. (2021). A meta-analysis of paraprofessional-delivered interventions to address challenging behavior among students with disabilities. *Journal of Positive Behavior Interventions, 23*(2), 68-80. https://doi.org/10.1177/1098300720911147

Walker, V. L., Coogle, C. G., Lyon, K. J., & Turf, M. (2021). A meta-analytic review of paraprofessional-implemented interventions for students with autism spectrum disorder. *Psychology in the Schools, 58(*4), 686-701. https://doi.org/10.1002.pits.22380

Wang, Y., Qian, G., Mao, S., & Zhang, S. (2025). The impact of physical exercise interventions on social, behavioral, and motor skills in children with autism: A systematic review and meta-analysis of randomized controlled trials. *Frontiers in Pediatrics, 13*, 1475019. https://doi.org/10.3389/fped.2025.1475019

*Watkins, L., O'Reilly, M., Ledbetter-Cho, K., Lang, R., Sigafoos, J., Kuhn, M., ... & Caldwell, N. (2017). A meta-analysis of school-based social interaction interventions for adolescents with autism spectrum disorder. *Review Journal of Autism and Developmental Disorders, 4*(4), 277-293. https://doi-org/10.1007/s40489-017-0113-5

*Wattanawongwan, S., Ganz, J. B., Hong, E. R., Dunn, C., Pierson, L. M., Yllades, V., & Foster, M. (2022). Quality review of social-communication interventions for adolescents and adults with ASD: Maintenance, generalization, and social validity. *Education and Training in Autism and Developmental Disabilities, 57*(1), 67–91. https://doi.org/10.1177/215416472205700106

*Weaver, L. L. (2015). Effectiveness of work, activities of daily living, education, and sleep interventions for people with autism spectrum disorder: A systematic review. *The American Journal of Occupational Therapy*, *69*(5), 6905180020p1-6905180020p11. https://doi.org/10.5014/ajot.2015.017962

*Whalon, K. J., Conroy, M. A., Martinez, J. R., & Werch, B. L. (2015). School-based peer-related social competence interventions for children with autism spectrum disorder: a meta-analysis and descriptive review of single case research design studies. *Journal of autism and developmental disorders, 45*(6), 1513–1531. https://doi.org/10.1007/s10803-015-2373-1

What Works Clearinghouse. (2017). *What Works Clearinghouse standards handbook* (Version 4.0). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://ies.ed.gov/ncee/wwc/Docs/referenceresources/wwc_standards_handbook_v4.pdf

White, S. W., Oswald, D., Ollendick, T., & Scahill, L. (2009). Anxiety in children and adolescents with autism spectrum disorders. *Clinical Psychology Review*, *29*(3), 216-229.

Wigal, S. B., Emmerson, N., Gehricke, J. G., & Galassetti, P. (2013). Exercise: Applications to childhood ADHD. *Journal of Attention Disorders, 17*(4), 279-290.

Wills, H. P., & Mason, B. A. (2014). Implementation of a self-monitoring application to improve on-task behavior: A high-school pilot study. Journal of Behavioral Education, 23(4), 421–434, https://doi.org/10.1007/s10864-014-9204-x

Williams, B. T., Gray, K. M., & Tonge, B. J. (2012). Teaching emotion recognition skills to young children with autism: A randomised controlled trial of an

emotion training programme. *Journal of Child Psychology and Psychiatry, 53*(12), 1268–1276. https://doi.org/10.1111/j.1469-7610.2012.02593.x

Williford, A. P., LoCasale-Crouch, J., Whittaker, J. V., DeCoster, J., Hartz, K. A., Carter, L. M., Wolcott, C. S., & Hatfield, B. E. (2017). Changing Teacher-Child Dyadic Interactions to Improve Preschool Children's Externalizing Behaviors. *Child development, 88*(5), 1544–1553. https://doi.org/10.1111/cdev.12703

World Health Organization. (2024). *Depression*. https://www.who.int/news-room/fact-sheets/detail/depression

*Xu, F., Gage, N. A., Zeng, S., Zhang, M., Iun, A., O'Riordan, M., & Kim, E. (2026). The use of digital interventions for children and adolescents with autism spectrum disorder: A meta-analysis. *Journal of Autism and Developmental Disorders, 56*, 499–515. https://doi.org/10.1007/s10803-024-06563-4.

*Yi, J., Kim, W., & Lee, J. (2022). Effectiveness of the SCERTS Model-Based Interventions for Autistic Children: A Systematic Review. *Journal of speech, language, and hearing research*, *65*(7), 2662–2676. https://doi.org/10.1044/2022_JSLHR-21-00518.

*Yuan, C., Wang, L. Group Instruction for Young Children with Autism: A Systematic Review. *J Behav Educ* 33, 831–861 (2024). https://doi.org/10.1007/s10864-023-09510-y

*Zagona, A. L., & Mastergeorge, A. M. (2018). An Empirical Review of Peer-Mediated Interventions: Implications for Young Children With Autism Spectrum Disorders. *Focus on Autism and Other Developmental Disabilities, 33*(3), 131-141.

Zaheri, E., Nasab, L. H., & Mohammadi, A. Z. (2013, September 17-19). *The influence of group art therapy with cognitive-behavioral view on the disruptive behaviors of children* [Paper]. 6th International Congress on Child and Adolescent Psychiatry, Tabriz, Iran.

Zeng, S., Zhao, H., Hu, X., Pereira, B. A., Pan, Q., Meng, C., ... & Stone-MacDonald, A. (2022). Systematic review of single case design meta-analyses for school-age students with autism spectrum disorders: *Current trend and future direction. Psychology in the Schools, 59*(5), 980-1000. https://doi.org/10.1002/pits.22599

Zorba, R. S., Akçamete, G., & Özcan, D. (2020). The analysis of the music therapy program's effect on turn-sharing skills and expressing feelings of children with autism spectrum disorder. *Croatian Journal of Education, 22*(2), 631–656. https://doi.org/10.15516/cje.v22i2.3405

*Zwaigenbaum, L., Bauman, M. L., Choueiri, R., Kasari, C., Carter, A., Granpeesheh, D., ... & Natowicz, M. R. (2015). Early intervention for children with autism spectrum disorder under 3 years of age: recommendations for practice and

research. *Pediatrics*, *136*(Supplemen _1), S60-S81. https://doi.org/10.1542/peds.2014-3667E

Appendix

Summary tables of findings

Table 1. Universal interventions

Approach	Target group	Reported Outcomes	Considerations
Physical activity interventions	Autistic pupils and those with ADHD as young as 3 years	Reductions in problem behaviour; improvements in self-regulation and social-emotional functioning	Longer and more intensive programmes associated with greater effects; optimal dose is unclear
Yoga- and mindfulness-based interventions	Autistic pupils ranging in age between 3 and 17	Improvements in communication, self-control, emotional regulation; reductions in aggression and irritability	Evidence preliminary and inconclusive; studies small and methodologically limited

Table 2. Targeted interventions

Approach	Target Group	Reported Outcomes	Considerations
Activity schedules	Autistic pupils aged 3-21 years	Improve on-task behaviour, transitions, and task completion	Can be delivered individually or whole class; format can vary; pupil preference matters
Peer-mediated interventions	Autistic pupils aged 0-18. Some evidence they also support those with SEMH needs, including ADHD	Increased social initiations, responses, joint engagement, communicative acts	Effects generally positive but variable; adult facilitation key; optimal dose is unclear

Behavioural interventions	Autistic children aged 3 to 21 years	Improve specific social skills; reduce disruptive behaviours	Effects vary; limited impact on broader communication; evidence not firmly established
Check-in Systems (CICO, DBRC)	Children and young people with SEMH and autistic pupils aged 3-18	Improve observable classroom behaviour	Effects small to moderate; require consistent implementation; long-term impact unclear
Creative Arts (Art & Music Therapy)	Children and young people with SEMH and autistic pupils aged 3-24	Improve social communication, emotional expression, and behaviour	Structured programmes show stronger effects; evidence quality is limited
NDBI (for example JASPER, ESDM)	Autistic pupils aged 2-16 (majority younger than 6)	Improve social communication, joint engagement, and play	Effects vary by model and dosage; training and context matter
Social Skills interventions	Autistic pupils with some evidence of supporting those with SEMH needs aged 1 - 18	Improve specific social skills; reduce disruptive behaviours	Effects vary; limited impact on broader communication; evidence not firmly established
Social Stories	Autistic pupils aged 0-17 years	Improve social interaction in some cases	Evidence mixed; more effective when combined with other strategies
Video-Based Interventions	Autistic pupils' and pupils with emotional behavioural disorders aged 3-25	Improve social engagement and on-task behaviour	Video modelling more effective than self-modelling; age and ability influence outcomes

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