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Pragmatic Language Interventions for Autistic Children: Evidence, Generalisation, and Neurodiversity-Informed Directions

Ilias Vasileiou^{1*}

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ABSTRACT

Autistic children do not experience pragmatic-language difficulties in the same way. Some may need support with conversation, inference, or communication repair, whereas others communicate effectively when the setting, task, or communication partner is familiar. This review examines what recent intervention research can-and cannot-tell us about supporting these differences. Literature published mainly between 2015 and 2025 was identified through PubMed, ERIC, citation searching, and relevant publisher databases. Earlier studies were retained when they informed current intervention models or debates. The reviewed approaches included explicit pragmatic teaching, naturalistic and play-based intervention, parent- and peer-mediated programmes, school-based support, and the use of technology. Many studies reported improvement in the behaviours or skills directly addressed during intervention. Evidence of lasting change in ordinary classrooms, homes, and peer relationships was much more limited. This distinction is important, since performing a practised task successfully is not the same as communicating more easily in daily life. Conclusions were also restricted by small samples, considerable variation between interventions, and the use of measures that were often closely related to the content taught. The review further considers how intervention goals are defined. Teaching may be helpful when it gives a child additional ways to communicate, participate, or manage misunderstandings. It is more difficult to justify when it mainly rewards behaviour that appears more neurotypical. Future work should examine outcomes chosen with autistic people, include children with a wider range of communication profiles, and consider partners and environments as part of pragmatic support.

INTRODUCTION

Pragmatics concerns what people do with language in context. It includes initiating and sustaining interaction, coordinating turns, managing topics, adapting a message to a listener, drawing inferences, repairing misunderstandings, and interpreting nonliteral language, prosody, gesture, and other contextual information. These abilities affect participation in classroom discussion, play, friendship, and self-advocacy; they are not optional additions to vocabulary or grammar. Autistic children show considerable variation across these areas. Some use little or no speech, while others have age-appropriate structural language but distinctive patterns of reciprocity, inference, prosody, narrative organisation, or conversational timing (American Psychiatric Association, 2022; Andreou *et al.*, 2022; Félix *et al.*, 2024; Georgiou & Spanoudis, 2021). It is therefore misleading to describe pragmatic language as a unitary deficit shared by all autistic people.

The educational and clinical consequences can nonetheless be substantial. A child who finds rapid, indirect, or unpredictable interaction difficult may have restricted access to peer activity and learning even when vocabulary and syntax are strong. Adults may also misread delayed responses, echolalia, reduced eye contact, extended discussion of focused interests, or use of augmentative and alternative communication as indifference or noncompliance. Recent scholarship

cautions against moving from a description of difference to an assumption of communicative incompetence (Gernsbacher & Pripas-Kapit, 2012; Jaswal & Akhtar, 2019; Leadbitter *et al.*, 2021; Yu & Sterponi, 2023). That caution is relevant to intervention because the choice of a target always carries a view about which forms of communication count.

Pragmatic-language intervention occupies an unusually broad territory. It includes direct teaching of conversational or narrative strategies, structured social-communication groups, developmental social-pragmatic programmes, naturalistic developmental behavioural interventions, peer-mediated and play-based approaches, parent-mediated intervention, video modelling, technology-supported practice, and school-based programmes delivered by teachers or speech-language therapists. An influential systematic review found promising intervention effects but also considerable variation in participants, targets, intensity, delivery agents, settings, and outcome measures (Parsons *et al.*, 2017). More recent research has expanded the evidence base through controlled studies of peer interaction, preschool pragmatic programmes, play-based approaches, and interventions embedded within everyday relationships (Bauminger-Zviely *et al.*, 2020; Deniz *et al.*, 2024; O’Keeffe & McNally, 2023; Parsons *et al.*, 2019; Pereira *et al.*, 2022, 2025). Yet this expansion has not eliminated longstanding questions about what improves, for whom,

¹ College for Humanistic Sciences-ICPS, University of Lancashire, Greece

* Corresponding author’s e-mail: ivasileiou@lancashire.ac.uk

under which conditions, and whether observed changes transfer beyond the intervention context.

Reviews report encouraging findings across direct, developmental, parent-mediated, peer-mediated, play-based, and technology-supported approaches (Binns & Oram Cardy, 2019; Parsons *et al.*, 2017; Sandbank *et al.*, 2020). Comparison remains difficult because studies use the same labels for different procedures and different labels for similar procedures. Samples, delivery contexts, mechanisms, and outcome definitions also vary. The useful question is therefore narrower than whether intervention ‘works’: which outcomes change, for which children, in which contexts, and whether those changes are maintained and useful outside treatment.

Transfer beyond the intervention context is a persistent evidential weakness. Many studies assess children immediately after treatment, often with familiar adults or tasks that resemble what was taught. Far fewer examine communication months later, with unfamiliar partners, or during ordinary classroom and family routines. Parsons *et al.* (2017) found that most pragmatic interventions in their review were clinic-based. Subsequent work has expanded school-, peer-, and parent-mediated options, but outcome heterogeneity still limits comparison (Denman *et al.*, 2017; Pereira & Lousada, 2023). Standardised tests, caregiver questionnaires, clinician ratings, observational coding, and goal-attainment measures capture different aspects of change and should not be treated as interchangeable evidence of generalisation.

Pragmatic communication is also inherently relational. Traditional accounts have often located communication breakdown primarily within the autistic individual. The double-empathy account instead proposes that misunderstanding can arise reciprocally between people with different perceptual and communicative experiences (Milton, 2012). Experimental and observational findings lend support to the importance of neurotype matching and interactional context: autistic–autistic interactions may display distinct strengths, and nonautistic observers can form less favourable first impressions of autistic people from brief social information (Crompton *et al.*, 2020; Sasson *et al.*, 2017). These findings do not deny that autistic children may seek support with inference, conversation, or self-advocacy. They do challenge the assumption that intervention should modify only the autistic participant while leaving partners, environments, and communicative expectations unchanged. The same argument is developed in the neurodiversity movement and by growing calls for participatory, strengths-based autism research. Neurodiversity-informed practice views neurological variation as part of human diversity while recognising that autistic people may experience substantial disability and require individualised support (Kapp, 2020; Leadbitter *et al.*, 2021). Within pragmatic intervention, this perspective changes both process and outcome. Goals should be selected collaboratively; communication modalities should be respected; assent, comfort, and self-determination should be monitored; and the possibility

of masking or camouflaging should be considered. Camouflaging may increase outward conformity while carrying psychological costs, making it an inadequate proxy for genuine communicative wellbeing (Cook *et al.*, 2021; Hull *et al.*, 2017). A child’s increased ability to suppress visible autistic behaviour is not equivalent to improved communication.

Inclusive education adds an ecological layer to this argument. Pragmatic participation is jointly shaped by the learner, interlocutors, task design, sensory context, classroom norms, and opportunities for supported interaction. Intervention may therefore target teachers’ language, peer understanding, visual and augmentative supports, predictable routines, repair strategies, and acceptance of different participation styles, alongside skills requested by the autistic learner. School-based implementation is especially important because pragmatic demands are embedded in collaborative learning, unstructured breaktimes, classroom humour, group decision making, and conflict resolution. However, implementation depends on staff knowledge, coordination between educators and speech-language therapists, time, programme feasibility, and fidelity that does not eliminate responsiveness to individual needs (O’Keeffe & McNally, 2023; Watkins *et al.*, 2015).

Who is represented in the evidence base also requires scrutiny. Intervention studies frequently enrol verbally fluent children without intellectual disability, exclude children who use augmentative communication, and report limited information about race, language background, socioeconomic context, gender diversity, or co-occurring conditions. Consequently, results may not generalise to the full autistic population. Cultural and linguistic variation is particularly consequential for pragmatics because expectations regarding directness, eye gaze, turn taking, politeness, narrative form, and adult–child interaction differ across communities. A behaviour coded as atypical in one context may be acceptable or valued in another. The overlap and distinction between autism, developmental language disorder, and social (pragmatic) communication disorder further underscore the need to separate structural-language ability, pragmatic performance, autistic traits, and contextual demands (Andreou *et al.*, 2022; Félix *et al.*, 2024; Georgiou & Spanoudis, 2021; Norbury, 2014).

An updated narrative synthesis is warranted because the field cannot be understood through an effectiveness estimate alone. Intervention assumptions, mechanisms, settings, and outcomes need to be considered together. Bibliometric evidence shows sustained interest in autistic pragmatics, including figurative language, prosody, social cognition, intervention, and technology (Liu *et al.*, 2024). At the same time, neurodiversity-informed scholarship has changed the ethical questions brought to social-communication treatment. Behavioural change must now be examined alongside authenticity, autonomy, participation, and the perspectives of autistic people and their families.

This review therefore examines pragmatic-language interventions for autistic children across clinical, family, peer, digital, and educational contexts. It asks five related questions: how pragmatic outcomes are defined; which intervention models and mechanisms predominate; what is known about effectiveness, maintenance, and generalisation; which methodological limitations recur; and how neurodiversity-informed principles might alter research and practice. The review does not assume that movement toward neurotypical performance is sufficient

evidence of benefit. It treats expanded choice, mutual understanding, meaningful participation, safety, and agency as the more relevant standards.

MATERIALS AND METHODS

This article is a critical narrative review, not a systematic review or meta-analysis. That design was chosen because the literature combines markedly different interventions, participant groups, study designs, outcome constructs, and conceptual positions; a pooled estimate would

Table 1: Comparison of Major Approaches to Pragmatic-Language Intervention

Approach	Principal targets and mechanisms	Typical context	Potential strengths	Recurring limitations	Inclusive considerations
Direct and explicit instruction	Conversation, inference, narrative, topic management, and repair taught through explanation, modelling, rehearsal, and feedback	Clinic, small group, or school	Makes implicit conventions visible and provides selectable strategies	Proximal outcomes, scripted performance, and uncertain transfer	Prioritise functional, learner-relevant goals; avoid compulsory eye contact or suppression of harmless autistic behaviour
Developmental, naturalistic, and play-based intervention	Joint engagement, reciprocity, spontaneous communication, and play supported through responsive, interest-led interaction	Play and everyday routines	Embeds communication in meaningful activity and allows multimodal participation	Broad labels, variable adult control, and outcome proximity	Preserve agency, focused interests, unconventional play, and opportunities to decline
Parent-mediated intervention	Caregiver responsiveness, waiting, expansion, shared engagement, and communication opportunities	Home and community routines	Increases opportunities with familiar partners and may support everyday use	Variable child outcomes, caregiver burden, and unequal access to coaching	Use collaborative goals, flexible dosage, home languages, and support for caregiver wellbeing
Peer-mediated and group intervention	Initiations, responses, reciprocal interaction, shared activity, and mutual repair	Inclusive classrooms, playgrounds, and groups	Offers varied partners and stronger ecological relevance	Sensory and performance demands; risk of instrumentalising peers	Treat peers as partners, teach mutual adaptation, and measure reciprocity and enjoyment
School-based support	Classroom participation, clarification, group work, conflict resolution, and self-advocacy	Ordinary educational routines	Links support directly to curriculum access and belonging	Time, training, coordination, and implementation constraints	Modify teacher language, task design, sensory conditions, processing time, and available communication modes
Technology-supported intervention	Video modelling, controlled rehearsal, visual support, telepractice, and digitally mediated communication	Digital tasks, home, clinic, or remote delivery	Predictability, adjustable pacing, repetition, and access	Heterogeneous mechanisms and weak evidence of generalisation	Use technology as a bridge to meaningful communication and respect typed or asynchronous communication as valid modes

obscure rather than resolve those differences. The review was planned with reference to SANRA, particularly its criteria concerning justification, purpose, literature searching, referencing, scientific reasoning, and balanced presentation (Baethge *et al.*, 2019).

Searches were conducted iteratively in PubMed and ERIC. Reference-list searching, forward citation tracking, and targeted searches of publisher databases were used to locate related or newer work. Search terms combined autism or autistic with pragmatic language, social communication, conversation, peer-mediated, parent-mediated, play-based, school-based, telepractice, video modelling, neurodiversity, double empathy, camouflaging, generalisation, and outcome measurement. The main focus was peer-reviewed English-language research published from 2015 to 2025 and involving autistic children. Earlier publications were included when they established an intervention model, conceptual distinction, or measurement issue used in later work. Studies concerned only with adults, speech production, or interventions lacking a relevant social-communication outcome were not central to the synthesis. Selected adult studies were retained when they directly informed the ethics or interpretation of child intervention.

Titles and abstracts were screened for relevance to the review questions, with full texts consulted when relevance or conceptual contribution remained uncertain. Studies were charted narratively by participants, intervention approach, delivery agent, setting, targeted outcome, maintenance or generalisation evidence, and major methodological limitations. The synthesis covered controlled trials, single-case studies, systematic reviews, qualitative research, theoretical papers, and practice frameworks; formal pooling was therefore neither appropriate nor attempted. Evidence was organised into seven domains: explicit instruction; developmental and naturalistic approaches; parent-mediated intervention; peer-mediated and play-based intervention; implementation in schools and inclusive settings; technology-supported intervention; and the definition and measurement of outcomes. Greater interpretive weight was given to systematic syntheses, controlled studies, replicated findings, and convergence across methods. Because the search was iterative rather than protocol-driven, it should not be read as exhaustive. No PRISMA flow diagram or pooled effect estimate is presented.

LITERATURE REVIEW

Pragmatic competence is multidimensional and context dependent. It includes communicative initiation and response, turn coordination, topic introduction and maintenance, presupposition, adaptation to listener knowledge, inferencing, nonliteral meaning, prosodic interpretation, narrative coherence, gesture, and the detection and repair of misunderstanding. Performance in any one domain may be influenced by structural language, attention, executive functioning, sensory regulation,

familiarity with the partner, anxiety, processing time, and the predictability of the setting. For this reason, an isolated pragmatic score cannot fully represent a child's communicative competence. Autistic pragmatic profiles are heterogeneous rather than uniformly impaired. A child may communicate effectively with familiar people but have difficulty with rapid group conversation; another may possess advanced vocabulary but find indirect requests or ambiguous reference difficult; another may communicate primarily through gesture, echolalia, or augmentative and alternative communication. There is also overlap between autism, developmental language disorder, and social (pragmatic) communication disorder, although the conditions are not interchangeable (Andreou *et al.*, 2022; Félix *et al.*, 2024; Georgiou & Spanoudis, 2021; Norbury, 2014). Intervention planning therefore requires analysis of the precise communicative activity, not merely a diagnostic label.

A functional approach distinguishes communicative capacity from communicative performance. Capacity concerns what a learner can understand or produce under supportive conditions; performance reflects what occurs in a particular interaction. Performance can deteriorate when language is fast, indirect, sensory conditions are demanding, or partners fail to recognise an autistic person's signals. Conversely, performance may improve when communication is written, visual, predictable, interest based, or shared with a familiar or autistic partner. This distinction explains why improvement on a decontextualised test may fail to appear in everyday settings and why apparent difficulty in one context does not necessarily indicate a stable lack of competence. Terminology matters here. Deficit-based descriptions can identify genuine support needs, but they can also imply that neurotypical behaviour is the only legitimate endpoint. Research challenging assumptions about autistic social motivation and figurative-language incapacity illustrates the risk of interpreting atypical performance without examining task demands or partner expectations (Gernsbacher & Pripas-Kapit, 2012; Jaswal & Akhtar, 2019). A balanced framework must recognise disability-related barriers while avoiding the presumption that difference is inherently dysfunctional.

Direct and Explicit Pragmatic-Language Programmes

Direct intervention typically decomposes pragmatic communication into teachable components. Common targets include greeting and initiating, maintaining a topic, asking contingent questions, recognising emotions, drawing inferences, understanding figurative language, organising narratives, and repairing breakdowns. Teaching may involve modelling, visual scripts, role play, explicit explanation, rehearsal, feedback, and repeated practice. Such approaches can be valuable because many social conventions are implicit and inconsistently applied. Making them explicit may reduce uncertainty and provide strategies that learners can use selectively.

The Pragmatic Intervention Programme is a notable contemporary example. It combines child-specific goals with structured activities addressing communicative intention, conversation, narrative, and contextual adaptation. Initial research with preschool children with autism or developmental language disorder indicated gains in pragmatic and broader language measures (Pereira *et al.*, 2022). A larger non-randomised controlled study subsequently reported clinically significant goal attainment and group differences on communication and language measures following 24 sessions (Pereira *et al.*, 2025). These findings are promising because they demonstrate a manualised programme with application in early educational contexts. However, non-random allocation, modest samples, and reliance on outcomes related to the intervention content limit causal and generalisation claims. Explicit instruction is most likely to be useful when goals are concrete, functional, and meaningful to the learner. Teaching a child how to indicate that a message was unclear, request extra processing time, enter a desired group activity, or explain a preferred communication mode can increase autonomy. By contrast, requiring eye contact, restricting harmless repetitive language, or training scripted small talk without evidence of personal relevance may increase outward conformity without improving mutual understanding. Dosage is another unresolved issue. Programmes vary widely in session frequency, total duration, group size, and professional involvement. Parsons *et al.* (2017) found no single delivery arrangement that could be treated as optimal across pragmatic interventions. Intensity alone is unlikely to determine success: distributed opportunities in meaningful contexts may be more valuable than a larger number of clinic trials. Future controlled studies should report intervention components and fidelity precisely, distinguish exposure from active engagement, and examine which learners benefit from particular combinations of direct teaching and naturalistic practice.

Developmental, Naturalistic, and Play-Based Approaches

Developmental social-pragmatic approaches treat communication as emerging through reciprocal engagement rather than through isolated skill rehearsal. Adults follow the child's interests, respond contingently, create communicative opportunities, and support increasingly complex interaction during play and routines. Naturalistic developmental behavioural interventions share these features while incorporating systematic prompting, modelling, reinforcement, and data-informed teaching (Schreibman *et al.*, 2015). Systematic reviews indicate that developmental social-pragmatic and play-based interventions can support joint attention, engagement, communication, language, and play in young autistic children (Binns & Oram Cardy, 2019; O'Keeffe & McNally, 2023). The natural context is a theoretical strength: the child practises communication for an immediate purpose with a responsive partner. It

also permits intervention to incorporate multimodal communication, sensory preferences, and focused interests.

The category itself is broad. An intervention labelled developmental or play based may differ substantially in adult control, child choice, behavioural procedures, targets, and assumptions about acceptable communication. Positive findings for one programme should not be generalised automatically to all approaches within the category. Project AIM also showed that estimates of early autism intervention effects are influenced by study quality and outcome proximity, with larger effects often appearing for measures closely aligned with treatment (Sandbank *et al.*, 2020). Play should not become a disguised compliance task. If adults repeatedly redirect the child toward predetermined toys, forms of play, or social behaviours, the activity may be naturalistic in location but not in function. High-quality play-based intervention preserves agency, recognises unconventional play as potentially meaningful, and uses adult responsiveness to expand—not replace—the child's communicative repertoire. Outcomes should include enjoyment, sustained mutual engagement, spontaneous communication, and transfer to interactions not led by the interventionist.

Parent-Mediated Interventions

Parent-mediated programmes coach caregivers to use responsive communication strategies during everyday activities. Common elements include following the child's lead, observing and interpreting communicative signals, reducing linguistic complexity, waiting for initiation, expanding the child's message, creating predictable opportunities, and supporting shared engagement. These programmes can increase the frequency of learning opportunities and may promote generalisation because communication is supported by a familiar partner across daily routines.

Meta-analytic and review evidence suggests small-to-moderate benefits for aspects of social communication and language, although effects vary across measures and studies (Deniz *et al.*, 2024; Liu *et al.*, 2020; Nevill *et al.*, 2018). Parent behaviour often changes more consistently than distal child outcomes, which is theoretically plausible: caregiver strategy use is the immediate intervention target, whereas child development is influenced by many additional factors. Variation in fidelity, child profile, programme intensity, and measurement contributes to inconsistent estimates. Generalisation should not be assumed merely because intervention occurs at home. A strategy learned in a coached play routine may not transfer to mealtimes, community settings, school, or interactions with siblings. Programmes should therefore plan across routines and partners, measure maintenance, and coordinate with educational staff where appropriate. Studies in lower-resource contexts further show that feasibility depends on access, cultural fit, professional support, and the time available to families (Lee & Meadan, 2021). Ethically, parent mediation must be collaborative.

Families should not be positioned as technicians responsible for delivering a prescribed treatment at all waking hours. Coaching should strengthen caregiver confidence and attunement rather than increase guilt or surveillance. Family-selected goals, flexible delivery, respect for multilingual communication, and attention to caregiver wellbeing are essential. Telepractice may improve access, but it can also reproduce inequities related to devices, connectivity, privacy, and digital literacy.

Peer-Mediated and Group Interventions

Pragmatics is fundamentally interpersonal, making peers important partners in intervention. Peer-mediated approaches typically teach classmates, siblings, or selected peers to initiate, respond, wait, model, invite participation, and sustain shared activity. They may be implemented during free play, classroom centres, group learning, lunch, or structured social groups. Reviews suggest that these approaches can increase initiations, responses, engagement, and reciprocal interaction in inclusive settings (Watkins *et al.*, 2015). The play-based randomised trial by Parsons *et al.* (2019) is particularly relevant because it assessed pragmatic performance during peer interaction rather than relying only on adult report. Gains were found in nonverbal communication and overall pragmatic performance. School-based research with minimally verbal peer dyads also shows that meaningful social participation does not require fluent speech and can be supported through shared activities and multimodal interaction (Bauminger-Zviely *et al.*, 2020).

Group programmes can provide varied partners and opportunities for feedback, but they may also impose substantial sensory, linguistic, and performance demands. A learner may demonstrate a skill in a predictable therapy group yet find it inaccessible in a noisy classroom or unstructured playground. Group composition, facilitator behaviour, shared interests, and psychological safety are therefore likely moderators. Reporting only mean change may conceal children who experience no benefit or increased distress. Peer mediation is defensible only when the relationship is reciprocal. Nonautistic peers should not be trained to normalise an autistic child or rewarded for producing target behaviours. Both partners can learn to recognise different communication styles, clarify intentions, repair misunderstandings, and negotiate activities. Outcomes should examine whether interaction becomes more balanced and enjoyable, whether social access expands, and whether voluntary relationships develop. Frequency counts alone cannot distinguish mutual engagement from tolerated participation.

School-Based and Inclusive Implementation

Schools are critical settings because pragmatic demands occur throughout the day and are linked directly to curriculum access, behaviour interpretation, peer belonging, and self-advocacy. A child must interpret teacher instructions, respond in group discussion, negotiate collaborative work, understand humour,

manage conflict, and seek clarification. Clinic-based gains have limited educational value if they do not support these activities. School intervention can combine individual strategy teaching with environmental modification. Teachers can reduce ambiguity, state expectations explicitly, provide visual or written alternatives, allow processing time, preview changes, and model repair language. Speech-language therapists can collaborate with teachers to identify high-impact routines and observe whether skills transfer. Peer education can promote acceptance of different communication modes and reduce the pressure placed solely on autistic students. Play-based interventions in educational contexts show promise, but the evidence base remains methodologically diverse (O’Keeffe & McNally, 2023). Implementation quality is influenced by staff training, time, leadership, class size, professional collaboration, and whether strategies fit ordinary routines. Fidelity should not mean rigid delivery that ignores sensory state or learner assent. It should protect essential mechanisms while allowing adaptation to culture, setting, and individual priorities. Multilingualism adds another practical and interpretive issue. Pragmatic conventions vary across languages and cultures, including expectations for eye gaze, directness, politeness, adult–child turn taking, narrative structure, and emotional expression. Assessment conducted only in the school language may misclassify difference as impairment. Intervention should preserve home-language communication and avoid asking families to abandon culturally meaningful interaction styles.

Technology-Supported Intervention

Technology-supported approaches include video modelling, interactive software, serious games, virtual reality, apps, telepractice, and digitally mediated social interaction. Potential advantages include predictable presentation, repetition, visual structure, adjustable pacing, reduced immediate social pressure, and access to otherwise unavailable specialists. For some learners, typed or asynchronous communication may itself be a preferred and effective pragmatic mode. Each technology works through a different mechanism, which studies need to specify. Video modelling may clarify a sequence; virtual environments may permit controlled rehearsal; telepractice may coach a parent; and online interaction may create authentic communities around shared interests. These are distinct mechanisms and should not be treated as a single intervention category. Evidence that a participant completes a digital task more accurately does not establish improved spontaneous communication. The unresolved issue is transfer to everyday interaction. Pragmatic interaction in everyday life involves uncertainty, rapidly changing context, competing sensory input, and partners who do not follow programmed scripts. Technology should therefore be linked deliberately with practice across people and settings. Outcome assessment should include real interaction and user experience, not only software performance. Digital intervention also

raises issues of accessibility and ethics. Programmes must accommodate motor, sensory, reading, and language differences; protect privacy; and avoid persuasive design that rewards normative appearance. Autistic young people should be involved in design decisions. Technology is most valuable when it expands communication options or access, rather than when it is used to intensify surveillance or automate judgments about supposedly appropriate social behaviour.

Outcomes, Generalisation, and Maintenance

The intervention literature uses diverse endpoints: frequency of initiations, contingent responses, conversational turns, joint engagement, narrative scores, parent questionnaires, clinician ratings, goal attainment, and standardised language tests. Each answers a different question. A proximal observational measure may be sensitive to a taught behaviour but vulnerable to expectancy effects; a standardised test may offer comparison but lack ecological validity; parent report may capture daily functioning but not distinguish change from altered expectations.

Measurement reviews identify limited and uneven psychometric evidence for child language and pragmatic instruments (Denman *et al.*, 2017; Pereira & Lousada, 2023). Researchers should justify why an outcome matches the proposed mechanism, use blinded assessment where feasible, and separate targeted from distal outcomes. Multi-method assessment is preferable: a standardised measure can be combined with naturalistic observation, child- or family-selected goals, and participation outcomes. Maintenance and generalisation require prospective design. Studies should define the behaviours, partners, environments, and time intervals across which transfer is expected. Follow-up should extend beyond a few weeks. Demonstrating the same response to a trained adult and an untrained peer is stronger evidence than repeating a clinic task. Ecological sampling, recorded classroom interaction, and repeated measures across routines can clarify variability rather than treating it as error.

Outcome selection must also make room for possible harm. Greater eye contact, reduced repetition, or more neurotypical prosody may look successful to observers while increasing effort or masking. Outcomes should include comfort, perceived authenticity, communicative confidence, self-advocacy, social access, and adverse experiences. For children who cannot report these directly, multimodal preference assessment and careful observation of assent and stress are necessary; adult interpretation should be presented cautiously.

Neurodiversity-Informed Considerations for Pragmatic Support

The double-empathy account reframes at least some communication difficulty as a mismatch between people rather than a one-sided autistic deficit (Milton, 2012). Research on interpersonal rapport and first impressions supports the proposition that partner neurotype and

nonautistic judgments shape interaction outcomes (Crompton *et al.*, 2020; Sasson *et al.*, 2017). Accordingly, pragmatic intervention may need to address not only the autistic learner but also partners, tasks, environments, and shared communicative expectations. Neurodiversity-informed intervention does not require denying disability or withholding explicit teaching. It requires that goals improve the learner's life rather than merely make behaviour appear less autistic. A young person may actively want help recognising indirect requests, navigating teasing, participating in group work, or explaining communication needs. These are legitimate goals when chosen collaboratively and taught as options rather than universal rules.

In practice, this perspective supports recognition of speech, gesture, writing, AAC, echolalia, silence, and delayed response as potentially valid forms of communication. It also places greater emphasis on mutual repair: partners can learn to clarify, wait, check understanding, and state assumptions. Reducing unnecessary ambiguity and sensory or temporal barriers may be as important as teaching an individual strategy. Evaluation should therefore extend beyond surface behavioural change to access, choice, belonging, safety, and reduced communication breakdown. These considerations represent ethical and theoretically grounded directions; they should not be interpreted as an empirically validated intervention model.

Camouflaging is a particularly important test case. Camouflaging can be associated with psychological cost and should not be treated as evidence of wellbeing (Cook *et al.*, 2021; Hull *et al.*, 2017). Clinicians and educators should ask whether a target increases effective communication or simply observer comfort. The distinction should be documented during goal selection and review.

RESULTS AND DISCUSSION

Across the reviewed literature, the clearest conclusion is not that a single intervention model is superior, but that effects depend on the alignment among participant profile, target, setting, dosage, delivery agent, and outcome measure. Direct programmes offer the greatest procedural clarity. For example, the Pragmatic Intervention Programme used 24 sessions and reported clinically meaningful goal attainment together with group differences in communication and language outcomes (Pereira *et al.*, 2025), extending earlier findings in preschool children with autism or developmental language disorder (Pereira *et al.*, 2022). Its manualisation and individualised goals make the treatment more reproducible than broadly labelled developmental or play-based approaches. Nevertheless, non-random allocation, modest samples, and measures closely related to taught content weaken claims that the programme changes spontaneous communication outside intervention. By comparison, naturalistic and play-based approaches sacrifice some procedural uniformity in order to embed communication in motivating activity. This may

improve ecological relevance, but the category includes markedly different degrees of adult direction, prompting, reinforcement, and child choice. Consequently, positive findings cannot be attributed simply to intervention being ‘naturalistic’; the active ingredient may be responsive adult behaviour, repeated opportunities, shared interest, explicit prompting, or their combination.

Participant characteristics further qualify comparisons. Studies involving verbally fluent children can target conversation, inference, narrative, or figurative language through verbal explanation and reflection, whereas interventions involving preschool or minimally speaking children more often target joint engagement, initiation, turn-taking, gesture, symbolic play, or multimodal reciprocity. Singhanía’s (2025) assessment of 36 autistic preschool children aged 1.6-4.6 years illustrates why a global pragmatic deficit score is insufficient: joint referencing, social organisation, turn-taking, and imitation were notably affected, but eye contact was not the predominant indicator, and communication was associated with language and symbolic play rather than perceptive cognitive ability. This finding complicates interventions that use increased gaze as a primary marker of social-communication improvement. It also supports profiling component abilities before selecting a target. At the other end of the developmental range, qualitative evidence from 10 parents of autistic adolescents aged 12-18 years identified difficulty teaching abstract, safety-critical concepts such as consent and personal boundaries, together with a need for practical examples, repetition, and coordinated professional support (Panagiotakopoulou *et al.*, 2024). Although sexuality education is not itself a pragmatic-language trial, it shows how pragmatic competence becomes consequential in real decisions and why adolescent goals should extend beyond conversational performance to comprehension, self-advocacy, safety, and relationship boundaries.

Setting and delivery agent appear to shape what can reasonably be expected to generalise. Clinic-based explicit teaching can reduce ambiguity and permit controlled rehearsal, but it also maximises similarity between instruction and assessment. School-based peer intervention introduces less predictable partners and demands and therefore provides a stronger test of functional use. In the randomised play-based peer-mediated trial by Parsons *et al.* (2019), improvements in nonverbal communication and overall pragmatic performance are notable because performance was assessed in peer interaction rather than solely through an adult questionnaire. Bauminger-Zviely *et al.* (2020) similarly demonstrated that minimally verbal peer dyads can participate meaningfully through nonverbal and multimodal communication. These studies broaden the population represented in the evidence and challenge the assumption that fluent speech is a prerequisite for pragmatic intervention. However, a structured peer dyad remains more supported than an unstructured playground, rapidly changing group task, or emerging

friendship. Evidence of improvement with a trained or familiar peer should therefore be treated as intermediate transfer, not as proof of generalisation across partners and settings.

Parent-mediated approaches offer high exposure within familiar routines and may be especially suitable for young children whose communication is strongly context-dependent. Reviews generally report small-to-moderate child effects, while changes in caregiver responsiveness are often more consistent (Deniz *et al.*, 2024; Liu *et al.*, 2020; Nevill *et al.*, 2018). This pattern is not necessarily a failure: parent behaviour is the proximal treatment target, whereas change in a child’s communication is more distal and moderated by language level, sensory regulation, opportunity, and partner response. A recent school-linked study is consistent with the importance of caregivers but also demonstrates the need for causal restraint. Sitoy *et al.* (2025) found, among 99 parents across three public elementary schools in Cebu, significant associations between reported use of prompting techniques and children’s perceived communication skills. The relatively large community sample and school-linked context add ecological value. Yet the descriptive correlational design, purposive recruitment, and reliance on parent perceptions cannot establish that prompting caused better communication or determine which prompts were helpful for which children. Prompting may facilitate access when it is contingent and faded, but intensive or poorly timed prompting may reduce initiation or autonomy. Trials should therefore compare prompt types, measure independent communication after prompts are withdrawn, and record child assent and stress as well as response frequency.

Dosage cannot currently be reduced to a simple more-is-better rule. Across the literature reviewed by Parsons *et al.* (2017), weekly delivery and approximately 12 weeks were common, whereas the Pragmatic Intervention Programme delivered 24 sessions (Pereira *et al.*, 2025). Parent-mediated models may distribute practice across many brief daily interactions, and digital systems can permit frequent repetition. These forms of exposure are not equivalent. Session count does not capture time actively engaged, the diversity of partners and routines, the cognitive or sensory demands of practice, or the degree to which support is faded. A concentrated clinic programme may produce rapid mastery of a scripted behaviour, while lower-intensity practice across classrooms, home routines, and peer activities may be more likely to support flexible use. Conversely, embedding intervention in daily life can create caregiver or teacher burden and threaten fidelity. Studies should report minutes of active participation, spacing, missed sessions, adaptation, partner training, and opportunities for unprompted use, rather than treating scheduled hours as a sufficient dosage metric.

The sustainability of effects remains one of the weakest parts of the evidence base. Immediate post-intervention gains are common, but follow-up periods are frequently short or absent, and maintenance is often tested with the

same materials or informants. This creates a consistent contradiction: intervention effects appear encouraging when measured proximally, yet confidence falls as outcomes become more distal, naturalistic, or temporally removed. Project AIM likewise found that effect estimates in early autism intervention were sensitive to study quality and outcome proximity (Sandbank *et al.*, 2020). A parallel pattern is evident in educational cognitive-intervention research. Vasileiou's (2026b) review of executive-function programmes found that trained cognitive performance could improve while transfer to reading, mathematics, and ordinary classroom engagement varied according to intervention type and educational integration. The comparison is instructive for pragmatic intervention: mastery of a component skill is not sufficient evidence of participation-level benefit. Sustainability should be tested after support is reduced, and generalisation should be examined prospectively across untrained partners, unfamiliar tasks, home and school contexts, and communication modes.

Technology-supported findings require the same distinction between task success and communicative change. Predictable digital environments, video models, virtual scenarios, and socially assistive robots may reduce processing pressure, provide repeated demonstrations, and adapt pacing. Vasileiou's (2026a) systematic review of 49 empirical AI studies in autism identified adaptive educational systems and socially assistive robotics as promising for individualised learning and structured social-communication practice. At the same time, small samples, prototype systems, heterogeneous algorithms and outcomes, and limited large-scale validation constrained generalisability. These concerns are especially important for pragmatics, where a system can reward a predefined response without establishing that the response is useful with human partners. Claims about improved eye contact, emotion recognition, or engagement may also reflect normative design assumptions. Digital tools should therefore function as bridges: a strategy rehearsed with a device should be practised with chosen partners in valued activities, while outcomes should include spontaneous repair, communicative choice, comfort, and participation. Privacy, algorithmic transparency, accessibility, and the possibility of automated surveillance must be evaluated alongside efficacy.

Methodological heterogeneity explains some apparently contradictory findings but should not become a blanket explanation that prevents stronger inference. Samples are often small, clinically selected, verbally fluent, and insufficiently described with respect to intellectual disability, AAC use, gender, multilingualism, socioeconomic circumstances, anxiety, or sensory profile. Outcome measures range from frequency counts and goal attainment to standardised tests and adult ratings, yet these are not interchangeable. Unblinded caregiver and clinician ratings may be sensitive to meaningful everyday change but are vulnerable to expectancy effects; standardised tests can support comparison but may miss context-dependent

competence; observational coding can be precise but still reflect the researcher's normative assumptions. The field needs preregistered primary outcomes, blinded assessment where feasible, active comparison conditions, treatment-fidelity data, and reporting of null, negative, and adverse effects. Multi-method designs should pair targeted skill measures with naturalistic interaction, participation, learner-selected goals, and follow-up. Analyses should also report individual response patterns, because a mean improvement can conceal nonresponse, distress, or benefit concentrated among children with particular language profiles.

The practical implication is a staged, neurodiversity-informed model rather than adoption of a branded programme on diagnosis alone. Assessment should first identify a barrier that matters to the child and occurs in a specified activity, such as requesting clarification in group work, communicating refusal, repairing a misunderstanding, entering a preferred peer activity, or understanding consent and boundaries. The team should then select an accessible strategy through the child's preferred modes, including speech, AAC, gesture, writing, echolalia, or delayed response. Explicit instruction can make hidden conventions visible, while naturalistic practice across chosen partners and settings tests whether the strategy remains useful. Parents, peers, teachers, and clinicians should be taught mutual adaptation - clearer language, waiting, checking interpretations, sensory adjustment, and non-blaming repair - rather than being used only to elicit more neurotypical behaviour from the child. Goals and dosage should be reviewed against benefit, effort, assent, and the risk of masking.

Accordingly, the most defensible definition of success is expanded communicative agency: more effective access to people, information, safety, learning, and valued relationships, with greater choice over how and when to communicate. This definition can accommodate genuine support needs without equating benefit with reduced autistic visibility. It also generates testable outcomes, including fewer unresolved breakdowns, successful communication with untrained partners, independent strategy use after prompts are faded, participation in selected activities, comfort, and maintenance over months. Neurodiversity-informed recommendations remain more developed conceptually and ethically than through comparative child trials, so they should not be presented as already proven superior. The next step is to test them directly by comparing learner-selected and norm-selected goals, individual-only and partner-plus-environment interventions, and conventional performance outcomes with participation and wellbeing outcomes.

This review has limitations. Its narrative design permitted comparison across heterogeneous methods and conceptual positions but cannot demonstrate exhaustive retrieval or provide pooled estimates. The boundaries among pragmatics, language, play, social communication, and functional participation remain contestable, and several included syntheses address broader social communication

rather than pragmatics alone. Recent evidence used in the synthesis also serves different functions: correlational and profile studies clarify contextual and participant variation, qualitative work identifies high-stakes functional needs, and executive-function and AI reviews offer relevant evidence about transfer and technology. None constitutes a direct comparative trial of neurodiversity-informed pragmatic intervention. Their convergence nevertheless strengthens the case for individualised profiling, explicit but functional teaching, partner and environmental support, and outcome assessment that extends beyond trained performance.

Implications for Practice

Assessment should begin with priorities identified by the autistic learner whenever this is possible, supplemented by family and educational perspectives. Rather than assigning a global social-skills goal, clinicians and educators should identify when communication breaks down, with whom, under which sensory and linguistic conditions, and which supports already help. A goal such as requesting clarification during group work is observable and participation-oriented; ‘improving social skills’ is not.

Support should combine individual strategy teaching with changes to partners and environments. Teachers and peers can use more explicit language, allow processing time, recognise AAC and unconventional signals, and repair misunderstandings without blame. Practice should involve several partners and ordinary routines, while monitoring should combine direct observation, individual goal attainment, and indicators of access, comfort, or self-advocacy. Before adopting a target, practitioners should ask whether it addresses a barrier identified by the learner or family, expands communication rather than observer comfort, and can be pursued without avoidable masking, distress, or loss of autonomy. These questions translate neurodiversity-informed principles into decisions that can be documented and reviewed.

Future Research

Research would benefit from comparing active ingredients and contexts rather than branded programmes alone. Factorial or dismantling designs could test the contribution of explicit teaching, peer practice, caregiver responsiveness, visual support, and intensity. Adaptive designs may also help determine which combinations suit particular language profiles, ages, anxiety levels, sensory needs, and preferred communication modes.

A core set of outcomes could improve comparability without displacing individual goals. At minimum, studies should assess functional communication, maintenance, generalisation, participation, learner experience, and adverse effects. Autistic children and adults should contribute to goal selection, material design, interpretation, and the language used to describe success. Longer-term studies are needed to examine educational access, relationships, self-advocacy, and wellbeing. Cross-

cultural and multilingual research should test intervention principles without assuming that pragmatic norms are universal. Implementation and economic studies are equally important if promising practices are to be sustained in ordinary schools and community services.

CONCLUSION

Pragmatic-language intervention may increase communication and participation for autistic children, but benefit depends on the target, teaching process, assessment context, and definition of success. Current evidence supports several potentially useful approaches while remaining limited by heterogeneous samples and measures, short follow-up, weak evidence of generalisation, and incomplete representation of autistic children. A stronger next generation of research would connect explicit support with natural interaction, partner learning, environmental accessibility, and outcomes selected with autistic people. The appropriate aim is not a less visibly autistic child. It is a child with more ways to communicate, greater access to valued activities and relationships, and more control over when and how those strategies are used.

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