Social Interaction Style in Autism: A narrative review of social behaviours and outcomes in autistic and neurotypical interactions

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Abstract

Social interaction difficulties are a defining feature of autism. Historically, research has concentrated on comparing the social behaviours of autistic and neurotypical individuals in cross-neurotype dyads, often attributing challenges in communication to autistic social deficits. However, recent studies on interactions between two autistic individuals provide new insights, suggesting that some social difficulties may at least partially arise from mutual misunderstandings. This narrative review analyses twenty-five studies on autistic, mixed, and neurotypical interactions, highlighting consistent differences (e.g., reduced mutual gaze and backchanneling in autistic interactions) and similarities between autistic and neurotypical social interactions (e.g., turn-taking), as well as measurements yielding mixed results (e.g., social motor synchrony). We discuss the variability in social behaviours, interaction outcomes, and study designs in the literature and interpret the existing findings in the light of individual deficits and relational difficulties. We emphasise the need for future research to consider both same- and mixed-neurotype interactions and to include perspectives from neurotypical as well as autistic individuals to enhance our understanding of social interaction in autism.

Keywords: autism, social interaction, Double Empathy, social interaction style

1. Introduction

1.1. Autism and social interactions

Social interactions are complex, dynamic processes involving multiple participants and influenced by various intra- and interpersonal factors. Each participant contributes their social abilities−cognition, motivation, and behaviours−creating unique interaction dynamics and outcomes (see Figure 1). Difficulties in social interaction are considered core characteristics of autism, yet the causes remain debated. This review examines social behaviours in interactions between autistic[†] and/or neurotypical[‡] individuals, critically evaluating current knowledge.

The clinical model recognises autism as a *disorder* with persistent social *deficits* [3]. Accounts such as the Theory of Mind[4] or the Social Motivation Hypothesis[5] support this perspective by proposing that autistic people have limited ability to interpret other people's minds and that they *do not want to* or *cannot* engage in and maintain social relations. These accounts receive criticism for being overly pathologizing [6–8] and having limited power to predict the "real-world" social behaviours of individuals in the autistic constellation[§] [10,11]. For example, despite difficulties, many autistic people are as motivated to have social relationships as their neurotypical peers [12]. The neurodiversity movement conceptualises autism as a natural neurodevelopmental variation, with interaction difficulties rooted in *differences* in their social interactions rather than being deficient. As the minority in the society (~1% worldwide [13]), autistic people are part of a society where structures, systems, and communication styles are defined by neurotypical norms. Thus, autistic communication styles are not always accommodated, which may lead to communication difficulties, particularly when interacting with neurotypical people.

Regardless of the theoretical stance, autistic people experience significant social interactions difficulties, especially, but not exclusively, with neurotypical peers. For example, both neurotypes form unfavourable impressions of autistic peers after brief interactions or video observation [14–18]. Thus, social behaviour carries signals that lead to instantaneous social judgements. At the same time, one's 'communication style'

[†] Being fully aware of the differences in cultural and individual preferences between person-first ("person with autism") and identity-first ("autistic person") language, here we consistently use the latter. This is because (1) studies suggest that it is preferred by the majority of English-speaking people with autism diagnosis [1], (2) it is considered to reduce stigma [2], and (3) it is preferred by all members of the autism community who have directly or indirectly contributed to the current article in terms of the topic, phrasing, and/or interpretations.

[‡] The term "neurotypical" is often used to refer to individuals who are not autistic. However, comparison groups labelled as neurotypical in autism research are often not screened for other forms of neurodivergence (e.g., anxiety, ADHD, etc.) or clinical conditions (e.g., major depression, schizophrenia). As such, this label should be interpreted with caution. Neurotypical is not synonymous with non-autistic and conflating the two risks obscuring the heterogeneity within non-autistic populations. In this review, we use the term "neurotypical" for clarity and ease of reading, while acknowledging its limitations in this context. We encourage the reader to consult the methods sections of individual studies to assess if comparison groups were sufficiently characterised to justify the label "neurotypical".

[§] As traditional expressions like "on the spectrum" can inadvertently suggest a linear continuum, implying a progression from "less" to "more" autistic traits, by using "autistic constellation" after Caroline Hearst [9], we aim to emphasise the multifaceted nature of autism.

seems to be stable across contexts[**]. For example, people are consistent in what and how they communicate (feelings, needs, thoughts) in different social settings (e.g., with their partner, friend, coworker) [20]. Because of that, researchers have investigated individual social behaviours like facial expressivity [21] or use of co-speech gestures [22] in single-person designs. However, it is unclear whether differences between autistic and neurotypical people in such designs could explain the *interaction* problems in cross-neurotypes dyads.

1.2. Social interaction style

Social interactions are inherently dynamic, bi- (or multi-) directional, back-and-forth processes, in which one person influences the other [17]. Hence, instead of focusing on individual *communication styles*, we propose examining *interaction styles*, encompassing both *intrapersonal* social abilities (e.g., facial expressivity or perspective taking) and *interpersonal,* relational factors emerging between interlocutors (e.g., turn taking). Autistic and neurotypical social interaction styles likely differ, leading to misunderstandings. The key question is whether these difficulties stem from autistic social skill deficits, mutual biases, or both.

The idea of an individual having a consistent social interaction style is not new. Previous research [23] divided autistic children into subgroups characterised as: socially aloof (not seeking interactions and indifferent to approaches of others), passive (not initiating but responding to approaches of others), active-but-odd (seeking interactions albeit in an atypical way), and typical. The original descriptions of the styles included behavioural variables like echolalia, idiosyncratic speech, and repetitive symbolic activities, and were further related to cognitive and emotional factors [24], and reported to be relatively stable across time, at least in adolescence [25]. Note that while the individual descriptors are *intrapersonal* (e.g., idiosyncratic speech), the phrasing of the subgroups is primarily *interpersonal* (e.g., indifference to others' approaches), highlighting the relational nature of autistic social difficulties, which may arise from individual atypicalities. Given the considerable heterogeneity of autism, we conceptualise social interaction styles as multidimensional profiles with overlaps and differences between both individuals and diagnostic groups.

[**] This does not mean that communication characteristics do not change between contexts – they certainly do, as shown both in typical development and in autism (e.g., [19]). However, individual tendencies often prevail across situations, shaping a recognisable interaction style despite contextual shifts.

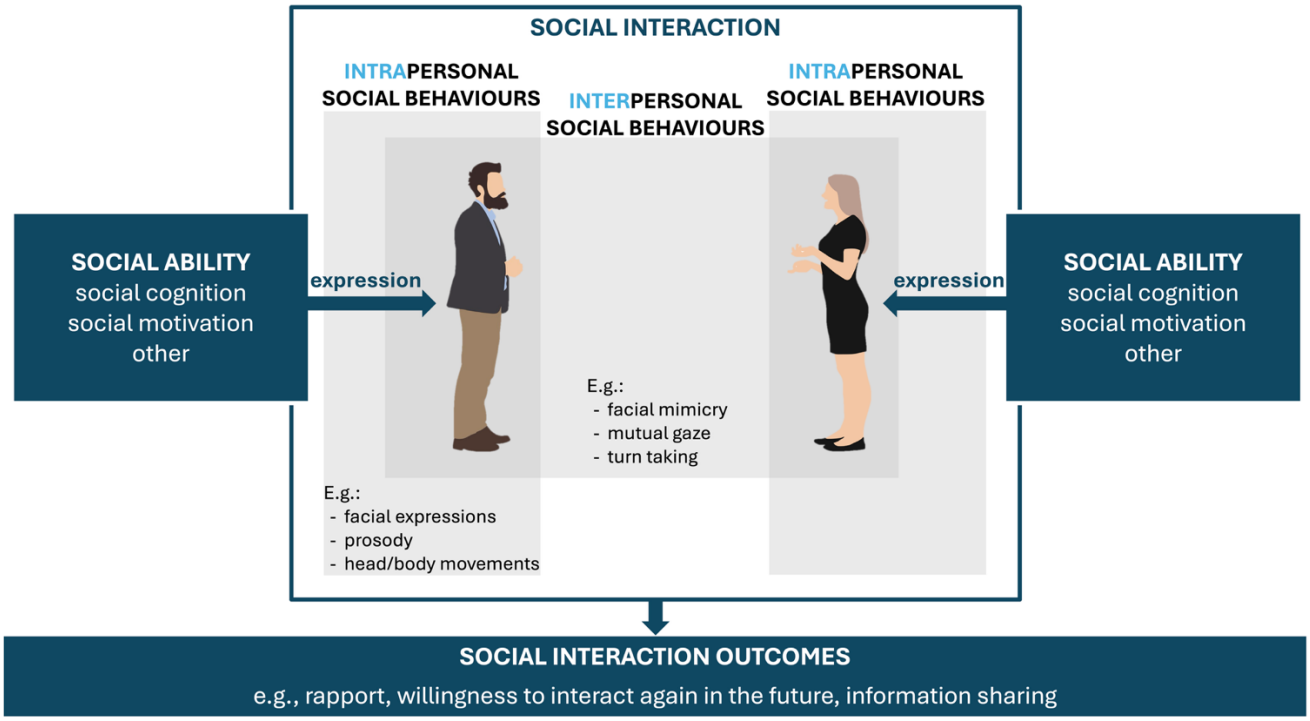

Figure 1 Model of social interaction. Social ability of each interactant includes social cognition (e.g., theory of mind, perspective taking, empathy, emotion recognition), social motivation (e.g., social orienting, willingness to initiate and maintain relationships) and other, contextual factors (e.g., cultural knowledge, language proficiency, physical wellbeing). The expression of this ability is social behaviours, spanning intrapersonal behaviours (i.e., individual behavioural skills and tendencies which can be measured in a single-person setting) and interpersonal behaviours (i.e., those which emerge and can only be measured in an interaction with another social agent). Social interaction outcomes are measurable results of social interactions, assessing the quality and effectiveness of the interaction according to participants' perceptions (e.g., ratings of rapport) or observable prosocial behaviours (e.g., information sharing, helping).

1.3.It takes (at least) two

Because clinical assessments and research are largely based on neurotypical norms [26] and autistic communication and interaction style often does not conform to these norms [27], it is tempting to conclude that social difficulties experienced by autistic people in the neurotypical world are predominantly due to individual social impairments, following the clinical model. Consequently, numerous studies have compared autistic vs. neurotypical groups, or mixed-neurotype vs. neurotypical dyads, often attributing any observed difficulties to social impairments in autistic individuals.

However, two overlapping theoretical frameworks offer alternatives to the clinical model's focus on intrinsic autistic social difficulties. The Double Empathy Problem (DEP) [28] proposes that communication gaps arise from differing worldviews and information processing between autistic and neurotypical individuals, creating mutual challenges. Like cross-cultural communication, difficulties arise not from one party's deficits but from reciprocal misunderstandings [29]. As a sociological lens for understanding cross-neurotype interactions, DEP is not positioned to provide precise empirical predictions. This limits the interpretation of available data as either supporting or contradicting its assumptions. Nevertheless, DEP has gained significant

academic and public attention [30]. Similarly, the Dialectical Misattunement Hypothesis [31] (DMH) predicts that interactions are more synchronous and enjoyable when the interactants are more likely to predict each other's actions, for example, due to a similar neurotype, experiences, and expectations. Based on both DEP and DMH, it could be expected that interactions between same-neurotype dyads (i.e., both autistic or both neurotypical) would be on average "better" or more successful than those of mixed-neurotype dyads.

Despite this relational perspective, most literature on autistic social difficulties focuses on social cognition abilities of individuals [32,33] rather than relational factors in interactions [17], generating extensive literature on atypicalities in social cognition, behaviours, and motivation [34], with social interaction itself remaining a blind spot [35,36]. Interestingly, the relationship between interaction outcomes and individual social cognition may be surprisingly weak [34,37]. Nevertheless, given the quick emergence of first impressions in interactions [18,34,38,39], cross-neurotype difficulties must be rooted in behavioural differences (or 'social presentation styles' [17]) between neurotypes, with possibly different presentations and outcomes in same- or mixed-neurotype dyads. However, only recently have researchers begun exploring how interactions between two autistic individuals differ from other types of dyads.

2. Review

2.1. Method and scope

To addresses the gap in the literature concerning real-world interactions between autistic and neurotypical individuals [35], we focus on studies that use interactive paradigms involving participants engaged in real or arranged interactions as opposed to tasks in which a person is evaluated alone. Thus, as inclusion criteria, in this review we include studies that: report (1) *social behaviours* and/or *interaction outcomes* (2) measured in a social *interaction*, (3) including *autistic dyads* (two autistic participants) and *neurotypical* and/or *mixed-neurotype dyads*. Our aim was to synthesise the current state of knowledge on social interactions between autistic and neurotypical individuals and to highlight key gaps, inconsistencies, and directions for future research.

No single set of keywords adequately captures studies meeting our inclusion criteria. Instead, we iteratively included papers found in the bibliographies of relevant articles, using PubMed and Google Scholar databases. We focused on articles published from 2010 onwards, reflecting the rise of research with relational views on autism. No restrictions were placed on sample size, age, or intelligence. In total, 25 studies met the criteria and are summarised in Table 1. Table S1 in Supplementary Material expands on this with details on dyad types, diagnosis disclosure, task, coder neurotype, age, gender ratio, sample sizes, and type of data collected. This work follows guidelines for narrative reviews [40–43].

We organise the social behaviours by whether they are *intra-* or *interpersonal* in nature. Intrapersonal social behaviours occur within an individual, despite being developed in a social context (e.g., speech-supporting gestures). Interpersonal social

behaviours emerge in interactions between individuals and cannot be observed without another agent (e.g., mutual eye contact). The distinction between them is not rigid [44].

This review is not an exhaustive list of social behaviours measured in an interaction but is rather intended as a starting point to be updated and expanded as the field develops. Where neurotype-matched dyad research is limited, we also discuss results from mixed-neurotype dyads and from varying levels of autistic traits in the general population. However, it is important to note that these last findings should be viewed as potential directions for further research in diagnosed autistic populations, as studies on autistic traits in the general population are not equivalent to research on individuals with a formal diagnosis [45]. This is not an attempt to test DEP, as it does not generate specific predictions [30] (however, Table 1 interprets results regarding relational social difficulties in autism). Instead, this review is an attempt to critically and systematically evaluate the available findings on autistic social interactions in terms of social behaviours and interaction outcomes.

Table 1 Studies investigating social interaction characteristics in interactive paradigms including autistic dyads. AUT = autistic dyad, NT = neurotypical (non-autistic) dyad, MIX = mixed-neurotype (one autistic and one neurotypical) dyad. RD = *Relational difficulties* = whether the main findings of the study support the relational character of autistic social difficulties, i.e., whether the measured characteristic differentiates AUT and MIX dyads such that AUT are more synchronised or report higher rapport (or similar interaction outcome) with the interaction partner; or whether an individual characteristic supports more successful interaction of autistic participants with other autistic people. "-" is used where it is not possible to assess (e.g., lack of MIX dyads). The subscript "$_{ind}$" indicates that the corresponding measurement was calculated per individual (not dyad). For more details on the conceptualisation of each measurement and additional study information (task used, neurotype of the coders, age group, gender ratio, sample size), see Supplementary Material.

Measurement	Main finding	Difference	RD	Article
SOCIAL BEHAVIOURS				
Mutual gaze	Less mutual gaze in MIX (and by trend, AUT) than NT. Only in NT, the mutual gaze duration correlated with rapport ratings.	(AUT=) MIX < NT	no	Rifai et al., 2022
Backchannels	More non-verbal backchanneling in NT than AUT (and those did not differ from MIX).	(MIX=) AUT < NT	no	
	More verbal backchanneling in NT than MIX and AUT.	MIX = AUT < NT	no	
	AUT dyads produced less verbal backchannels, which were also less diverse and complex, than NT dyads	AUT < NT	-	Wehrle, Vogeley, et al., 2023a
Turn taking	Gap lengths were comparable between AUT and NT dyads, although in AUT they were significantly longer in the first stages of the interaction.	AUT = NT (overall); AUT > NT (in early stages)	-	Wehrle, Cangemi, et al., 2023
Communication clarity	No differences between the dyads.	AUT = NT = MIX	no	Oates et al., 2024
Communication efficiency	In both written and oral conditions, NT and AUT we similarly efficient, but in MIX dyads, AUT_{ind} used more words than NT_{ind}.	AUT = NT, in MIX: AUT_{ind} < NT_{ind}	yes	Geelhand et al., 2024
	In both written and oral conditions, NT dyads were more efficient (faster) than AUT and MIX dyads, with no differences between the latter two.	AUT = MIX < NT	no	
Intonation	AUT as a group have a more melodic intonation style (higher wiggliness and spaciousness) than NT, but there are considerable individual differences	AUT more melodic than NT	-	Wehrle et al., 2022
Filled pauses	Both groups produced nearly identical rate of filled pauses, but NT adapted their rate more than AUT to the interlocutor.	AUT = NT	-	Wehrle, Grice, et al., 2023
	No group differences in the type of filled pauses	AUT = NT	-	
	AUT speakers produced fewer filled pauses realised with the typical level intonation contour than NT speakers.	AUT < NT for typical filled pauses	-	
Silent pauses	AUT speakers produced more long (700ms + or 2s+) silent pauses than NT speakers.	AUT > NT	-	Wehrle, Vogeley, et al., 2023b
	No group differences when analysing silent pauses of any length.	AUT = NT	-	
SYNCHRONY / COORDINATION				
Motion synchrony	All dyads showed motion synchrony, but synchrony in NT was larger than in AUT or MIX.	AUT = MIX < NT	no	Georgescu et al., 2020
	In the collaborative task, AUT showed larger motion synchrony than NT, but the groups did not differ in the non-collaborative task.	Collab.: AUT > NT; Individ. AUT = NT	-	Glass & Yuill, 2023
	No differences in amount of synchrony between the dyads.	AUT = MIX = NT	no	Efthimiou et al., 2025
Smiling synchrony	Reduced smiling synchronisation in MIX vs. NT; and marginally larger in AUT when controlling for overall smiling.	NT > MIX, (AUT > MIX)	yes	McNaughton et al., 2024
Joint action	AUT were less able to predict and temporarily coordinate their actions than NT.	AUT < NT	-	Stoit et al., 2011
	Marginally less synchrony (i.e., more movement of the table) and longer task completion time in AUT vs. NT child dyads. No differences for child-adult dyads.	AUT < NT	-	Trevisan et al, 2021
	Less synchrony (i.e., less stepping in-synch) in AUT vs. NT child dyads. No differences for child-adult dyads.	AUT < NT	-	
Communication synchrony	AUT less likely to align the conceptualizations of their communicative signals to the partner.	AUT < MIX = NT	no	Wedge et al., 2019
INTERACTION OUTCOMES				
Rapport	No dyad differences in their ratings of "interaction quality/success" (=rapport)	AUT = NT = MIX	no	Alkire et al., 2023
	NT reported higher rapport than other dyads, and AUT higher than MIX.	MIX < AUT < NT	yes	Crompton, Sharp, et al., 2020
	AUT rated higher on rapport than NT, and those than MIX. The ratings did not differ between autistic and non-autistic observers.	MIX < NT < AUT	yes	
	Lower rapport in MIX than AUT and NT.	MIX < AUT = NT	yes	Crompton, Ropar, et al., 2020a
	No differences between MIX, AUT, and NT	MIX = AUT = NT	no	Crompton et al., 2025
	Lower rapport in MIX than AUT and NT.	MIX < AUT = NT	yes	Rifai et al., 2022
	Rapport the highest in AUT-only than other groups. Rapport for AUT_{ind} changed as a function of number of other AUT in the group, while NT rapport scores were relatively stable across group types.	AUT > NT	yes	Foster, Ackerman, et al., 2024
	AUT rated rapport lower than MIX and NT. NT_{ind} reported higher rapport than AUT_{ind}, regardless of the dyad type.	NT = MIX > AUT; NTind > AUTind	no	Oates et al., 2024
Communication accuracy	Drawings of AUT and NT were (similarly) more accurate than those of MIX.	AUT = NT > MIX	yes	
Communication rate	MIX were faster to complete the task than NT. AUT did not differ significantly from NT or from MIX.	MIX > NT	no	

Information transfer	AUT and NT relayed a similar amount of story detail, and both more than MIX.	AUT = NT > MIX	yes	Crompton, Ropar, et al., 2020a
	No differences between MIX, AUT, and NT in amount of story detail.	MIX = AUT = NT	no	Crompton et al., 2025
Ratings of partner's traits	Both AUT_{ind} and NT_{ind} rated AUT_{ind} as more awkward, less socially warm, less attractive. No differences for intelligence and trustworthiness.	AUT_{ind} > NT_{ind} for both groups	yes	Morrison, DeBrabander, Jones, Faso, et al., 2020
Quality of social interaction	Perception of quality of conversation do not differ for NT_{ind} and $AUT_{ind.}$	AUT_{ind} = NT_{ind}	yes	
Ratings of closeness to the partner	AUT_{ind} report feeling closer to their partners than $NT_{ind.}$	AUT_{ind} > NT_{ind}	yes	
Ratings of sharing	AUT_{ind} disclosing more to AUT_{ind} partners than to NT_{ind} partners.	AUT_{ind} > NT_{ind} for AUT partners	yes	
Interest in future interaction	NT_{ind} prefer NT_{ind}, AUT_{ind} trend towards other $AUT_{ind.}$	AUT_{ind} < NT_{ind} for NT; AUTind > NTind (trend) for AUT	yes	
	Both AUT and NT reported higher desire to interact again than MIX dyads.	AUT and NT > MIX	yes	McNaughton et al., 2024
Qualitative analyses: flow, attunement, rapport	Flow, rapport and intersubjective attunement were significantly increased in AUT than MIX.	AUT > MIX	yes	Williams et al., 2021
Interaction quality	MIX friendships more durable and stable than AUT, with higher levels of goal oriented social behaviours and positive affect. No differences in prosocial behaviours, conversation, and play.	MIX > AUT	no	Bauminger et al., 2008
	NT_{ind} showed higher participation in peer interaction and more complex social behaviours than AUT_{ind}, but both showed more positive than negative social behaviours. AUT_{ind} descriptively more likely to interact with NT_{ind} than other AUT_{ind}.	Qualitative differences	no	Bauminger et al., 2003
INTERACTION MEASUREMENT - INTERACTION OUTCOME				
Social skills	AUT_{ind} score lower in (neurotypical-cantered) social abilities, but only minimal links were found between AUT_{ind} social ability and their social interaction outcomes. If any, social ability of NT_{ind} were more predictive of the outcomes than those of AUT_{ind} in MIX.	Weak relation of social skills and interaction	-	Morrison, DeBrabander, Jones, Ackerman, et al., 2020
Motion synchrony	A stronger link between synchrony and rapport in NT vs MIX and AUT, but no main effect of synchrony on rapport in any dyad.	NT > MIX = AUT	-	Efthimiou et al., 2025
Smiling synchrony	Smiling synchrony predicted willingness to interact again and enjoyment but not interaction quality.	NT = MIX (too few AUT dyads)	-	McNaughton et al., 2024
Mutual gaze, backchannels	Only in NT, the mutual gaze duration correlated with rapport ratings. Verbal/non-verbal backchannels did not correlate with rapport.	NT > MIX = AUT	-	Rifai et al., 2022

3. Interpersonal social interaction characteristics

3.1. Gaze

The literature on gaze to interlocutor's face in autism is mixed. Some report reduced attention to eyes and face in autistic children [46], others find no differences [47,48], and one reported that both neurotypes look more at a conversation partner's face when discussing an interesting topic rather than a generic one .

Gaze helps coordinate social interaction dynamics, such as turn-taking. Neurotypical individuals typically look away when speaking and return their gaze to signal a turn's end [49]. Similar gaze functions exist across autistic traits [66], yet autistic individuals often report difficulties with gaze timing in conversation [51]. Studies have also linked autism to reduced coordination between gaze and other social behaviours, particularly in dynamic face-to-face interactions [50].

Only one study has examined gaze in autistic dyads. Rifai and colleagues [52] found higher mutual gaze in neurotypical than mixed neurotype dyads, with the latter not differing from autistic dyads. They also reported a positive correlation between mutual gaze and self-reported rapport, but only in neurotypical dyads. Similarly, other studies report less mutual gaze in mixed and high-autistic-trait dyads [53], and reduced face-directed gaze in individuals with higher autistic traits [54]. While more research is needed, current evidence suggests autistic individuals establish mutual gaze less frequently, though this does not necessarily impair interaction outcomes like rapport.

3.2. Turn taking

Turn taking is a cooperative interaction fundamental to social interaction [55], aiming to organise an exchange such that only one person speaks at one time [56]. Little is known about turn-taking in autism, particularly in autistic interactions. Recent research by Wehrle and colleagues [57] offers initial insights into turn-taking in autistic dyads, specifically among German speakers.

Wehrle [57] found that neurotypical and autistic dyads showed similar proportion of silence, overlap, and single-speaker speech. However, autistic dyads had less balanced speaking times, with one partner often talking more, especially early in conversations. Neurotypical dyads engaged in longer exchanges with more turn transitions and shorter utterances. At the population level, Peng et al. [53] found that high-autistic-trait dyads had fewer turns than low-trait dyads.

Gaps are silent pauses between speakers, while overlaps occur when one starts speaking before the other finishes. These are quantified using a continuous measure called Floor Transfer Offset (FTO), where positive values indicate gaps and negative - overlaps. In neurotypical interactions, gaps are typically brief (~200 ms) and shorter gaps enhance feelings of connection [58–60].

Wehrle, Cangemi, et al. [61] found no overall FTO differences between autistic and neurotypical adults, but autistic dyads had longer gaps early in conversations, suggesting a slower alignment in conversational dynamics. Peng et al. [53] reported

fewer overlaps in high-autistic-trait dyads, suggesting reduced predictive abilities in conversation. A few studies have also found longer gaps [62–64] and silences before answering a question [65,66] in mixed-neurotype vs neurotypical interactions, though these studies involved neurotypical adults conversing with younger autistic partners, often in interview-like settings, with sometimes unclear intelligence range of the samples.

3.3. Backchannels

Backchanneling involves verbal (e.g., ”mhm,””yeah”) and non-verbal (e.g., head nods) cues produced by listeners that signal engagement and encourage speakers to hold the floor. Verbal backchannels account for most within-speaker overlaps, but as an implicit, other-oriented signal, they reinforce rather than interrupt speech. Neurotypical individuals rely on backchannels to maintain smooth interactions, and they often perceive deviations from typical patterns as negative [67].

Few studies have examined backchanneling in autism. Rifai et al. [52] found fewer non-verbal backchannels in autistic dyads and fewer verbal ones in both autistic and mixed dyads. The rate of either type of backchannelling did not correlate with self-rated rapport. Wehrle, Vogeley et al. [68] also reported reduced and less varied verbal backchannels in autistic dyads, especially early in conversations. Autistic speakers showed a stronger preference for specific backchannels and used more rising intonations, while neurotypical speakers varied their intonation based on backchannel type. Similarly, a study of mixed dyads found that only neurotypical children used the Japanese backchannel /ne/ for turn initiations, requests, and confirmations, even though autistic children understood its function [69].

Despite limited research, findings consistently suggest autistic individuals use fewer and less varied backchannels. However, many studies used task-based interactions rather than free conversation, where autistic individuals may prioritise goal completion over small talk, possibly accounting for reduced backchanneling [57].

3.4. Smiling and laughter

Smiling and laughter play key roles in conversations, varying in function based on context and reciprocity [70], e.g., shared laughter, unlike solo laughter, fosters social bonding and emotional convergence [57]. In neurotypical dyads, smiling synchrony predicts positive interaction outcomes like connection and enjoyment [71,72].

Only three studies have examined smiles and laughter in autistic dyads. McNaughton et al. [73] reported that mixed dyads showed less synchrony than neurotypical dyads and marginally less than autistic dyads when controlling for overall smiling. Wehrle [57] observed twice as much laughter in neurotypical dyads compared to autistic ones. Bauminger et al. [74] found autistic children made more eye contact with a smile when interacting with neurotypical than autistic peers. Findings from studies without autistic dyads align with these results: autistic children produce less varied laughter than their typically developing peers [75] and are less likely to reciprocate smiles or laughter, despite similar rates of solo laughter (compared to children with Down Syndrome [76]). Similarly, autistic adolescents smile less, receive

fewer smiles, and show lower interpersonal smile coordination, with less improvement over time [77]. Contrary to that, a population-based study found no difference in smile coordination across autistic traits [53]. Interestingly, although depression affects smiling and laughter [78] and is common in autism [79], none of these studies have reported related diagnosis or traits in their samples.

3.5. Synchrony and reciprocity

Research consistently shows that neurotypical individuals spontaneously synchronise behaviours from infancy [80], with interpersonal synchrony fostering enjoyment, prosocial behaviour, and positive affect [81,82]. Even previously unacquainted dyads watching a movie together synchronise smiles, strengthening social connection [71,72]. Synchrony is one of the most studied aspects of social interaction in autism.

Reviews suggest less interpersonal synchrony in autistic and mixed dyads compared to neurotypical ones [83–86]. Autistic adolescents show reduced spontaneous and intentional synchrony across tasks involving imitation, interpersonal coordination, facial expression, eye gaze, body language, affect, and motion energy [87–89]. However, some evidence indicates successful social motor adaptation in autism, even in individuals with severe learning disabilities [90].

Social motor synchrony refers to the rhythmically matched movements of two or more people [87]. Typically, synchrony is more prominent in spontaneous than in intentional tasks in autism [84], but it is lower in autistic or mixed dyads than neurotypical ones.

In a series of conversational tasks, Georgescu et al. [91] found that adult neurotypical dyads exhibited more motion energy synchrony than autistic or mixed-neurotype dyads, but Efthimiou and colleagues found no dyad differences in a single 5-minute interaction, although they reported a stronger link between motion synchrony and rapport in neurotypical than other dyads [92]. In another study using a collaborative joint-action task, autistic children showed less benefit from peer assistance and were less likely to synchronise their movements compared to neurotypical children, even though they demonstrated greater stability in solo tasks, suggesting differences in inter-personal coordination rather than motor skills [93]. On the other hand, Glass and Yuill [94] reported that while there were group differences in overall amount of motion, autistic children showed equal or even greater motor synchrony compared to neurotypical peers.

An alternative and innovative approach was taken by Ward et al. [95], who investigated motor synchrony in autistic children and professional actors during an interactive theatrical play using wearable sensors. They captured motor coupling that might be missed by human observers. While they do not point to a particular pattern or type of social behaviour and do not compare synchrony between neurotypes, their approach offers promising possibilities for future naturalistic research.

In the context of communication alignment, the only study including autistic interactions found that autistic dyads were less likely to align non-verbal signals with

recent communicative history compared to mixed or neurotypical dyads, indicating reduced non-verbal synchrony [96]. Additionally, in mixed-neurotype interactions, autistic children produced fewer contingent utterances and more monologue-like speech, indicating decreased reciprocity [48]. Together, these studies suggest that autistic individuals may be less adaptive to their communication partner in dynamic exchanges.

Finally, oscillatory neural synchrony arises from continuous adaptation of the interacting partners' behaviours [97]. While it is crucial to explore the neural correlates of interpersonal synchrony in autistic communication, no hyperscanning studies have yet focused on autistic dyads. Existing hyperscanning research suggests decreased neural synchrony in mixed-neurotype dyads. For instance, autistic adults show less neural synchrony with a neurotypical confederate than their neurotypical peers [98], which is related to atypical eye contact [99,100] and greater social difficulties [101]. However, Peng et al. [53] reported enhanced neural synchronisation (and self-reported interaction outcomes) in dyads with high autistic traits during a semi-structured conversational task, compared to dyads with low autistic traits and mixed dyads.

4. Intrapersonal social interaction characteristics

In the following, we describe intrapersonal social behaviours as reported in studies including interaction between autistic and/or neurotypical people. However, we encourage the reader to explore existing autism literature investigating similar characteristics in single-person designs, e.g., prosody [102], emotion recognition [33,103], and motor skills [104].

4.1. Facial expressiveness

Facial expressiveness –referring to variations in dynamic facial behaviour, with more expressive individuals generally being perceived as more agreeable and well-liked in social interactions [105] – may be an important factor in autism. Some studies find greater variance in facial expressions in autistic compared to neurotypical individuals [106], while others suggest autistic minds are harder to read [107–109], possibly due to lower expressiveness [107]. However, results are mixed as to whether autistic people are [110] or are not [109] less expressive. Nevertheless, neurotypical raters tend to perceive autistic expressions as less natural and more atypical [18,111,112], which leads them to assign less favourable social ratings [107].

4.2. Kinematics

Motor behaviours may differ between autistic and neurotypical individuals in low-level kinematics, potentially influencing higher-level social behaviours like social motor synchrony. Evidence shows autistic individuals exhibit atypical movement patterns in production and imitation, which may be mediated by motor execution as well as social motivation, action representation, and executive function [113]. For instance, Zhao et al. [114] found group differences in autistic and neurotypical children's head movements across all three axes, while Edey et al. [108] observed kinematic

differences in videos of autistic and neurotypical adults directing geometric shapes to generate animations.

4.3.Prosody

Prosody refers to the rhythm, intonation (melody), and flow of speech, including pauses [115]. It plays a key role in expressing emotions and intentions, clarifying grammatical structure and sentence meaning, and managing discourse with others. For example, speakers modulate pitch to signal sentence structure (e.g., raising pitch in questions) and conversational cues (e.g., falling pitch at the end of a turn and rising pitch at the beginning of a turn). A recent review by Grice et al. [115] analyses both the perception and production of prosody in autism across development. However, to our knowledge, studies involving autistic dyads have so far focused only on production.

Autistic intonation is often described as either "robotic" and "monotonous" (little pitch variation) or "melodic" and "singsongy" (greater variation) [115], with empirical studies supporting the latter and highlighting individual differences [57,116]. Further, Wehrle [57] found no prosodic differences in turn transitions between autistic and neurotypical dyads. In another study with a simulated interaction task ("conversing" with an actress in a pre-recorded video), autistic participants showed a higher mean pitch and lower harmony-noise-ratio than the neurotypical group [117]. Though social outcomes could not be measured in that study, these basic prosodic differences should be explored in relation to interaction characteristics in the future.

Filled pauses are hesitations in speech, such as 'uhm' or 'uh', which serve to maintain the current turn in conversation. Unlike backchannels, filled pauses are produced by the speaker, not the listener, and can occur in a single speaker's speech. While high rates of filled pauses may be viewed negatively in public speaking, they can facilitate understanding and the flow of everyday conversation [57].

Research on filled pauses in autism is limited, with only one study including autistic dyads. Wehrle, Grice, et al. [118] found no differences in frequency or choice of filled pauses between autistic and neurotypical dyads, though autistic individuals showed more atypical intonation (greater pitch variation) and larger differences between interlocutors in a dyad. This could reflect higher heterogeneity in the autistic population or less adaptation to the partner.

Studies on mixed dyad interactions, including only one on adults, generally show that autistic individuals produce fewer filled pauses than neurotypical peers. Adults use fewer 'uhm' and 'uh' [119], while children and adolescents produce fewer 'uhm' [120–125]. One study found no differences [126]. It should also be noted that most focused on structured interactions (e.g., ADOS interview) or monologic speech, indicating a need for data from natural, unstructured conversations.

Silent pauses, or moments of no speech within a speaker's turn, are common. The only study of silent pauses from autistic vs. neurotypical conversations found that autistic dyads produced more long silent pauses (i.e., longer than 700 ms or 2s, in two analyses) than neurotypical dyads [57,127]. This group difference disappeared when analysing any length of silent pause. Studies not including autistic dyads produced

mixed results: autism was linked to fewer silent pauses in children when narrating a book [128], but similar amount or more silent pauses in adults in a sentence repetition task and in an interview-like conversations, respectively [119,129]. Overall, it seems likely that autistic people produce more silent pauses than neurotypicals, but this should interpreted with caution given the small amount of previous work and considerable methodological differences among them (see [57] for a discussion).

5. Social interaction outcomes

To understand how social behaviours influence interactions, it is necessary to link them to interaction outcomes. However, there is no unified definition of what constitutes a 'good' interaction [34], and the success in conversation depends on individual, often multiple, goals [130]. It is also unclear whether autistic and neurotypical individuals perceive interactions and their outcomes similarly. For instance, while both neurotypes rate interactions with autistic partners as more awkward, autistic raters are more willing to interact again [17], suggesting differing perceptions of success. Some studies use self-ratings of satisfaction, rapport, or willingness to interact again, while others assess objective outcomes like information transfer [131] or task performance [132,132,133]. Some studies, however, do not measure success directly and instead conceptualise social behaviours as interaction outcomes. This can lead to the assumption that deviations from neurotypical norms in behaviour imply unsuccessful interactions. For example, if increased eye contact enhances rapport in neurotypical dyads but not in autistic dyads, focusing on mutual gaze may mislead us into thinking autistic interactions are less successful, despite similar rapport ratings across groups [52].

Rapport is a commonly used social interaction outcome, but results are inconsistent (see Table 1). Some studies report higher rapport in same-neurotype than mixed dyads [52,131], while others find higher rapport in neurotypical than autistic dyads [133], or no differences between dyad types [134,135]. Self- and observer-ratings can also diverge: in one study, mixed dyads were rated lower by participants but higher by observers [136].

Some studies additionally assessed objective outcomes. Crompton and colleagues found that self-rated rapport and task success (information transfer) were higher in same-neurotype dyads than mixed dyads [131], but in a well-powered replication of this study, they found no differences between dyad types in information transfer, and rapport was higher in neurotypical than autistic and/or mixed dyads [135]. On the other hand, Oates et al. [133], who used a different task and objective measures (drawing accuracy, speed, and communication clarity), found lower self-rated rapport in autistic dyads, but no clear link to task performance. In fact, mixed dyads completed the task faster, and all dyads were similar in clarity, suggesting no consistent relationship between subjective and objective measures.

Other factors may shape these outcomes. In a four-person group study [137], autistic participants rated rapport highest in all-autistic groups, but ratings declined with more neurotypical peers. Neurotypical participants' ratings were stable, suggesting they may face fewer relational barriers (see also [132]). Perceived group composition may

have influenced responses [39]: neurotypicals might have become or tried to appear more tolerant, while autistic participants might have felt more accepted in all-autistic groups, boosting rapport ratings.

Finally, Morrison et al. [17] assessed interaction quality along broader socio-communicative impressions. Both groups rated autistic partners as more awkward and less warm, though competence ratings (intelligence, quality of conversation) were similar. Also, autistic participants disclosed more and felt closer in same-neurotype dyads, and only neurotypical participants preferred future interactions within their own neurotype. Although socio-communicative mechanisms behind social interaction outcomes are rarely investigated [17,131,137], it should be an important focus in future studies.

Qualitative and observational coding approaches provide a middle ground between behavioural measures and social interaction outcomes. Through a qualitative linguistic analysis, Williams et al. [138] found that autistic conversations showed greater flow, rapport, and intersubjective attunement than those of mix-neurotype dyads, whether familiar or unfamiliar. Crucially, participants were paired multiple times with different partners, revealing that some autistic individuals showed markedly higher communicative competence with autistic than neurotypical partners. This highlights the relational nature of social differences in autism.

In contrast, studies coding autistic children's and adolescents' free interactions found greater participation and friendship quality in mixed dyads than autistic-only dyads [74,139]. However, the children were not asked to evaluate their own interactions, and the behavioural coders−presumably neurotypical−had significant interpretative flexibility. For example, 'expressing enjoyment while playing' can take different forms in autistic and neurotypical children. A neurotypical perspective may therefore favour behaviours more typical of mixed dyads.

6. Cognitive, affective, and other mechanisms underlying autistic social difficulties

Beyond social behaviours, cognitive, affective, and contextual factors shape social interactions. For instance, cognitive biases like rejection sensitivity can lead to negative perceptions of interactions [140]. This is common in social anxiety [141], which frequently co-occurs with autism [142]. Emotion regulation also plays a role; better regulation enhances wellbeing and social functioning [143], while emotion dysregulation, common in autism [144], may impact interactions. Also, interacting with those sharing one's neurotype fosters a sense of connectedness to the community. This connectedness has significant benefits for autistic individuals, from increased self-esteem to generally increased wellbeing [145]. Knowing a partner is also autistic may reduce rejection anxiety and enhance perceived rapport [137]. Yet, despite their importance, few studies control for such cognitive/affective factors in autistic dyads.

One study examined Theory of Mind use in free conversations, finding that while both autistic and neurotypical youth referenced mental states of the partners, autistic individuals violated (neurotypical) conversational norms more often [134]. However, self-rated rapport did not differ across dyad types, nor did it correlate with conversational Theory of Mind skills. Another study tested whether social difficulties stem from deficits in internal action modelling [146]. Autistic dyads showing weaker predictive coordination in a motor task, supporting this hypothesis. Finally, a study on social cognition, skills, and motivation found these factors minimally predictive of actual interaction outcomes in both autistic and neurotypical adults [34]. This challenges the common assumption that deficits in these areas are primary drivers of social difficulties in autism. Instead, other factors (perhaps among the reviewed here social behaviours) may play a more significant role in influencing social interactions.

7. Discussion and conclusions

We reviewed studies examining social behaviours and interaction outcomes in autistic, neurotypical, and mixed dyads to characterise social interaction styles in autism. Most research focuses on interpersonal dynamics across verbal and non-verbal domains, highlighting how autistic and neurotypical interactions differ in social coordination and expressive behaviours.

Although research on autistic interactions is still emerging, certain behavioural differences are evident. Autistic dyads generally show less mutual gaze, backchanneling, and reciprocal smiling and laughter than neurotypical ones, aligning with findings that neurotypical negative evaluations of autistic people are more influenced by non-verbal than verbal behaviours [18,147]. In contrast, turn-taking appears similar across all dyad types. Other behaviours show mixed results; for instance, while social motor synchrony is lower in mixed dyads than same-neurotype dyads, it remains unclear whether autistic and neurotypical dyads differ in this aspect.

The literature remains diverse in the social behaviours studied (e.g., mutual gaze), interaction types (e.g., free conversation vs. goal-directed tasks), and social outcomes measured (e.g., rapport, willingness to interact again) [30]. Few studies account for individual traits such as emotion regulation, cognitive biases, or empathy, which are known to differ between autistic and neurotypical individuals, and which can potentially influence results. We discuss these findings in the context of relational versus individual social difficulties in autism, considering sample variability and study design differences.

7.1. Relational vs individual social difficulties in autism

A central question is whether social difficulties in autism stem primarily from individual, autism-related social deficits (as proposed by the clinical model), relational challenges arising from neurotype mismatches (as suggested by DEP/DMH), or a combination of both. As summarised in Table 1, the clearest support for relational difficulties ("better" autistic than cross-neurotype interactions – but please see a discussion of what makes an interaction "better" in section 5: Social interaction outcomes) comes from self-reported interaction outcomes. Conversely, studies

comparing social behaviours in autistic and cross-neurotype interactions mostly find no differences. The clearest differences between autistic and neurotypical interactions in this review relate to interpersonal behaviours, such as mutual gaze, backchanneling, and reciprocal smiling and laughter. Finally, some studies relating social behaviours to interaction outcomes suggest that autistic and neurotypical individuals may rely on different social cues in building rapport and other interaction outcomes.

In the broader autism literature, one line of evidence for relational difficulties comes from studies showing that interactions between autistic individuals are often more successful than mixed-neurotype interactions. For example, in line with numerous first-person accounts [27,148–150], same-neurotype dyads tend to report higher rapport and greater willingness to interact again compared to cross-neurotype dyads [17,52,73,131,136,137,151]. Similarly, both autistic and neurotypical students prefer friendships with peers of their own neurotype, and this matching predicts relationship strength better than popularity or neurotype alone [151,152]. Similarly, matching level of autistic traits in the general population predicts positive social outcomes and friendship [153–155].

Further evidence for relational difficulties comes from studies showing that neurotypical individuals also contribute to communication breakdowns with autistic partners. They tend to blame autistics more than themselves for misunderstandings and rate them as more egocentric [156], undervalue autistic people's social competence [157], overestimate how helpful they themselves are [158], struggle to interpret autistic facial expressions [159], behaviours [109], and mental states [108], and have problems "reading" autistic peers leading to less favourable social ratings [18,107–109]. These biases lead to the rapid formation of negative impressions, reducing willingness to engage with autistic individuals [16–18] and increasing their risk of social isolation and loneliness, connected to poor mental health [160–162].

However, some evidence suggests that autistic individuals face social challenges even in the absence of neurotype mismatches. For example, autistic individuals may struggle to anticipate their partners' actions, regardless of neurotype [146] and they tend to evaluate less favourably other autistic people than neurotypicals [17]. Autistic children show less inclination to interact with autistic than neurotypical peers [74]. Finally, difficulties in peer interactions among autistic children and adolescents have been observed even when controlling for their level of social and emotional symptoms [163].

Together, the literature provides evidence for *both* individual and relational social challenges in autism. Autism may involve inherent social alterations, as suggested by the clinical model. Alternatively, both neurotypes may be equally adept at interacting with those who share their social style, but heterogeneity in autism can still cause mismatches. For example, idiosyncratic social behaviours often observed in autistic individuals —such as differences in facial expressions [159]—can increase the likelihood of mismatched interaction styles, even within the autistic community. From this perspective, social challenges in autism are largely relational but affect both same- and cross-neurotype interactions. Ultimately, it may be simply too early to draw definitive

conclusions given the diversity of measurements, tasks, and sample characteristics in current research.

7.2. Individual differences in social behaviours

None of the measurements reported here, including those showing robust group effects (e.g., backchanneling), clearly differentiate between autistic and neurotypical individuals. For example, Wehrle [57] found that while all autistic dyads in his corpus differed from the average neurotypical dyad, the differences were spread across various parameters. Notably, reducing the social difficulties autistic individuals face to group-level neurotype differences risks "behaviourising rather than humanising" them, i.e., saying that autistic people behave in a certain way "*because* of their autism", which undermines their agency and disregards the individual motivations [29]. Similarly, applying neurotypical standards to autistic needs can be misleading and potentially harmful. For example, some autistic people may prefer less frequent social contact than the average neurotypical person, but this reduced social motivation does not diminish their humanity. This underscores the need for individual- or dyad-level investigations. For example, Wood et al. [164] found that laughter in interactions depends more on an individual's tendency to laugh than their partner's behaviour, underscoring the importance of individual-level factors. Yet, only one study using a dyadic design for autistic interactions included multiple interactions per participant allowing to model individual tendencies [138]. Such designs would also allow to investigate how individual behaviours of each neurotype changes depending on interactions in same or mixed dyads. Also, mixed-methods approaches combining qualitative and quantitative measures, yield valuable insights [26].

7.3. Sample characteristics and design aspects

Most reviewed studies focused on interactions between verbally communicative autistic individuals with typical intelligence and no learning disabilities who are mostly English-speaking. Expanding research to other languages and including individuals who communicate in different ways (for example, with aided Augmentative and Alternative Communication; AAC), and who have varying support needs is crucial for a broader understanding of autism. However, autistic individuals with fewer support needs are more likely to be held to neurotypical standards, leading to negative social judgments. While neurotypicals tend to form more positive judgments when they are informed their partner is autistic [16], such improvement in ratings occurs *regardless* of whether the person is actually autistic [39]. This raises the question of whether knowing the diagnosis status promotes genuine tolerance or just inflates reported first impressions, making it a potential confounding factor. Many of the reviewed here studies considered this, with two specifically testing it [92,135] (see Supplementary Material).

Another key consideration is autistic masking (or camouflaging), the suppression of natural autistic behaviours to appear more "neurotypical". While masking influences social interactions, few studies account for it [148], and none have explored its impact in same vs. cross-neurotype dyads. Although the role of camouflaging in social interactions is a complex, context- and individual-dependent phenomenon, we

encourage future studies to, as a minimum, statistically control for quantifiable camouflaging behaviours (e.g., using the Camouflaging Autistic Traits Questionnaire [165]).

DMH suggests that differences in interaction styles between autistic and neurotypical individuals may grow over time, emphasising the developmental perspective [27]. While the reviewed studies included children, adolescents, and adults (see Supplementary Material), no clear age differences in social difficulties emerged. At the same time, some studies highlight short-term changes, reporting increased behavioural alignment over the course of a an interaction, although at a slower rate in autistic dyads [57,61,68], or increased preference for same-neurotype peer interactions over months [151].

Given neurotypical biases against autistics, observer neurotype is crucial in behavioural coding studies (see Supplementary Material for information on coders' neurotype in the reviewed studies). While most use neurotypical raters [16,107,109], observer characteristics may influence ratings more than the behaviours themselves [16]. Studies with autistic raters explore shared social judgements (higher rapport ratings for autistic dyads [136], lower naturalness ratings for autistic individuals [112]) and differences in perceived interaction outcomes (while autistic actors received lower ratings overall, autistic raters were more willing to engage with them in the future [166]). Notably, the observation that *both* neurotypes rate autistic individuals less favourably challenges the common assumption that autistic individuals are less sensitive to social cues.

In terms of study design, there are considerable differences in the nature of the interaction task used in the published studies, from free [92] or semi-structured conversations [91], through goal-oriented conversational exchanges [57], to monologic highly structured verbal tasks [131,135]or non-verbal collaborations [96]. This methodological heterogeneity limits the comparability of studies.

Finally, most studies label comparison groups as "neurotypical" or "typically developing" based solely on the absence of an autism diagnosis, often via self-report. However, neurodivergence extends beyond autism, so "non-autistic" should not be equated with "neurotypical." We encourage future studies to screen for other forms of neurodivergence and caution readers to interpret findings with this limitation in mind.

7.4. The importance of the autistic perspective

While a behaviour may serve a specific function in neurotypical interactions, its reduced expression in autistic individuals doesn't necessarily lead to poorer social outcomes. For example, frequent mutual gaze is associated with higher rapport in neurotypical dyads but not in mixed or autistic dyads [52]. Similarly, social motion synchrony carries less social meaning in autistic interactions [92,167], and although both neurotypes rate autistics less favourably, only other autistic individuals are more willing to engage with them in the future [17,166]. These examples highlight that the same behaviour can have different functions or interpretations across neurotypes, suggesting that autistic social outcomes are less reliant on behaviours that drive

neurotypical judgments. This could indicate that neurodivergent intersubjectivity is less dependent on rigid social norms and more on shared understanding with less demand for coordination [26]. Alternatively, autistic outcomes may depend on behaviours not typically measured in neurotypical interactions.

Thus, deeming either autistic or neurotypical behaviours as 'correct' would unjustly empower one group over the other based on factors like majority status or stigma/ableism. Instead, we must investigate social interaction differences and their underlying motivators. For instance, reduced backchanneling in autistic individuals may be perceived as lack of interest by neurotypical interactants, but it may instead reflect a strategy to minimize distractions or a distinct communication style with a preference for explicitness [57]. It is essential to identify which behaviours best predict social interaction outcomes for both neurotypes and prioritise these in future research.

7.5. Outlook for facilitating cross-neurotype communication

To improve cross-neurotype interactions, we must understand the different social styles, including behaviours and underlying skills (social cognition, affect, and motivation). While interventions often aim to make autistic individuals behave/seem more 'neurotypical' [168], this often does not translate to social success in the real-world [10,11]. Communication improvements should involve both perspectives, not limiting the burden to the neurodivergent [29]. Some evidence suggests that it may be more effective to target the social skills of the neurotypical, not autistic people, to improve cross-neurotype interactions [34]. For example, neurotypicals who are better able to infer the mental states of autistic people tend to evaluate them more favourably [34,39,107]. In that vein, one cognitive behavioural therapy manual [169] aims to support autistic individuals in guiding their communication partners through: 1) defining personal goals and success, 2) disclosing communication preferences (e.g., 'I may not maintain eye contact, but this doesn't indicate disinterest'), and 3) providing specific guidance (e.g., 'Please verbalise emotions instead of relying on facial cues').

8. Conclusions

The traditional, clinical view of autism has focused on deficits, particularly in socio-communicative areas. However, evolving perspectives driven by the neurodiversity movement and greater inclusion of autistic voices are reshaping this understanding. Evidence now emerges that suggests that social difficulties in autism may at least partially arise from mismatches in interaction styles between autistic and neurotypical individuals. This review analysed studies comparing autistic dyads with neurotypical or mixed dyads, revealing both similarities (e.g., general turn-taking) and differences in social behaviours (e.g., reduced mutual gaze and backchanneling in autistic interactions). To advance the understanding of the different social interaction styles, research needs to consider both same- and mixed-neurotype dyads and incorporate subjective evaluations from both neurotypical and autistic perspectives. We encourage researchers to move beyond neurotypical-centric views by engaging directly with the autism community, ideally through participatory research or, at the

very least, by discussing findings with autistic representatives to ensure a more nuanced and inclusive understanding of social interactions.

Authorship contribution statement:

M.M. - conceptualisation, methodology, visualisation, funding acquisition, writing—original draft, writing—review and editing, I.D., A.H., T.W. – methodology, writing—review and editing, supervision.

Bibliography:

1. Kenny L, Hattersley C, Molins B, Buckley C, Povey C, Pellicano E. Which terms should be used to describe autism? Perspectives from the UK autism community. *Autism Int J Res Pract*. 2016;20(4):442-462. doi:10.1177/1362361315588200
2. Gernsbacher MA. Editorial Perspective: The use of person-first language in scholarly writing may accentuate stigma. *J Child Psychol Psychiatry*. 2017;58(7):859-861. doi:10.1111/jcpp.12706
3. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (5th Ed.).*; 2013. doi:https://doi.org/10.1176/appi.books.9780890425596
4. Baron-Cohen S, Leslie AM, Frith U. Does the autistic child have a "theory of mind"? *Cognition*. 1985;21(1):37-46. doi:10.1016/0010-0277(85)90022-8
5. Chevallier C, Kohls G, Troiani V, Brodkin ES, Schultz RT. The social motivation theory of autism. *Trends Cogn Sci*. 2012;16(4):231-239. doi:10.1016/j.tics.2012.02.007
6. Cole GG, Millett AC. The closing of the theory of mind: A critique of perspective-taking. *Psychon Bull Rev*. 2019;26(6):1787-1802. doi:10.3758/s13423-019-01657-y
7. Gernsbacher MA, Yergeau M. Empirical failures of the claim that autistic people lack a theory of mind. *Arch Sci Psychol*. 2019;7(1):102-118. doi:10.1037/arc0000067
8. Jaswal VK, Akhtar N. Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism. *Behav Brain Sci*. 2019;42:e82. doi:10.1017/S0140525X18001826
9. AutAngel. Constellation Model. https://www.autangel.org.uk/resources/
10. Bottema-Beutel K, Kim SY, Crowley S. A systematic review and meta-regression analysis of social functioning correlates in autism and typical development. *Autism Res Off J Int Soc Autism Res*. 2019;12(2):152-175. doi:10.1002/aur.2055
11. Sasson NJ, Morrison KE, Kelsven S, Pinkham AE. Social cognition as a predictor of functional and social skills in autistic adults without intellectual disability. *Autism Res*. 2020;13(2):259-270. doi:10.1002/aur.2195
12. Cresswell L, Hinch R, Cage E. The experiences of peer relationships amongst autistic adolescents: A systematic review of the qualitative evidence. *Res Autism Spectr Disord*. 2019;61:45-60. doi:10.1016/j.rasd.2019.01.003
13. Zeidan J, Fombonne E, Scorah J, et al. Global prevalence of autism: A systematic review update. *Autism Res*. 2022;15(5):778-790. doi:10.1002/aur.2696
14. Foster S, Jones DR, Pinkham AE, Sasson NJ. Facial Affect Differences in Autistic and Non-Autistic Adults Across Contexts and Their Relationship to First-Impression Formation. *Autism Adulthood*. Published online April 30, 2024. doi:10.1089/aut.2023.0199
15. Grossman RB, Mertens J, Zane E. Perceptions of self and other: Social judgments and gaze patterns to videos of adolescents with and without autism spectrum disorder. *Autism*. 2019;23(4):846-857. doi:10.1177/1362361318788071

16. Morrison KE, DeBrabander KM, Faso DJ, Sasson NJ. Variability in first impressions of autistic adults made by neurotypical raters is driven more by characteristics of the rater than by characteristics of autistic adults. *Autism*. 2019;23(7):1817-1829. doi:10.1177/1362361318824104
17. Morrison KE, DeBrabander KM, Jones DR, Faso DJ, Ackerman RA, Sasson NJ. Outcomes of real-world social interaction for autistic adults paired with autistic compared to typically developing partners. *Autism*. 2020;24(5):1067-1080. doi:10.1177/1362361319892701
18. Sasson NJ, Faso DJ, Nugent J, Lovell S, Kennedy DP, Grossman RB. Neurotypical Peers are Less Willing to Interact with Those with Autism based on Thin Slice Judgments. *Sci Rep*. 2017;7(1):40700. doi:10.1038/srep40700
19. Cox C, Fusaroli R, Nielsen Y, et al. Social Context Matters for Turn-Taking Dynamics: A Comparative Study of Autistic and Typically Developing Children. Published online November 6, 2024. doi:10.31234/osf.io/zw3hj_v1
20. Ivanov M, Werner PD. Behavioral communication: Individual differences in communication style. *Personal Individ Differ*. 2010;49(1):19-23. doi:10.1016/j.paid.2010.02.033
21. Guha T, Yang Z, Grossman RB, Narayanan SS. A Computational Study of Expressive Facial Dynamics in Children with Autism. *IEEE Trans Affect Comput*. 2018;9(1):14-20. doi:10.1109/TAFFC.2016.2578316
22. de Marchena A, Eigsti IM. Conversational gestures in autism spectrum disorders: Asynchrony but not decreased frequency. *Autism Res*. 2010;3(6):311-322. doi:10.1002/aur.159
23. Wing L, Gould J. Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *J Autism Dev Disord*. 1979;9(1):11-29. doi:10.1007/BF01531288
24. Scheeren AM, Koot HM, Begeer S. Social Interaction Style of Children and Adolescents with High-Functioning Autism Spectrum Disorder. *J Autism Dev Disord*. 2012;42(10):2046-2055. doi:10.1007/s10803-012-1451-x
25. Scheeren AM, Koot HM, Begeer S. Stability and change in social interaction style of children with autism spectrum disorder: A 4-year follow-up study. *Autism Res*. 2020;13(1):74-81. doi:10.1002/aur.2201
26. Heasman B, Gillespie A. Neurodivergent intersubjectivity: Distinctive features of how autistic people create shared understanding. *Autism*. 2019;23(4):910-921. doi:10.1177/1362361318785172
27. Davis R, Crompton CJ. What Do New Findings About Social Interaction in Autistic Adults Mean for Neurodevelopmental Research? *Perspect Psychol Sci*. 2021;16(3):649-653. doi:10.1177/1745691620958010
28. Milton DEM. On the ontological status of autism: the 'double empathy problem.' *Disabil Soc*. 2012;27(6):883-887. doi:10.1080/09687599.2012.710008
29. Hillary A. Neurodiversity and cross-cultural communication. In: *Neurodiversity Studies*. Routledge; 2020.
30. Livingston LA, Hargitai LD, Shah P. The double empathy problem: A derivation chain analysis and cautionary note. *Psychol Rev*. Published online June 3, 2024. doi:10.1037/rev0000468
31. Bolis D, Balsters J, Wenderoth N, Becchio C, Schilbach L. Beyond Autism: Introducing the Dialectical Misattunement Hypothesis and a Bayesian Account of Intersubjectivity. *Psychopathology*. 2017;50(6):355-372. doi:10.1159/000484353
32. Mathersul D, McDonald S, Rushby JA. Understanding advanced theory of mind and empathy in high-functioning adults with autism spectrum disorder. *J Clin Exp Neuropsychol*. 2013;35(6):655-668. doi:10.1080/13803395.2013.809700

33. Uljarevic M, Hamilton A. Recognition of Emotions in Autism: A Formal Meta-Analysis. *J Autism Dev Disord*. 2013;43(7):1517-1526. doi:10.1007/s10803-012-1695-5
34. Morrison KE, DeBrabander KM, Jones DR, Ackerman RA, Sasson NJ. Social Cognition, Social Skill, and Social Motivation Minimally Predict Social Interaction Outcomes for Autistic and Non-Autistic Adults. *Front Psychol*. 2020;11. Accessed July 12, 2022. https://www.frontiersin.org/articles/10.3389/fpsyg.2020.591100
35. De Jaegher H. Embodiment and sense-making in autism. *Front Integr Neurosci*. 2013;7. doi:10.3389/fnint.2013.00015
36. Bottema-Beutel K. Glimpses into the blind spot: Social interaction and autism. *J Commun Disord*. 2017;68:24-34. doi:10.1016/j.jcomdis.2017.06.008
37. Usher LV, Burrows CA, Schwartz CB, Henderson HA. Social competence with an unfamiliar peer in children and adolescents with high functioning autism: Measurement and individual differences. *Res Autism Spectr Disord*. 2015;17:25-39. doi:10.1016/j.rasd.2015.05.005
38. DeBrabander KM, Morrison KE, Jones DR, Faso DJ, Chmielewski M, Sasson NJ. Do First Impressions of Autistic Adults Differ Between Autistic and Nonautistic Observers? *Autism Adulthood*. 2019;1(4):250-257. doi:10.1089/aut.2019.0018
39. Sasson NJ, Morrison KE. First impressions of adults with autism improve with diagnostic disclosure and increased autism knowledge of peers. *Autism Int J Res Pract*. 2019;23(1):50-59. doi:10.1177/1362361317729526
40. Baumeister RF. Writing a Literature Review. In: Prinstein MJ, ed. *The Portable Mentor: Expert Guide to a Successful Career in Psychology*. Springer; 2013:119-132. doi:10.1007/978-1-4614-3994-3_8
41. Baumeister RF, Leary MR. Writing Narrative Literature Reviews. *Rev Gen Psychol*. 1997;1(3):311-320. doi:10.1037/1089-2680.1.3.311
42. Green BN, Johnson CD, Adams A. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *J Chiropr Med*. 2006;5(3):101-117. doi:10.1016/S0899-3467(07)60142-6
43. Siddaway AP, Wood AM, Hedges LV. How to Do a Systematic Review: A Best Practice Guide for Conducting and Reporting Narrative Reviews, Meta-Analyses, and Meta-Syntheses. *Annu Rev Psychol*. 2019;70(Volume 70, 2019):747-770. doi:10.1146/annurev-psych-010418-102803
44. Bloch C, Vogeley K, Georgescu AL, Falter-Wagner CM. INTRApersonal Synchrony as Constituent of INTERpersonal Synchrony and Its Relevance for Autism Spectrum Disorder. *Front Robot AI*. 2019;6. Accessed March 4, 2024. https://www.frontiersin.org/articles/10.3389/frobt.2019.00073
45. Sasson NJ, Bottema-Beutel K. Studies of autistic traits in the general population are not studies of autism. *Autism*. Published online November 26, 2021:13623613211058515. doi:10.1177/13623613211058515
46. Hanley M, Riby DM, McCormack T, et al. Attention during social interaction in children with autism: Comparison to specific language impairment, typical development, and links to social cognition. *Res Autism Spectr Disord*. 2014;8(7):908-924. doi:10.1016/j.rasd.2014.03.020
47. Dawson G, Hill D, Spencer A, Galpert L, Watson L. Affective exchanges between young autistic children and their mothers. *J Abnorm Child Psychol*. 1990;18(3):335-345. doi:10.1007/BF00916569
48. Nadig A, Lee I, Singh L, Bosshart K, Ozonoff S. How does the topic of conversation affect verbal exchange and eye gaze? A comparison between typical development and high-functioning autism. *Neuropsychologia*. 2010;48(9):2730-2739. doi:10.1016/j.neuropsychologia.2010.05.020

49. Ho S, Foulsham T, Kingstone A. Speaking and Listening with the Eyes: Gaze Signaling during Dyadic Interactions. Guo K, ed. *PLOS ONE*. 2015;10(8):e0136905. doi:10.1371/journal.pone.0136905
50. Cañigueral R, Hamilton AF de C. The Role of Eye Gaze During Natural Social Interactions in Typical and Autistic People. *Front Psychol*. 2019;10. doi:10.3389/fpsyg.2019.00560
51. Trevisan DA, Roberts N, Lin C, Birmingham E. How do adults and teens with self-declared Autism Spectrum Disorder experience eye contact? A qualitative analysis of first-hand accounts. *PLOS ONE*. 2017;12(11):e0188446. doi:10.1371/journal.pone.0188446
52. Rifai OM, Fletcher-Watson S, Jiménez-Sánchez L, Crompton CJ. Investigating Markers of Rapport in Autistic and Nonautistic Interactions. *Autism Adulthood*. 2022;4(1). doi:10.1089/aut.2021.0017
53. Peng X, Li T, Liu G, Ni W, Yi L. Enhanced neural synchronization during social communications between dyads with high autistic traits. *Cereb Cortex*. 2024;34(13):104-111. doi:10.1093/cercor/bhae027
54. von dem Hagen EAH, Bright N. High autistic trait individuals do not modulate gaze behaviour in response to social presence but look away more when actively engaged in an interaction. *Autism Res*. 2017;10(2):359-368. doi:10.1002/aur.1666
55. Cooney G, Wheatley T. Conversation. In: *Handbook of Social Psychology*. 6th ed. E.Finkel, S. T. Fiske, D. T. Gilbert, & W. Mendes; (in press).
56. Sacks H, Schegloff EA, Jefferson G. A Simplest Systematics for the Organization of Turn Taking for Conversation*. In: Schenkein J, ed. *Studies in the Organization of Conversational Interaction*. Academic Press; 1978:7-55. doi:10.1016/B978-0-12-623550-0.50008-2
57. Wehrle S. *Conversation and Intonation in Autism*. Language Science Press; 2023. doi:10.5281/zenodo.10069004
58. Dingemanse M, Liesenfeld A. From text to talk: Harnessing conversational corpora for humane and diversity-aware language technology. In: Muresan S, Nakov P, Villavicencio A, eds. *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*. Association for Computational Linguistics; 2022:5614-5633. doi:10.18653/v1/2022.acl-long.385
59. Reece A, Cooney G, Bull P, et al. The CANDOR corpus: Insights from a large multimodal dataset of naturalistic conversation. *Sci Adv*. 2023;9(13):eadf3197. doi:10.1126/sciadv.adf3197
60. Templeton EM, Chang LJ, Reynolds EA, Cone LeBeaumont MD, Wheatley T. Fast response times signal social connection in conversation. *Proc Natl Acad Sci*. 2022;119(4):e2116915119. doi:10.1073/pnas.2116915119
61. Wehrle S, Cangemi F, Janz A, Vogeley K, Grice M. Turn-timing in conversations between autistic adults: Typical short-gap transitions are preferred, but not achieved instantly. *PLOS ONE*. 2023;18(4):e0284029. doi:10.1371/journal.pone.0284029
62. Feldstein S, Konstantareas M, Oxman J, Webster CD. The chronography of interactions with autistic speakers: An initial report. *J Commun Disord*. 1982;15(6):451-460. doi:10.1016/0021-9924(82)90018-1
63. Heeman P, Lunsford R, Selfridge E, Black L, van Santen J. Autism and Interactional Aspects of Dialogue. In: Katagiri Y, Nakano M, eds. *Proceedings of the SIGDIAL 2010 Conference*. Association for Computational Linguistics; 2010:249-252. Accessed May 28, 2024. https://aclanthology.org/W10-4346
64. Ochi K, Ono N, Owada K, et al. Quantification of speech and synchrony in the conversation of adults with autism spectrum disorder. *PLOS ONE*. 2019;14(12):e0225377. doi:10.1371/journal.pone.0225377

65. Warlaumont AS, Oller DK, Dale R, Richards JA, Gilkerson J, Xu D. Vocal Interaction Dynamics of Children With and Without Autism. *Proc Annu Meet Cogn Sci Soc*. 2010;32(32).
66. Warlaumont AS, Richards JA, Gilkerson J, Oller DK. A Social Feedback Loop for Speech Development and Its Reduction in Autism. *Psychol Sci*. 2014;25(7):1314-1324. doi:10.1177/0956797614531023
67. Li HZ. Backchannel Responses as Misleading Feedback in Intercultural Discourse. *J Intercult Commun Res*. 2006;35(2):99-116. doi:10.1080/17475750600909253
68. Wehrle S, Vogeley K, Grice M. Backchannels in conversations between autistic adults are less frequent and less diverse prosodically and lexically. *Lang Cogn*. 2023;1(26). doi:10.1017/langcog.2023.21
69. Yoshimura Y, Kawahara K, Kikuchi M. Turn-taking in Children with Autism Spectrum Disorder: Discussion regarding Ne and Backchannel Interjections. *Jpn Linguist*. 2020;26:3-11.
70. Wood A, Niedenthal P. Developing a social functional account of laughter. *Soc Personal Psychol Compass*. 2018;12(4):e12383. doi:10.1111/spc3.12383
71. Cheong JH, Molani Z, Sadhukha S, Chang LJ. Synchronized affect in shared experiences strengthens social connection. *Commun Biol*. 2023;6(1):1-14. doi:10.1038/s42003-023-05461-2
72. Golland Y, Mevorach D, Levit-Binnun N. Affiliative zygomatic synchrony in co-present strangers. *Sci Rep*. 2019;9(1):3120. doi:10.1038/s41598-019-40060-4
73. McNaughton KA, Moss A, Yarger HA, Redcay E. Smiling synchronization predicts interaction enjoyment in peer dyads of autistic and neurotypical youth. *Autism*. Published online March 18, 2024:13623613241238269. doi:10.1177/13623613241238269
74. Bauminger N, Shulman C, Agam G. Peer Interaction and Loneliness in High-Functioning Children with Autism. *J Autism Dev Disord*. 2003;33(5):489-507. doi:10.1023/A:1025827427901
75. Hudenko WJ, Stone W, Bachorowski JA. Laughter Differs in Children with Autism: An Acoustic Analysis of Laughs Produced by Children With and Without the Disorder. *J Autism Dev Disord*. 2009;39(10):1392-1400. doi:10.1007/s10803-009-0752-1
76. Reddy V, Williams E, Vaughan A. Sharing humour and laughter in autism and Down's syndrome. *Br J Psychol*. 2002;93(2):219-242. doi:10.1348/000712602162553
77. Zampella CJ, Bennetto L, Herrington JD. Computer Vision Analysis of Reduced Interpersonal Affect Coordination in Youth With Autism Spectrum Disorder. *Autism Res*. 2020;13(12):2133-2142. doi:10.1002/aur.2334
78. Sakamoto S, Nameta K, Kawasaki T, Yamashita K, Shimizu A. Polygraphic Evaluation of Laughing and Smiling in Schizophrenic and Depressive Patients. *Percept Mot Skills*. 1997;85(3_suppl):1291-1302. doi:10.2466/pms.1997.85.3f.1291
79. Lai MC, Kassee C, Besney R, et al. Prevalence of co-occurring mental health diagnoses in the autism population: a systematic review and meta-analysis. *Lancet Psychiatry*. 2019;6(10):819-829. doi:10.1016/S2215-0366(19)30289-5
80. Condon WS, Sander LW. Neonate Movement Is Synchronized with Adult Speech: Interactional Participation and Language Acquisition. *Science*. 1974;183(4120):99-101. doi:10.1126/science.183.4120.99
81. Mogan R, Fischer R, Bulbulia JA. To be in synchrony or not? A meta-analysis of synchrony's effects on behavior, perception, cognition and affect. *J Exp Soc Psychol*. 2017;72:13-20. doi:10.1016/j.jesp.2017.03.009

82. Vicaria IM, Dickens L. Meta-Analyses of the Intra- and Interpersonal Outcomes of Interpersonal Coordination. *J Nonverbal Behav*. 2016;40(4):335-361. doi:10.1007/s10919-016-0238-8
83. Carnevali L, Valori I, Mason G, Altoè G, Farroni T. Interpersonal motor synchrony in autism: a systematic review and meta-analysis. *Front Psychiatry*. 2024;15. doi:10.3389/fpsyt.2024.1355068
84. Glass D, Yuill N. Social motor synchrony in autism spectrum conditions: A systematic review. *Autism*. 2024;28(7):1638-1653. doi:10.1177/13623613231213295
85. McNaughton KA, Redcay E. Interpersonal Synchrony in Autism. *Curr Psychiatry Rep*. 2020;22(3):12. doi:10.1007/s11920-020-1135-8
86. Murat Baldwin M, Xiao Z, Murray A. Temporal Synchrony in Autism: a Systematic Review. *Rev J Autism Dev Disord*. 2022;9(4):596-617. doi:10.1007/s40489-021-00276-5
87. Fitzpatrick P, Frazier JA, Cochran DM, Mitchell T, Coleman C, Schmidt RC. Impairments of Social Motor Synchrony Evident in Autism Spectrum Disorder. *Front Psychol*. 2016;7. doi:10.3389/fpsyg.2016.01323
88. Fitzpatrick P, Romero V, Amaral JL, et al. Evaluating the importance of social motor synchronization and motor skill for understanding autism. *Autism Res*. 2017;10(10):1687-1699. doi:10.1002/aur.1808
89. Zadok E, Gordon I, Navon R, Rabin SJ, Golan O. Shifts in Behavioral Synchrony in Response to an Interaction Partner's Distress in Adolescents With and Without ASD. *J Autism Dev Disord*. 2022;52(10):4261-4273. doi:10.1007/s10803-021-05307-y
90. Glass D, Yuill N. Evidence of mutual non-verbal synchrony in learners with severe learning disability and autism, and their support workers: a motion energy analysis study. *Front Integr Neurosci*. 2024;18. doi:10.3389/fnint.2024.1353966
91. Georgescu AL, Koeroglu S, Hamilton AF de C, Vogeley K, Falter-Wagner CM, Tschacher W. Reduced nonverbal interpersonal synchrony in autism spectrum disorder independent of partner diagnosis: a motion energy study. *Mol Autism*. 2020;11(1):11. doi:10.1186/s13229-019-0305-1
92. Efthimiou TN, Wilks CE, Foster S, et al. Social motor synchrony and interactive rapport in autistic, non-autistic, and mixed-neurotype dyads. *Autism*. Published online February 24, 2025:13623613251319585. doi:10.1177/13623613251319585
93. Trevisan DA, Enns JT, Birmingham E, Iarocci G. Action coordination during a real-world task: Evidence from children with and without autism spectrum disorder. *Dev Psychopathol*. 2021;33(1):65-75. doi:10.1017/S0954579419001561
94. Glass D, Yuill N. Moving Together: Social Motor Synchrony in Autistic Peer Partners Depends on Partner and Activity Type. *J Autism Dev Disord*. Published online June 13, 2023. doi:10.1007/s10803-023-05917-8
95. Ward JA, Richardson D, Orgs G, Hunter K, Hamilton A. Sensing interpersonal synchrony between actors and autistic children in theatre using wrist-worn accelerometers. In: *Proceedings of the 2018 ACM International Symposium on Wearable Computers*. ACM; 2018:148-155. doi:10.1145/3267242.3267263
96. Wadge H, Brewer R, Bird G, Toni I, Stolk A. Communicative misalignment in Autism Spectrum Disorder. *Cortex*. 2019;115:15-26. doi:10.1016/j.cortex.2019.01.003
97. Hamilton AFDC. Hyperscanning: Beyond the Hype. *Neuron*. 2021;109(3):404-407. doi:10.1016/j.neuron.2020.11.008
98. Quiñones-Camacho LE, Fishburn FA, Belardi K, Williams DL, Huppert TJ, Perlman SB. Dysfunction in interpersonal neural synchronization as a mechanism for social impairment in autism spectrum disorder. *Autism Res Off J Int Soc Autism Res*. 2021;14(8):1585-1596. doi:10.1002/aur.2513

99. Hirsch J, Zhang X, Noah JA, et al. Neural correlates of eye contact and social function in autism spectrum disorder. *PLOS ONE*. 2022;17(11):e0265798. doi:10.1371/journal.pone.0265798
100. Tanabe HC, Kosaka H, Saito DN, et al. Hard to "tune in": neural mechanisms of live face-to-face interaction with high-functioning autistic spectrum disorder. *Front Hum Neurosci*. 2012;6. doi:10.3389/fnhum.2012.00268
101. Key AP, Yan Y, Metelko M, et al. Greater Social Competence Is Associated With Higher Interpersonal Neural Synchrony in Adolescents With Autism. *Front Hum Neurosci*. 2022;15. doi:10.3389/fnhum.2021.790085
102. McCann J, Peppé S. Prosody in autism spectrum disorders: a critical review. *Int J Lang Commun Disord*. 2003;38(4):325-350. doi:10.1080/1368282031000154204
103. Harms MB, Martin A, Wallace GL. Facial Emotion Recognition in Autism Spectrum Disorders: A Review of Behavioral and Neuroimaging Studies. *Neuropsychol Rev*. 2010;20(3):290-322. doi:10.1007/s11065-010-9138-6
104. Zampella CJ, Wang LAL, Haley M, Hutchinson AG, de Marchena A. Motor Skill Differences in Autism Spectrum Disorder: a Clinically Focused Review. *Curr Psychiatry Rep*. 2021;23(10):64. doi:10.1007/s11920-021-01280-6
105. Kavanagh E, Whitehouse J, Waller BM. Being facially expressive is socially advantageous. *Sci Rep*. 2024;14(1):12798. doi:10.1038/s41598-024-62902-6
106. Drimalla H, Baskow I, Behnia B, Roepke S, Dziobek I. Imitation and recognition of facial emotions in autism: a computer vision approach. *Mol Autism*. 2021;12(1):27. doi:10.1186/s13229-021-00430-0
107. Alkhaldi RS, Sheppard E, Mitchell P. Is There a Link Between Autistic People Being Perceived Unfavorably and Having a Mind That Is Difficult to Read? *J Autism Dev Disord*. 2019;49(10):3973-3982. doi:10.1007/s10803-019-04101-1
108. Edey R, Cook J, Brewer R, Johnson MH, Bird G, Press C. Interaction takes two: Typical adults exhibit mind-blindness towards those with autism spectrum disorder. *J Abnorm Psychol*. 2016;125(7):879-885. doi:10.1037/abn0000199
109. Sheppard E, Pillai D, Wong GTL, Ropar D, Mitchell P. How Easy is it to Read the Minds of People with Autism Spectrum Disorder? *J Autism Dev Disord*. 2016;46(4):1247-1254. doi:10.1007/s10803-015-2662-8
110. Stagg SD, Slavny R, Hand C, Cardoso A, Smith P. Does facial expressivity count? How typically developing children respond initially to children with autism. *Autism*. 2014;18(6):704-711. doi:10.1177/1362361313492392
111. Faso DJ, Sasson NJ, Pinkham AE. Evaluating Posed and Evoked Facial Expressions of Emotion from Adults with Autism Spectrum Disorder. *J Autism Dev Disord*. 2015;45(1):75-89. doi:10.1007/s10803-014-2194-7
112. Hubbard DJ, Faso DJ, Assmann PF, Sasson NJ. Production and perception of emotional prosody by adults with autism spectrum disorder. *Autism Res*. 2017;10(12):1991-2001. doi:10.1002/aur.1847
113. McWeeny S, Kolday A, Wodka EL, Mostofsky SH, Caffo BS, Ewen JB. Mechanisms of Altered Imitation in Autism Spectrum Disorders. *Autism Res*. n/a(n/a). doi:10.1002/aur.70046
114. Zhao Z, Zhu Z, Zhang X, et al. Atypical Head Movement during Face-to-Face Interaction in Children with Autism Spectrum Disorder. *Autism Res*. 2021;14(6):1197-1208. doi:10.1002/aur.2478
115. Grice M, Wehrle S, Krüger M, Spaniol M, Cangemi F, Vogeley K. Linguistic prosody in autism spectrum disorder—An overview. *Lang Linguist Compass*. 2023;17(5):e12498. doi:10.1111/lnc3.12498
116. Wehrle S, Cangemi F, Vogeley K, Grice M. *New Evidence for Melodic Speech in Autism Spectrum Disorder*.; 2022. doi:10.21437/SpeechProsody.2022-8

117. Drimalla H, Scheffer T, Landwehr N, et al. Towards the automatic detection of social biomarkers in autism spectrum disorder: introducing the simulated interaction task (SIT). *Npj Digit Med*. 2020;3(1):1-10. doi:10.1038/s41746-020-0227-5
118. Wehrle S, Grice M, Vogeley K. Filled Pauses Produced by Autistic Adults Differ in Prosodic Realisation, but not Rate or Lexical Type. *J Autism Dev Disord*. Published online May 3, 2023. doi:10.1007/s10803-023-06000-y
119. Lake JK, Humphreys KR, Cardy S. Listener vs. speaker-oriented aspects of speech: Studying the disfluencies of individuals with autism spectrum disorders. *Psychon Bull Rev*. 2011;18(1):135-140. doi:10.3758/s13423-010-0037-x
120. Gorman K, Olson L, Hill AP, Lunsford R, Heeman PA, van Santen JPH. Uh and um in children with autism spectrum disorders or language impairment. *Autism Res*. 2016;9(8):854-865. doi:10.1002/aur.1578
121. Irvine CA, Eigsti IM, Fein DA. Uh, Um, and Autism: Filler Disfluencies as Pragmatic Markers in Adolescents with Optimal Outcomes from Autism Spectrum Disorder. *J Autism Dev Disord*. 2016;46(3):1061-1070. doi:10.1007/s10803-015-2651-y
122. Jones R, Zane ER, Grossman RB. Like, it's important: The frequency and use of the discourse marker like in older autistic children. *Autism Dev Lang Impair*. 2022;7:23969415221129132. doi:10.1177/23969415221129132
123. Lunsford R, Heeman P, Black L, Santen J. Autism and the use of fillers: Differences between "um" and "uh." In: ; 2010:107-110.
124. McGregor KK, Hadden RR. Brief Report: "Um" Fillers Distinguish Children With and Without ASD. *J Autism Dev Disord*. 2020;50(5):1816-1821. doi:10.1007/s10803-018-3736-1
125. Parish-Morris J, Liberman MY, Cieri C, et al. Linguistic camouflage in girls with autism spectrum disorder. *Mol Autism*. 2017;8(1):48. doi:10.1186/s13229-017-0164-6
126. Suh J, Eigsti IM, Naigles L, Barton M, Kelley E, Fein D. Narrative Performance of Optimal Outcome Children and Adolescents with a History of an Autism Spectrum Disorder (ASD). *J Autism Dev Disord*. 2014;44(7):1681-1694. doi:10.1007/s10803-014-2042-9
127. Wehrle S, Vogeley K, Grice M. Characteristics and distribution of silent pauses in conversations between autistic and non-autistic dyads. In: Proceedings of the 20th International Congress of Phonetic Sciences. ICPhS.; 2023.
128. Thurber C, Tager-Flusberg H. Pauses in the narratives produced by autistic, mentally retarded, and normal children as an index of cognitive demand. *J Autism Dev Disord*. 1993;23(2):309-322. doi:10.1007/BF01046222
129. Engelhardt PE, Alfridijanta O, McMullon MEG, Corley M. Speaker-Versus Listener-Oriented Disfluency: A Re-examination of Arguments and Assumptions from Autism Spectrum Disorder. *J Autism Dev Disord*. 2017;47(9):2885-2898. doi:10.1007/s10803-017-3215-0
130. Yeomans M, Schweitzer ME, Brooks AW. The Conversational Circumplex: Identifying, prioritizing, and pursuing informational and relational motives in conversation. *Curr Opin Psychol*. 2022;44:293-302. doi:10.1016/j.copsyc.2021.10.001
131. Crompton CJ, Ropar D, Evans-Williams CV, Flynn EG, Fletcher-Watson S. Autistic peer-to-peer information transfer is highly effective. *Autism*. 2020;24(7):1704-1712. doi:10.1177/1362361320919286
132. Geelhand P, Papastamou F, Jaspard S, Kissine M. Autistic adults display different verbal behavior only in mixed-neurotype interactions: Evidence from a

referential communication task. *Autism*. Published online November 21, 2024:13623613241298376. doi:10.1177/13623613241298376
133. Oates M, Bean A, Kickbusch R, Sauer S. Extending Double Empathy: Effects of Neurotype-Matching on Communication Success in an Expository Context. *Am J Speech Lang Pathol*. 2024;1(14). doi:10.1044/2024_AJSLP-23-00393
134. Alkire D, McNaughton KA, Yarger HA, Shariq D, Redcay E. Theory of mind in naturalistic conversations between autistic and typically developing children and adolescents. *Autism*. 2023;27(2):472-488. doi:10.1177/13623613221103699
135. Crompton CJ, Foster SJ, Wilks CEH, et al. Information transfer within and between autistic and non-autistic people. *Nat Hum Behav*. Published online May 14, 2025:1-13. doi:10.1038/s41562-025-02163-z
136. Crompton CJ, Sharp M, Axbey H, Fletcher-Watson S, Flynn EG, Ropar D. Neurotype-Matching, but Not Being Autistic, Influences Self and Observer Ratings of Interpersonal Rapport. *Front Psychol*. 2020;11. Accessed June 28, 2022. https://www.frontiersin.org/article/10.3389/fpsyg.2020.586171
137. Foster S, Ackerman RA, Wilks C, et al. Rapport in Same and Mixed Neurotype Groups of Autistic and Non-autistic Adults. Published online July 9, 2024. doi:10.31219/osf.io/efvbc
138. Williams GL, Wharton T, Jagoe C. Mutual (Mis)understanding: Reframing Autistic Pragmatic "Impairments" Using Relevance Theory. *Front Psychol*. 2021;12. doi:10.3389/fpsyg.2021.616664
139. Bauminger N, Solomon M, Aviezer A, Heung K, Brown J, Rogers SJ. Friendship in High-functioning Children with Autism Spectrum Disorder: Mixed and Non-mixed Dyads. *J Autism Dev Disord*. 2008;38(7):1211-1229. doi:10.1007/s10803-007-0501-2
140. Downey G, Feldman SI. Implications of rejection sensitivity for intimate relationships. *J Pers Soc Psychol*. 1996;70(6):1327-1343. doi:10.1037/0022-3514.70.6.1327
141. Clark DM, Wells A. A cognitive model of social phobia. In: *Social Phobia: Diagnosis, Assessment, and Treatment*. The Guilford Press; 1995:69-93.
142. Spain D, Sin J, Linder KB, McMahon J, Happé F. Social anxiety in autism spectrum disorder: A systematic review. *Res Autism Spectr Disord*. 2018;52:51-68. doi:10.1016/J.RASD.2018.04.007
143. Gross JJ, John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *J Pers Soc Psychol*. 2003;85(2):348-362. doi:10.1037/0022-3514.85.2.348
144. Cai RY, Richdale AL, Uljarević M, Dissanayake C, Samson AC. Emotion regulation in autism spectrum disorder: Where we are and where we need to go. *Autism Res*. 2018;11(7):962-978. doi:10.1002/aur.1968
145. Botha M, Dibb B, Frost DM. 'It's being a part of a grand tradition, a grand counter-culture which involves communities': A qualitative investigation of autistic community connectedness. *Autism*. 2022;26(8):2151-2164. doi:10.1177/13623613221080248
146. Stoit AMB, van Schie HT, Riem M, et al. Internal model deficits impair joint action in children and adolescents with autism spectrum disorders. *Res Autism Spectr Disord*. 2011;5(4):1526-1537. doi:10.1016/j.rasd.2011.02.016
147. Grossman RB. Judgments of social awkwardness from brief exposure to children with and without high-functioning autism. *Autism*. 2015;19(5):580-587. doi:10.1177/1362361314536937
148. Crompton CJ, Hallett S, Ropar D, Flynn E, Fletcher-Watson S. 'I never realised everybody felt as happy as I do when I am around autistic people': A thematic

analysis of autistic adults' relationships with autistic and neurotypical friends and family. *Autism*. 2020;24(6):1438-1448. doi:10.1177/1362361320908976
149. Sinclair J. Being Autistic Together. *Disabil Stud Q*. 2010;30(1). doi:10.18061/dsq.v30i1.1075
150. Watts G, Crompton C, Grainger C, et al. 'A certain magic' – autistic adults' experiences of interacting with other autistic people and its relation to Quality of Life: A systematic review and thematic meta-synthesis. *Autism*. Published online June 3, 2024:13623613241255811. doi:10.1177/13623613241255811
151. Chen YL, Senande LL, Thorsen M, Patten K. Peer preferences and characteristics of same-group and cross-group social interactions among autistic and non-autistic adolescents. *Autism*. 2021;25(7):1885-1900. doi:10.1177/13623613211005918
152. Chen YL, Schneider M, Patten K. Exploring the role of interpersonal contexts in peer relationships among autistic and non-autistic youth in integrated education. *Front Psychol*. 2022;13. doi:10.3389/fpsyg.2022.946651
153. Bolis D, Lahnakoski JM, Seidel D, Tamm J, Schilbach L. Interpersonal similarity of autistic traits predicts friendship quality. *Soc Cogn Affect Neurosci*. 2021;16(1-2):222-231. doi:10.1093/scan/nsaa147
154. Faso DJ, Corretti CA, Ackerman RA, Sasson NJ. The broad autism phenotype predicts relationship outcomes in newly formed college roommates. *Autism*. 2016;20(4):412-424. doi:10.1177/1362361315585733
155. Wainer AL, Block N, Donnellan MB, Ingersoll B. The broader autism phenotype and friendships in non-clinical dyads. *J Autism Dev Disord*. 2013;43(10):2418-2425. doi:10.1007/s10803-013-1789-8
156. Heasman B, Gillespie A. Perspective-taking is two-sided: Misunderstandings between people with Asperger's syndrome and their family members. *Autism*. 2018;22(6):740-750. doi:10.1177/1362361317708287
157. Milton DEM, Heasman B, Sheppard E. Double Empathy. In: Volkmar FR, ed. *Encyclopedia of Autism Spectrum Disorders*. Springer New York; 2020:1-9. doi:10.1007/978-1-4614-6435-8_102273-2
158. Heasman B, Gillespie A. Participants Over-Estimate How Helpful They Are in a Two-Player Game Scenario Toward an Artificial Confederate That Discloses a Diagnosis of Autism. *Front Psychol*. 2019;10. Accessed June 29, 2022. https://www.frontiersin.org/article/10.3389/fpsyg.2019.01349
159. Brewer R, Biotti F, Catmur C, et al. Can Neurotypical Individuals Read Autistic Facial Expressions? Atypical Production of Emotional Facial Expressions in Autism Spectrum Disorders. *Autism Res Off J Int Soc Autism Res*. 2016;9(2):262-271. doi:10.1002/aur.1508
160. Cassidy S, Bradley L, Shaw R, Baron-Cohen S. Risk markers for suicidality in autistic adults. *Mol Autism*. 2018;9(1):42. doi:10.1186/s13229-018-0226-4
161. Hedley D, Uljarević M, Wilmot M, Richdale A, Dissanayake C. Understanding depression and thoughts of self-harm in autism: A potential mechanism involving loneliness. *Res Autism Spectr Disord*. 2018;46:1-7. doi:10.1016/j.rasd.2017.11.003
162. Mazurek MO. Loneliness, friendship, and well-being in adults with autism spectrum disorders. *Autism*. 2014;18(3):223-232. doi:10.1177/1362361312474121
163. Wang YC, Tai YM, Wu YY, Chiu YN, Tsai WC, Gau SSF. A follow-up study of peer relationships in autistic and non-autistic youths: Mediating effects from autistic, emotional and behavioral symptoms. *Res Dev Disabil*. 2024;151:104768. doi:10.1016/j.ridd.2024.104768

164. Wood A, Templeton E, Morrel J, Schubert F, Wheatley T. Tendency to laugh is a stable trait: findings from a round-robin conversation study. *Philos Trans R Soc B Biol Sci*. 2022;377(1863):20210187. doi:10.1098/rstb.2021.0187
165. Hull L, Mandy W, Lai MC, et al. Development and Validation of the Camouflaging Autistic Traits Questionnaire (CAT-Q). *J Autism Dev Disord*. 2019;49(3):819-833. doi:10.1007/s10803-018-3792-6
166. DeBrabander KM, Morrison KE, Jones DR, Faso DJ, Chmielewski M, Sasson NJ. Do First Impressions of Autistic Adults Differ Between Autistic and Nonautistic Observers? *Autism Adulthood*. 2019;1(4):250-257. doi:10.1089/aut.2019.0018
167. Koehne S, Hatri A, Cacioppo JT, Dziobek I. Perceived interpersonal synchrony increases empathy: Insights from autism spectrum disorder. *Cognition*. 2016;146:8-15. doi:10.1016/j.cognition.2015.09.007
168. Pallathra AA, Cordero L, Wong K, Brodkin ES. Psychosocial Interventions Targeting Social Functioning in Adults on the Autism Spectrum: a Literature Review. *Curr Psychiatry Rep*. 2019;21(1):5. doi:10.1007/s11920-019-0989-0
169. Dziobek I, Stoll S. *Hochfunktionaler Autismus bei Erwachsenen: ein kognitiv-verhaltenstherapeutisches Manual*. Verlag W. Kohlhammer; 2019.

SUPPLEMENTARY MATERIAL

Table S2 Studies investigating social interaction characteristics in interactive paradigms including autistic dyads. AUT = autistic dyad, NT = neurotypical (non-autistic) dyad, MIX = mixed-neurotype (one autistic and one neurotypical) dyad. *Relational difficulties* = whether the main findings of the study support the relational character of autistic social difficulties, i.e., whether the measured characteristic differentiates AUT and MIX dyads such that AUT are more synchronised or report higher rapport (or similar interaction outcome) with the interaction partner; or whether an individual characteristic supports more successful interaction of autistic participants with other autistic people. "-" is used where it is not possible to assess (e.g., lack of MIX dyads). The subscript "$_{ind}$" indicates that the corresponding measurement was calculated per individual (not dyad). *Type* = C (coding; the measurement was coded by external observers); O (observed; the measurement was extracted in an objective way); SR (self-rating of the participants); OR (other rating; the measurement was extracted from ratings of external observers). *Modality* = V (verbal), NV (non-verbal).

Social interaction characteristic		Take homes			Study information								Category		
Measure-ment	Description	Main finding	Diffe-rence	Rela-tional diffi-culies	Article	Dyad types	Diagnosis revealed	Task	Co-der	Age group (mean age)	Gender (m:f:o)	$N_{autistic}$: $N_{compar.}$	Type	Modality	Mode
SOCIAL BEHAVIOURS															
Mutual gaze	Mutual gaze instances coded by external observers	Less mutual gaze in MIX (and by trend, AUT) than NT.	(AUT=) MIX < NT	no	**(Rifai et al., 2022)**	AUT, MIX, NT	yes	videos of the diffusion chain task from Crompton, Ropar, et al. (2020)	NT*	adults (34)	09:51:03	unclear	C	NV	Inter
Backchannels	Non-verbal backchannels coded by external observers	More non-verbal backchanneling in NT than AUT (and those did not differ from MIX).	(MIX=) AUT < NT	no									C	NV	Inter
	Verbal backchannels coded by external observers	More verbal backchanneling in NT than MIX and AUT.	MIX = AUT < NT	no									C	V	Inter
	Frequency, diversity, and complexity of verbal backchannels	AUT dyads produced less verbal backchannels, which were also less diverse and complex, than NT dyads	AUT < NT	-	**(Wehrle, Vogeley, et al., 2023a)**	AUT, NT	unclear	a collaborative "map task"	-	adults (40)	21:07:00	14:14	O	V	Inter
Turn taking	Gap length	Gap lengths were comparable between AUT and NT dyads, although in AUT they were significantly longer in the first stages of the interaction.	AUT = NT (overall); AUT > NT (in early stages)	-	**(Wehrle, Cangemi, et al., 2023)**	AUT, NT	unclear	a collaborative "map task"	-	adults (40)	21:07:00	14:14	O	V	Inter
Communi-cation clarity	Total number of clarifying questions asked by the follower (fewer questions = more clarity)	No differences between the dyads.	AUT = NT = MIX	no	**(Oates et al., 2024)**	AUT, MIX, NT	no	one person gives directions while the other draws shapes	NT*	adults (?)	09:41:10	30:28	C	V	Inter
Communi-cation efficiency	Decrease in verbosity (number of words produced) to describe ambiguous images	In both written and oral conditions, NT and AUT we similarly efficient, but in MIX dyads, AUT_{ind} used more words than NT_{ind}.	AUT = NT, in MIX: AUT_{ind} < NT_{ind}	yes	**(Geelhand et al., 2024)**	AUT, MIX, NT	no	an online referential communication task (oral or written; no video)	NT*	adults (32)	38:96:00	67:67	C	V	Inter

Social interaction characteristic		Take homes			Study information								Category		
	Decrease in duration of rounds to describe ambiguous images	In both written and oral conditions, NT dyads were more efficient (faster) than AUT and MIX dyads, with no differences between the latter two.	AUT = MIX < NT	no									O	V	Inter
Intonation	Intonation, measured as wiggliness and spaciousness (also compared to more traditionally used mean pitch range and f0)	AUT as a group have a more melodic intonation style (higher wiggliness and spaciousness) than NT, but there are considerable individual differences	AUT more melodic than NT	-	**(Wehrle et al., 2022)**	AUT, NT	unclear	a collaborative "map task"	-	adults (40)	21:07:00	14:14	O	V	Intra
Filled pauses	Rate of filled pauses	Both groups produced nearly identical rate of filled pauses, but NT adapted their rate more than AUT to the interlocutor.	AUT = NT	-	**(Wehrle, Grice, et al., 2023)**	AUT, NT	unclear	a collaborative "map task"	-	adults (40)	21:07:00	14:14	O	V	Intra
	Lexical choice of filled pauses (uhm vs uh)	No group differences in the type of filled pauses	AUT = NT	-									O	V	Intra
	Intonational analysis (rises vs falls) of filled pauses	AUT speakers produced fewer filled pauses realised with the typical level intonation contour than NT speakers.	AUT < NT for typical filled pauses	-									O	V	Intra
Silent pauses	Frequency of silent pauses	AUT speakers produced more long (700ms + or 2s+) silent pauses than NT speakers.	AUT > NT	-	**(Wehrle, Vogeley, et al., 2023b)**	AUT, NT	unclear	a collaborative "map task"	-	adults (40)	21:07:00	14:14	O	V	Intra
	Frequency of silent pauses	No group differences when analysing silent pauses of any length	AUT = NT	-									O	V	Intra
SYNCHRONY / COORDINATION															
Motion synchrony	Motion energy analysis	All dyads showed motion synchrony, but synchrony in NT was larger than in AUT or MIX.	AUT = MIX < NT	no	**(Georgescu et al., 2020)**	AUT, MIX, NT	no	five 5-min long conversation tasks	-	adults (42)	34:24:00	29:29	O	NV	Inter
	Motion energy analysis	In the collaborative task, AUT showed larger motion synchrony in than NT, but the groups did not differ in the non-collaborative task.	Collab.: AUT > NT; Individ. AUT = NT	-	**(Glass & Yuill, 2023)**	AUT, NT	unclear	a collaborative and a non-collaborative tablet tasks	-	children (9)	18:07:00	13:12	O	NV	Inter
	Motion energy analysis	No differences in amount of synchrony between the dyads.	AUT = MIX = NT	no	**(Efthimiou et al., 2025)**	AUT, MIX, NT	yes and no	5-min free conversation	-	adults (26)	17:57:12	38:48	O	NV	Inter
Smiling synchrony	External coders coding the videos for presence/absence of smiles	Reduced smiling synchronisation in MIX vs. NT; and marginally larger in AUT when controlling for overall smiling.	NT > MIX, (AUT > MIX)	yes	**(McNaughton et al., 2024)**	AUT, MIX, NT	no, but some shared	5-min free conversation and 5-min video-watching	NT*	child./ adoles. (13)	76:58:00	33:103	C	NV	Inter
Joint action	Motor action coordination	AUT were less able to predict and temporarily coordinate their actions than NT.	AUT < NT	-	**(Stoit et al., 2011)**	AUT, NT	unclear	cooperative virtual stick control task.	-	child./ adoles. (12)	42:14:00	28:28	O	NV	Inter

Social interaction characteristic		Take homes			Study information								Category		
	"Wobbliness" of the table being moved in coordination	Marginally less synchrony (i.e., more movement of the table) and longer task completion time in AUT vs. NT child dyads. No differences for child-adult dyads.	AUT < NT	-	**(Trevisan et al., 2021)**	AUT, NT	yes for the adult, no for the peer	moving tables through a maze, alone or collaboratively with a researcher or a same/other neurotype child	-	child. (10)	35:15:00	21:29	O	NV	Inter
	Synchronisation of steps in joint action (table moving) task	Less synchrony (i.e., less stepping in-synch) in AUT vs. NT child dyads. No differences for child-adult dyads.	AUT < NT	-									O	NV	Inter
Communi-cation synchrony	Aligning non-verbal communications to reference recent communicative history	AUT less likely to align the conceptualizations of their communicative signals to the partner	AUT < MIX = NT	no	**(Wadge et al., 2019)**	AUT, MIX, NT	no	solving puzzles with non-verbal leading /following.	-	adults (24)	32:20:00	22:30	O	NV	Inter
INTERACTION OUTCOMES															
Rapport	A self-rated multidimensional index of "interaction quality/success" (elsewhere called "rapport") from ratings of ease, enjoyment, friendliness, success, and awkwardness	No dyad differences in their ratings of "interaction quality/success" (=rapport)	AUT = NT = MIX	no	**(Alkire et al., 2023)**	AUT, MIX, NT	no, but some shared	5-min unstructured conversation with an unfamiliar person	NT*	child./ adoles. (13)	74:26:00	32:68	SR	V	Inter
	A self-rated multidimensional index of rapport: a cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	NT reported higher rapport than other dyads, and AUT higher than MIX.	MIX < AUT < NT	yes	**(Crompton, Sharp, et al., 2020)**	AUT, MIX, NT	yes	3 semi-structured tasks	-	adults (37)	12:57:03	36:36	SR	V	Inter
	Other-rated multidimensional index of rapport: a cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	AUT rated higher on rapport than NT, and those than MIX. The ratings did not differ between autistic and non-autistic observers.	MIX < NT < AUT	yes			no	videos of 3 semi-structured tasks	AUT, NT	adults (34)	28:48:02	39:39	OR	V	Inter
	Self-rated multidimensional index of rapport: a cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	Lower rapport in MIX than AUT and NT.	MIX < AUT = NT	yes	**(Crompton, Ropar, et al., 2020)**	AUT, MIX, NT	yes	diffusion chain: participants relay a story through successive dyads	-	adults (37)	12:57:03	24:48	SR	V	Inter

Social interaction characteristic		Take homes			Study information								Category		
	Self-rated multidimensional index of rapport: a cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	No differences between MIX, AUT, and NT. Rapport was higher when the diagnosis was disclosed (for "teachers" the rapport highest in NT, for "learners" AUT and NT higher than MIX).	MIX = AUT = NT	no	**(Crompton et al., 2025)**	AUT, MIX, NT	yes and no (manipulated)	diffusion chain (replication of Crompton, Ropar, et al., 2020a), additionally manipulating whether the story was fictional or factual	-	adults (28)	67:197:47	154:157	SR	V	Inter
	Self-rated multidimensional index of rapport: a cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	Lower rapport in MIX than AUT and NT.	MIX < AUT = NT	yes	**(Rifai et al., 2022)**	AUT, MIX, NT	yes	videos of the diffusion chain task from Crompton, Ropar, et al. (2020)	NT*	adults (34)	09:51:03	unclear	SR	V	Inter
	A cumulative score from ratings of ease, enjoyment, friendliness, success, and awkwardness	Rapport the highest in AUT than other groups. Rapport for AUT_{ind} changed as a function of number of other AUT in the group, while NT rapport scores were relatively stable across group types.	AUT > NT	yes	**(Foster et al., 2024)****	AUT, NT, MIX_{AUT} MIX_{NT}	no (but type of group yes)	free interaction and collaborative jenga tower building	-	adults (28)	29:84:26 (4 undisclosed)	77:66	SR	V	Inter
	Composite score, as in (Crompton, Ropar, et al., 2020)	AUT rated rapport lower than MIX and NT. NT_{ind} reported higher rapport than AUT_{ind}, regadless of the dyad type.	NT = MIX > AUT; NTind > AUTind	no	**(Oates et al., 2024)**	AUT, MIX, NT	no	one person gives directions while the other draws shapes	NT*	adults (?)	09:41:10	30:28	SR	V	Inter
Communic-ation accuracy	Score for drawing accuracy (drawn shapes' location, colour, and shape)	Drawings of AUT and NT were (similarly) more accurate than those of MIX.	AUT = NT > MIX	yes									C	V & NV	Inter
Communi-cation rate	Speed of task completion (based on the time spent on instruction giving and drawing)	MIX were faster to complete the task than NT. AUT did not differ significantly from NT or from MIX.	MIX > NT	no									C	V & NV	Inter
Information transfer	Number of details retained in a chain	AUT and NT relayed a similar amount of story detail, and both more than MIX.	AUT = NT > MIX	yes	**(Crompton, Ropar, et al., 2020)**	AUT, MIX, NT	yes	diffusion chain: participants relay a story through successive dyads	-	adults (37)	12:57:03	24:48	O	V	Inter
		No differences between MIX, AUT, and NT. Being aware of the neurotype of the partner did not influence the results.	MIX = AUT = NT	no	**(Crompton et al., 2025)**	AUT, MIX, NT	yes and no (manipulated)	diffusion chain (replication of Crompton, Ropar, et al., 2020a), additionally manipulating whether the story was fictional or factual	-	adults (28)	67:197:47	154:157	O	V	Inter
Ratings of partner's traits	Awkwardness, attractiveness, intelligence, trustworthiness	Both AUT_{ind} and NT_{ind} rated AUT_{ind} as more awkward, less socially warm, less attractive. No	AUT_{ind} > NT_{ind} for both groups	yes	**(Morrison, DeBrabander, Jones,**	AUT, MIX, NT	no, but some shared	5-min unstructured conversation with an unfamiliar person	-	adults (22)	125:00:00	67:58	SR	V	Inter

Social interaction characteristic		Take homes			Study information								Category		
		differences for intelligence and trustworthiness.			**Faso, et al., 2020)**										
Quality of social interaction	Meaningful and high quality conversation	Perception of quality of conversation do not differ for NT_{ind} and AUT_{ind}	AUT_{ind} = NT_{ind}	yes									SR	V	Inter
Ratings of closeness to the partner	Composite score of inclusion of the other in self and of the subjective closeness index	AUT_{ind} report feeling closer to their partners than NT_{ind}	AUT_{ind} > NT_{ind}	yes									SR	V	Inter
Ratings of sharing	Levels of self-disclosure in a conversation	AUT_{ind} disclosing more to AUT_{ind} partners than to NT_{ind} partners	AUT_{ind} > NT_{ind} for AUT partners	yes									SR	V	Inter
Interest in future interaction	Composite score of 4 items (e.g., willingness to hang out in free time)	NT_{ind} prefer NT_{ind}, AUT_{ind} trend towards other AUT_{ind}	AUT_{ind} < NT_{ind} for NT; AUTind > NTind (trend) for AUT	yes									SR	V	Inter
	Self-rated desire to interact again	Both AUT and NT reported higher desire to interact again than MIX dyads.	AUT and NT > MIX	yes	**(McNaughton et al., 2024)**	AUT, MIX, NT	no, but some shared	5-min free conversation and 5-min video-watching	-	child./ adoles. (13)	76:58:00	33:103	SR	V	Inter
Qualitative analyses: flow, attunement, rapport	Qualitative coding of "flow", "tuning in", "running along the edges of meaning"	Flow, rapport and intersubjective attunement were significantly increased in AUT than in MIX.	AUT > MIX	yes	**(Williams et al., 2021)**	AUT, MIX	yes	free conversation	AUT and NT	adults (?)	unclear	8:?	C	V	Inter
Interaction quality	Coded behaviour of positive social interaction, "global", and dyadic relationship scales (e.g., pro-social behaviour, small talk, smile, self-disclosure, shared fun)	MIX friendships more durable and stable than AUT, with higher levels of goal oriented social behaviours and positive affect. No differences in prosocial behaviours, conversation, and play.	MIX > AUT	no	**(Bauminger et al., 2008)**	AUT or neurodivergent (AUT + another diagnosis), MIX	unclear	2 collaborative tasks	NT*	child./ adoles. (10)	69:04:00	42:31	C	V & NV	Inter
	Coded behaviour of positive, negative, and	NT_{ind} showed higher participation in peer interaction and more complex social behaviours than AUT_{ind}, but	Qualitative	no	**(Bauminger et al., 2003)**	AUT or neurodivergent	unclear	free play	NT*	child./ adoles. (11)	31:04:00	18:17	C	V & NV	Inter

Social interaction characteristic		Take homes			Study information								Category		
	low-level interaction characteristics	both showed more positive than negative social behaviours. AUT_{ind} descriptively more likely to interact with NT_{ind} than other AUT_{ind}.	differen-ces			(AUT + another diagnosis), MIX									
INTERACTION MEASUREMENT - INTERACTION OUTCOME															
Social skills	Coded behaviour (appropriate content, paralinguistic behaviours, interactive behaviours, and non-verbal behaviours) related to self-reported measures of interaction outcomes	AUT_{ind} score lower in (neurotypical-centered) social abilities, but only minimal links were found between AUT_{ind} social ability and their social interaction outcomes. If any, social ability of NT_{ind} were more predictive of the outcomes than those of AUT_{ind} in MIX.	Weak relation of social skills and interaction	-	**(Morrison, DeBrabander, Jones, Ackerman, et al., 2020)**	AUT, MIX, NT	no, but some shared	5-min unstructured conversation with an unfamiliar person	-	adults (22)	125:00:00	67:58	C	V & NV	Inter/intra
Motion synchrony	Social motor synchrony related to self-rated rapport	A stronger link between synchrony and rapport in NT vs MIX and AUT (and no difference between MIX and AUT), but no main effect of synchrony on rapport in any dyad. Being aware of the neurotype of the partner did not influence the results.	NT > MIX = AUT	-	**(Efthimiou et al., 2025)**	AUT, MIX, NT	yes and no (manipulated)	5-min free conversation	-	adults (26)	17:57:12	38:48	O	NV	Inter
Smiling synchrony	Smile synchrony related to self-reported enjoyment, willingness to interact again, and interaction quality	Smiling synchrony predicted willingness to interact again and enjoyment (but not interaction quality), even when controlling for overall amount of smiling.	NT = MIX (too few AUT dyads)	-	**(McNaughton et al., 2024)**	AUT, MIX, NT	no, but some shared	5-min free conversation and 5-min video-watching	NT*	child./ adoles. (13)	76:58:00	33:103	C	NV	Inter
Mutual gaze, backchannels	Mutual gaze related to rapport	Only in NT, the mutual gaze duration correlated with rapport ratings. Verbal/non-verbal backchannels did not correlate with rapport.	NT > MIX = AUT	-	**(Rifai et al., 2022)**	AUT, MIX, NT	yes	videos of the diffusion chain task from Crompton, Ropar, et al. (2020)	NT*	adults (34)	09:51:03	unclear	C	NV	Inter

- All studies included interactions with peers (child-child, adult-adult), with exception of Trevisan et al., 2021, where children interacted with a peer or with an adult.
- * = the neurotype is presumably NT, not explicitly stated in the article.
- ** = The design of Foster et al., 2024 included groups, not dyads. The MIX groups were either with majority of autistic (3AUT + 1NT) or neurotypical participants (3NT + 1 AUT).

1. Alkire, D., McNaughton, K. A., Yarger, H. A., Shariq, D., & Redcay, E. (2023). Theory of mind in naturalistic conversations between autistic and typically developing children and adolescents. *Autism*, *27*(2), 472–488. https://doi.org/10.1177/13623613221103699
2. Bauminger, N., Shulman, C., & Agam, G. (2003). Peer Interaction and Loneliness in High-Functioning Children with Autism. *Journal of Autism and Developmental Disorders*, *33*(5), 489–507. https://doi.org/10.1023/A:1025827427901
3. Bauminger, N., Solomon, M., Aviezer, A., Heung, K., Brown, J., & Rogers, S. J. (2008). Friendship in High-functioning Children with Autism Spectrum Disorder: Mixed and Non-mixed Dyads. *Journal of Autism and Developmental Disorders*, *38*(7), 1211–1229. https://doi.org/10.1007/s10803-007-0501-2

4. Crompton, C. J., Foster, S. J., Wilks, C. E. H., Dodd, M., Efthimiou, T. N., Ropar, D., Sasson, N. J., Lages, M., & Fletcher-Watson, S. (2025). Information transfer within and between autistic and non-autistic people. *Nature Human Behaviour*, 1–13. https://doi.org/10.1038/s41562-025-02163-z
5. Crompton, C. J., Ropar, D., Evans-Williams, C. V., Flynn, E. G., & Fletcher-Watson, S. (2020). Autistic peer-to-peer information transfer is highly effective. *Autism*, *24*(7), 1704–1712. https://doi.org/10.1177/1362361320919286
6. Crompton, C. J., Sharp, M., Axbey, H., Fletcher-Watson, S., Flynn, E. G., & Ropar, D. (2020). Neurotype-Matching, but Not Being Autistic, Influences Self and Observer Ratings of Interpersonal Rapport. *Frontiers in Psychology*, *11*. https://www.frontiersin.org/article/10.3389/fpsyg.2020.586171
7. Efthimiou, T. N., Wilks, C. E., Foster, S., Dodd, M., Sasson, N. J., Ropar, D., Lages, M., Fletcher-Watson, S., & Crompton, C. J. (2025). Social motor synchrony and interactive rapport in autistic, non-autistic, and mixed-neurotype dyads. *Autism*, 13623613251319585. https://doi.org/10.1177/13623613251319585
8. Foster, S., Ackerman, R. A., Wilks, C., Dodd, M., Calderon, R. M., Ropar, D., Fletcher-Watson, S., Crompton, C. J., & Sasson, N. (2024). *Rapport in Same and Mixed Neurotype Groups of Autistic and Non-autistic Adults*. OSF. https://doi.org/10.31219/osf.io/efvbc
9. Geelhand, P., Papastamou, F., Jaspard, S., & Kissine, M. (2024). Autistic adults display different verbal behavior only in mixed-neurotype interactions: Evidence from a referential communication task. *Autism*, 13623613241298376. https://doi.org/10.1177/13623613241298376
10. Georgescu, A. L., Koeroglu, S., Hamilton, A. F. de C., Vogeley, K., Falter-Wagner, C. M., & Tschacher, W. (2020). Reduced nonverbal interpersonal synchrony in autism spectrum disorder independent of partner diagnosis: A motion energy study. *Molecular Autism*, *11*(1), 11. https://doi.org/10.1186/s13229-019-0305-1
11. Glass, D., & Yuill, N. (2023). Moving Together: Social Motor Synchrony in Autistic Peer Partners Depends on Partner and Activity Type. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-023-05917-8
12. McNaughton, K. A., Moss, A., Yarger, H. A., & Redcay, E. (2024). Smiling synchronization predicts interaction enjoyment in peer dyads of autistic and neurotypical youth. *Autism*, 13623613241238269. https://doi.org/10.1177/13623613241238269
13. Morrison, K. E., DeBrabander, K. M., Jones, D. R., Ackerman, R. A., & Sasson, N. J. (2020). Social Cognition, Social Skill, and Social Motivation Minimally Predict Social Interaction Outcomes for Autistic and Non-Autistic Adults. *Frontiers in Psychology*, *11*. https://www.frontiersin.org/articles/10.3389/fpsyg.2020.591100
14. Morrison, K. E., DeBrabander, K. M., Jones, D. R., Faso, D. J., Ackerman, R. A., & Sasson, N. J. (2020). Outcomes of real-world social interaction for autistic adults paired with autistic compared to typically developing partners. *Autism*, *24*(5), 1067–1080. https://doi.org/10.1177/1362361319892701
15. Oates, M., Bean, A., Kickbusch, R., & Sauer, S. (2024). Extending Double Empathy: Effects of Neurotype-Matching on Communication Success in an Expository Context. *American Journal of Speech-Language Pathology*, *1*(14). https://doi.org/10.1044/2024_AJSLP-23-00393
16. Rifai, O. M., Fletcher-Watson, S., Jiménez-Sánchez, L., & Crompton, C. J. (2022). Investigating Markers of Rapport in Autistic and Nonautistic Interactions. *Autism in Adulthood*, *4*(1). https://doi.org/10.1089/aut.2021.0017
17. Stoit, A. M. B., van Schie, H. T., Riem, M., Meulenbroek, R. G. J., Newman-Norlund, R. D., Slaats-Willemse, D. I. E., Bekkering, H., & Buitelaar, J. K. (2011). Internal model deficits impair joint action in children and adolescents with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(4), 1526–1537. https://doi.org/10.1016/j.rasd.2011.02.016
18. Trevisan, D. A., Enns, J. T., Birmingham, E., & Iarocci, G. (2021). Action coordination during a real-world task: Evidence from children with and without autism spectrum disorder. *Development and Psychopathology*, *33*(1), 65–75. https://doi.org/10.1017/S0954579419001561
19. Wadge, H., Brewer, R., Bird, G., Toni, I., & Stolk, A. (2019). Communicative misalignment in Autism Spectrum Disorder. *Cortex*, *115*, 15–26. https://doi.org/10.1016/j.cortex.2019.01.003
20. Wehrle, S., Cangemi, F., Janz, A., Vogeley, K., & Grice, M. (2023). Turn-timing in conversations between autistic adults: Typical short-gap transitions are preferred, but not achieved instantly. *PLOS ONE*, *18*(4), e0284029. https://doi.org/10.1371/journal.pone.0284029
21. Wehrle, S., Cangemi, F., Vogeley, K., & Grice, M. (2022). New evidence for melodic speech in Autism Spectrum Disorder. *Proc. Speech Prosody. 2022*, 37–41. https://doi.org/10.21437/SpeechProsody.2022-8
22. Wehrle, S., Grice, M., & Vogeley, K. (2023). Filled Pauses Produced by Autistic Adults Differ in Prosodic Realisation, but not Rate or Lexical Type. *Journal of Autism and Developmental Disorders*. https://doi.org/10.1007/s10803-023-06000-y
23. Wehrle, S., Vogeley, K., & Grice, M. (2023a). Backchannels in conversations between autistic adults are less frequent and less diverse prosodically and lexically. *Language and Cognition*, *1*(26). https://doi.org/10.1017/langcog.2023.21
24. Wehrle, S., Vogeley, K., & Grice, M. (2023b). Characteristics and distribution of silent pauses in conversations between autistic and non-autistic dyads. *Proceedings of the 20th International Congress of Phonetic Sciences. ICPhS.*
25. Williams, G. L., Wharton, T., & Jagoe, C. (2021). Mutual (Mis)understanding: Reframing Autistic Pragmatic "Impairments" Using Relevance Theory. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.616664