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Perceived Neurotype of the Other May Affect Self/Other-Representation in Autistic People

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Abstract

Recent work suggests that the 'social deficits' historically ascribed to autism may be the product of cross-neurotype sociocommunicative differences between autistic people and the neurotypical majority. Where previous work has explored impacts of neurotype mismatches on more complex social behaviour, we aimed to explore how perception of another person's neurotype affects unconscious, implicit processes of self/other-representation that underpin higher-order sociocognitive processes. Autistic ($n = 149$) and non-autistic ($n = 166$) participants completed a perceptual matching task where they affirmed or negated learned associations between geometric shapes and three person-labels (themselves, a named friend, and a stranger). The majority of autistic participants perceived their friends and strangers as neurotypical, and the usual preferential processing of friends over strangers was reduced in this group. Effects of other neurotypes were evident in slightly lower accuracy when processing information about people with a different neurodivergent/neurotypical status to participants. The real-life relevance of cognitive biases was indicated by an indirect relationship of greater self-bias to more intense past-year suicide ideation via the mediator of lower autistic community connectedness. Being a neurominority affects implicit processing of socially-relevant information as well as explicit social processes, and these differences may be quantified by a simple cognitive measure linked to complex social behaviour.

Keywords

self-representation, neurotype, double empathy, social cognition

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Lay Abstract

What is Already Known About this Topic?

Autistic people often have negative social encounters with non-autistic people. Historically, this has been blamed on 'social deficits' in autistic people. We now know that people of different neurotypes communicate differently, and difficulties arise when people of different neurotypes interact. While these effects of neurotype mismatches between individuals are observable in complex social behaviour, we do not know if they are also evident in more fundamental processes underpinning how we think about and experience affiliation with other people.

What Does this Paper Add?

We wanted to see if a perceived neurotype affects the way that people process information about familiar and unfamiliar others (friends vs. strangers). Usually, people are better at processing information about friends than strangers. This is because friends are socially relevant and hence become affiliated to our self-concept, an affiliation which seems to be important for feelings of connectedness. If effects of the other person's neurotype are evident in the way we process information unconsciously, it may go some way to explaining why autistic people often feel socially disconnected from others.

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Autistic and non-autistic participants in our study completed an online task where they had to quickly process information about themselves, a real-life friend who they identified as neurodivergent or neurotypical, or a stranger. We asked them whether they perceived the stranger as neurotypical or neurodivergent. We also controlled for variables that might affect the results.

We found that participants were poorer when processing information about people with different neurotypes. Most autistic participants perceived their friends and strangers as neurotypical, and they showed no processing advantages for friends over strangers. This may mean that autistic people implicitly feel a greater distance between themselves and neurotypical friends as well as strangers. Our study also suggested that differences in biases towards self- and friends may be related to real-life mental health and social outcomes, although these relationships are complex and need further study.

Implications for Practice, Research and/or Policy

The findings suggest that the perceived neurotype of other people may affect the unconscious way we process information about others, as well as complex, conscious social behaviour. They also suggest that it may be more difficult to process information about people of a different neurotype, possibly because of reduced affiliation with them. These findings may help explain why communication between autistic and non-autistic people can be difficult, and could also be applicable to other neurominority groups, like ADHDers. Unconscious biases in the way we process information can be manipulated, and this may be helpful if these unconscious biases really influence the way people feel.

Recent years have seen the recasting of 'deficits in social communication and social interaction' (American Psychiatric, 2013) as the product of interactional dynamics between neurotypical and neurodivergent minds (Davis & Crompton, 2021; Milton, 2012). Research indicates that differing sociocommunicative behaviour affects friendship, rapport development, conversational ease and problem-resolution between autistic and non-autistic people (Chen et al., 2022; Crompton et al., 2020; Funawatari et al., 2024; Geelhand et al., 2024; Heasman & Gillespie, 2018, 2019; Morrison et al., 2020; Rifai et al., 2022; Watts et al., 2024). This literature suggests that non-autistic people are perturbed by the different verbal and non-verbal social behaviour of autistic people (Brewer et al., 2016; Casartelli et al., 2020; Edey et al., 2016), and that this may contribute to prejudice against autistic people (Clin & Kissine, 2023; Stagg et al., 2023). This is important because negative interactions with non-autistic people are a regular source of distress for autistic people (Feller et al., 2023; Parenteau et al., 2023). These findings challenge the traditional notion of sociocognitive 'deficits' ascribed to autistic people, suggesting instead that observed difficulties could be impacted by cross-neurotype dynamics.

One fundamental yet implicit process, central to social cognition and information processing about other people, is our self-representation. Research has demonstrated that the self-representation is multifaceted: it includes not only higher-level representations, drawing on autobiographical memories and conscious reflections and narratives on own personality, beliefs, identity and worth, but also a more fundamental, biological self, incorporating the distinction between *self vs. other* and *relevant vs. not relevant to me*. This more fundamental, biological self, acting as an evolutionarily advantageous 'centre of gravity' (Sui & Gu, 2017) or 'anchoring point' (Scheller & Sui, 2022), implicitly influences information processing by drawing our finite attentional and computational resources towards self-relevant information, which can begin at the early, automatic stages of attentional selection at the gateway to perception (Scheller et al., 2024). A manifestation of this self is a self-prioritisation effect occurring in processing and mnemonic advantages for self-relevant information (Alexopoulos et al., 2012; Cunningham et al., 2008; Desebrock et al., 2022; Sui et al., 2012; Symons & Johnson, 1997), as well as in perceived and preferred distances between self and potentially threatening strangers (Desebrock et al., 2022; Moseley et al., 2022; Sui & Humphreys, 2015). Because many self-related stimuli, like our faces and names, are benefitted by greater familiarity to the individual, associative learning tasks have been a particularly helpful means of delineating prioritisation of the self-concept irrespective of confounds like familiarity. Perceptual matching tasks, for instance, show that when initially arbitrary stimuli, such as shapes, are linked with the self-concept through associative learning during the instruction phase, these stimuli are rapidly 'tagged' as socially relevant through association with the self, and hence lead to more efficient processing, reflected in faster and more accurate responses to shapes associated with the self in the matching task (Scheller & Sui, 2022; Sui et al., 2012, 2023). In a similar vein, their association with the self-concept is believed to explain why information related to familiar others or in-group members is tagged as socially relevant and hence processed more quickly and accurately than that of strangers (Enock et al., 2020; Golubickis et al., 2019; Moradi et al., 2020; Moseley et al., 2022; Sui & Humphreys, 2017). This fundamental involvement of the self-concept, even when processing information about other people, is evinced by the evidence of shared neural substrates for mentalising (understanding the mental states of others) and self-representation (Sui & Gu, 2017; Yankouskaya & Sui, 2022).

The way that people consciously and unconsciously represent their self-concept has important relevance to real

life. Differences or 'disturbances' in the self-concept have been identified as core and maintaining factors in various forms of psychopathology such as depression (Giommi et al., 2023; Kyrios et al., 2015), and specific signatures of self-appraisal over time differentiate people with and without the lifetime history of suicidality (Sokol et al., 2024). Importantly, overt or conscious differences in the 'higher-order' self-concept and its relation to others also appear to be reflected in the way people *implicitly* prioritise information about themselves and others: for instance, implicit perception of the distance between the self-concept and familiar and unfamiliar others appears to be linked to conscious feelings of loneliness (Moseley et al., 2022). Relatedly, implicit differences in self- and friend-prioritisation can be highly precise indicators of psychopathological states like depression when assessed through non-verbal tasks (Hobbs, Sui et al., 2023; Liu et al., 2022; Sui et al., 2021), and can similarly predict early positive response to anxiolytics (Hobbs et al., 2020; Hobbs, Beck et al., 2023). Beyond reflecting an individual's present state, studies have also demonstrated the potential to harness self-prioritisation biases for health and wellbeing (Caldwell et al., 2018; Verplanken & Sui, 2019), highlighting that there may be clinical *and* predictive utility in research about implicit self/other processing.

As of yet, the way that autistic people implicitly represent their selves in relation to other people is poorly understood, although self-representation has long been a topic of interest in autism research. Differences in the self-concept are implied in early development (Lombardo & Baron-Cohen, 2011), and the way autistic adults monitor and differentiate between self- and other-mental states (Burrows et al., 2016; Lai et al., 2019), but investigations of self-prioritisation in autistic people have generated mixed findings. Some studies indicate typical behavioural self-prioritisation in mnemonic and perceptual paradigms (Amodeo et al., 2024; Lind et al., 2020; Williams et al., 2018), and typical attentional capture for own names (Nijhof et al., 2022; Oomen et al., 2022). However, others report reduced self-prioritisation in memory (Burrows et al., 2017; Henderson et al., 2009; Lombardo et al., 2007); reduced attentional capture by own face stimuli (Cygan et al., 2022); reduced prioritisation of self-owned items and self-generated actions (Grisdale et al., 2014; Hartley & Bird, 2023; Wuyun et al., 2020); and diminished self-bias at later stages of perceptual processing (Amodeo et al., 2024).

Where previous investigations of the self-prioritisation effect in autistic people have utilised perceptual matching tasks, they have typically focused on trials where the self-concept *matches* the shape linked with it through associative learning, where self-prioritisation effects comparable to those seen in the general population were reflected in faster and more accurate affirmation that the self-concept belongs with the shape associated with it (Moseley et al., 2022; Williams et al., 2018). However, mismatching trials, where individuals must negate the pairing of the self-label with a shape not associated with it, are also highly informative. These trials represent a relatively higher processing demand, requiring appropriate top-down inhibition of the bottom-up attentional systems which orient to self-related information, despite it being presented with a mismatched stimulus (Humphreys & Sui, 2016). Self- and friend-prioritisation, for these items, manifest in the way that non-autistic people often struggle to 'unhook' themselves from salient self- and friend-concepts to indicate their pairing with the incorrect label. We previously observed that autistic participants were less captured by self- or friend-related items in mismatching trials, suggesting possibly reduced specificity between these concepts *and* reduced friend-prioritisation (Moseley et al., 2022). We also found reduced friend-prioritisation in matching trials, where autistic participants were no more accurate for friends than strangers, and a higher-level processing task where, asked to physically represent the 'emotional' closeness of self-, friend- and stranger-items, autistic participants placed friends significantly closer to strangers than did non-autistic people, who tended to keep themselves and their friends away from the socially threatening stranger. A greater perceived distance between self and friend, and a smaller distance between the friend and stranger (i.e., reduced friend-prioritisation), were associated with greater loneliness.

This reduced likelihood of associating or 'anchoring' familiar others with the self-concept, in autistic people, might be connected with other observations of reduced identification with in-groups (Skorich & Haslam, 2022), a finding linked to poorer mental health in this population (Maitland et al., 2021). The observation that autistic people were seen to differentiate less between friends and strangers (Moseley et al., 2022) may suggest that both are conceptualised as out-groups to the autistic self. This would indeed appear consistent with the pervasive non-belonging that autistic people experience as marginalised minorities among neurotypical people (Botha et al., 2022; Jones et al., 2022; Zhuang et al., 2023), and, in contrast, the sense of belonging that is associated with identifying with other autistic or neurodivergent people more broadly (Botha et al., 2022; Davies et al., 2024; Watts et al., 2024). The neurotype of other people has not yet been investigated as a potential determinant of how the self is represented in relation to neurotypical and neurodivergent others, but it seems likely to affect these processes given the impact of the other-neurotype on the way autistic people respond to those around them, and the different ways autistic people monitor and present their selves when camouflaging to blend in with non-autistic people (Ai et al., 2022). If both familiar and unfamiliar others feel distant due to their neurotype in relation to autistic individuals, this could explain previous observations of reduced friend-prioritisation as manifest in reduced differentiation between friend and

stranger (Moseley et al., 2022). In this instance, we might expect to see interacting effects of perceived neurotype and diagnosis, with autistic participants showing reduced differentiation between friend and stranger (e.g., reduced friend-prioritisation) if they perceive both to be neurotypical.

Hoping to replicate and lend additional explanatory power to our previous findings of reduced friend-prioritisation (Moseley et al., 2022), we investigated the effects of perceived neurotype of the other on implicit information processing about self and others in autistic people. As there is suggestion that autistic people can feel belonging amongst individuals with broader forms of neurodivergence who are equally 'different' (Botha et al., 2022), we examined perceptions of the other as either neurotypical or neurodivergent, conceptualising these as out-group and in-group members to autistic people respectively. We hypothesised an interaction between diagnosis and shape-label, reflecting reduced differentiation between friend and stranger items in autistic people (Moseley et al., 2022). Incorporating a naturalistic design, we did not expect uniformity in how each group perceived familiar and unfamiliar others, but nonetheless hypothesised that a greater number of autistic individuals would be expected to perceive friends and strangers as neurotypical than non-autistic people to perceive others as neurodivergent. Analysis would be determined by sample size, but if feasible to model the perceived neurotype of others as factors, we expected that those who perceived the other as an out-group member in relation to their neurotype (e.g., perceiving the other as neurotypical in the case of autistic participants) would differentiate less between the friend and the stranger. In matching trials, this would be reflected in less preferential processing of friends over strangers (i.e., less difference in accuracy between friend/stranger items); in mismatching trials, this would look like greater/easier disengagement from friend stimuli which, through association with the self, would normally be preferentially processed over strangers (e.g., improved ability to 'unhook' from friend items and hence greater accuracy for these items, where normally these would be harder to negate).

As per previous analyses where differences in self-processing were examined at the group level and as continuous variables differing across individuals (Lind et al., 2020; Moseley et al., 2022; Williams et al., 2018), we subsequently explored the relevance of these biases to indices of real-world significance for autistic people, following the approach adopted by these previous studies to calculate continuous metrics of self- and friend-bias at the individual level. Since perceived neurotype might affect self- and other-referential processing, we first examined relationships between self-prioritisation, friend-prioritisation and autistic community connectedness, a suggested buffer for the deleterious impact of being a marginalised neurotype (Cage et al., 2022). Since differences in conscious and implicit self-concept have been repeatedly observed in relation to depression and suicidality (Liu et al., 2022; Sokol et al., 2024; Sui et al., 2021), both of which are more prevalent in autistic people (Hedley et al., 2022; Lai, 2023), we secondly examined associations between self- and friend-prioritisation and these outcomes in autistic people.

Methods

Participants

We recruited formally-diagnosed autistic participants ($n = 170$) living in the United Kingdom or United States through Prolific (a participant recruitment website) between March and July 2022. In order to ensure data quality, we excluded 20 autistic participants whose accuracy on our principal task was lower than 55% (see Analysis). As a result of our exclusions, the final autistic sample ($n = 149$) comprised 66 cisgender men, 60 cisgender women, and 23 participants who were transgender men, transgender women, or had other transgender and/or non-binary identities. Most were diagnosed as adults (average age 19.7 [*SD*: 9.04], although 19.5% did not report the year of diagnosis).

Between April and May 2022, we used Prolific to recruit age- and sex-matched cisgender non-autistic participants ($n = 185$) living in the United Kingdom or United States. Most completed the study all at once, but 39.2% were part of a larger study who completed the perceptual matching task approximately 4 weeks before completing the other measures specific to this study. We excluded 19 non-autistic participants on the basis of low task accuracy. The final non-autistic sample ($n = 166$) comprised 82 men, 79 women, and 5 participants with transgender or non-binary identities. Demographic information for all participants is presented in Table 1.

Procedure and Materials

We received ethical approval for the study via the Faculty Ethics Committee at the first author's institution (#39396). The study (approx. 50 min) comprised three experimental tasks (hosted on Inquisit) and then several standardised scales (hosted on Qualtrics); participants could complete the whole study remotely without contact with the researchers. After consenting to participate and providing demographic information, we asked participants to type in the name of a person they would consider one of their closest friends. We then asked whether that friend was of the same sex or gender identity as the participant; how many years they had known them; how close they felt to them (on a scale from 1, 'not familiar at all', to 7, 'highly familiar'); and, finally, whether they thought (or knew) their friend was neurotypical ('not autistic or neurodivergent in any way') or neurodivergent ('autistic or with another

Table 1. Participant Demographics.

	Autistic group ($n = 149$)	Non-autistic group ($n = 166$)
Age	x̄ 27.83 (*SD*: 6.16), *18–39*	x̄ 27.90 (*SD*: 6.12), *18–39*
Racial and/or ethnic groups identified with:		
% White (/White British or American)	77.3	64.1
% Black (Black British/American, or African American)	6.3	4.4
% Mixed ethnicity	4.5	9.4
% Asian	2.4	9.4
% Hispanic or Latino	2.4	1.9
% Prefer not to answer	7.1	10.8
Highest level of education completed:		
% General Certificate of Secondary Education (United Kingdom)	10.3	12.3
% A-Levels/AS-Levels (United Kingdom)	26.2	15
% High school diploma (United States)	9.3	15
% Scholastic Aptitude Tests (United States)	0	5
% Advanced Placement Tests (United States)	0	17.3
% Technical or community college	11.7	4.4
% Undergraduate/bachelor's degree	30.1	19.7
% Graduate degree (MA, MSc, MPhil, other)	7.6	10
% Doctorate degree (PhD, other)	4.8	1.3
% Do not know/not applicable	0	0
Current employment/work status:		
% Employed part-time	17.5	12.5
% Employed full-time	34.8	45.9
% Self-employed	9.4	5.7
% Student	17.6	16.2
% Looking for work or unable to work	18.3	6.9
% Carer	2.4	1.3
% Retired	0	0.6
% Rather not say/did not answer	0	10.9

form of neurodivergence, like ADHD'). We next asked participants to choose a name for an imagined stranger from a list of traditionally male- and female-names, asking them to select a name suggestive that the stranger was of the same sex and gender as themselves.

Using a well-established paradigm (Sui et al., 2012), our experiment then took participants through an associative learning phase where they learnt associations between three geometric shapes and three person-labels (see Figure 1, Part A): 'yourself', 'a friend (who you identified as "[entered name]")', and 'a stranger (who you gave the name "[chosen name]")'. Participants were asked to focus on whether the word matched with the shape. Participants then completed 6 self-paced trials where they were shown examples of 3 matching and 3 mismatching trials and told to indicate whether the word matched with the shape, pressing 'b' to indicate matches and 'v' to indicate mismatches. This was followed by 12 self-paced practice trials, where participants were given feedback after each trial and then overall accuracy and time taken were calculated, and then 12 practice trials at real speed with the same kind of feedback was provided. Consequently, participants completed 3 experimental blocks of 72 trials each, where they were asked to indicate, 'as quickly and accurately as possible', whether word-shape pairings were congruent with those they had learnt. Within each trial (Figure 1, Part B), a fixation cross was shown for 500 ms, followed by a shape-label pairing (500 ms); the screen was blank for 3000 ms, waiting for a participant's response, before feedback was displayed for 500 ms ('correct', 'incorrect', 'slow' if they failed to respond). Between each block, our experiment provided participants with a summary of their timings and accuracy so far, a reminder of the associations they had learnt, and reassurance if they were finding the task difficult.

Each block contained matching (36) and mismatching (36) trials. Matching trials were defined as instances where the shape was presented with the learnt person-label, and divided evenly into 12 self-matching, 12 friend-matching, and 12-stranger matching trials. Mismatching trials were those where the shape was presented with the incorrect person-label, and likewise divided into 12 self-mismatching, 12 friend-mismatching and 12 stranger-mismatching trials. Mismatches were moreover divided evenly between the two alternative person-labels.

After the task, we asked participants to indicate whether they had thought about the stranger as neurotypical or neurodivergent. We then asked them to complete two other experimental tasks (the subject of other reports), followed by measures of autistic community connectedness (autistic participants only), depressive symptoms, and suicide ideation. We used 7 items of the ten-item Autistic Community Connectedness scale (Cage et al., 2022), eschewing the subscale on political activism relating to autism, considered less relevant in the present context, in order to reduce participant burden. Each item is scored from 1–6 (range 7–42) where higher scores reflect greater community connectedness; internal consistency was high in our autistic group ($\alpha = .74$), whose average score was 20.6 (*SD*: 6.3). The Patient Health Questionnaire-9 (PHQ-9) (Kroenke & Spitzer, 2002), a brief measure of depression (scores ranging 0–27 with higher values reflecting more severe symptoms), showed high internal consistency in our samples ($\alpha = .88$ and .9 for autistic and non-autistic participants respectively). A cut-off of 8 is indicative of major depressive disorder: the average scores of the autistic and non-autistic groups were 12.78 (*SD*: 6.5, *Mdn*: 13) and 7.90 (*SD*: 6.1, *Mdn*: 7) respectively. We measured the frequency of past-year suicide ideation with a single item from the Self-Injurious Thoughts and Behaviours Interview, short form (SITBI) (Nock et al., 2007), scored from 0 (no suicide ideation) to 6 (suicide ideation occurring every day). We also measured the average intensity/duration of suicide ideation, scored from 1 (suicide ideation which lasted less than a minute) to 6 (suicide ideation which persisted for more than 2 days at a time).

Analysis

Initially, to examine the effect of neurotype-alignment in our primary analysis, we first examined how participant groups *perceived* the neurotype of the friend and stranger with two chi-squared tests of independence (where we compared the distribution of autistic and non-autistic participants between those who perceived the friend and stranger to have the same neurotypical/neurodivergent status as themselves, and those who perceived the friend and stranger to have a different neurotypical/neurodivergent status as themselves). We coded perceived neurotype of friends and strangers where 1 represented the same neurotypical/neurodivergent status (i.e., perceiving the other as neurotypical like yourself, or neurodivergent like yourself), and 2 represented different status (i.e., perceiving the other as neurotypical when neurodivergent yourself or vice versa). We discarded from analyses datasets from 3 non-autistic participants who expressed that they were uncertain of their friend's neurotype (an option not selected by any autistic participants); moreover, missing data on perceived neurotype of friends and/or strangers meant that 23 autistic participants and 15 non-autistic participants were not included, resulting in samples of 126 and 148 respectively in analyses using these variables.

In our subsequent group-level analysis of the perceptual matching task, we followed the previous precedent by focusing on accuracy, which is sensitive to differences between groups (Moseley et al., 2022; Sui & Humphreys, 2017), though we provide the same analyses with reaction time data in Supplementary Materials. For 24 autistic and 22 non-autistic participants out of 315 participants in total, there were notable reductions in accuracy compared to the

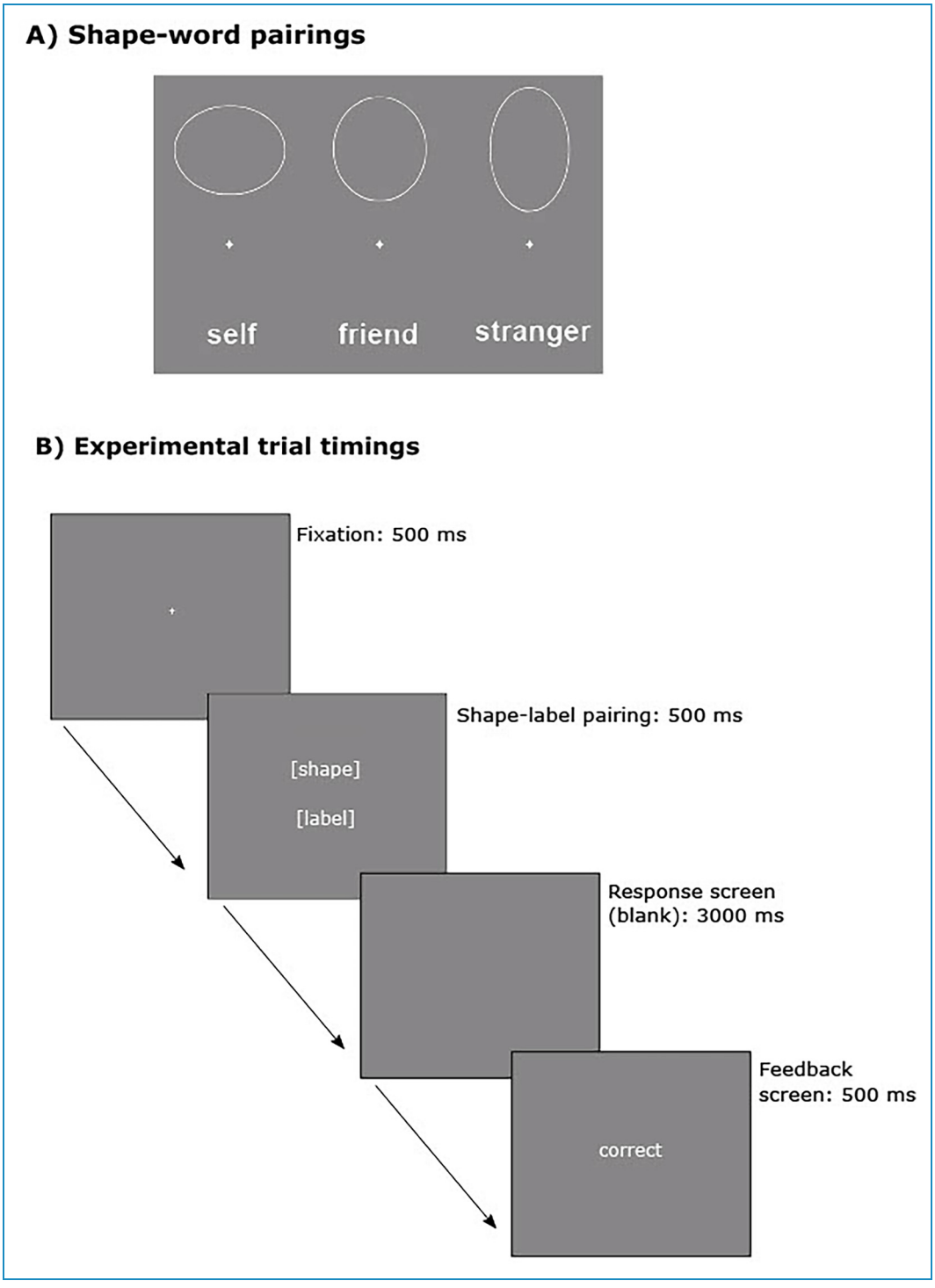

Figure 1. Perceptual Matching Task. *Note*. Part A Depicts Shape-Label Associations Learnt by Participants. Part B Depicts the Timing and Sequence of Experimental Trials.

remaining sample (overall accuracy below 55%). We examined data from these participants, and for them only, excluded trials with no response (likely due to task interruption or short lapses in attention) and trials with correct responses but reaction times more than 3 standard deviations from the mean across all conditions. We removed 41.5% of trials across all 46 participants (on average 89 trials per participant), and re-calculated accuracy for each of them. Altogether, the deleted trials comprised 6.1% of the total data.

Our aforementioned preliminary analyses showed that autistic and non-autistic participants were highly unequal in their perception of friend and stranger neurotype. Having insufficient power to model these as factors, we instead modelled them as covariates in mixed-model ANOVAs aimed to address unbalanced sample sizes between groups. In two 2 × 3 × 2 ANOVAs, we modelled within subject factors (Matching [2] and Shape [3]), and Diagnosis [2] as a between-subject factor. In the first ANOVA, we included only depression as a covariate, given its effect on self/other processing (Liu et al., 2022). In the second, otherwise identical analysis, we included a friend and a stranger neurotype as additional covariates. Sphericity was violated for the Shape factor, so we report Huynh-Feldt values throughout. Significant interactions were explored with two-tailed between/within-subjects post-hoc tests.

Next, to understand the possible relevance of cognitive biases to real-world outcomes in autistic people, we conducted exploratory Pearson correlation analyses in our autistic group alone. As in previous literature in autistic and non-autistic populations (Liu et al., 2025; Moseley et al., 2022; Williams et al., 2018), we operationalised the extent of self-prioritisation at an individual level by subtracting the average accuracy for Self-matching items from the averaged averages of Friend-matching and Stranger-matching items (such that higher scores reflected greater self-prioritisation); the extent of friend-prioritisation was operationalised by subtracting average accuracy for Friend-matching trials from Stranger-matching trials (such that higher scores reflected greater friend-prioritisation). We examined relationships between these variables and autistic community connectedness, depression, and the frequency and intensity of past-year suicide ideation.

Unfortunately, due to time pressures, the study was not preregistered. We did not request permission from participants to make the data freely available, but it is available on reasonable request. Finally, although the research team included neurotypical and neurodivergent people, we regret that autistic people were not otherwise involved in study design or implementation.

Results

Perceived Neurotype of Friend and Stranger Characters

Autistic and non-autistic participants differed in their perception of the neurotypes of 'friend', $\chi^2(2) = 71.83$, $p < .001$, and 'stranger', $\chi^2(2) = 258.35$, $p < .001$, characters. The stranger was perceived as neurotypical by 144 out of 149 autistic people, vs. 143 of 148 non-autistic participants. For the friend, similarly, only 52 of 126 autistic people perceived their friend as neurodivergent like themselves, while 129 of 148 non-autistic participants perceived their friend as neurotypical like themselves. Groups did not differ significantly in the number of years they had known their friend ($p = .906$), how familiar they felt with them
($p = .600$), and the likelihood that their friend shared their sex or gender ($p = .09$).

Since an insufficient sample size precluded our modelling perceived friend and stranger neurotype as between-subject factors, we examined their effect through modelling them as covariates in one of two otherwise identical 3 × 2 × 2 mixed ANOVAs. We first present analyses without controlling for the perceived neurotype of the other.

Self- and Friend-Bias Irrespective of the Perceived Neurotype

With depression as the only covariate, we observed a main effect of Shape, $F(1.91, 567.24) = 5.50$, $p = .005$, partial $\eta^2 = .02$, reflecting the greatest accuracy for self, then friend, then stranger shapes. An interaction between Matching × Shape, $F(1.98, 586.55) = 13.70$, $p < .001$, partial $\eta^2 = .04$, reflected that this Shape effect was significant in matching trials where the shape was presented with the learned person-label, $F(1.85, 547.96) = 13.70$, $p < .001$, partial $\eta^2 = .04$, but not in mismatching trials where shapes were presented with person-labels that were contrary to learned associations ($p = .280$). There were no other main effects or interactions, including relating to Diagnosis.

Effects of Perceived Neurotype on Self- and Friend-Bias

With the addition of perceived friend and stranger neurotype as covariates, main effects of Diagnosis, $F(1, 269) = 5.75$, $p = .017$, partial $\eta^2 = .02$, and the covariate Stranger neurotype, $F(1, 269) = 7.83$, $p = .006$, partial $\eta^2 = .03$, reflected that, respectively, autistic participants were more accurate than non-autistic participants; and participants who perceived the stranger as the same broad neurotype as themselves (both neurotypical/neurodivergent) were more accurate.

While differential effects of Diagnosis on self- and friend-bias (as reflected Diagnosis × Shape interactions) were absent when not controlling for perceived friend and stranger neurotype, controlling for these covariates revealed a three-way interaction of Matching × Shape × Diagnosis, $F(2, 538) = 6.85$, $p = .001$, partial $\eta^2 = .03$ (see Figure 2). The effect was driven by a significant interaction of Shape and Diagnosis in mismatching trials, $F(2, 538) = 5.89$, $p = .003$, partial $\eta^2 = .02$; the same interaction, in matching trials, was non-significant at $p = .084$). Between-group analyses revealed that autistic people were significantly more accurate than non-autistic people for mismatching friend, $F(1, 270) = 12.95$, $p < .001$, partial $\eta^2 = .05$, and mismatching self-items, $F(1, 270)$

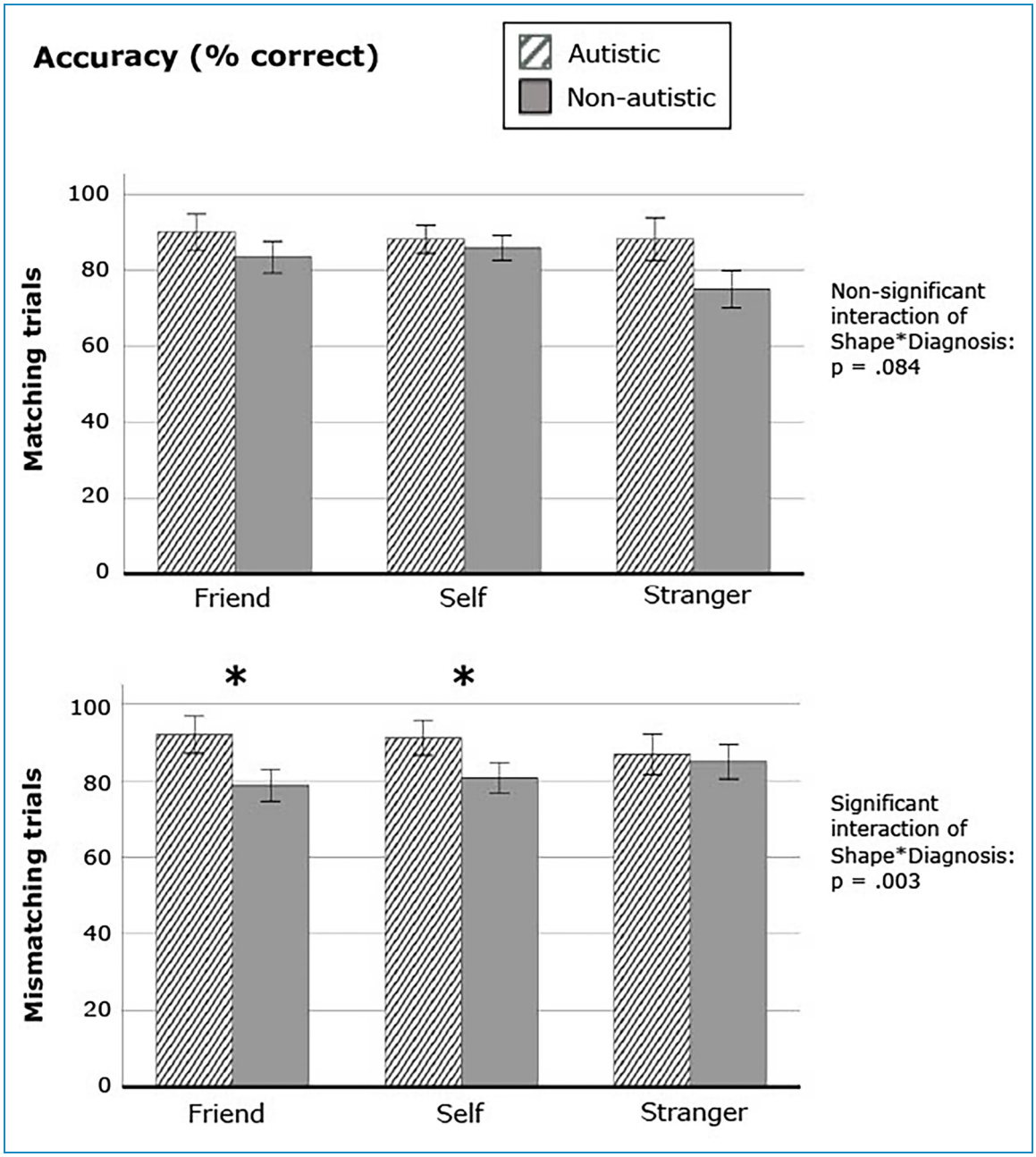

Figure 2. Accuracy in Matching and Mismatching Trials. *Note.* Accuracy (% Correct) for Friend, Self and Stranger Items in Matching and Mismatching Trials, Controlling for Depression, Friend and Stranger Neurotype-Alignment. Only the Significant Interaction of Shape × Diagnosis in Mismatching Trials was Explored with Individual Post-hoc Comparisons. Error Bars Reflect 95% Confidence Intervals and Asterisks Reflect Significant Group Differences.

= 10.12, $p = .002$, partial $\eta^2 = .04$, but not mismatching stranger items ($p = .519$). Within group comparisons for mismatching trials showed no significant effect of Shape for autistic ($p = .104$) or non-autistic participants ($p = .203$). The covariate perceived stranger neurotype also had an effect on the Matching × Shape interaction, $F(2, 528) = 7.16$, $p < .001$, partial $\eta^2 = .03$, where, in matching trials, the neurotype of the stranger had the greatest impact on accuracy for stranger items. Caution must be taken since perceived neurotype of friend and stranger were covariates rather than factors, with small samples: however, the data suggested having the same neurotypical or neurodivergent status as the stranger was associated with more accurate performance than having a different status to the stranger. In mismatching trials, the stranger neurotype had the greatest impact on self-items, where those who perceived the stranger's neurotype as

neurotypical or neurodivergent like themselves had greater accuracy.

Individual Differences in Relationships Between Cognitive Biases and Real-Life Outcomes

Within the autistic group, our individual-level analysis indicated that self-prioritisation and friend-prioritisation were positively correlated ($r = .370$, $p < .001$). In relation to outcome measures, weak correlations suggested that greater self-prioritisation ($r = -.218$, $p = .008$) was associated with lower autistic community connectedness. While neither self- or friend-prioritisation were associated with mental health-related variables, higher autistic community connectedness was associated with lower intensity of past-year suicide ideation ($r = -.170$, $p = .038$).

Given its relationships to autistic community connectedness, we performed a post-hoc mediation analysis examining the indirect effect of self-prioritisation on intensity of past-year suicide ideation via autistic community connectedness. This analysis, using PROCESS for SPSS (5000 samples, Model 4) (Hayes, 2017), confirmed no direct relationship between the extent of self-prioritisation on suicide ideation ($b = -1.08$, $p = .237$), but a significant indirect effect of greater self-prioritisation on suicide ideation via lower autistic community connectedness ($b = .46$ [bootSE: .29], bootCI: .03, 1.14).

Discussion

Recent work has emphasised that sociocommunicative differences across neurotypes have marked impacts on the ease of communication and rapport between autistic and neurotypical people (Chen et al., 2021; Crompton et al., 2020; Heasman & Gillespie, 2018, 2019; Rifai et al., 2022). This approach contextualises the difficulties autistic people face in the social world as the consequence of being a minority neurotype who are impaired when socialising with neurotypical people, who intuitively 'like' autistic people less (Clin & Kissine, 2023; Stagg et al., 2023). To our knowledge, this is the first study to explore whether the perception of the other as neurotypical or a neurodivergent minority influences more fundamental processes underpinning social cognition. The way people process information about self and others reveals preferential processing of certain information, typically about familiar others and in-groups, which is 'tagged' as socially-relevant to the self (Scheller & Sui, 2022; Sui & Gu, 2017). We explored effects of the other's perceived neurotype on these processes at group level, and explored relationships between real-life outcomes and self- and friend-prioritisation at an individual-level. While our analysis was exploratory and results must be interpreted with caution, several findings were of potential note.

Perceived Neurotype of Another Person Appears to Affect Self/Other-Processing

When we controlled for the markedly different ways that autistic and non-autistic people perceived others' neurotype, we observed differences between diagnostic groups which were previously masked. In neurotypical populations, self-prioritisation effects are most evident in matching trials (Liu et al., 2025). Interestingly, as observed in our previous study (Moseley et al., 2022), differences between autistic and non-autistic people emerged in mismatching trials (reflecting the more complex top-down inhibition of orientation to self-relevant information), rather than in matching trials which primarily reflect bottom-up orienting to self-relevant information (Humphreys & Sui, 2016; Sui et al., 2024) – suggesting the need to examine this paradigm differently in this group. Another point of replication with our previous work (Moseley et al., 2022) was that autistic people performed significantly better than non-autistic participants when negating mismatching self and friend trials. Direct comparison of the two studies is complicated by the fact that herein we controlled for depression in our sample so as to more accurately examine autistic status, but otherwise, there as here, this reduced 'stuckness' on mismatching trials might reflect reduced attentional capture by self and friend items, and hence reduced self- and friend-prioritisation in autistic people.

Our control for depression in this study might explain why the effect of 'autism diagnosis' was stronger in our previous study, where it might have reflected other uncontrolled-for differences between groups. A slightly weaker effect in the present study would also be consistent with the way in which the effect of Diagnosis was unmasked by modelling perceived neurotype as a covariate. While our original and preferred approach had been to treat perceived neurotype as a factor, the imbalance in the data necessitated using it as a covariate, a valid approach to control for perceived neurotype. By accounting for the binary perceived neurotype, we removed variance in accuracy that would otherwise have inflated the error term, especially given the uneven distribution of perceived neurotype in friends and strangers. This reduction in residual variance might have effectively sharpened the estimate of the Diagnosis effect, potentially changing a non-significant result into a significant one with the covariate accounted for.

Unsurprisingly, controlling for perceived neurotype had a negligible effect on non-autistic accuracy for self and friend mismatching trials; unfortunately, since almost all non-autistic people perceived strangers and friends to be neurotypical like themselves, we were unable to look at effects of the other's neurotype on non-autistic participants' performance. However, improved autistic performance on these items, once controlling for perceived neurotype, produced the significant group differences reflecting reduced self- and friend-prioritisation. More broadly, across all

participants, perceiving the stranger as having a different neurotypical/neurodivergent status to yourself was associated with poorer performance in stranger-matching trials and self-mismatching trials.

These findings suggest that in addition to affecting more complex social behaviour, the perceived neurotype of the other may affect *implicit* or unconscious self-/other-processing, exerting an additional processing demand which non-autistic people do not typically need to navigate. Why might it be more difficult to process information about people whose neurotypical or neurodivergent status differs from one's own? One possible explanation lies in the bias people show towards positive and rewarding stimuli (Yankouskaya et al., 2023). Real-world social difficulties, which arise as a result of differing sociocommunicative behaviour between neurotypical people and autistic people (Chen et al., 2021; Crompton et al., 2020; Heasman & Gillespie, 2018, 2019; Rifai et al., 2022), and indeed neurotypical people and ADHDers (Godfrey-Harris & Shaw, 2023), might mean that perceiving a familiar or unfamiliar other as neurotypical, when neurodivergent oneself, imbues them with some level of negative association or threat. Pleasurable interactions and feelings of belonging between autistic people, and between autistic and other neurodivergent people (Botha et al., 2022; Crompton et al., 2020; Watts et al., 2024), might similarly create a bias towards people who are perceived as neurodivergent minorities like the individual, who might hence constitute a socially-salient in-group (Enock et al., 2020; Golubickis et al., 2019; Moradi et al., 2020; Moseley et al., 2022; Sui & Humphreys, 2017). Since neurotypical/neurodivergent status separated many autistic participants from their friend *and* the stranger, this fundamental difference might explain why autistic people were less 'stuck' on friend-items once we had tried to control for the statistical variance associated with perceived neurotype. This additional separateness might also explain why participants who perceived the stranger as differing in their neurotypical/neurodivergent status found it harder to confirm matches with these items.

While we cannot presently confirm either interpretation, or ascertain cause and effect between poorer processing and reduced identification, we do know that social identification is important for mental health and moderates the beneficial properties of social connections (Steffens et al., 2021). Accordingly, reduced social identification would be consistent with the link previously observed between loneliness and reduced friend/stranger differentiation in autistic people (Moseley et al., 2022), and the beneficial effects we and others observed in relation to autistic and neurodivergent community connectedness (Botha et al., 2022; Cage et al., 2022; Watts et al., 2024). While researchers have suggested deleterious consequences of reduced social identification in autistic people (Skorich & Haslam, 2022), they have situated this as a deficit inherent to autistic people without considering the societal marginalisation of the same (Turnock et al., 2022). We encourage future research to consider both intra- *and* extrapersonal factors that might give rise to these processing differences, while attempting to connect implicit to explicit effects of neurotype differences on social behaviour and wellbeing.

Self-Prioritisation was Linked to Suicide Ideation Through Lower Community Connectedness

As a preliminary means of exploring possible relationships between cognitive biases and outcomes relevant to autistic people, we explored relationships between self- and friend-prioritisation and social connectedness to other autistic people, depression and two indices of past-year suicide ideation. Both heightened self- and friend-prioritisation in matching trials were associated with lower connectedness to the autistic community. However, through this mediator, greater self-prioritisation was also indirectly associated with greater intensity of past-year suicide ideation. This analysis was post-hoc and exploratory, and cannot support directional relationships between variables. It does, however, support the possible relevance of implicit cognitive self-prioritisation in the processes that underpin suicide ideation, as per relationships between self-prioritisation and depression in neurotypical people (Hobbs, Beck et al., 2023; Liu et al., 2022).

The absence of direct relationships between self- and friend-prioritisation and psychopathology might suggest that these relationships operate differently in autistic people, but could equally reflect insufficient power, the ubiquity of psychopathology in autistic people, and the relative simplicity of the task vs. the longitudinal complexity of relationships with health and social outcomes. While the present analysis was exploratory and could not ascertain directional relationships between variables, we encourage further efforts to address the paucity of research in this area, given the clinical applicability of cognitive biases in detecting and treating psychopathology in the general population (Fodor et al., 2020; Hobbs, Beck et al., 2023; Liu et al., 2022; Sui et al., 2021).

Limitations and Future Directions

Given that our study was exploratory and analyses were not corrected for multiple statistical comparisons, it is possible that significant differences between groups arose as false positives (type 1 errors). The results require replication through more rigorously designed investigations. While we decided to observe the effects of other-neurotype as it naturally occurs in participants' perceptions of friends and hypothetical strangers (rather than experimentally, and artificially, manipulating these), the imbalance between autistic and non-autistic participants prevented us from modelling the perceived neurotype of the other as an independent

variable effectively. For the stranger neurotype in particular, it is possible that the effects of this variable were disproportionately affected by comparisons involving small groups (e.g., with 143 non-autistic and 5 autistic people perceiving the stranger to have the same neurotypical/neurodivergent status as themselves, and 144 autistic people and 5 non-autistic people perceiving the stranger to have a different neurotypical/neurodivergent status). Experimental manipulation of the way participants perceive friends and strangers might help clarify and establish directionality in the effects and relationships observed here. While explicit labelling of others' neurotypes might create bias in participants (Geelhand et al., 2024; Livingston et al., 2024) and we avoided it for that reason, future manipulations might take advantage of the fact that in reality, individuals often do not know the neurotype of those they interact with, responding instead to verbal and non-verbal cues which affect their behaviour (Geelhand et al., 2024; Whelpley & May, 2023). Incorporating more naturalistic elements into this design, such as subtle cuing as to the neurotype of the unfamiliar other, would allow for more ecologically valid investigation of cross-neurotype effects on implicit social processing, as well as addressing the question as to whether differing sociocommunicative behaviour affects self/other representation in the same way as known or perceived neurotypical/neurodivergent status.

We were unable to validate autism diagnoses in our participants, although the autistic sample in question were those who, via Prolific, indicated that they did possess a formal diagnosis by a qualified specialist. Our late-diagnosed, highly educated autistic sample were unrepresentative of the whole autistic community, most notably autistic people with higher support needs which would have precluded their participation. Several marginalised groups, including people of colour, non-binary and/or transgender people, were underrepresented. Recruiting from Prolific meant that we excluded those with lower computer-literacy and without access to this technology, and that our participants might not reflect a wider autistic population not seeking to engage in psychological research. Notably, our non-autistic population, whose non-autistic status was similarly unconfirmed, may have also been atypical, as perhaps indicated by relatively high levels of depression. Previous studies are suggestive of a greater prevalence of mental health conditions in Prolific than in undergraduate samples (Stanton et al., 2022), and so, although our analyses controlled for depression specifically, the non-autistic group may have been unrepresentative of broader population norms (Borodovsky, 2022).

There is a need for further investigation to interrogate the theoretical premises of our work. The majority of empirical research investigating cross-neurotype social dynamics, much of it stemming from the concept of 'double empathy' (Milton, 2012), focuses on interactions and social processes between autistic and non-autistic people (Chen et al., 2022; Crompton et al., 2020; Funawatari et al., 2024; Geelhand et al., 2024; Heasman & Gillespie, 2018, 2019; Morrison et al., 2020; Rifai et al., 2022; Watts et al., 2024). In our study, our choice to examine the effects of perception along the neurotypical/neurodivergent divide was based on reported feelings of belongingness that autistic people can feel among other neurominorities (Botha et al., 2022), and the shared experiences of the same. Among these neurominorities, ADHDers, in particular, are another highly stigmatised and victimised neurominority group (Aguado-Gracia et al., 2021; Visser et al., 2024), and one which, indeed, also has poorer wellbeing and higher suicide rates (Fuller-Thomson et al., 2022). However, our design disallowed specification as to whether the friend and stranger's neurominority neurotype precisely matched that of our autistic participants. While the concept of double empathy requires more rigorous experimental exploration (Livingston et al., 2024), one area of development pertains to social communication and relations between neurotypical people and those of different neurominority identities, and between individuals of different neurominority identities (e.g., autistic, ADHD, specific learning difficulties). We venture to suggest that effects of other-neurotype on implicit and (downstream) explicit social processes could be expected to pertain to ADHDers, who also show reduced self-prioritisation and distinct neural substrates underpinning self and emotion processing (Ahmed et al., 2024; Rafi et al., 2023) and who also appear to fall foul of mixed-neurotype social dynamics (Godfrey-Harris & Shaw, 2023).

Conclusions

While replicating previous findings of reduced 'capture' by self- and friend-related information in mismatching trials, these preliminary results suggest that the perceived neurotype of the other may affect how autistic people implicitly process information about themselves and others, adding computational demands that might reflect the separateness of both familiar and unfamiliar neurotypical others from the autistic individual. We observed relationships between greater self-prioritisation and greater intensity of past-year suicide ideation, mediated by lower autistic community connectedness. While the findings require replication in designs suitable for drawing causal inferences, they suggest the relevance of self-prioritisation to social functioning and wellbeing. Further research should explore the social and clinical relevance of cognitive biases related to self/other-processing in directional, focused and rigorously controlled study designs.

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Ethical Considerations

The study was reviewed and approved by the Science and Technology Faculty Ethics Panel at Bournemouth University (#39396). It was performed in accordance with the ethical standards set out in the 1964 Helsinki Declaration.

Consent to Participate

Participants were fully informed about the nature and content of the study, and all gave written consent to participate.

Consent for Publication

Participants consented in writing to publication of the anonymous data.

Authors Contributions

The perceptual matching paradigm was designed by JS, whose body of work primarily underpinned the study. Contributions were as follows: conceptualisation and study design (RLM, KH, led by JS); funding acquisition (JS); programming the experiment (JS, KH); collecting the data (RLM, KH); supervising data collection (JS); preparing the data (JS, KH); analysing the data (JS, KH, RLM); visualising the data (JS, KH, RLM); writing the original draft (RLM); writing and refining the manuscript (JS, KH, RLM). All authors read and approved the final manuscript.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

Participants did not provide consent for data to be hosted in publicly available repositories. However, data and materials are available on reasonable request.

Supplemental Material

Supplemental material for this article is available online.

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