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"The languages that you know draw the boundary of your world"

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Title page

Full manuscript title

“The languages that you know draw the boundary of your world”: A thematic analysis of the experiences of autistic bilingual adults living in the UK

Running title

Experiences of autism and bilingualism in the UK

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Abstract

Background: While being bilingual (knowing 2 or more languages) is becoming a more common experience globally, little is known about the combined experience of bilingualism and autism. Research currently available focuses on quantifying language and cognitive development, and the only two qualitative accounts of first-hand experiences are from either bilingual children or highly multilingual adults (with 4 languages or more), which may not represent the wider autistic bilingual population. All other accounts focus on parents or practitioners. This qualitative study reports the experiences of autistic bi- and multilingual adults, focusing on barriers and enablers to language learning and reported benefits of bilingualism.

Methods: Thirty-nine UK-based autistic bilingual adults (41% female, mean age = 33.2 years, range = 16-61) with knowledge of 2 to 7 languages (mean = 3.6, SD = 1.4) completed an online Demographic and Language Questionnaire including three open-ended questions about the interplay between autism and bilingualism. A thematic analysis was conducted on the responses to these open-ended questions.

Results: Participants perceived many opportunities and benefits brought by bilingualism, in terms of relationships, hobbies, mobility, employment, education, and cultural insight. Respondents reported social communication as being a major benefit of being bilingual, and discussed how bilingualism had broadened their mindset, while identifying factors that had enabled or challenged their language learning journey.

Conclusions: This study builds upon the few reports available to highlight experiences that are shared by autistic bilingual people regardless of the number of languages they know. It is the first study to report the perspectives of UK-based autistic bilingual adults who, in most cases, grew up in a bilingual environment. Accounts of the factors that can facilitate or hinder language learning will inform the development of strategies to better support autistic people. These findings have implications for bilingual families and practitioners supporting autistic bilingual people.

Community Brief

“Why is this an important issue?”

At least half the world’s population is bilingual or lives in a bilingual environment. However, the experiences of autistic bilingual people are rarely represented or acknowledged. So far, research in this field has concentrated primarily on parent perspectives and on the effects of bilingualism for autistic children’s skills. Only one study to date has focused on understanding the experiences of autistic bilingual adults themselves, but this research focused on multilinguals with four or more languages. It is essential to represent the whole autistic bi- or multilingual community, including those with 2 or 3 languages.

“What was the purpose of this study?”

The study explored the experiences of autistic bilingual people, focusing on the perceived benefits of bilingualism; the shared experiences of autism, bilingualism, especially regarding identity; and the elements that make language learning easier or more difficult.

“What did the researchers do?”

Thirty-nine autistic bilingual adults completed an online questionnaire. The questionnaire included quantitative questions about the participants’ language profile, and open-ended questions about their experiences of being autistic and bilingual. The answers were analysed and summarised using a method called thematic analysis.

“What were the results of the study?”

Participants reported that being bilingual had shaped their ability to communicate socially, it had helped them to understand the perspectives of others, and better express themselves. Participants also identified many additional opportunities and benefits of bilingualism in terms of relationships, hobbies, mobility, employment, education, and cultural insight. They discussed how bilingualism had influenced their self-understanding in terms of increased awareness of their own skills, and it had contributed to a broadened mindset. Participants also listed several difficulties in becoming bilingual that they considered linked to being autistic. Participants highlighted several elements that had made their language learning easier or harder, including the learning environment, opportunities for practice, or specific language competencies.

“What do these findings add to what was already known?”

Previous studies describing the experiences of autistic bilingual people only represented people with four or more languages, and most of these studies only involved one or two people. This

study is more representative of the wider autistic bilingual population. It shows that autistic people benefit from bilingualism in their daily life, even when they know “only” two languages. It highlights that being bilingual is a part of autistic bilingual people’s identity. It reports that different autistic people need different learning strategies to best learn additional languages.

“What are potential weaknesses in the study?”

Participants answered our pre-set questions online, and our questions had very few prompts. As a result, it is possible that many topics were not mentioned. Future research should build upon the topics presented here to describe them more specifically.

“How will these findings help autistic adults now or in the future?”

There are still many barriers to equal access to additional language learning for autistic people. This study shows how valuable autistic people find bilingualism, and it supports autistic people’s advocacy movement for equal rights and opportunities.

Main text

1 Background

Knowing several languages is commonly considered a valuable skill that enriches one's sociocultural experiences.¹ However, autistic people are routinely excluded from conversations around bilingualism¹ and its related experiences. This exclusion could be due to the fact that autism is clinically characterised by a distinctive profile of social and communication differences, with language delay being the most common difference leading to referral to specialist services in children.² Both language use and proficiency are highly variable amongst autistic people: 15 to 25% of autistic children use little spoken language,³ but 55 to 95% of autistic people who had little spoken language in childhood have expressive language skills similar to that of their non-autistic peers in adulthood.⁴ Regardless of the quantity of language produced, language differences have been described in vocabulary learning,⁵ morphology (e.g. the omission of past tense),⁶ phonology (e.g. increased repetition of neologisms),⁷ and increased prevalence of dysgraphia or situational mutism.^{8,9} Conversely, autistic people can also demonstrate enhanced language skills, including hyperlexia or enhanced pattern recognition, with an increased prevalence in autistic people.^{10,11}

These language and communication differences have led researchers to address the implications of being bilingual or living in bilingual environments on language and cognitive development for autistic people. Thus far, most studies have assessed the impact of bilingual exposure on language and cognitive skills in autistic children and young people and, to date, research has identified either no detrimental effects of bilingualism^{12,13} or early signs of positive effects in areas including executive functioning¹⁴ and social communication.¹⁵ Furthermore, a review of research focusing on the implications for language development found no evidence of delays in autistic bilingual children.¹⁶ Despite this growing evidence base demonstrating an absence of negative effects of bilingualism on language and cognitive skills, many parents and practitioners remain concerned that bilingualism is detrimental to autistic children's development. Indeed, many clinical practitioners still frequently advise bilingual parents to raise their children monolingually,¹⁷⁻¹⁹ even if the rest of the family maintains their multilingualism.²⁰

In addition to cognitive effects, bilingualism can be highly advantageous to autistic people in terms of contribution to social development,²¹ family and cultural connections,^{17,19} and increased wellbeing.^{22,23} Especially for autistic children growing up in bilingual families, excluding a child from a bilingual upbringing after an autism diagnosis can have negative

¹ “Bilingualism” refers to using “two or more languages (or dialects)”, as summarised by Grosjean¹, and as used customarily in the research fields related to bilingualism. It is used interchangeably with “Multilingualism”.

consequences, particularly in terms of relationships and participation in activities. Indeed, being able to understand the languages of their family and community is a key enabler to accessing their heritage,¹⁷ and to strengthening the bond with their close and extended family,¹⁹ as well as with their religious and cultural community,^{18,24,25} all of which are critical to building one's identity.

So far, two studies have sought to report the perspectives of autistic bilingual people themselves, and quantified their lived experiences of being both autistic and bilingual. The first asked autistic bilingual children aged 7-14 who grew up in a bilingual home about their school experiences, especially their identity formation compared to their classmates and their classroom experiences.²⁶ Those in more bilingual environments (in the study: schools with a number of pupils with English as an additional language (EAL) higher than the UK average) were more positive about being bilingual than those in more monolingual settings (schools with fewer than average pupils with EAL). Children expressed the potential positive impact of additional social and communication opportunities as a result of bilingualism, for example to interact with their extended family. The second study explored the lived experiences of autistic multilingual adults who spoke four or more languages.²¹ Participants reported that bilingualism had enabled them to better understand themselves and others around them – for example introducing them to different ways of thinking –, and it provided opportunities for hobbies, travel, work, and building and maintaining relationships – for example allowing them to connect with the autistic community around the world. Taken together, these findings suggest that bilingualism comes with a plethora of benefits across socio-cultural and communicative domains. However, both studies employed relatively specialised subgroups of the autistic bilingual community; one being children's experiences, and the other a group of multilingual adults with four or more languages. It is likely that the experiences of multilingual individuals are not representative of the wider autistic bilingual population, and research suggests that the majority of autistic bilingual people do not have four languages or more.²⁷ Therefore, a direct account from a broader range of autistic bilingual adults is necessary to fully capture the effect of bilingualism on autistic people's identity, well-being and inclusion in society.

This study addresses this gap by understanding the intersection of autism and bilingualism with a broader representation of participants with two or more languages. This study explores the experiences of 39 autistic bi- and multilingual adults, with a focus on how each identity – being autistic and being bilingual – affects their experience of the other, and the importance of linguistic identity in their everyday lives. The research questions are: (1) How do the motivations and benefits expressed by multilingual autistic people match those of the wider autistic bilingual population? (2) Do autistic bilingual people perceive being bilingual as part of their identity? (3) What are the barriers and enablers identified by autistic bilingual people in their bilingual journey?

2 Methods

Methodological approach

This study used a cross-sectional survey design with self-report measures and open-ended questions to explore the demographic and language profiles of autistic bilingual people, as well as their lived experiences. Data were analysed thematically.

Participants

Thirty-nine autistic bilingual people participated in the study. Inclusion criteria stated that participants had to be aged 16 or above, have self-reported knowledge of at least two languages, have a self-reported autism diagnosis, and reside in the UK at the time of the study. Language proficiency was not assessed, which is further discussed in the Limitations section below. The study received ethical approval from the PPLS Research Ethics Committee of the University of Edinburgh (reference 338-1718/4). The researchers advertised the study via a flyer (available at <https://osf.io/mxs8/>) circulated through social media, autism charities and networks across the UK, disability services of UK universities, and lists of participants from previous research who had expressed interest in taking part in additional studies.

Procedure

All participants completed an online consent form and were sent a personal link to the online survey. Participants were then invited to take part in a follow-up neurocognitive assessment outside the scope of the present study. Data were collected from July to December 2018. Participants received a £20 gift voucher as compensation for their time and their support with the overall project, which involved participating in online questionnaires and the neurocognitive assessment. Participants had to be able to complete the questionnaire independently without support. This limitation is further discussed in the Limitations section below.

Measures

The study used the Demographic & Language Questionnaires, an online survey built in Qualtrics, available to view at <https://osf.io/ns7ma/>.²⁸ The survey contained four main sections: demographic information, detailed language history for up to seven languages (additional languages could be listed at the end of the section), overall language information related to non-verbal experiences currently and in childhood and language-switching habits, and open-ended questions. The present study focused on the participants' answers to the open-ended questions. These questions addressed the experiences of language learning and experiences of language use,

and their thoughts on the role of bilingualism and the interplay between autism and their bilingualism experience. No question was mandatory, thus preserving the comfort of the participants and ensuring that answers were voluntary. The main open-ended questions, each allowing up to 20,000 characters responses, were:

1. Think about when you were learning your languages. What was easy? What was challenging?
2. Do you think learning and knowing several languages is useful? Why? (For people in general, and for you in particular)
3. Is there anything you want to tell us, but we didn't ask?

Participants also completed other assessments during a follow-up in-person appointment as part of a study on the sociocognitive effects of bilingualism. These additional assessments included the Wechsler Abbreviated Scale of Intelligence 2nd Edition (WASI-II) to measure non-verbal IQ, the Test of Everyday Attention to measure executive skills, a visual perspective-taking task, and a cognitive and affective perspective-taking task. The data gathered in these cognitive assessments are outside the scope of the present study, and only the non-verbal IQ score is provided here for additional information regarding the participants, thus clarifying who is and is not represented in this study.

Data analysis

All participants completed the Demographic and Language Questionnaire in full. To accurately describe the sample, we analysed and combined their responses to create new language profile measures for each language reported: overall language proficiency, acquisition context, and current context of use. Full details of the questionnaire data management are available in Supplementary material 1. Demographics and language history data were analysed with descriptive analyses using R (version 3.5.3).

Answers to the open-ended questions were analysed in NVivo (release 1.5) using inductive thematic analysis within a critical realist framework.²⁹ This method is an appropriate approach for exploratory studies addressing under-researched topics, deriving themes from raw data rather than looking at the data from the perspective of prior theories and assumptions.³⁰ This process involved six stages of data analysis: familiarisation with the data, preliminary coding of the data, generation of patterns or themes across the codes, review of the themes, definition and naming of the themes, and production of the analysis report.³⁰

After familiarisation with the data, two coders (B.G.D. and R.D.) each analysed the answers of respectively 26 and 25 participants for first-level codes, leading to the answers of 12 participants (31%) being double-coded, to confirm consensus between the coders. First, the coders independently produced the first-level codes for these 12 participants' data, before reconvening

to compare the codes and reach a consensus. The first-level codes generated for the double-coded data were all identical or thematically equivalent (i.e., the first-level code “Broaden perspective-mindset” generated by B.G.D. was equivalent to the first-level code “mind-expanding” generated by R.D.), confirming consensus between the coders. Each coder then conducted the first-level coding of their remaining allocated data. The first-level coding led to 86 distinct first-level codes across all 39 participants (see Supplementary material 4 for examples of first-level codes). The coders conducted together the subsequent stages of the thematic analysis to group the first-level codes into mid-level sub-themes and top-level themes, to reach a final combination that meaningfully encapsulated almost all the coded material, as per Braun and Clarke’s guidelines.³⁰ This combination of themes and sub-themes is reported below to address our research questions.

3 Results

3.1 Respondents

The participants (n=39)’ mean age was 34.5 years (range: 16-61), and the mean age when receiving a clinical diagnosis of autism was 26.6 years (range: 3-56). Gender distribution was 41.0% female, 35.9% male, and 23.1% either disclosed a different gender identity or did not disclose their gender identity. Mean non-verbal IQ as measured by the WASI-II was 119.8 (SD = 10.4, range = 101 – 145), highlighting that the group consisted only of people with average to very high IQ. Forty-eight per cent of participants were native English speakers. Non-native English speakers (52%) reported their English proficiency as part of the Language Questionnaire, self-rating their oral and written comprehension and expression proficiency on a 9-point scale, ranging from 0 proficiency = “not at all proficient” to 8 = “excellent proficiency”. An overall English proficiency score was calculated for each participant as the average of the four self-rated proficiency scores, with a group mean of 7.33 (SD = 0.99, range: 4.50-8.00) across all non-native English speakers. Importantly, 7 (18%) participants self-reported having been non- or minimally-speaking in childhood by selecting “Yes” to the question “Were you non-verbal as a child (in other words, did you start speaking unusually late in your childhood)?”. Further demographic and language characteristics are reported in Tables 1, Figure 1, and Supplementary Materials 2 and 3.

Table 1 – Participants’ demographic characteristics (n=39)

Age in years, M (SD, range)	34.5 (12.8, 16 – 61)
Age at diagnosis in years, M (SD, range)	26.6 (14.4, 3 – 56)
Gender, N (%)	
Female	16 (41.0)
Male	14 (35.9)
Other gender identity / Not disclosed	9 (23.1)
Non-verbal IQ, M (SD, range)	119.8 (10.4, 101 – 145)
Highest Education, N (%)	
Less than an undergraduate degree	12 (30.8)
Undergraduate degree or higher	26 (66.7)
Country of birth, N (%)	
UK	19 (48.7)
Non-UK, English-speaking ^a	5 (12.8)
Europe, non-English speaking ^b	9 (23.1)
Non-Europe, non-English speaking ^c	5 (12.8)
Non-UK-born UK-residents, N (%)	19 (48.7)
Age of arrival in the UK, M (SD, range)	21.4 (11.1, 2 – 38)

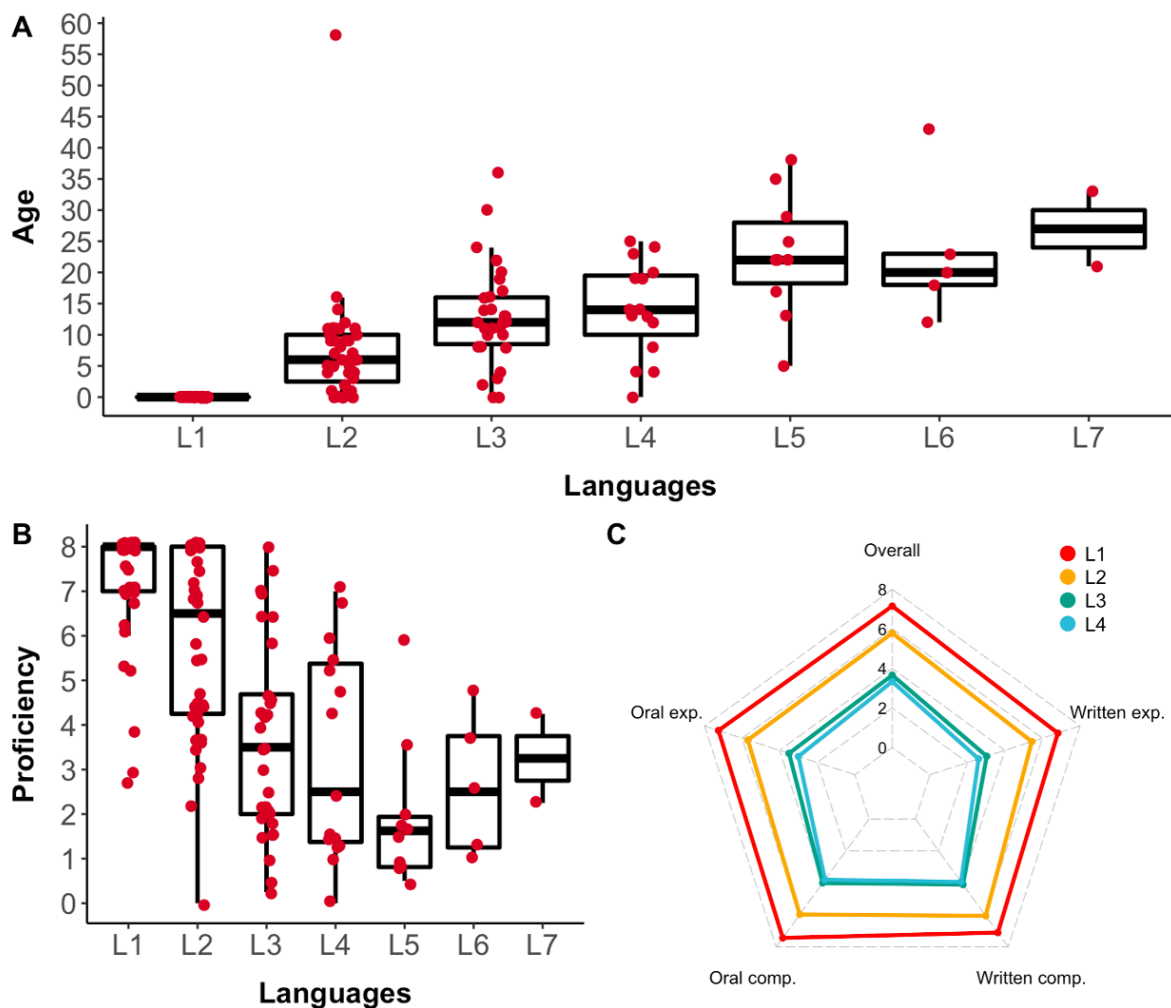
Note: Summary table of the autistic participants’ demographic characteristics. One data point was missing for the “Highest Education” question.

a = Canada (1), India (1), New Zealand (1), South Africa (1), USA (1).

b = France (2), Germany (3), Norway (3), Ukraine (1).

c = Argentina (1), China (1), Macau (1), Russia (1), South Korea (1)

Figure 1 – Age of acquisition and proficiency for the languages reported



A. Age of acquisition: Scatterplot and boxplot showing the distribution of the ages of acquisition (in years) for the languages (L) 1 to 7 reported by each participant, ranked by age of acquisition.

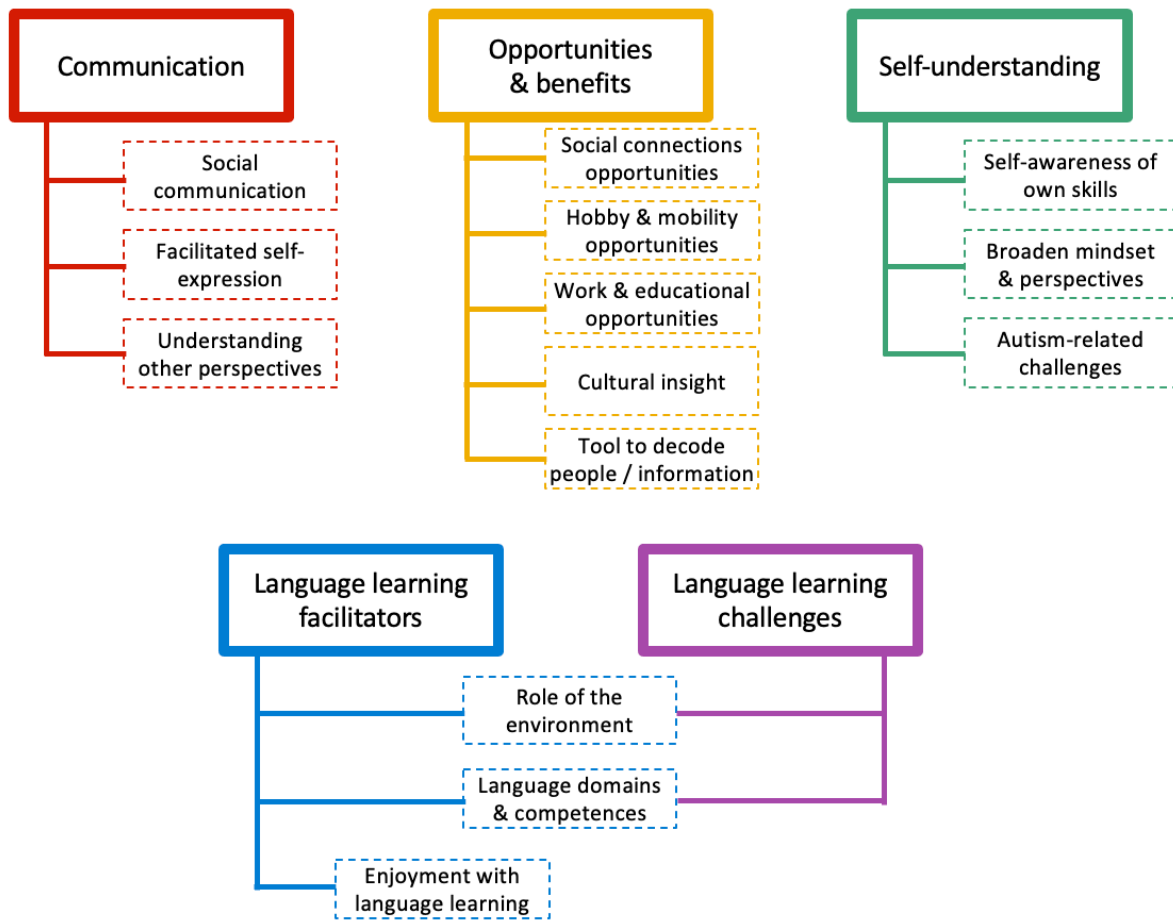
B. Language proficiency: Scatterplot and boxplot showing the distribution of the overall self-rated proficiency (averaged across self-rated skills in oral expression, oral comprehension, written expression, and written comprehension) for the languages (L) 1 to 7 reported by each participant, ranked by age of acquisition, on a scale from 0 (= "not at all") to 8 (= "excellent").

C. Detailed language proficiency: Radar plot of the overall and detailed (written expression, written comprehension, oral expression, and oral comprehension) self-rated proficiency of the respondents for their languages (L) 1 to 4 (ranked by age of acquisition), averaged across all participants, on a scale from 0 (= "not at all") to 8 (= "excellent").³¹

3.2 Thematic analysis

Five central themes arose from the interviews. These were: (1) 'communication'; (2) 'opportunities and benefits'; (3) 'self-understanding'; (4) 'language learning challenges'; (5); 'language learning facilitators' (Figure 2).

Figure 2 – Thematic map of themes and sub-themes identified in the data



Note. Themes are presented circled in bold, related sub-themes are circled with dashed lines.³¹

3.2.1 Theme 1: Communication

This theme envelops participants’ references to explicit discussions relating to the communicative aspect of bilingualism across all questions asked (Figure 2). It included three sub-themes: (a) ‘social communication’; (b) ‘facilitated self-expression’; and (c) ‘understanding other perspectives’.

Relating to the subtheme ‘social communication’, participants frequently highlighted communication with others as both a benefit of and a drive for knowing multiple languages. For example, *“it’s a powerful way to connect with people”* [P39], and *“I like that with a bit of practice I have access to a valuable skill (L2) for communicating with people”* [P21]².

Participants also discussed how having access to multiple languages provided them with a richer set of concepts to more precisely identify and express their thoughts and emotions, as illustrated by these quotes: *“personally it’s also fun to be able to express myself in different ways,*

² All participant quotes are reported as they appear in the data, regardless of spelling, capitalization, and/or grammatical errors.

with a wider vocabulary that takes in cultural differences” [P08], and *“[bilingualism] teaches you to express yourself in different ways if you struggle to explain yourself exactly”* [P20].

Finally, participants considered that knowing multiple languages allowed them to better understand different perspectives, referring to both cultural differences and differences between people. For example, *“[bilingualism] does allow you to appreciate that language forms ways of thinking”* [P20], and *“[bilingualism] has opened me up to many wonderful points of view and also understanding that I could only have gained through other languages”* [P01].

3.2.2 Theme 2: Opportunities and benefits

This theme encapsulates what participants perceived as increased opportunities available to them thanks to bilingualism. It brings together five sub-themes: (a) ‘social connections’; (b) ‘hobby and mobility’; (c) ‘work and education’; (d) ‘cultural insight’; and (e) ‘tool to decode people and information’.

The sub-theme ‘social connections’ refers to the notion that being bilingual had allowed some participants to create and maintain relationships with family members, friends, or romantic partners. For example: *“I also speak different languages with different family members”* [P18], *“My best friend is [nationality]³, and his family feels like my family, so I’m exposed to [language] when I’m visiting”* [P14], and *“[I] had long term relationships - sequentially - in all those languages”* [P23].

Participants reported that their hobbies were also shaped by their understanding of multiple languages, with bilingualism being useful for *“appreciating books/film/theatre/TV etc. all of which provide insights and enjoyment that can’t be obtained from sticking to one language”* [p24]. One benefit regularly mentioned was also international mobility (*“travel, travel, travel”* [P23]), as illustrated by *“[bilingualism] is useful to travel and live abroad”* [P09]. In several cases, participants had moved to a different country either as a motivation to learn another language, or as an opportunity made possible because they already knew the language.

Related to this is the sub-theme of ‘work and educational opportunities’, referring to the participant’s reports that bilingualism had been key in pursuing their higher education or securing employment. This is illustrated by the following quotes: *“it helped me being able to come here to study”* [P04], and *“it is essential for my work”* [P24].

Participants regularly listed ‘cultural insight’ as a benefit, linking specific languages to the cultures that use them. For example, P24 wrote *“knowledge of other languages is useful for understanding how people from other cultures think, how other cultures work”*.

Conversely, some participants described the process of learning additional languages as a puzzle to be figured out, while others use languages as tools that allow them to *“decipher”* [P16]

³ All languages (but English) and countries (but the United-Kingdom) were removed for anonymity.

the meaning of concepts or information, independent of a communicative role: *“while I know that many people consider languages as a means of communication, I rather see them as an intricate and complex web of interconnected system that govern the world”* [P18], and *“it helps to make different connections to the same concept”* [P07].

3.2.3 Theme 3: Self-understanding

This theme summarises participants’ reflections that being bilingual had shaped their awareness and understanding of their own identity, mindset, skills, options, and difficulties. This theme gathers three sub-themes: (a) ‘autism-related challenges’; (b) ‘self-awareness of own skills’; and (c) ‘broaden mindset and perspectives’.

Participants reported that some of the social features of learning and using languages overlapped with aspects of autism; in particular differences in the social domain. Participants discussed social challenges relating to communication (*“being somewhat challenged socially made practicing speaking far more challenging”* [P20]), and social understanding (*“[bilingualism] is a way of learning to see different perspectives. This is perhaps particularly useful for me, because I have to work quite hard to see something from someone else’s perspective in the first place”* [P39]).

Relatedly, many participants explained how they had become aware of their own skills: *“it’s been such a great experience learning my own capabilities”* [P21]. This awareness was often implicitly positioned relative to a hypothetical norm – or typically autistic abilities – and thus we interpret these insights as having a connection to autistic identity. For example, several participants considered that they enjoyed language learning *“far more than the average person”* [P16] or found it *“easier than most people”* [P10]. Three participants (P03, P11, and P21) specified being hyperlexic, but others instead described their *“natural ability”* [P25] with specific language-related skills, most notably the production of native-like accents thanks to their listening skills (P10 and P16), or the understanding of grammar rules (P16). Participants also expressed pride and feeling rewarded when reaching a level of proficiency allowing them to use their languages. *“For me, it is useful simply because it is quite rewarding and calming when something that was so alien to me before now makes sense”* [P22], and *“learning languages have given me a feeling that I can do something”* [P14].

Finally, participants expressed that knowing several languages had shaped their identity more generally, and broadened their mindset, attitudes, and perspectives. Indeed, several participants stated that being bilingual has influenced their *“ways of thinking”* (*“different sentence structures and ways of expression enhances the way of thinking about and seeing the world”* [P37]) and their perspectives more broadly (*“[my languages] broaden my perspective”* [P17]). Some participants also considered the influence of bilingualism as part of their identity, as expressed by P03 *“I have a unique perspective on the world because I have experienced more than one culture*

and have lived in both”, and P05, “multiple languages have been part of my identity and background”. Overall, this sub-theme can be summarised by P32’s quote: “the languages that you know draw the boundary of your world”.

3.2.4 Theme 4: Language learning challenges

This theme brings together the references to elements that made language learning difficult, and contains two sub-themes: (a) ‘role of the environment’; (b) ‘language domains and competences’.

Participants identified the language learning environment as playing a crucial role across several elements of language learning or skill development, though what constituted a challenging environment varied between participants. For example, participants reported that “learning in school was difficult” [P12], listing school-based tasks such as learning lists of words or following a pre-defined pace as unsuitable for them. On the contrary, several participants also considered that learning languages in adulthood was more challenging than in childhood, either explaining that “as an adult, I find it difficult to memorise vocabulary and grammar” [P17], or that “adult things’ comes in the way, not that language learning is harder in itself now” [P14]. Lack of opportunities to practice was identified as a barrier to learning, as illustrated by P13 with “the most challenging part is to retain the knowledge. I’m fairly good at picking up new languages, but I forget about them just as easily when I don’t use them”. Some participants pointed out that their self-perceived social challenges made practicing oral expression difficult.

Importantly, participants highlighted specific language competences or domains as being challenging, though these competences or domains differed between participants. Oral comprehension and expression were regularly mentioned as difficult (“I find hearing and speaking the language difficult” [P26]), with oral expression being often singled out, and several participants explained that “speaking is challenging for [them] because [they] become very anxious about making a mistake” [P11]. Several participants experienced difficulties with memorising vocabulary and /or grammar. For some participants, difficulties rather related to disentangling double meanings and expressions across languages.

3.2.5 Theme 5: Language learning facilitators

This theme refers to the participants’ opinions on the factors facilitating their language learning journey, and contains three sub-themes: (a) ‘role of the environment’; (b) ‘language domains and competences’; and (c) ‘enjoyment with language learning’.

Several participants pointed out that learning languages had been easy for them in childhood, be that with their close or extended family, in their community more generally, or in primary school, as expressed by P10: “I did not find learning English or [language] challenging in primary school”, who benefitted from school-based learning. Indeed, some participants explained

how their learning environment (family, community, school, or on their own) had supported their language learning. On the contrary, for some participants learning with their family or within a country or community that used the language had facilitated their progress, *“learning in the country where it was spoken was loads easier”* [P12], but not school-based learning. Importantly, being able to follow their own learning pace had been particularly beneficial for some participants. A final environmental facilitator that encouraged practice opportunities was having language learning as a shared interest with friends, partners, or family members, as illustrated by this quote: *“my friend and I loved [language] so much so we were encouraged to learn more with our excitement for the language”* [P25].

Participants highlighted several language competences or domains as having been easy to develop, though again, these differed between participants. Written comprehension and expression were regularly reported as easy (*“reading and writing has always been a lot easier in acquiring a new language than listening and talking it”* [P37]). However, some participants found pronunciation easy, especially imitating accents, as explained by P16: *“I have a really good ear for languages and can reproduce non-native sounds with good accuracy”*. Several participants pointed out that they had been able to learn either or both vocabulary and grammar with ease – as shown respectively by the following quotes: *“I find learning vocabulary very easy in all languages”* [P30] and *“I have always enjoyed grammar and the rules”* [P16] – especially when they were able to rely on connections and similarities between their languages.

Finally, participants discussed how enjoying cultures, languages or language learning had supported and facilitated their learning, as illustrated by P25: *“It was easy when you had enthusiasm. [...] It was difficult, but fun. With [language], I enjoyed learning the language a lot and I did not find it difficult, I found it easy.”*

4 Discussion

This study is the first to report the lived experiences of a group of UK-based autistic bi- and multilingual adults who know two or more languages. The findings reveal numerous ways in which bilingualism can shape the life of autistic people, and in which autism can shape the language learning journey of bilingual people, with autism and bilingualism influencing one another. Building upon previous findings, the themes identified in this study show how the benefits of knowing two or three languages mirror those of knowing four or more languages for autistic people.²¹ For example, we reported that autistic bilinguals consider that knowing more than one language had allowed them to access a range of opportunities – such as social connections and hobbies, and had shaped their social communication skills. The findings, especially those related to the self-understanding theme, also highlight how being bilingual can

be an integral part of autistic bilingual people's identity, and shed light on the factors that can complicate or facilitate their language learning.

This group included a wide range of demographic and language profiles (for example with ages of acquisition of their second language ranging from birth to adulthood, with varying language learning environments, and varying levels of proficiency), reflecting the diversity of the autistic bilingual population described in previous research.^{21,32} This allowed us to capture a diverse range of lived experiences and insights regarding the bidirectional influence of autism and bilingualism. Even though the majority (24 out of 39) of the participants only reported two or three languages, the motivations to learn languages and the perceived benefits they discussed mirrored those expressed by autistic multilinguals with four or more languages.²¹ Motivations and benefits discussed included personal elements (such as enjoyment in language learning or self-awareness of their abilities), interpersonal elements (such as facilitated communication or social connections), and societal elements (such as access to opportunities and cultural insight). Overall, the social domain was highlighted as a key element of the intertwined experience of autism and bilingualism, emerging from both the 'Opportunities & benefits' and 'Communication' themes. Participants explained how bilingualism either supported or enabled meaningful relationships, and they reported that learning and knowing several languages had strengthened their social and communication skills, as well as their ability to understand other perspectives. This finding dovetails with that of Digard et al. (2020)³² suggesting a relationship between bi- and multilingualism and self-rated social life quality for autistic adults. This is particularly relevant as these domains are regularly reported as challenging for autistic people.³³⁻³⁵ Strikingly, a majority of the participants (25 out of 39) spontaneously mentioned a social element to their bilingual experience at least once, particularly its benefits, even though the questions were not prompting towards this theme. This finding supports the idea of intrinsic social motivation for many autistic people within this group. This adds to the growing body of literature showing that autistic people do not intrinsically lack social drive,³⁶ and that social elements play an important role in their everyday life as is the case for non-autistic people – for example through friendships and relationships, which are positive predictors of autistic adults' quality of life.³⁷ Crucially, the social connections enabled by their knowledge of multiple languages and their drive also included connections with their autistic peers from around the world,²¹ in turn informing their identity-building as autistic. Outside of the social domain, and similarly to the accounts of the multilingual autistic respondents from Nolte et al. (2021)²¹, participants expressed benefits of bilingualism in several other contexts linked with wider issues encountered by autistic people, including confidence in their abilities³⁸ or employment opportunities. This is particularly relevant as being employed has been linked with a higher quality of life for autistic adults,³⁷ while unemployment is an ongoing serious issue for the autistic community.³⁹ Arguably, it is evident that many of these

motivations and perceived benefits can be experienced by any bilingual, regardless of their neurotype. Indeed, research in non-autistic populations also reports benefits of bilingualism in academic and professional opportunities, communication, and sociocultural understanding.^{40,41}

Expanding on the experiences of autistic multilinguals presented in Nolte et al. (2021),²¹ the current results also reveal the interplay between autism, bilingualism, and identity. Indeed, being bilingual is an intrinsic part of many participants' identities. For some, this is more closely aligned with the bi-cultural component of their experience – especially for those who have grown up hearing and/or speaking several languages or have lived in different countries. For others, it is due to bilingualism shaping their own self-understanding – for example allowing them to access interests and hobbies, set their own goals, broaden their perspectives, or better understand their own abilities. These findings highlight the importance of supporting bilingual autistic children,⁴² as it is evident that bilingualism can act as an additional tool to help autistic people thrive within their community, family and own individual identity. In addition, it is equally crucial to support autistic people who want to become bilingual, as this skill can open doors for additional opportunities.

There is evidence identifying societal and institutional barriers in terms of access to additional language learning for autistic people,⁴² and indications that autistic people themselves consider autism as both an advantage and a disadvantage for additional language learning.²¹ This study also identifies some of the specific challenges and facilitators that autistic bilinguals identify related to language learning.

Participants highlighted the role of the environment, though different respondents favoured different learning environments. Some respondents reported that learning from birth with their families had been the best option for them, others pointed out that they had benefitted from school-based learning. Others still explained how school-based learning could sometimes be ill-suited to their learning profile, and they favoured independent or community-based learning. As such, while many respondents identified a preferred learning environment, not all did, and some mentioned that their preferred environment changed between childhood and adulthood. Together, this suggests that supporting a range of learning opportunities could benefit the learners. Importantly, participants also listed numerous language domains and language competencies – such as oral expression and comprehension, grammar, or vocabulary – that in some cases were easy to develop, while in other cases were particularly challenging. In short, the similarities in language domains listed and the discrepancies in participants' experiences highlight that for autistic learners (just as for neurotypical learners), there is not a “one size fits all” approach to language learning; one skill can be easy for some learners, whilst difficult for others. Future research should better understand how the specificities of autism might shape autistic learners' acquisition of the different language domains listed above. In addition, this

diversity in language learning experiences reinforces the need for individualised, person-centred support for autistic learners of additional languages.⁴²

The present study raises new questions regarding the joint experience of autism and bilingualism. A dedicated investigation of the language learning strategies of autistic people would provide the autistic community with better-suited learning experiences and support. In addition, a comparative account of the experience of autistic and non-autistic bilinguals would show whether and how autistic people can uniquely experience bilingualism, for example in terms of the sensory aspects of languages, or regarding communicative benefits. Finally, and importantly, as participants spontaneously mentioned social cognitive processes – in particular the understanding of different perspectives – as an aspect of their lives shaped by bilingualism, the relationship between bilingualism and social cognition in autism should be investigated further. To date, this relationship has almost exclusively been studied in neurotypical populations, and remains limited.⁴³ In autism, the relationship between bilingualism and social processes has only been covered by a few studies, which focused on social life quality,³² overall functional⁴⁴ or social⁴⁵ communication, or overall social functioning.^{13,46} As participants independently pointed out the link between bilingualism and social process, it is essential to address this question in the context of autism specifically.

Limitations

The findings should be considered in light of their limitations. First, the data were collected using open-ended questions that included very few prompts. While this was suitable in that it allowed participants to report elements of their experience that were the most relevant to them, it will be important for future research to investigate each topic more specifically, focusing first on the facilitators and barriers to language learning, to better support autistic language learners. Further intersecting experiences could be revealed by giving priority to depth over breadth, such as biculturalism or migratory experiences of autistic bilingual people.

Although each participant also attended an in-person appointment, we did not conduct any standardised language skills assessment, thus preventing us from rigorously verifying the self-reported proficiencies. Similarly, we did not verify the presence of language impairments or savant skills, only enquiring about experiences of being non-speaking in childhood or adulthood, as mentioned in the Methods section 2.3. Previous research shows that self-ratings of language proficiency and standardised language tests provide similar results,^{3,47} but this has not yet been verified with an autistic population.

There are also limitations regarding the profile of our participant sample profile. Females were over-represented in comparison to the male-to-female ratio estimates in autism averaging 3:1.⁴⁸ However, the gender distribution in our group mirrored the commonly reported bias

towards female participants in online studies,^{49,50} including in autism research.⁵¹ Additionally, we did not enquire about the ethnicity of the participants, though we recognise that intersectionality⁵² between autism, ethnicity, and language status could also impact the experience of autistic bilinguals.⁵³ Furthermore, our current methods – which involved no additional support to the participants to complete neither the questionnaire nor the additional cognitive assessments – were unlikely to allow participation from bilingual autistic people with intellectual disabilities, contributing to the lack of understanding of this specific population. Indeed, the mean non-verbal IQ in the group was 119.8 (range = 101 – 145), highlighting that our study did not include any input from autistic bilingual people with lower IQ or intellectual disability. Similarly, the age at diagnosis (Table 1, mean = 26.6, range = 3 – 56) as well as the participants’ responses (particularly those covered in section 3.2.3 Theme 3: Self-understanding) hints that apart from the 7 respondents (18%) who self-report having been non- or minimally-speaking in childhood, people in this group may not have experienced marked language delays as children. The lack of representation of autistic bilingual people with lower IQ, intellectual disability, or language delay is a limitation that has to be considered in the broader societal context of additional language learning access for all autistic people. Indeed, currently and over the last few decades, autistic children and young people, especially those with language delay or intellectual disabilities are being denied opportunities for additional language learning, including within their own family and cultural community. These attitudes and policies against bilingualism for autistic people inevitably lead to bias in the current adult autistic bilingual population – and by extension in the related research – against those with language delay or intellectual disability. Still, it is urgent that upcoming research provides a better representation and understanding of these specific populations. Finally, participants were all residing in the UK at the time of the study, and it is reasonable to assume that autistic bilinguals residing in other countries might have different experiences. However, this sample greatly varied regarding their country of origin, age, and age at diagnosis of autism, allowing variation in diagnosis procedures across time and space to shape the participants’ overall lived experiences. Importantly, we must point out that the different language learning environments (i.e. at home, at school, or in the community) reported by the participants, as well as their current use of their languages (i.e. their current level of immersion in their non-native languages) may also have influenced the overall picture of the results reported here. Future research should seek to better represent each specific language journey, such as growing up bilingually in a bilingual environment, or learning a foreign language at school before moving to a country where the language is spoken, amongst other profiles.

5 Conclusion

This study is the first to report the perception of a larger group of autistic bilingual adults living in the UK regarding their joint experience as being both autistic and bilingual. Participants described numerous motivations and benefits to being bilingual – citing for example social factors or access to opportunities, as well as a better understanding of themselves and others, how being bilingual had shaped their identity, and how specific environmental and language-dependent factors could both enable or hinder their language learning. These findings have implications for bilingual families and the practitioners who support them. Knowing the long-term benefits of bilingualism identified by autistic bilinguals themselves will help reduce the worries of bilingual parents regarding a bilingual upbringing, and it will also provide practitioners and policy-makers with clear evidence for equal access to additional language learning opportunities for autistic people. In addition, gaining a deeper insight into the various language learning experiences of autistic people will inform general and language-specific education practices, to better support bilingual learners and learners of additional languages.

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Authorship Disclosure Statements

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Authorship Confirmation Statement

Digard BG contributed to the conceptualization and methodology of the study, curation of the data, analysis of the data, validation of the analysis, investigation, and visualisation of the results, writing of the original draft, and reviewing and editing of the manuscript. Davis R contributed to the analysis of the data, validation of the analysis, writing of the original draft, and reviewing and editing of the manuscript. Stanfield A contributed to the funding acquisition, the resources for the completion of the study, and the overall supervision of the project. Sorace A contributed to the overall supervision of the project. Fletcher-Watson S contributed to the resources for the completion of the study, and the overall supervision of the project. All co-authors reviewed and approved the manuscript prior to submission. The manuscript has been submitted solely to this journal and is not published, in press, or submitted elsewhere.

References

1. Grosjean F. *Bilingual*. Harvard University Press; 2010.
2. Dover CJ, Couteur AL. How to diagnose autism. *Arch Dis Child*. 2007;92(6):540-545. doi:10.1136/adc.2005.086280
3. Brantmeier C, Vanderplank R, Strube M. What about me?: Individual self-assessment by skill and level of language instruction. *System*. 2012;40(1):144-160. doi:10.1016/j.system.2012.01.003
4. Brignell A, Morgan AT, Woolfenden S, et al. A systematic review and meta-analysis of the prognosis of language outcomes for individuals with autism spectrum disorder. *Autism Dev Lang Impair*. 2018;3:2396941518767610. doi:10.1177/2396941518767610
5. Mitchell S, Brian J, Zwaigenbaum L, et al. Early Language and Communication Development of Infants Later Diagnosed with Autism Spectrum Disorder: *J Dev Behav Pediatr*. 2006;27(Supplement 2):S69-S78. doi:10.1097/00004703-200604002-00004
6. Tager-Flusberg H. Do Autism and Specific Language Impairment Represent Overlapping Language Disorders? In: *Developmental Language Disorders*. Psychology Press; 2004.
7. Kjelgaard MM, Tager-Flusberg H. An investigation of language impairment in autism: Implications for genetic subgroups. *Lang Cogn Process*. 2001;16(2-3):287-308. doi:10.1080/01690960042000058
8. Mayes SD, Breaux RP, Calhoun SL, Frye SS. High Prevalence of Dysgraphia in Elementary Through High School Students With ADHD and Autism. *J Atten Disord*. 2019;23(8):787-796. doi:10.1177/1087054717720721
9. Steffenburg H, Steffenburg S, Gillberg C, Billstedt E. Children with autism spectrum disorders and selective mutism. *Neuropsychiatr Dis Treat*. 2018;Volume 14:1163-1169. doi:10.2147/NDT.S154966
10. Craig HK, Telfer AS. Hyperlexia and Autism Spectrum Disorder: A Case Study of Scaffolding Language Growth Over Time. *Top Lang Disord*. 2005;25(4):364-374. doi:10.1097/00011363-200510000-00011
11. Mottron L, Dawson M, Soulières I. Enhanced perception in savant syndrome: patterns, structure and creativity. *Philos Trans R Soc B Biol Sci*. 2009;364(1522):1385-1391. doi:10.1098/rstb.2008.0333
12. Beauchamp MLH, MacLeod AAN. Bilingualism in children with autism spectrum disorder: Making evidence based recommendations. *Can Psychol Can*. 2017;58(3):250-262. doi:10.1037/cap0000122
13. Uljarević M, Katsos N, Hudry K, Gibson JL. Practitioner review: Multilingualism and neurodevelopmental disorders – an overview of recent research and discussion of clinical implications. *J Child Psychol Psychiatry*. 2016;57(11):1205-1217. doi:10.1111/jcpp.12596
14. Montgomery L, Chondrogianni V, Fletcher-Watson S, Rabagliati H, Sorace A, Davis R. Measuring the Impact of Bilingualism on Executive Functioning Via Inhibitory Control Abilities in Autistic Children. *J Autism Dev Disord*. Published online August 18, 2021. doi:10.1007/s10803-021-05234-y
15. Valicenti-McDermott M, Tarshis N, Schouls M, et al. Language differences between monolingual english and bilingual english-spanish young children with autism spectrum disorders. *J Child Neurol*. 2013;28(7):945-948. doi:10.1177/0883073812453204
16. Drysdale H, van der Meer L, Kagohara D. Children with autism spectrum disorder from bilingual families: A systematic review. *Rev J Autism Dev Disord*. 2015;2(1):26-38. doi:10.1007/s40489-014-0032-7
17. Hampton S, Rabagliati H, Sorace A, Fletcher-Watson S. Autism and bilingualism: A qualitative interview study of parents' perspectives and experiences. *J Speech Lang Hear Res*. 2017;60(2):435-446. doi:10.1044/2016_JSLHR-L-15-0348
18. Kay-Raining Bird E, Lamond E, Holden J. Survey of bilingualism in autism spectrum disorders. *Int J Lang Commun Disord*. 2012;47(1):52-64. doi:10.1111/j.1460-6984.2011.00071.x

19. Yu B. Issues in bilingualism and heritage language maintenance: Perspectives of minority-language mothers of children with autism spectrum disorders. *Am J Speech Lang Pathol.* 2013;22(1):10-24. doi:10.1044/1058-0360(2012/10-0078)
20. Yu B. Code-Switching as a Communicative Resource Within Routine, Bilingual Family Interactions for a Child on the Autism Spectrum. *Perspect ASHA Spec Interest Groups.* 2016;1(14):17-28. doi:10.1044/persp1.SIG14.17
21. Nolte K, Fletcher-Watson S, Sorace A, Stanfield A, Digard BG. Perspectives and Experiences of Autistic Multilingual Adults: A Qualitative Analysis. *Autism Adulthood.* 2021;3(4):310-319. doi:10.1089/aut.2020.0067
22. Halle TG, Whittaker JV, Zepeda M, et al. The social-emotional development of dual language learners: Looking back at existing research and moving forward with purpose. *Early Child Res Q.* 2014;29(4):734-749. doi:10.1016/j.ecresq.2013.12.002
23. Han WJ, Huang CC. The Forgotten Treasure: Bilingualism and Asian Children's Emotional and Behavioral Health. *Am J Public Health.* 2010;100(5):831-838. doi:10.2105/AJPH.2009.174219
24. Jegatheesan B. Multilingual Development in Children with Autism : Perspectives of South Asian Muslim Immigrant Parents on Raising a Child with a Communicative Disorder in Multilingual Contexts. *Biling Res J.* 2011;34(2):185-200. doi:10.1080/15235882.2011.597824
25. Sher DA, Gibson JL, Browne WV. "It's Like Stealing What Should be Theirs." An Exploration of the Experiences and Perspectives of Parents and Educational Practitioners on Hebrew-English Bilingualism for Jewish Autistic Children. *J Autism Dev Disord.* Published online October 16, 2021. doi:10.1007/s10803-021-05314-z
26. Howard KB, Katsos N, Gibson JL. The school experiences of bilingual children on the autism spectrum: An interpretative phenomenological analysis. *Res Dev Disabil.* 2019;87:9-20. doi:10.1016/j.ridd.2019.01.008
27. Digard BG, Sorace A, Stanfield A, Fletcher-Watson S. Autism and multilingualism: Language profiles and lived experiences. Published online August 7, 2020. doi:10.17605/OSF.IO/N5ERH
28. Digard BG, Fletcher-Watson S. Autism & Bilingualism: Demographic and Language Questionnaires. Published online May 16, 2020. doi:10.17605/OSF.IO/NS7MA
29. Maxwell JA. *A Realist Approach for Qualitative Research.* SAGE; 2012.
30. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol.* 2006;3(2):77-101. doi:10.1191/1478088706qp063oa
31. Digard BG, Davis R, Sorace A, Stanfield A, Fletcher-Watson S. Being autistic and bilingual: A thematic analysis of the experiences of autistic bilingual adults living in the UK. Published online November 28, 2021. doi:10.17605/OSF.IO/GTXJ5
32. Digard BG, Sorace A, Stanfield A, Fletcher-Watson S. Bilingualism in autism: Language learning profiles and social experiences. *Autism.* Published online July 17, 2020;1362361320937845. doi:10.1177/1362361320937845
33. Brighenti S, Schintu S, Liloia D, Keller R. Neuropsychological aspects of Asperger Syndrome in adults: a review. *Neuropsychol Trends.* 2018;(24):63-95. doi:10.7358/neur-2018-024-brig
34. Velikonja T, Fett AK, Velthorst E. Patterns of Nonsocial and Social Cognitive Functioning in Adults With Autism Spectrum Disorder: A Systematic Review and Meta-analysis. *JAMA Psychiatry.* 2019;76(2):135. doi:10.1001/jamapsychiatry.2018.3645
35. Vincent A, Fonseca DD, Baumstarck K, Charvin I, Alcaraz-Mor R, Lehucher-Michel MP. The quality of life and the future of young adults with Asperger syndrome. *Disabil Rehabil.* 2019;0(0):1-8. doi:10.1080/09638288.2018.1544297
36. Jaswal VK, Akhtar N. Being versus appearing socially uninterested: Challenging assumptions about social motivation in autism. *Behav Brain Sci.* 2019;42. doi:10.1017/S0140525X18001826

37. Mason D, McConachie H, Garland D, Petrou A, Rodgers J, Parr JR. Predictors of quality of life for autistic adults: Quality of life of autistic adults. *Autism Res.* 2018;11(8):1138-1147. doi:10.1002/aur.1965
38. Nguyen W, Ownsworth T, Nicol C, Zimmerman D. How I See and Feel About Myself: Domain-Specific Self-Concept and Self-Esteem in Autistic Adults. *Front Psychol.* 2020;11. Accessed May 8, 2022. <https://www.frontiersin.org/article/10.3389/fpsyg.2020.00913>
39. Gerhardt PF, Lainer I. Addressing the Needs of Adolescents and Adults with Autism: A Crisis on the Horizon. *J Contemp Psychother.* 2011;41(1):37-45. doi:10.1007/s10879-010-9160-2
40. Fox R, Corretjer O, Webb K, Tian J. Benefits of foreign language learning and bilingualism: An analysis of published empirical research 2005–2011. *Foreign Lang Ann.* 2019;52(3):470-490. doi:10.1111/flan.12418
41. Fox R, Corretjer O, Webb K. Benefits of foreign language learning and bilingualism: An analysis of published empirical research 2012–2019. *Foreign Lang Ann.* 2019;52(4):699-726. doi:10.1111/flan.12424
42. Davis R, Fletcher-Watson S, Digard BG. Autistic People’s Access to Bilingualism and Additional Language Learning: Identifying the Barriers and Facilitators for Equal Opportunities. *Front Psychol.* 2021;12:4074. doi:10.3389/fpsyg.2021.741182
43. Schroeder SR. Do Bilinguals Have an Advantage in Theory of Mind? A Meta-Analysis. *Front Commun.* 2018;3. doi:10.3389/fcomm.2018.00036
44. Iarocci G, Hutchison SM, Toole GO. Second language exposure, functional communication, and executive function in children with and without autism spectrum disorder (ASD). *J Autism Dev Disord.* 2017;47(6):1818-1829. doi:10.1007/s10803-017-3103-7
45. Ratto AB, Potvin D, Pallathra AA, Saldana L, Kenworthy L. Parents report fewer executive functioning problems and repetitive behaviors in young dual-language speakers with autism. *Child Neuropsychol.* Published online March 11, 2020:1-17. doi:10.1080/09297049.2020.1733512
46. Valicenti-McDermott M, Seijo R, Shulman L. Social Differences Between Monolingual English and Bilingual English-Spanish Children With Autism Spectrum Disorders. *Pediatr Neurol.* 2019;100:55-59. doi:10.1016/j.pediatrneurol.2019.07.001
47. Edele A, Seuring J, Kristen C, Stanat P. Why bother with testing? The validity of immigrants’ self-assessed language proficiency. *Soc Sci Res.* 2015;52:99-123. doi:10.1016/j.ssresearch.2014.12.017
48. Loomes R, Hull L, Mandy WPL. What Is the Male-to-Female Ratio in Autism Spectrum Disorder? A Systematic Review and Meta-Analysis. *J Am Acad Child Adolesc Psychiatry.* 2017;56(6):466-474. doi:10.1016/j.jaac.2017.03.013
49. Sax LJ, Gilmartin SK, Bryant AN. Assessing Response Rates and Nonresponse Bias in Web and Paper Surveys. *Res High Educ.* 2003;44(4):409-432. doi:10.1023/A:1024232915870
50. Smith WG. *Does Gender Influence Online Survey Participation? A Record-Linkage Analysis of University Faculty Online Survey Response Behavior.* San José State Univeristy; 2008. Accessed February 15, 2020. <https://eric.ed.gov/?id=ED501717>
51. Deserno MK, Borsboom D, Begeer S, Geurts HM. Multicausal systems ask for multicausal approaches: A network perspective on subjective well-being in individuals with autism spectrum disorder. *Autism.* 2017;21(8):960-971. doi:10.1177/1362361316660309
52. Crenshaw K. Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color. *Stanford Law Rev.* 1990;43(6):1241-1300.
53. Rosa J, Flores N. Unsettling race and language: Toward a raciolinguistic perspective. *Lang Soc.* 2017;46(5):621-647. doi:10.1017/S0047404517000562

Supplementary Materials

Supplementary material 1. Survey data management

Participants completed the online Demographic and Language Questionnaire,²⁶ which includes four main sections: demographic information, detailed language history for up to seven languages (additional languages could be listed at the end of the section), overall language information related to non-verbal experiences and language-switching habits, and open-ended questions.

Several variables were created based on the participants' responses.

Language proficiency: For each language, proficiency was calculated as the average of 4 self-rated language skills (oral expression, oral comprehension, written expression, written comprehension).

Number of languages reported (N language R): Each participant provided data on a number of languages ranging from 1 to 7.

Number of languages known with medium to high proficiency (N language P4): For each participant, this was the number of languages reported with a proficiency equal to or over 4 ("Adequate"). This threshold was defined as indicating that the respondents had a more than a basic grasp of the language. This discrete variable ranged from 1 to 7.

Age of acquisition: Participants were asked "how old were you when you first encountered L2" and the answer to this question was defined as the age of acquisition.

Language order: Participants reported their languages in varying orders (e.g. by increasing age of acquisition, or by decreasing proficiency). Languages were reordered by age of acquisition, with the 2nd language being the first language learned after the native language.

Acquisition context: For each language, participants indicated the frequency of use with different interlocutors and in different contexts. The home environment included 5 item scores (parent 1, parent 2, siblings, other people in the household, other members of the family), the school environment included 1 item (school), and the community environment included 2 item scores (friends, community). Not all participants assigned a score to all items (e.g. participants without siblings did not report a score for this item). The maximum score reported in an environment was the score assigned to that environment. The main context of acquisition was identified as the environment with the highest score. When the main (highest-scoring) context had a score strictly under 3 ("Occasionally"), the main context was re-coded as "independent", highlighting the fact that the respondent mostly learned the language independently, and didn't use it in the home, the school, or the community.

Current context: The main context of current use was identified in the same manner as the main context of acquisition. For this variable, the home environment included 7 item scores (parent 1, parent 2, siblings, partner, children, other members of the family, flatmates), the school/work

environment included 1 item (school/work), and the community environment included 2 item scores (friends, community).

Supplementary material 2. Participants' language characteristics (n=39)

A. Number of languages				B. Age of acquisition and proficiency		
	R, N (%)	P4, N (%)		Languages (N)	Age in years, M (SD, range)	Proficiency, M (SD, range)
1 lang.	0 (0.0)	6 (15.4)		L1 (39)	0 (0, 0 – 0)	7.2 (1.4, 2.8 – 8)
2 lang.	9 (23.1)	20 (51.3)		L2 (39)	7.5 (9.7, 0 – 58)	5.8 (2.1, 0 – 8)
3 lang.	15 (38.5)	10 (25.6)		L3 (30)	13.1 (8.4, 0 – 36)	3.7 (2.2, 0.3 – 8)
4 lang.	5 (12.8)	2 (5.1)		L4 (15)	13.4 (7.3, 0 – 24)	3.3 (2.4, 0 – 7)
5 lang.	5 (12.8)	0 (0.0)		L5 (10)	22.8 (9.8, 5 – 38)	2.0 (1.7, 0.5 – 6)
6 lang.	3 (7.7)	0 (0.0)		L6 (5)	23.2 (11.8, 12 – 43)	2.7 (1.6, 1 – 4.8)
7+ lang.	2 (5.1)	1 (2.6)		L7 (2)	27 (8.5, 21 – 33)	3.3 (1.4, 2.3 – 4.3)

C. Age of acquisition – Age groups distribution, n (%)						
Language (N)	Birth (age = 0)	Early childhood (age = 1 – 5)	Late childhood (age = 6 – 10)	Adolescence (age = 11 – 17)	Early adulthood (age = 18 – 30)	Adulthood (age > 30)
L1 (39)	(100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
L2 (39)	5 (12.8)	12 (30.8)	13 (33.3)	8 (20.5)	0 (0.0)	1 (2.6)
L3 (30)	2 (6.7)	3 (10.0)	5 (16.7)	14 (46.7)	5 (16.7)	1 (3.3)
L4 (15)	1 (6.7)	2 (13.3)	1 (6.7)	5 (33.3)	6 (40.0)	0 (0.0)
L5 (10)	0 (0.0)	1 (10.0)	0 (0.0)	2 (20.0)	5 (50.0)	2 (20.0)
L6 (5)	0 (0.0)	0 (0.0)	0 (0.0)	1 (20.0)	3 (60.0)	1 (20.0)
L7 (2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)

	D. Acquisition context, N (%)				E. Current context of use, N (%)			
	Home	School	Com.	Indep.	Home	S./W.	Com.	Indep.
L1 (39)	38 (97.4)	1 (2.6)	0 (0.0)	0 (0.0)	35 (89.7)	1 (2.6)	2 (5.1)	1 (2.6)
L2 (39)	11 (28.2)	11 (28.2)	6 (15.4)	11 (28.2)	19 (48.7)	8 (20.5)	2 (5.1)	10 (25.6)
L3 (30)	4 (13.8)	6 (20.7)	1 (3.4)	18 (62.1)	6 (20.0)	6 (20.0)	2 (6.7)	16 (53.3)
L4 (15)	4 (28.6)	0 (0.0)	1 (7.1)	9 (64.3)	1 (6.7)	1 (6.7)	7 (46.7)	6 (40.0)
L5 (10)	1 (10.0)	0 (0.0)	1 (10.0)	8 (80.0)	2 (20.0)	1 (10.0)	1 (10.0)	6 (60.0)
L6 (5)	1 (20.0)	1 (20.0)	0 (0.0)	3 (60.0)	3 (60.0)	0 (0.0)	0 (0.0)	2 (40.0)
L7 (2)	0 (0.0)	1 (50.0)	0 (0.0)	1 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100.0)

Note. Summary table of the autistic participants' language characteristics. Some percentages do not sum up to 100% due to cumulative rounding effects. Reported sample sizes (N) reflect the number of respondents who provided useable age of acquisition data (in years).

A. Number of languages: Number and proportion of respondents who reported (R) or were proficient (i.e. with an average self-rated proficiency equal or above 4, where 4 = "Adequate") (P4) in 1, 2, 3, 4, 5, 6, or 7 or more languages (lang.).

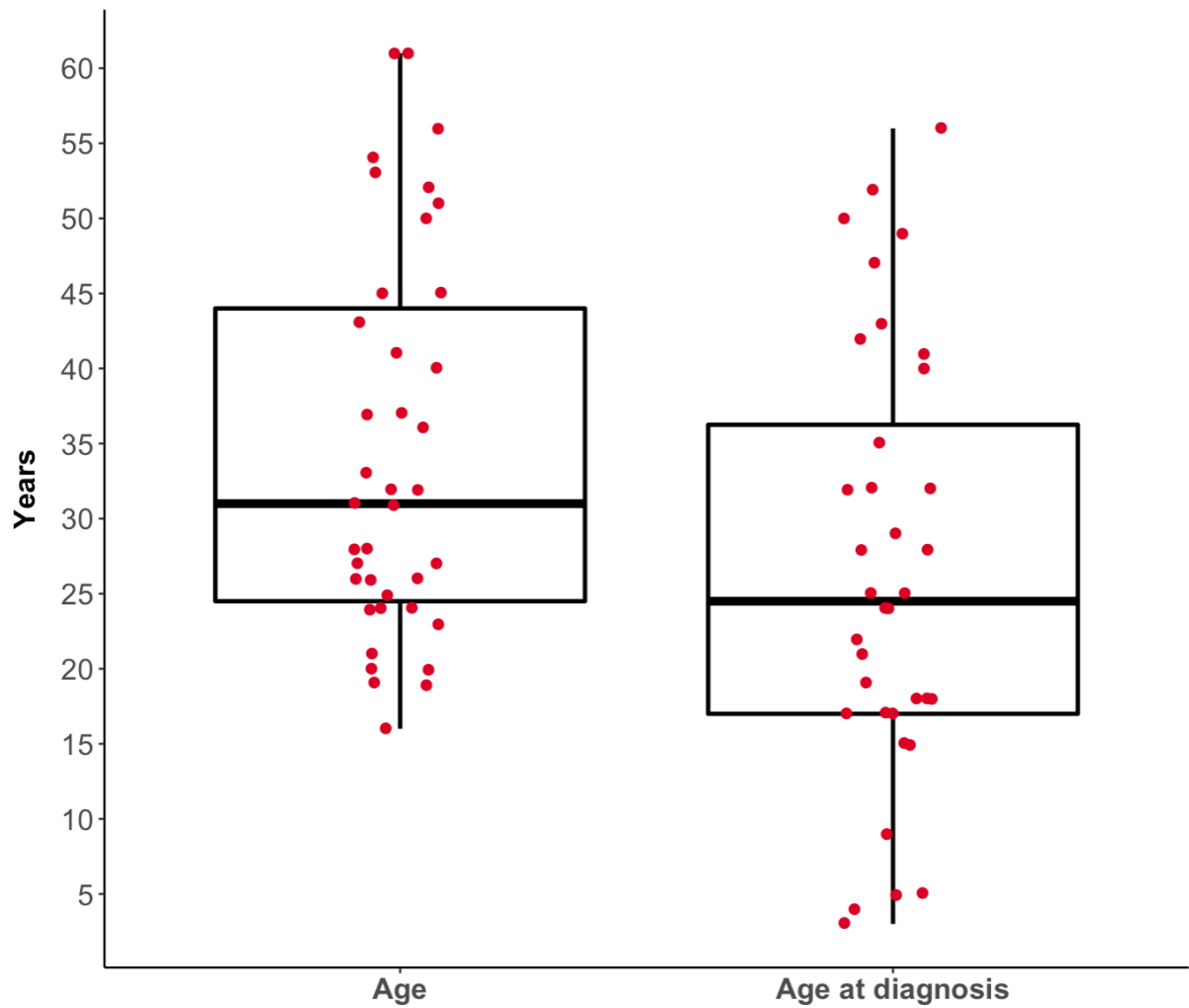
B. The age of acquisition (Age) in years, and self-reported current proficiency (Proficiency) provided by the participants for their languages (L) 1 to 7. Proficiency was calculated as the average of the self-rated proficiency score at oral production, oral comprehension, written production, and written comprehension, on a 9-points Likert-scale from 0 (= "not at all") to 8 (= "Excellent").

C. Age of acquisition – Age groups distribution: Number and proportion of respondents who acquired their languages (L) 1 to 7 at birth, during early childhood, late childhood, adolescence, early adulthood, and late adulthood.

D. The acquisition context: Number and proportion of respondents who acquired their languages (L) 1 to 7 mostly at home, at school, in the community (Com.), or independently (Indep.). One participant who reported an L3 did not report an acquisition context for L3. One participant who reported an L4 did not report an acquisition context for L4. Proportions for L3 and L4 are calculated based on the number of participants who provided the information.

E. Current context of use: Number and proportion of respondents who use their languages (L) 1 to 7 mostly at home, at school or at work (S./W.), in the community (Com.), or independently (Indep.).

Supplementary material 3. Visualisation of the participants' chronological age and age at autism diagnosis (n = 39)



Note. Boxplot and scatterplot showing the distribution of the chronological age (Age) and age at diagnosis (in years) reported by each participant.

Supplementary material 4. Examples of initial first-level codes for all identified mid-level subthemes and top-level themes

Top-level themes	Mid-level subthemes	Examples of initial first-level codes
Communication	Social communication	Social exchange, interaction, social communication, family communication
	Facilitated self-expression	New concepts, new expressions, meaningful communication
	Understanding other perspectives	Different perspectives, different ways, others' mindset
Opportunities & benefits	Social connections opportunities	Friendships, family communication, partners, limits isolation
	Hobby & mobility opportunities	Travel, move abroad, films, books, music, hobby, insight enjoyment, access to information, online use
	Work & educational opportunities	School, university, education, employment
	Cultural insight	Different cultures, communities together, social niceties
	Tool to decode people/information	Access to information, decode, decipher
Self-understanding	Self-awareness of own skills	Capabilities, patience, pride, rewarding, identity, personality, natural abilities, greater than average, ease of learning, autism community, special interest
	Broaden mindset & perspectives	Different perspectives, others' mindset, mind-expanding
	Autism-related challenges	Social difficulties, masking, chat scripts, non-speaking childhood, autism community
Language learning facilitators / challenges	Role of the environment	Family, multilingual childhood, easy in childhood, community use, community-based learning, general education, language classes at school, difficulty with school-based learning, implicit learning, pace-determined success,

		opportunities to practice, difficulties learning in adulthood
	Language domains and competences	Vocabulary easy, vocabulary difficult, double meaning difficulties, grammar rules & patterns easy, grammar rules and patterns difficult, pronunciation advantages, hyperlexia, oral expression difficulties, oral comprehension difficulties
Language learning facilitators	Enjoyment with language learning	Fun, shared interest, special interest, natural abilities