

CREATING A BILINGUAL RESOURCE FOR EMOTION COMMUNICATION AMONG PEOPLE WITH AUTISM: AN ADAPTATION OF TALKING MATS®

Jessica Lauren Duff
BA Linguistics with Spanish, 2026

Abstract: Conversations about emotions are difficult, especially when bilingual, as different languages represent emotions differently. Autistic traits (including difficulties with social interaction and communication) may complicate this further, making communication feel inaccessible. Yet, there is a notable lack of autism-related supportive resources for bilinguals.

Talking Mats® (TM) is a monolingual framework that facilitates self-expression through visuals, using a scale across which cards are placed. The present study proposes an adapted, bilingual version of TM and gauges its usefulness. We hypothesise the following:

H1: Bilinguals presented with a Talking Mat® that incorporates both of their languages will communicate more effectively than those presented with a standard, monolingual mat.

H2: Individuals with increased autistic traits will benefit more from the adaptation than those with lower traits.

The adaptation incorporates both Spanish and English through double sided cards (e.g. *quiet space/espacio tranquilo*), intending to support comfort and reciprocity, and bridge gaps between differences in emotional representations.

Both hypotheses were considered in relation to two outcome variables: effectiveness scores and (number of) codeswitches. Results indicated that a bilingual TM may benefit self-expression, by way of higher levels of codeswitching. Both the standard and adapted TM were generally effective in aiding communication. However, the adapted TM does not, currently, present as more effective for individuals with higher autistic trait levels. Nonetheless, this exploratory study begins to address the notable lack of autism-related bilingual resources, seeking to aid those at risk of emotional suppression. The project has the potential to improve communication and regulation for a vulnerable, under-represented population and enhance their functioning in daily life.

Keywords: Bilingualism, Speech and language therapy, Talking Mats, Autistic traits, Emotion communication

Supervisor(s): Dr Margreet Vogelzang

Acknowledgements

I would like to express my sincere thanks to my supervisor, Dr Margreet Vogelzang, for not only taking on a student outside of her school, but for her invaluable guidance, and for all the time and effort she has put into this project.

I am also grateful to my module leader, Dr Damien Hall, particularly for his encouragement and support in attending the British Conference of Undergraduate Research. It was an unforgettable experience.

I would also like to thank my disability practitioner, Rachel, for 4 years' worth of support. Knowing that I always have someone in my corner has been instrumental in completing this project and degree, and I will always be grateful for her help.

Finally, I want to thank my partner, Christopher. For his patience, his countless proofreads, and for filling every day of this degree with so much happiness. I wouldn't be where I am today without our teamwork.

Table of Contents

1	Introduction	5
2	Background	6
2.1	Bilingualism and Emotion Communication	6
2.2	Autism and Emotion Communication	8
2.3	Existing Frameworks.....	10
2.4	Present Study	11
3	Methodology	12
3.1	Participants	12
3.2	Materials	15
3.2.1	Talking Mats®.....	15
3.2.2	Questionnaires.....	18
3.2.3	Translations	19
3.2.4	Effectiveness Frameworks.....	20
3.3	Design.....	21
3.4	Procedure	21
3.5	Data Processing.....	22
3.5.1	Analyses	24
4	Results.....	24
4.1	Descriptive Statistics	24

4.2	Effectiveness of Communication.....	25
4.2.1	Full Sample of Participants.....	25
4.2.2	Sub Sample of Spanish-English Bilinguals Only.....	28
4.3	Autistic Traits	31
4.3.1	Whole Sample	31
4.3.2	Sub Sample of Spanish-English Bilinguals Only.....	33
5	Discussion	36
5.1	Hypothesis 1: ATM Improving Communication	37
5.1.1	H1 – Effectiveness of Communication	37
5.1.2	H1 – Participant Enjoyment	38
5.1.3	H1 – Codeswitches.....	39
5.2	Hypothesis 2: Influence of Autistic Traits	40
5.2.1	H2 – Effectiveness of Communication	40
5.2.2	H2 – Participant Enjoyment	41
5.2.3	H2 – Codeswitches.....	41
5.3	Recommendations for Future Study	42
5.3.1	Sampling Bias	42
5.3.2	Considerations for Bilingual Resource Making	43
6	Conclusion.....	44

1 Introduction

Different languages represent emotions differently (Barrios Rodríguez and Antropova Antropova, 2024; Wierzbicka, 2005). Each language may also have distinct associations with emotional states based on unique experience (Caldwell-Harris, 2014; Williams et al., 2020). This complicates emotion communication for bilinguals.

Autistic traits, such as difficulties with social interaction (American Psychiatric Association, 2013), may complicate this further, making communication feel impossible. Yet, there is a notable lack of autism-related supportive resources for bilinguals.

Talking Mats® (TM) are used in speech therapy (Hancock et al., 2023: 60), education (Richards and Crane, 2020), and research (Chauhan et al., 2024), to aid individuals with communication difficulties, such as learning difficulties or dementia (Murphy et al., 2018). TM facilitates self-expression through visuals (Stans et al., 2019); option cards (representing situations/states) are sorted into categories, according to the user's opinions. However, the resource is strictly monolingual, meaning that it may not adequately support autistic bilinguals.

The present study proposes an adapted, bilingual TM, and gauges its usefulness. The adaptation incorporates both Spanish and English through double sided cards (e.g. *quiet space/espacio tranquilo*), intending to support comfort and reciprocity, and bridge gaps between differences in emotional representations.

This research seeks to aid those at risk of emotional suppression, including those isolated in a foreign language environment or operating with a neurodevelopmental condition. The project has the potential to improve communication and regulation for a vulnerable, under-represented population, enhancing their functioning in daily life.

2 Background

2.1 Bilingualism and Emotion Communication

The benefits of bilingualism have long been discussed (Peal and Lambert, 1962). It has been claimed that a 'bilingual advantage' may manifest in improved executive function (Bialystok, 1986; Barac et al., 2014), working memory (Blom et al., 2014), and social understanding (Trelles and Castro, 2019). However, communication challenges faced by bilinguals, such as conceptual differences in emotion words, are frequently overlooked (Pérez-Rojas et al., 2019). Through recognising communicative challenges, this study does not assume a deficit view. Instead, it recognises that, in Western society, systems and practices are built to serve the monolingual norm (de Houwer, 2022). This is observed in education (de Jong et al., 2025), healthcare (Cho, 2025), and research (Grover, 2023).

Challenges with translatability, have been observed across languages, such as in comparisons of English with Balinese (Sudipa, 2022) or Russian (Wierzbicka, 1998). Within a Spanish-English context, sad-related adjectives, like *abatido* (dejected/depressed) or *apesadumbrado* (depressed/afflicted) demonstrate such conceptual differences (Barrios Rodríguez and Antropova Antropova, 2024). In Spanish additional nuance conveyed through the allomorphs of *to be* (*ser*, permanently; *estar*, temporarily), permit speakers to distinguish between feelings, attitudes, and character traits, which they are unable to do in English (Barrios Rodríguez and Antropova Antropova, 2024: 52-54).

These differences have been taken as evidence that emotions are culture-specific (Wierzbicka, 1998), or that sadness must not relate to any universal concept (Barrios

Rodríguez and Antropova Antropova, 2024: 43; Oh, 2025). However, this study rejects such notions of linguistic determinism (Whorf, 1956), contending that our thoughts and abilities are not wholly dictated by language. It assumes that all language users experience the same, nuanced emotions. Thus, translation difficulties do not stem from any language-based strength or deficit, but from differences in linguistic nuance. This assumption is corroborated by *The Great Eskimo Vocabulary Hoax* (Pullum, 1989), which debunks claims that lexical differences determine processing abilities (Boas, 1911; Whorf 1940).

Bilingual individuals must also navigate associations between each language and its perceived appropriateness (Mann and de Bruin, 2022). A key factor that drives these selections is language dominance. Most bilinguals have a dominant language (Silva-Corvalán and Treffers-Daller, 2016), meaning that they display greater ease in this language (Pavlenko, 2014: 23). This could lead to the assumption that a bilingual would feel more comfortable expressing their emotions in their dominant language, particularly because of associations with richer emotion vocabulary (Cohrsen-Hernandez, 2021: 33). However, in reality, language choices are substantially more nuanced (Meuter and Gao, 2023).

Codeswitching refers to the use of multiple languages in an utterance (Schächinger Tenés et al., 2023). Historically, this has been characterised as a negative outcome of multilingualism, treated as confusion or lack of control (Weinrich, 1953). However, it is now regarded as a natural and systematic product of multiple language use (Myers-Scotton, 1993; Williams et al., 2020). It is also recognised that variation exists regarding frequency and context (Özkara et al., 2025: 1). For example, Spanish-dominant bilinguals may codeswitch into Spanish to express anxiety, whilst English-dominant bilinguals have also been observed to employ Spanish here

(Guttfreund, 1990). This may relate to aforementioned semantic differences, wherein Spanish can facilitate more nuanced emotional explanations.

Psychological factors must also be considered. Associations may be drawn between emotions and languages due to usage in distinct emotional and cultural contexts (Caldwell-Harris, 2014; Williams et al., 2020: 3). Codeswitching in therapeutic settings indicates that the dominant language can better express emotive content or vulnerability (Oh, 2025; Pavlenko, 2005). Whereas, codeswitches to a non-dominant language may be used as protection from emotive content, retreating to a space psychologically further from an event/emotion (Cohrsen-Hernandez, 2021; Keysar et al., 2012).

Nevertheless, in therapy situations, the use of a person's full linguistic repertoire (all their languages) may permit better memory access and improved emotion communication (Santiago-Rivera and Altarriba, 2002). This is because memories may be entangled with the language and culture in which they were formed (Schrauf and Rubin, 2001). Associated emotions may also be more intense when recalled in the language of original encoding (Marian and Kaushanskaya, 2004). The distinct uses of languages demonstrate benefits of bilingual language use for emotion conversation, providing justification for the creation of a bilingual resource.

2.2 Autism and Emotion Communication

When the above challenges of bilingual communication are compounded by difficulties associated with autism spectrum disorder (ASD) (American Psychiatric Association, 2013), emotion communication can feel impossible.

Expectations for non-verbal communication (Radford et al., 2025), as well as unaccommodating environments (de Marchena et al., 2025) may worsen such difficulties. These expectations are commonplace in settings designed for neurotypical communication (Hoerricks, 2026). Thus, we observe a gap between autistic and allistic (non-autistic) communication, for which autistic individuals are often unjustly blamed (Sheppard et al., 2016). The double empathy problem recognises this gap as a mutual issue, for which both parties share responsibility (Milton, 2012). This is concordant with Crip Linguistics, which approaches disability-related language differences as variation, rather than deficiency (Henner and Robinson, 2023). This shift in perspective is also seen in the *neurodiversity movement* (Lerner et al., 2023), which pushes for neurodiversity-affirming approaches/interventions, wherein, strengths are supported and challenges are recognised (Dawson et al., 2022).

Communication is frequently recognised as a challenge for autistic individuals (Nuske et al., 2020; Pavlopoulou et al., 2025). This may relate to the estimation that 50-85% of individuals with ASD also have alexithymia (Poquérousse et al., 2018: 1; Zangwill, 2013: 1). Alexithymia, typically characterised as a deficit (Hill et al., 2004), is a sub-clinical phenomenon (Silani et al., 2008), relating to a difficulty identifying feelings and distinguishing between emotional and bodily sensations (Poquérousse et al., 2018: 2). This suggests that allowing bilinguals with ASD to access their full linguistic repertoire may facilitate more successful emotion communication, because there is a larger repertoire to draw from (Castellón et al., 2026; Cohen et al., 2025).

Through autism-related resources that support emotion communication, these obstacles and support needs can be better addressed. This is important when we consider the risks of communication difficulties. For example, 47% of autistic

individuals report experiencing bullying (Trundle et al., 2023). This is associated with low self-esteem (Reid and Batten, 2006), and suicidal ideation/attempt (Mayes et al., 2013). Effective emotion communication is crucial for suicide and self-harm prevention (Martínez-Rives et al., 2025), and for improving general wellbeing (Gregory et al., 2023; Abdelaziz and Sallam, 2025). This demonstrates the need for adaptations supporting emotion communication, for all groups within the autistic population, such as bilinguals with autism.

2.3 Existing Frameworks

Resources are available to support autistic individuals with emotion communication, such as augmentative and alternative communication (Iacano et al., 2016), Social Stories (Gray and Garand, 1993), and Talking Mats® (TM) (Stewart et al., 2018). TM allows individuals, irrespective of age and ability, to better express their feelings and opinions (Murphy et al., 2018: 49). The use of option symbols, related to a central topic, allow verbal and non-verbal communication (Stans et al., 2019). TM supports autistic individuals through increased processing time (Haigh et al., 2019). It also provides an alternative focus from typical conversational conventions (Murphy et al., 2018: 49), through a predictable structure and removed social pressures for eye contact (Tsamitrou and Plumet, 2024; Stuart et al., 2022). This structure, alongside visual image cards, should help by reducing attention and memory demands (Rutherford et al., 2020).

However, the existing TM resource is strictly monolingual; there are currently no other resources/adaptations suited to an autistic bilingual population. The only prevalent therapy method for Spanish-English bilingual adults, known as *dichos*

(Altarriba and Santiago-Rivera, 1994), is unsuitable for autistic populations as it relies on sayings/idioms (Cohrssen-Hernandez, 2021: 10). As autistic individuals often experience difficulties parsing idiomatic expressions (American Psychiatric Association, 2013), an appropriate resource for bilinguals with ASD does not exist.

21.4% of children speak a language other than English at home (Department for Education, 2025); with a growing population of multilinguals in the UK, it is increasingly important that communication practices reflect contemporary society.

2.4 Present Study

This study addresses the notable lack of autism-related bilingual resources through adapting TM for Spanish-English bilinguals. The first hypothesis (H1) for this study predicts that bilinguals presented with a Talking Mat[®] that incorporates both Spanish and English will communicate more effectively than those presented with a standard, monolingual mat. This is anticipated due to differences in emotion representations between languages (Barrios Rodríguez and Antropova Antropova, 2024), as well as the psychological implications of language dominance (Santiago-Rivera et al., 2009; Cohrssen-Hernandez, 2021: 33). The adapted Talking Mat[®] (ATM) should allow bilinguals to engage their full linguistic repertoire.

The effectiveness of the adaptation will be compared with a standard TM among bilingual speakers of Spanish and English. This effect will be measured through researcher-rated effectiveness scores, participant enjoyment, and participants' use of both languages (i.e. codeswitches).

The second hypothesis (H2) predicts that individuals with increased autistic traits, measured by the Comprehensive Autistic Trait Inventory (CATI) (English et al., 2021), will benefit more from the ATM than those with lower traits; owing to the benefits of visual aids (Rutherford et al., 2020) and structured conversation (Tsamitrou and Plumet, 2024). The interaction between autistic traits and effectiveness of the ATM will also be measured through effectiveness scores, enjoyment scores, and codeswitches.

Due to the dearth of previous research regarding bilingual adaptations, this can be considered an exploratory study.

3 Methodology

3.1 Participants

24 participants were recruited through volunteer sampling. 79.17% were female (19/24) and 20.83% were male (5/24). All participants were students ($M_{\text{age}} = 20.75$ years, age range 18-23 years). Promotional materials (flyers, emails) were shared within Newcastle University, targeting speakers of Spanish and English. Given that there are no unanimous criteria for bilingualism (Yim and Clément, 2021: 1370), the inclusion criterion was the ability to confidently converse in both Spanish and English. 50% of participants spoke at least one other additional language, see Table 1.

Table 1 – Distribution of Languages in Sample

First language (L1)	n	Percentage
English	17	70.83%
Spanish	5	20.83%
Spanish and English	2	8.33%
Additional Languages		
Portuguese	7	29.17%
French	6	25%
German	3	12.5%
Mandarin	3	12.5%
Italian	2	8.33%

Observing autistic traits within the general population permitted a broader sample and avoided autistic/non-autistic labels, which reinforce the deficit model and lead to conflicting results in research (Andreou and Skrimpa, 2022; Mottron and Bzdok, 2020). Therefore, this study will consider autistic traits as a continuous variable, recognising that autistic people have unique combinations of characteristics (Hodges et al., 2020). 8.33% of participants had a diagnosis of ASD; 16.67% had a provisional diagnosis or suspected ASD. Some participants disclosed other disabilities, including ADHD (4.17%), depression (4.17%), and anxiety (4.17%); they were not excluded.

Overall, the mean CATI score was 123.46. Scores ranged from 83-181 (mode: 91, median: 109.5). The threshold for classifying individuals as autistic is 134 (English et al, 2021: 12). 33.33% of participants scored above the threshold (8/24), 62.5% of which had a confirmed or suspected diagnosis of ASD (5/8).

Being that the ATM intends to support Spanish-English bilinguals in emotion conversation, through activating their full linguistic repertoire, participants that speak additional languages may represent a confound, as elements of their linguistic repertoire are neglected. Therefore, a subsample, excluding participants that speak three or more languages (50% of total sample), was created, see Table 2. In anticipation of this, all analyses were run twice: full sample first, subsample second.

Table 2 – Participant Subsample that Excludes Multilinguals

	Unilingual Group				Bilingual Group			
	n	%	Mean	SD	n	%	Mean	SD
Characteristics								
Gender								
Male	2	33.333%			2	33.333%		
Female	4	66.667%			4	66.667%		
Age			19.833	0.898			20.833	1.462
CATI Score			112.667	28.871			122.333	28.371

3.2 Materials

3.2.1 Talking Mats®

The “Me and My Senses” Talking Mats® resource was used. It supports communication of an individual’s ‘lived’ sensory experiences, needs, and challenges (Douglas, 2023). This provided a framework to discuss emotions, ensuring that conversation topics were not overly personal/triggering. This avoided nuisance variables, such as discrepancies based on unwillingness to confront personal topics with a stranger. Time taken to establish a therapeutic alliance may be essential, predicting active participation (del Río Olvera et al., 2022). TM recognises that individuals are unlikely to disclose ‘big issues’ without first being encouraged to reflect upon, and share, the small ones (Cameron and Matthews, 2017). Therefore, the resource was designed to gain a holistic reflection of an individual’s feelings across aspects of their life (Cameron and Matthews, 2017). This resource is intended for young people; appropriate here as participants were aged 18-23.

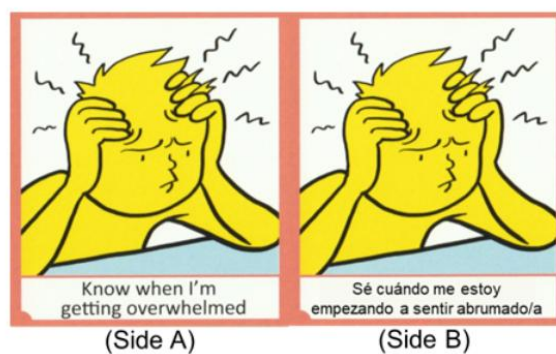
The TM includes a top-scale which consists of 3 image-cards, these represented *I feel good about this*, *I feel neutral about this*, and *I feel not good about this*. The listener (researcher) hands a series of cards to the thinker (participant), who places them on the mat, one at a time, and may provide justification. The thinker is given the option to add any additional information on a blank card, see Figure 1. Listener and thinker are nomenclature directly adopted from TM framework.

Figure 1 – Example Talking Mat®



The resource was translated into Spanish, by the researcher, to incorporate language/culture-specific words in the ATM. Adapted cards were double-sided, featuring English on one side, and Spanish translations on the other, see Figure 2.

Figure 2 – Example of Adapted Talking Mat® card



The ATM, see Figure 3, intends to support comfort and reciprocity, and bridge gaps in emotional representations between languages, allowing participants to codeswitch.

Figure 3 – Example of Adapted Talking Mat®



Initially, culturally relevant images were to be used within the ATM. However, it was concluded that the original images were sufficient for Spanish audiences as they are not overly Anglocentric (yellow characters, neutral backgrounds). Moreover, TM is designed to keep cognitive load low (Cameron and Matthews, 2017: 64), which would not be achieved if cards presented multiple images to process.

3.2.2 Questionnaires

Questionnaires were created and administered in Qualtrics XM.

3.2.2.1 *Language History Questionnaire*

A language history questionnaire was created to provide context for each participant's language background.

3.2.2.2 *The Comprehensive Autistic Trait Inventory (CATI)*

The CATI measures autistic traits in adults within the general population (English et al., 2021). Participants rate their agreement with 42 statements related to autistic trait dimensions. It better represents a contemporary conceptualisation of ASD than other measures, like the Autism-Spectrum Quotient (Baron-Cohen et al., 2001) or the Social Responsiveness Scale (Constantino et al., 2003). This is because it considers currently associated trait dimensions, like sensory sensitivity, providing a more accurate measure (English et al., 2021).

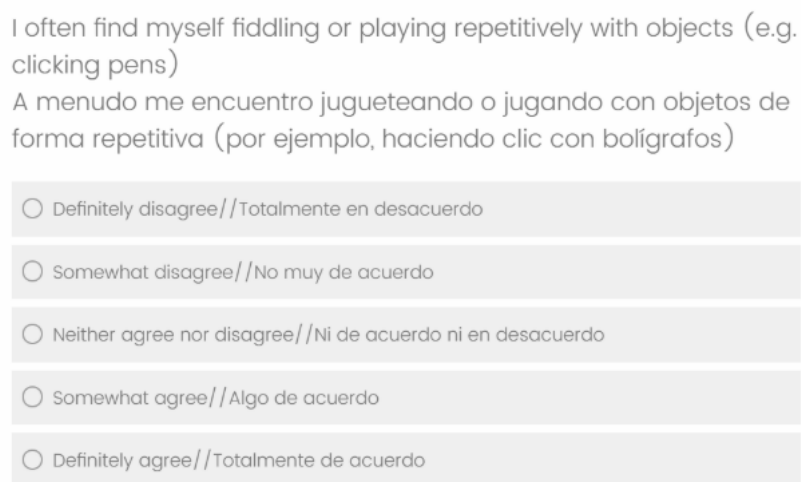
3.2.2.3 *Post-Activity Evaluation Questionnaire*

An evaluation questionnaire was created to gauge the effectiveness of each resource. Participants were asked to rate their enjoyment on a five-point Likert-type scale (*did not enjoy at all-enjoyed a lot*).

3.2.3 Translations

Within the questionnaires, instructions and questions were provided in English and Spanish, with answer options being available in both languages for closed questions, see Figure 4.

Figure 4 – Example Question (CATI Question 1)



I often find myself fiddling or playing repetitively with objects (e.g. clicking pens)
A menudo me encuentro jugueteando o jugando con objetos de forma repetitiva (por ejemplo, haciendo clic con bolígrafos)

☐ Definitely disagree//Totalmente en desacuerdo

☐ Somewhat disagree//No muy de acuerdo

☐ Neither agree nor disagree//Ni de acuerdo ni en desacuerdo

☐ Somewhat agree//Algo de acuerdo

☐ Definitely agree//Totalmente de acuerdo

Translations intended to avoid response bias, as bilinguals may answer differently dependent upon which language is represented (Dylman and Zakrisson, 2023; Paz et al., 2021).

All Spanish materials were translated manually by the researcher. As the researcher was an L2 Spanish speaker, a language teacher (Spanish L1) reviewed all translated materials (questionnaires and TM cards), to ensure that no avoidable differences were present. For the ATM, this was particularly important because participants may be influenced to codeswitch due to a difference in meaning rather than a link with their language or culture (Meuter and Gao, 2023).

3.2.4 Effectiveness Frameworks

The Talking Mats® Effectiveness Framework of Functional Communication (EFFC) (Talking Mats® Ltd. 2016) was used by the researcher to provide an effectiveness score. This involves rating seven indicators out of four, with the maximum score being 28. Due to the ambiguous/broad nature of indicators, an adapted framework was created by the researcher: the Adapted Effectiveness Framework of Functional Communication (AEFFC), see Appendix 1. Indicators were operationalised and made directly relevant to this study, see Figure 5.

Figure 5 – AEFFC Example Item

Talking Mat™ EFFC Indicator:

Engagement – the social closeness that is established in the interaction and maintained through rapport and joint attention.

Corresponding AEFFC Items:

Did the thinker make purposeful and controlled eye contact with the listener/objects/visual stimuli connected with the interview at least 50% of the time?

Did the thinker demonstrate open body language at least 50% of the time? E.g. facing the listener and/or mat.

Did the thinker demonstrate active engagement at least 50% of the time? I.e. attending to the interview process and being responsive to interview prompts and stimuli.

The AEFFC consists of 14 questions, six of which are reverse scored. Each question is answered 'yes' (1 point), 'no' (0 points), or 'sometimes' (0.5 points).

3.3 Design

Participants were randomly assigned to groups: 12 in the Unilingual Group and 12 in the Bilingual Group.

Each TM consisted of 11 cards, presented to each participant (thinker) in the same order for standardisation. All cards were presented alongside the question “*How do you feel about X?*”. In the Bilingual Group, the English side was read before the Spanish. For example, “*How do you feel about ‘bright light’ or ‘luz brillante’?*”.

Within the TM activity, participants were first presented with basic cards and progressed to more abstract cards. TM intends to support cognition, meaning that it is crucial to follow a logical sequence (Cameron and Matthews, 2017).

Participants were then given the option to add blanks. In line with the TM framework, the activity concluded with the researcher (listener) recapitulating information shared and allowing for changes to be made.

3.4 Procedure

The same researcher conducted each session. Participants were notified that the researcher was a Spanish-English bilingual, and that they should use whichever language they felt most comfortable using.

Informed consent was obtained in writing prior to data collection, see Appendix 2.

Questionnaires were completed on the researcher’s laptop.

All participants completed the language history questionnaire and CATI.

The Unilingual Group completed the standard TM, and the Bilingual Group completed the ATM.

Prior to beginning the TM activity, participants were read instructions, including what the top-scale was, and how to use the mat. The Bilingual Group received additional instructions regarding bilingual aspects, see Appendix 3 for scripts.

Participants completed the evaluation questionnaire according to their group.

3.5 Data Processing

For both hypotheses, scores for effectiveness of communication, participant enjoyment, and participants' use of both languages (i.e. codeswitches) were measured.

Two independent raters (the researcher and another rater) scored effectiveness of communication through the EFFC and AEFFC, using video recordings of each TM activity. All videos were watched under the same conditions, with each video being watched in one sitting. TM activities were scored without knowledge of the other rater's score. The EFFC was scored out of 28 and the AEFFC was scored out of 14, see Table 3 for mean scores.

Table 3 – Descriptive Statistics of Scores by Raters

EFFC Rater 1		EFFC Rater 2		AEFFC Rater 1		AEFFC Rater 2	
Mean	SD	Mean	SD	Mean	SD	Mean	SD
23.333	2.882	22.458	3.559	11.646	1.432	12.042	1.534

Cohen's Kappa was used to measure inter-rater reliability, determining whether agreement between raters occurred by chance, and whether there were any major discrepancies. These scores revealed no notable differences in scores given by each rater. Within both effectiveness frameworks, raters showed moderate agreement ($\kappa = .597$ for EFFC, $\kappa = .600$ for AEFFC) (McHugh, 2012). Due to the similarity in Cohen's Kappa scores, the AEFFC was used for data processing because the questions are more objective and are tailored to this study.

Participant enjoyment was measured through the post-activity questionnaire.

Participants' use of both languages was measured through codeswitches. Both verbal and non-verbal codeswitches were considered. Tokens of non-verbal codeswitches include any instance of the participant choosing to lay the Spanish side of the TM card. Verbal tokens include any instance of the participant switching to Spanish independently, measured in instances of switching, as codeswitching ranges from single word insertions to longer segments (Muysken, 2000).

3.5.1 Analyses

For H1, the above outcome variables (effectiveness scores, participant enjoyment, and codeswitches) were used in linear regression models, to determine whether group predicted effectiveness of communication. RStudio 2026.01.0 was used.

For H2, these outcome variables were used alongside CATI scores in linear regression models to determine whether the strength of autistic traits can be used to predict effectiveness of communication within each group.

Cronbach's Alpha was used to measure the internal consistency of the CATI to verify reliability of scores. Results indicated excellent internal consistency ($\alpha = .96$) (Taber, 2017: 1278). These are compatible with figures reported by English et al. (2021): reliable to excellent values across subscales ($\alpha = .81$ - $\alpha = .94$).

4 Results

4.1 Descriptive Statistics

Across all contexts, the mean researcher-rated effectiveness score was 11.840. Consistent with the Talking Mats® Effectiveness Framework (2016), a cut-off of 75% was used to characterise effective communication (10.5). This indicates that, on average, the TM and ATM were effective. See Table 4.

There was little difference in enjoyment scores (mean = 4 in both groups). In the adapted group, participants averaged 8.333 codeswitches. This included an extreme outlier of 38; with this removed, the mean codeswitches was 5.636.

Table 4 – Descriptive statistics for Effectiveness of Adapted TM

Group	AEFFC			Enjoyment		Codeswitches	
	n	Mean	SD	Mean	SD	Mean	SD
Unilingual	12	11.688	1.137	4.000	0.577	0.000	0.000
Bilingual	12	12.000	1.588	4.000	0.408	8.333	9.944

4.2 Effectiveness of Communication

H1 predicted that bilinguals presented with the ATM would communicate more effectively than those presented with a standard, monolingual mat. The effect of group was measured on effectiveness scores, participant enjoyment, and codeswitches.

4.2.1 Full Sample of Participants

Linear regression analyses were conducted to determine whether group (Bilingual or Unilingual) influenced communication effectiveness. Table 5 outlines coefficients for each outcome variable.

Table 5 – Effect of Group on Outcome Variables in Full Sample

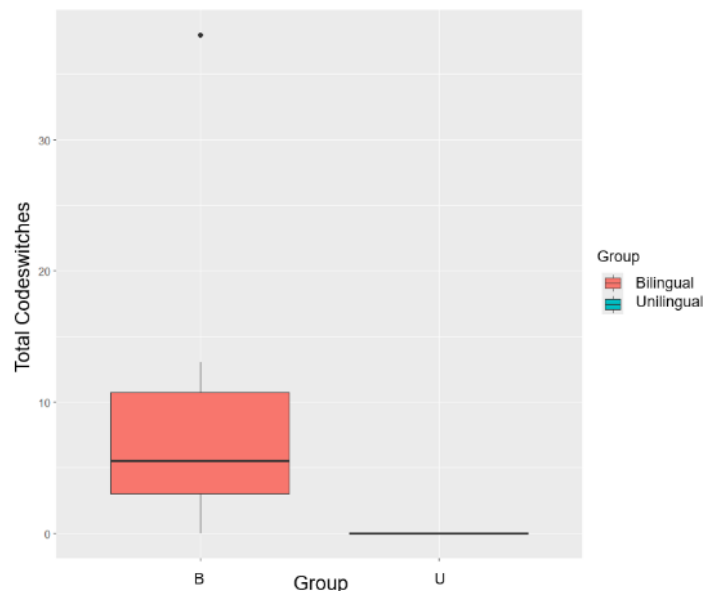
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	12.000	0.416	28.821	<.001 ***
Effect of Group	-0.313	0.589	-0.531	.601
on				
AEFFC Scores				
(Intercept)	4.000	0.151	26.530	<.001 ***
Effect of Group	<.001	0.213	0.000	1.000
on Enjoyment				
(Intercept)	8.333	2.120	3.931	<.001 ***
Effect of Group	-8.333	2.998	-2.779	.011 *
on Total				
Codeswitches				
(Intercept)	3.333	0.611	5.452	<.001 ***
Effect of Group	-3.333	0.865	-3.855	<.001 ***
on NV				
Codeswitches				
(Intercept)	5.000	1.807	2.767	0.011 *
Effect of Group	-5.000	2.555	-1.957	0.060 .
on V				
Codeswitches				

No significant effect of group on effectiveness scores was revealed, as measured by AEFFC scores. This indicates that group explained 1% of the variance ($R^2=.013$, $F(1,22)=0.282$, $p=.601$).

There was no effect of group on participant enjoyment, with <1% of the variance explained ($R^2<.001$, $F(1,22)<0.001$, $p=1$). Participants rated their enjoyment similarly, regardless of which mat they completed.

There was a significant effect of group on codeswitches, with codeswitching being significantly more likely in the bilingual group. Regarding codeswitches, group explains 26% of the variance ($R^2=.260$, $F(1,22)=7.725$, $p=.011$). The effect was skewed by a major outlier, see Figure 6. There were no codeswitches in the Unilingual Group.

Figure 6 – Total Codeswitches in the Bilingual and Unilingual Groups



This effect remained significant for non-verbal codeswitches, with 40% of the variance explained by group ($R^2=.403$, $F(1,22)=14.860$, $p<.001$). The effect was marginally significant for verbal codeswitches ($R^2=.148$, $F(1,22)=3.828$, $p=.063$).

4.2.2 Sub Sample of Spanish-English Bilinguals Only

In anticipation of additional languages representing a confound, the above analyses were repeated within the sub sample, see Table 6.

Table 6 – Effect of Group on Outcome Variables in Subset

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	12.875	.455	28.326	<.001 ***
Effect of Group	-1.333	.643	-2.074	.065 .
on				
AEFFC Scores				
(Intercept)	3.833	0.167	23.000	<.001 ***
Effect of Group	0.333	0.236	1.414	.188
on Enjoyment				
(Intercept)	8.500	1.165	7.293	<.001 ***
Effect of Group	-8.500	1.648	-5.157	<.001 ***
on Total				
Codeswitches				

(Intercept)	4.167	0.920	4.527	.001 **
--------------------	-------	-------	-------	---------

Effect of Group	-4.167	1.302	-3.201	.009 **
------------------------	--------	-------	--------	---------

on NV

Codeswitches

(Intercept)	4.333	0.596	7.267	<.001 ***
--------------------	-------	-------	-------	-----------

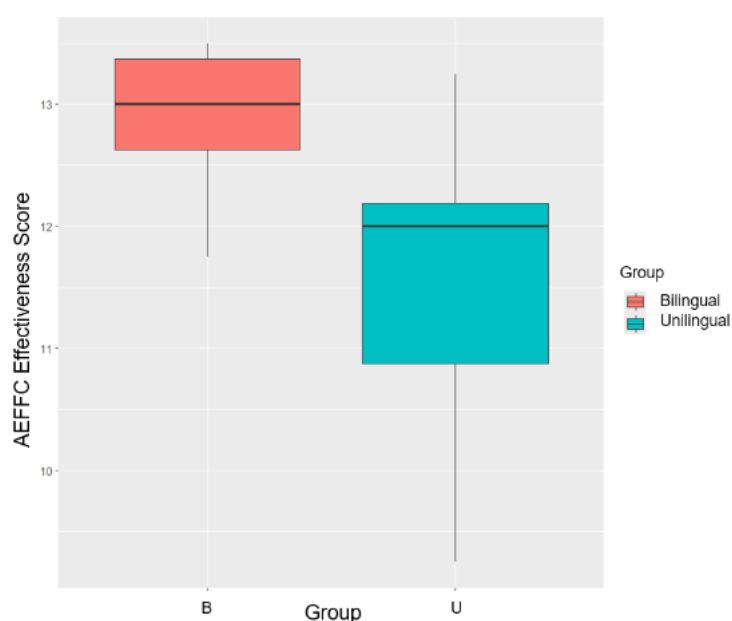
Effect of Group	-4.333	0.843	-5.139	<.001 ***
------------------------	--------	-------	--------	-----------

on V

Codeswitches

The effect of group on effectiveness scores became marginally significant and explained 30% of variance ($R^2=.301$, $F(1,10)=4.303$, $p=.065$). Figure 7 illustrates the numerical difference between groups.

Figure 7 – AEFFC Effectiveness Scores in the Bilingual and Unilingual Groups

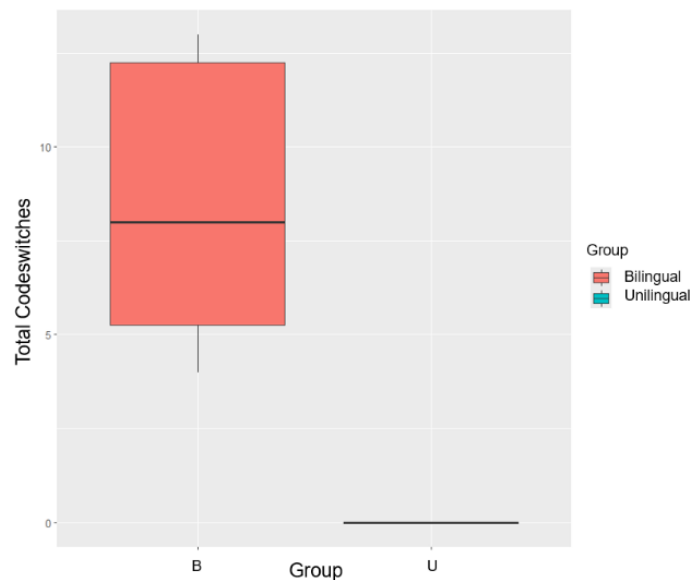


The effect of group on participant enjoyment remained non-significant with multilinguals excluded. Group explained 17% of variance ($R^2=.167$, $F(1,10)=2$, $p=.188$).

The effect of group on codeswitches was stronger within the subsample, wherein group explained 73% of variance ($R^2=.727$, $F(1,10)=26.6$, $p<.001$), see Figure 8.

This effect was significant for non-verbal ($R^2=.506$, $F(1,10)=10.25$, $p=.009$) and verbal ($R^2=.725$, $F(1,10)=26.41$, $p<.001$) codeswitches. In the subsample, the major outlier was not present.

Figure 8 – Total Codeswitches in the Bilingual and Unilingual Groups for Subsample



4.3 Autistic Traits

H2 predicted that individuals with increased autistic traits would benefit more from the ATM than those with lower trait levels. The effect of group and CATI scores were measured on effectiveness scores, participant enjoyment, and codeswitches.

4.3.1 Whole Sample

Multiple regression analyses were conducted to measure these effects, see Table 7 for overview.

Table 7 – Effects of Group and CATI Scores on Outcome Variables in Full Sample

	Estimate	Std. Error	t value	Pr(> t)
Scores for Effectiveness of Communication				
(Intercept)	9.873	1.663	5.936	<.001 ***
Group	0.702	2.331	0.301	.766
CATI Score	0.016	0.012	1.321	.202
Group:CATI Score	-0.006	0.018	-0.353	.728
Participant Enjoyment				
(Intercept)	4.546	0.621	7.316	<.001 ***
Group	-0.704	0.871	-0.808	.429
CATI Score	-0.004	0.005	-0.907	.375

Group:CATI Score 0.006 0.007 -0.803 .431

Total Codeswitches

(Intercept) -1.363 8.646 -0.158 .876

Group 1.363 12.119 0.112 .912

CATI Score 0.074 0.064 1.158 .261

Group:CATI Score -0.074 0.096 -0.770 .450

Non-Verbal Codeswitches

(Intercept) 3.659 2.574 1.421 .171

Group -3.659 3.608 -1.014 .323

CATI Score -0.002 0.019 -0.131 .897

Group:CATI Score 0.002 0.028 0.087 .932

Verbal Codeswitches

(Intercept) -5.022 7.252 -0.692 .497

Group 5.022 10.164 0.494 .627

CATI Score 0.076 0.053 1.427 .169

Group:CATI Score -0.076 0.080 -0.949 .354

The Bilingual Group's effectiveness scores were not significantly higher among participants with increased autistic traits than those with lower levels ($F(3,20)=0.842$, $p=.202$). The model explained 11% of the

variance ($R^2=.112$). As CATI scores increased, so did the general effectiveness in both groups, as seen in Figure 9. Within the Bilingual Group, more variation was observed than in the Unilingual Group.

There was no significant effect of CATI score on participant enjoyment, with 4% of the variance explained ($R^2=.043$, $F(3,20)=0.298$, $p=.375$).

The multiple regression revealed no significant relationship between CATI scores and codeswitches. 30% of the variance in codeswitches between groups was explained ($R^2=.306$, $F(3,20)=2.945$, $p=.261$). Whilst this is non-significant, a general increase in total codeswitches was seen as CATI scores increased. This continued to be non-significant for non-verbal ($R^2=.404$, $F(3,20)=4.514$, $p=.897$) and verbal ($R^2=.227$, $F(3,20)=1.957$, $p=.169$) codeswitches.

4.3.2 Sub Sample of Spanish-English Bilinguals Only

The above analyses were repeated in the subsample, see Table 8.

Table 8 – Effects of Group and CATI Scores on Outcome Variables in Sub Sample

	Estimate	Std. Error	t value	Pr(> t)
Scores for Effectiveness of Communication				
(Intercept)	12.837	2.217	5.789	<.001 ***
Group	-2.238	2.998	-0.746	.477
CATI Score	<.001	0.018	0.018	.986

Group:CATI Score 0.008 0.025 0.325 .753

Participant Enjoyment

(Intercept) 4.537 0.649 6.717 <.001 ***

Group -1.369 0.877 -1.561 .157

CATI Score -0.004 0.005 -0.829 .431

Group:CATI Score 0.015 0.007 2.036 .076 .

Total Codeswitches

(Intercept) 21.621 3.254 6.645 <.001 ***

Group -21.621 4.400 -4.914 .001 **

CATI Score -0.107 0.026 -4.140 .003 **

Group:CATI Score 0.107 0.036 2.953 .018 *

Non-Verbal Codeswitches

(Intercept) 10.837 3.859 2.809 .023 *

Group -10.837 5.217 -2.077 .071 .

CATI Score -0.055 0.031 -1.775 .114

Group:CATI Score 0.055 0.043 1.266 .241

Verbal Codeswitches

(Intercept) 10.784 1.796 6.004 <.001 ***

Group -10.784 2.429 -4.440 .002 **

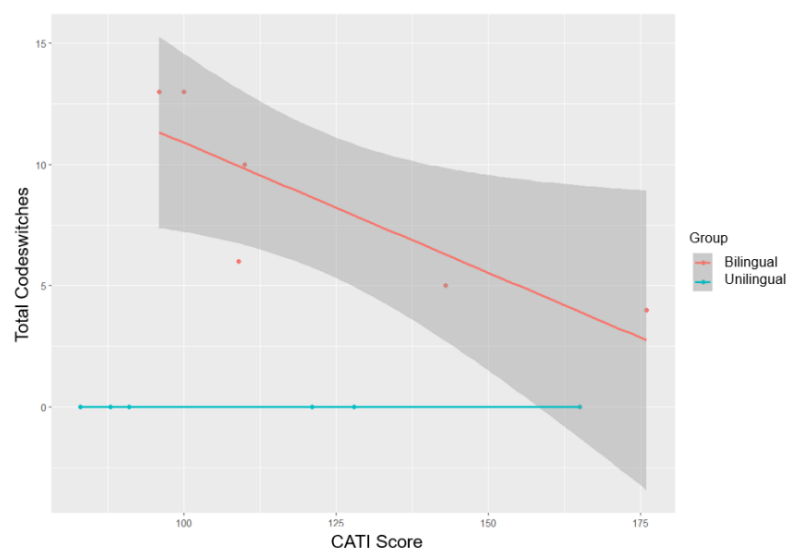
CATI Score	-0.053	0.014	-3.687	.006 **
Group:CATI Score	0.053	0.020	2.630	.030 *

Effectiveness scores remained non-significant, with effectiveness scores of participants in the Bilingual Group being no higher among participants with increased autistic traits ($F(3,8)=1.258$, $p=.986$). CATI scores and group accounted for 32% of variance ($R^2=.320$).

CATI score was not a significant predictor of enjoyment ($R^2=.485$, $F(3,8)=2.508$, $p=.431$).

The effect of group and CATI scores on codeswitches became statistically significant, explaining 91% of the variance ($R^2=.913$, $F(3,8)=28$, $p=.003$). An interaction was seen wherein increased CATI scores correlated with decreased codeswitches in the Bilingual Group. No effect occurred in the Unilingual Group as no codeswitches were present, see Figure 10.

Figure 10 – Effect of CATI Score and Group on Total Codeswitches in Sub Sample



Non-verbal codeswitches were not significantly influenced by CATI scores ($p=.114$).

There was a marginally significant effect of group ($p=.071$). CATI scores and group explained 65% of the variance in non-verbal codeswitches ($R^2=.646$, $F(3,8)=4.858$).

Although verbal codeswitches were non-significant within the full sample ($p=.153$), significant effects of group ($p=.002$) and CATI scores ($p=.006$) were observed when multilinguals were excluded. A significant interaction was also observed ($p=.030$). As with total codeswitches, an increase in CATI score correlated with decreased verbal codeswitches. Group and CATI scores explained 90% of variance ($R^2=.898$, $F(3,8)=23.540$).

5 Discussion

This study examined the effectiveness of the ATM for autistic bilinguals, with a standard TM as a control. Based on the identified needs of autistic bilinguals (Guttfreund, 1990; Nuske et al., 2020), it was hypothesised that the Bilingual Group would communicate more effectively. It was also hypothesised that higher autistic traits would correlate with increased effectiveness of the ATM, as monolinguals with autistic traits already benefit from the standard TM (Chauhan et al., 2024). Both hypotheses were considered in relation to three outcome variables: a) effectiveness scores, b) enjoyment scores, and c) number of codeswitches.

5.1 Hypothesis 1: ATM Improving Communication

5.1.1 H1 – Effectiveness of Communication

Effectiveness scores showed marginal support for H1. Within the whole sample, the result was non-significant ($p=.601$). However, this became marginally significant in the subsample ($p=.065$).

Both resources were effective (79.167%, as measured by AEFFC). This is corroborated by previous studies demonstrating the efficacy of TM (Bradshaw et al., 2018; Cameron and Matthews, 2017). As TM is demonstrably effective, an adaptation may be seen as unnecessary. However, the lack of evidence for any negative effect, and the possibility of a positive effect, strongly suggests that future research should continue advocating for this group.

Furthermore, all instances of non-effective communication scores in the Bilingual Group were from participants that spoke additional languages (whose full linguistic repertoire was not represented). There were no instances of non-effective communication among bilinguals in the ATM; this was not the case in Unilingual Group, wherein instances of non-effective communication scores were equal across bi- and multilinguals.

The increased effectiveness in the Bilingual Group is expected, pertaining to the use of an individual's full linguistic repertoire to improve emotion communication (Schrauf and Rubin, 2001). The differences between the full sample and subsample underlines the importance of additional languages being controlled for, indicating that effects may be mitigated if one's full linguistic repertoire is not represented. This is

corroborated by evidence that leveraging an individual's linguistic repertoire enhances cognitive engagement (Bulut Albaba, 2025; Cummins, 2007; Gimenez, 2023). Benefits can be linked to translanguaging, used to describe spaces wherein multilinguals can integrate languages (Wei, 2018: 23), because translanguaging may support comprehension (Mashala and Sanders, 2025). This is an ideal approach to foster emotion communication. Translanguaging also supports the integration of cultural knowledge (Wei and García, 2022), coinciding with our understanding of bilingual language use as a tool for emotion conversation (Santiago-Rivera and Altarriba, 2002; Schrauf and Rubin, 2001).

5.1.2 H1 – Participant Enjoyment

Enjoyment scores did not support H1; they were non-significant across samples ($p=1.000$ in full sample, $p=.188$ in subsample). This may be attributed to a methodological flaw: participants are unable to express preference without having experienced both measures. Thus, a repeated measures design may be preferable to the independent groups design employed here. This should permit a more reliable statistical inference as participants are their own control (Kraska, 2010).

In accordance with previous research, participant enjoyment was high overall (mean=4/*enjoyed activity*, range=3-5/*neutral-really enjoyed activity*). This corroborates reports of TM being an enjoyable activity (e.g. Murphy et al., 2007: 3).

5.1.3 H1 – Codeswitches

Participants' use of codeswitches provides the strongest evidence for H1. This finding was significant both within the full sample ($p=.011$) and the subsample ($p<.001$).

This is consistent with evidence that codeswitching may be employed for emotional functions (Guttfreund, 1990; Meuter and Gao, 2023; Santiago-Rivera et al., 2009).

This finding is supported by growing evidence for the emotional functions of codeswitching, such as self-expression (Karimpour et al., 2024; Sanchez and Pérez-García, 2020). This study interprets codeswitches as a measure for richness of self-expression, influenced by emotional resonance and cultural identity, facilitating social intimacy (Oh, 2025: 1).

It is, however, important to consider why codeswitches did not occur in the Unilingual Group. It is possible that the researcher simply sharing that they were bilingual was not sufficient to support a linguistically inclusive environment. Linguistic choices of perceived authority figures may influence language choices in bilingual contexts (Dołowy-Rybińska, 2020). The lack of codeswitches may indicate that participants did not feel comfortable to employ a language not represented within the resource. This supports the need for a bilingual resource to foster rich, open communication, and corroborates research suggesting that bilingual language choices are nuanced and context dependent (Meuter and Gao, 2023).

It is also possible that the lack of codeswitches in the Unilingual Group is related to differences in language dominance. More balanced bilinguals may codeswitch more than those who have a dominant language (Olson, 2024). Therefore, future research should control for language entropy, which estimates language balance (i.e. the

diversity of language use) across communicative contexts (Gullifer et al., 2018). High entropy indicates equal engagement with languages (Kang et al., 2023). Controlling for language entropy would facilitate understanding of language use better than subjective self-report measures (Hernández-Rivera et al., 2024). It also avoids typical Western perspectives of bilinguals as a homogenous group, because factors like age of acquisition impact language processing (Gullifer and Titone, 2021).

This evidence is not sufficient to warrant the acceptance or rejection of H1. However, the significance of codeswitches, and patterns of effectiveness scores, justifies the need for further study in this area.

5.2 Hypothesis 2: Influence of Autistic Traits

5.2.1 H2 – Effectiveness of Communication

Effectiveness scores did not support the acceptance of H2. Within the full sample, as CATI scores increase, there is a slight increase in effectiveness scores, as predicted by H2. However, this is non-significant ($p=.202$); the representation of participants' full linguistic repertoire may not specifically link with improved communication among individuals with higher autistic traits. Results from the subsample support this; effectiveness scores plateau in the Bilingual Group, with little influence of CATI scores ($p=.086$). This can be contrasted with the Unilingual Group, wherein effectiveness scores are positively correlated with CATI scores, which opposes the assumption that autistic bilinguals benefit more from an environment representative of their linguistic repertoire (Castellón et al., 2026; Cohen et al., 2025). Importantly,

this difference in findings does not support the notion that autistic individuals could be better served by limiting their linguistic repertoire, as is still unsuitably advised by therapists and practitioners (Castellón et al., 2026; Franco and Costa, 2024). A larger sample would be required to adequately observe differences between groups. No conclusions can currently be drawn regarding a link between efficacy and autistic trait levels.

5.2.2 H2 – Participant Enjoyment

A negative relationship between enjoyment and CATI score was observed within the Bilingual Group, contrasted with a positive relationship in the Unilingual Group. This would be an unanticipated finding; however, it is not possible to draw any meaningful conclusion. Participants rated enjoyment consistently and outliers created the appearance of an effect. This was non-significant in both samples (full sample, $p=.375$; subsample, $p=.431$). Thus, enjoyment scores are unable to inform the acceptance or rejection of the hypothesis.

5.2.3 H2 – Codeswitches

In the full sample, no effect of group and CATI scores were observed in relation to codeswitches ($p=.261$). However, in the subsample, a significant effect ($p=.006$) was observed, opposing H2. Participants' use of codeswitches decreased as CATI scores increased. The effect could be linked with cognitive rigidity, a trait dimension associated with ASD (Cahalan et al., 2025). Non-autistic individuals may perceive a hyper-sensitivity to rules as rigidity (Progovac and Benítez-Burraco, 2025: 3). This hyper-sensitivity may manifest as enhanced awareness of linguistic expectations

within an English-speaking environment, furthered by the researcher being an L1 English speaker, ultimately discouraging participants with higher trait levels from accessing Spanish.

However, the anticipated finding of a positive correlation between autistic traits and codeswitches in the Bilingual Group may still be relevant, as the independent groups design of this study limits our understanding of typical use.

The present findings do not provide sufficient evidence to support H2. The adaptation may have some benefits; however, these benefits are not shown to be specifically influenced by the presence of autistic traits.

5.3 Recommendations for Future Study

5.3.1 Sampling Bias

The sample size was limited (full sample, $n=24$, subsample, $n=12$), thus underpowered to address the hypotheses. Statistically non-significant results may be related to inadequate sample size (Andrade, 2020: 102). This prevents findings from being extrapolated to a wider population of bilinguals with autistic traits (Faber and Fosenca, 2014: 28). The sample also had a bias towards English-dominant speakers, with 70.83% of participants reporting English as their L1. Cultural factors are likely to impact language choice in emotion conversation (Guttfreund, 1990; Meuter and Gao, 2023). Therefore, language dominance within the sample may have skewed results. This is furthered by participants being university students in the UK, highlighting a likely bias towards Western Educated Industrialised Rich and

Democratic (WEIRD) backgrounds (Henrich et al., 2010). Student samples are not representative of the general population, nor of age-matched non-students, typically due to higher average socio-economic backgrounds (Andringa and Godfroid, 2020; Wild et al., 2022). Future research should seek a larger, more representative sample to increase statistical power and generalisability to the wider population of autistic bilinguals.

5.3.2 Considerations for Bilingual Resource Making

Some liberties had to be taken when translating the resource. For example, standard TM cards do not feature a subject (e.g. “*can think with background noise*” rather than “*I can think...*”). In Spanish, a personal pronoun can be added when the reference is ambiguous, but pronoun use is not necessary because this information is conveyed through verb conjugation (Gelormini-Lezama and Almor, 2011: 3). Therefore, when translating “*can think*” into Spanish, either *poder* (to be able to) or *puedo* (I can) can be used; both of which alter the original sense. A proficient speaker of English would likely interpret the cards as referencing themselves, despite the lack of personal pronoun. For this reason, *puedo* was chosen.

Translatability issues also stemmed from the use of idiomatic phrases. For example, “*OK with*” lacks an ideal translation. This was translated as “*no me molesta*” (it doesn’t annoy me) or “*no tengo ningún problema con*” (I don’t have a problem with). During the TM activity, some participants expressed preference for the English due to matters of phrase length or avoidance of negation. Negation is a particularly important factor to control for when researching autistic participants, due to additional processing demands (Dudschig et al., 2018).

Other participants expressed preferences for Spanish translations due to their precise meaning. Spanish emotion words may convey additional information when compared with their English semi-equivalents (Barrios Rodríguez and Antropova Antropova, 2024). These differences in opinions demonstrate the importance of considering linguistic nuances, to ensure that data and participant voices are not misinterpreted. Furthermore, they corroborate the idea that there may be benefits to using bilingual tools for emotion communication.

6 Conclusion

This study proposed an adapted Talking Mat® to support emotion conversation among bilinguals with ASD. Results indicated that that a bilingual TM may benefit self-expression, by way of higher levels of codeswitching. Both the standard and adapted TM were generally effective in aiding communication. However, the adapted TM does not, currently, present as more effective for individuals with higher autistic trait levels. Nonetheless, this exploratory study begins to address the notable lack of autism-related bilingual resources. Future study, beginning with a larger, non-WEIRD, and strictly bilingual sample, should consider a repeated measures design. The impact of translation choices must also be carefully considered.

References

- Abdelaziz, A.M. and Sallam, S. 2025. 'The indirect effect of communication skills on the relationship between emotional maturity and mental health disorders among a sample of Egyptian university students'. *Current Psychology* 44: 3491–3502.
- Altarriba, J. and Santiago-Rivera, A. L. 1994. 'Current perspectives on using linguistic and cultural factors in counseling the Hispanic client'. *Professional Psychology: Research and Practice* 25(4): 388–397.
- American Psychiatric Association. 2013. *Diagnostic and statistical manual of mental disorders* (5th ed.). US: APA.
- Andrade, C. 2020. 'Sample size and its importance in research'. *Indian Journal of Psychological Medicine* 42(1): 102–103.
- Andringa, S. and Godfroid, A. 2020. 'Sampling bias and the problem of generalizability in applied linguistics'. *Annual Review of Applied Linguistics* 40: 134–142.
- Andreou, M. and Skrimpa, V. 2022. 'Re-examining labels in neurocognitive research: evidence from bilingualism and autism as spectrum-trait cases'. *Brain sciences* 12(8): 11-13.
- Barac, R., Bialystok, E., Castro, D. C., and Sanchez, M. 2014. 'The cognitive development of young dual language learners: a critical review'. *Early childhood Research Quarterly* 29(4): 699-714.
- Barrios Rodríguez, M. A., and Antropova Antropova, S. 2024. 'The problem of translatability of sad-related adjectives in Spanish and English'. *Onomázein* 15: 41–66.

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., and Clubley, E. 2001. 'The autism-spectrum quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians'. *Journal of Autism and Developmental Disorders* 31(1): 5–17.

Bialystok, E. 1986. 'Factors in the growth of linguistic awareness'. *Child Development* 57(2): 498–510.

Blom, E., Küntay, A.C., Messer, M., Verhagen, J., and Leseman, P. 2014. 'The benefits of being bilingual: working memory in bilingual Turkish-Dutch children'. *Journal of Experimental Child Psychology* 128: 105-119.

Boas, F. 1911. *Handbook of American Indian Languages Part 1*. Washington: Government Printing Office.

Bradshaw, J., Gore, N.J., Darvell, C. 2018. 'Supporting the direct involvement of students with disabilities in functional assessment through use of Talking Mats®'. *Tizard Learning Disability Review* 23(2): 111-116.

Bulut Albaba, M. 2025. 'Proposing a linguistic repertoires perspective in multilingual higher education contexts'. *Journal of Learning Development in Higher Education*, 36: 1-8.

Cahalan, S., Mitroff, S. R., Subiaul, F., & Rosenblau, G. 2025. 'Using the cognitive rigidity-flexibility dimension to deepen our understanding of the autism spectrum'. *Personality Neuroscience* 8(3).

Cameron, L. and Matthews, R. 2017. 'More than pictures: developing an accessible resource'. *Tizard Learning Disability Review* 22(2): 57-65.

Castellón, F.A., Gómez, L.R., and Ramos-Gallardo, T. 2026. 'Beyond the bilingualism myth: toward culturally sustaining autism interventions for multilingual families'.

Frontiers in Psychiatry 17: 1-7.

Caldwell-Harris, C. 2014. 'Emotionality differences between a native and foreign language: theoretical implications'. *Frontiers in Psychology* 5: 1–4.

Chauhan, A., Leadbitter, K., Gray-Burrows, K.A., Vinall-Collier, K., Pickles, N., Baker, S.R., Marshman, Z., and Day, P.F. 2025. 'An 'explosion in the mouth': the oral health experiences of autistic children'. *Autism* 29(3): 627-641.

Cho, J. 2025. *Multilingual Practices and Monolingual Mindsets: Critical Sociolinguistic Perspectives on Health Care Interpreting (1st ed.)*. Oxford: Routledge.

Cohen, S. R., Wishard Guerra, A., Aragón, M. J., Estrada, A., and Lee, E. 2025. 'How do parents scaffold their autistic children's bilingual language interactions in everyday settings?'. *Autism : The International Journal of Research and Practice* 29(12): 3014–3031.

Cohrssen-Hernandez, M. 2021. 'Emotion disclosure in Spanish and English bilinguals'. *Scripps Senior Theses*, 1778: 1-43.

Constantino, J. N., Davis, S. A., Todd, R. D., Schindler, M. K., Gross, M. M., Brophy, S. L., Metzger, L. M., Shoushtari, C. S., Splinter, R., and Reich, W. 2003. 'Validation of a brief quantitative measure of autistic traits: comparison of the social responsiveness scale with the autism diagnostic interview-revised'. *Journal of Autism and Developmental Disorders* 33(4): 427–433.

Cummins, J. 2007. 'Rethinking monolingual instructional strategies in multilingual classrooms'. *Canadian Journal of Applied Linguistics* 10: 221-240.

Dawson, G., Franz, L., and Brandsen, S. 2022. 'At a crossroads-reconsidering the goals of autism early behavioral intervention from a neurodiversity perspective'. *JAMA pediatrics* 176(9): 839–840.

de Houwer, A. 2023. 'The danger of bilingual-monolingual comparisons in applied psycholinguistic research'. *Applied Psycholinguistics* 44(3): 343-357.

de Jong, E. J., Soltero-González, L., Manríquez, J., Morita-Mullaney, T., Gillanders, C., Chaparro, S., and Alvarez, A. 2025. 'Bilingual education as resistance: challenging standardization in a complex world'. *Bilingual Research Journal* 48(4): 349–354.

del Río Olvera, F. J., Rodríguez-Mora, Á., Senín-Calderón, C., and Rodríguez-Testal, J. F. 2022. 'The first session is the one that counts: an exploratory study of therapeutic alliance'. *Frontiers in Psychology* 13.

de Marchena, A., Cuneo, N., Gurbuz, E., Brown, M., Trujillo, J., and Bergstrom, J. 2025. 'Communication in autistic adults: an action-focused review'. *Current psychiatry reports* 27(8): 471–481.

Department for Education. 2025. 'Schools, pupils, and their characteristics'. Last accessed 10 May 2026, from: <https://explore-education-statistics.service.gov.uk/find-statistics/school-pupils-and-their-characteristics/2024-25#section-first-language>

Dołowy-Rybińska, N. 2020. 'Informal bilingual teachers' language practices and the consequences on pupils' language choices in a situation of unequal bilingualism: the case of an Upper Sorbian education system'. *Multilingua* 39(2): 169–191.

Douglas, P. 2023. 'Me and my senses: hearing the lived experience of the individual'. Last accessed 13 May 2026, from: <https://www.talkingmats.com/me-and-my-senses/>

- Dudschig, C., Mackenzie, I. G., Maienborn, C., Kaup, B., and Leuthold, H. 2019. 'Negation and the N400: investigating temporal aspects of negation integration using semantic and world-knowledge violations'. *Language, Cognition and Neuroscience* 34(3): 309–319.
- Dylman, A. S. and Zakrisson, I. 2025. 'The effect of language and cultural context on the BIG-5 personality inventory in bilinguals'. *Journal of Multilingual and Multicultural Development* 46(2): 392–405.
- English, M. C. W., Gignac, G. E., Visser, T. A. W., Whitehouse, A. J. O., Enns, J. T., and Maybery, M. T. 2021. 'The Comprehensive Autistic Trait Inventory (CATI): development and validation of a new measure of autistic traits in the general population'. *Molecular autism* 12(1): 37.
- Faber, J. and Fonseca, L. M. 2014. 'How sample size influences research outcomes'. *Dental press journal of orthodontics* 19(4): 27–29.
- Franco, M. and Costa, A. P. 2025. 'Should parents only use one language with their autistic children? The relations between multilingualism, children's social Skills, and parent-child communication'. *Journal of Autism and Developmental Disorders* 55(8): 2761–2773.
- Gelormini-Lezama, C. and Almor, A. 2011. 'Repeated names, overt pronouns, and null pronouns in Spanish'. *Language and Cognitive Processes* 26(3): 437–454.
- Gimenez, J. 2023. 'Edulingualism: linguistic repertoires, academic tasks and student agency in an English-dominant university'. *International Journal of Multilingualism* 20(2): 656–671.

Gray, C.A. and Garand, J.D. 1993. 'Social stories: improving responses of students with autism with accurate social information'. *Focus on Autism and Other Developmental Disabilities* 8(1): 1–10.

Gregory, A. J. P., Dirks, M. A., Nitschke, J. P., Wong, J. M., Human, L. J., and Bartz, J. A. 2024. 'Association between depression symptoms and emotional-communication dynamics'. *Clinical Psychological Science* 12(5): 807-822.

Grover, V. L. 2023. 'From monolingual mindset to plurilingual ethos: challenging perspectives on language(s)'. *Journal of Multilingual and Multicultural Development* 44(8): 751–764.

Gullifer, J. W., Chai, X. J., Whitford, V., Pivneva, I., Baum, S., Klein, D., and Titone, D. 2018. 'Bilingual experience and resting-state brain connectivity: impacts of L2 age of acquisition and social diversity of language use on control networks'. *Neuropsychologia* 117: 123–134.

Gullifer, J. W. and Titone, D. 2021. 'Engaging proactive control: Influences of diverse language experiences using insights from machine learning'. *Journal of Experimental Psychology* 150(3): 414–430.

Guttfreund, D.G. 1990. 'Effects of language usage on the emotional experience of Spanish-English and English-Spanish bilinguals'. *Journal of Consulting and Clinical Psychology* 58(5): 604–607.

Haigh, S. M., Walsh, J. A., Mazefsky, C. A., Minshew, N. J., and Eack, S. M. 2018. 'Processing speed is impaired in adults with autism spectrum disorder, and relates to social communication abilities'. *Journal of Autism and Developmental Disorders* 48(8): 2653–2662.

Hancock, A., Northcott, S., Hobson, H., and Clarke, M. 2023. 'Speech, language and communication needs and mental health: the experiences of speech and language therapists and mental health professionals'. *International Journal of Language & Communication Disorders* 58(1): 52–66.

Henrich, J., Heine, S.J., Norenzayan, A. 2010. 'The weirdest people in the world?' *Behavioural and Brain Sciences* 33(2–3): 61–135.

Henner, J. and Robinson, O. 2023. 'Unsettling languages, unruly bodyminds: a crip linguistics manifesto'. *Journal of Critical Study of Communication and Disability* 1: 7-37.

Hernández-Rivera, E., Kalogeris, A., Tiv, M., and Titone, D. 2024. 'Self-evaluations and the language of the beholder: objective performance and language solidarity predict L2 and L1 self-evaluations in bilingual adults'. *Cognition Research* 9(1).

Hill, E., Berthoz, S., and Frith, U. 2004. 'Brief report: cognitive processing of own emotions in individuals with autistic spectrum disorder and in their relatives'. *Journal of Autism and Developmental Disorders* 34(2): 229–235.

Hodges, H., Fealko, C., and Soares, N. 2020. 'Autism spectrum disorder: definition, epidemiology, causes, and clinical evaluation'. *Translational pediatrics* 9(1): 55–65.

Hoerricks, J. 2026. 'The script is not the silence: autotheory of a GLP mind in a pathologized world'. *Neurodiversity* 4: 1-8.

Iacono, T., Trembath, D., and Erickson, S. 2016. 'The role of augmentative and alternative communication for children with autism: current status and future trends'. *Neuropsychiatric Disease and Treatment* 12: 2349–2361.

- Kang, K., Xiao, Y., Yu, H., Diaz, M.T., and Zhang, H. 2023. 'Multilingual language diversity protects native language production under different control demands'. *Journal of Brain Sciences* 13(11): 1-22.
- Karimpour, S., De Costa, P., and Nazari, M. 2026. 'Emotions in switching the code: contributions for English language teachers' identity construction'. *Journal of Multilingual and Multicultural Development* 47(3): 1528–1540.
- Keysar, B., Hayakawa, S. L., and An, S. G. 2012. 'The foreign-language effect: thinking in a foreign tongue reduces decision biases'. *Psychological Science* 23(6): 661–668.
- Kraska, M. 2010. 'Repeated measures design'. In B.B. Frey (ed.) *Encyclopedia of Research Design*. SAGE Publications, Inc.: 1244-1247.
- Mann, A. and de Bruin, A. 2022. 'Bilingual language use is context dependent: using the Language and Social Background Questionnaire to assess language experiences and test-retest reliability'. *International Journal of Bilingual Education and Bilingualism* 25(8): 2886–2901.
- Marian, V. and Kaushanskaya, M. 2004. 'Self-construal and emotion in bicultural bilinguals'. *Journal of Memory and Language* 51(2): 190–201.
- Martínez-Rives, N.L., Martín Chaparro, M.P., Kotera, Y., Dhungel, B., and Gilmour, S. 2025. 'The role of communication and social support in suicidal behaviour in adults aged between 18-40 years: a systematic review'. *The European Journal of Psychiatry* 39(1): 1-12.

Mashala, M. and Sanders, D. A. 2025. 'The use of translanguaging to support the teaching of literacy: intermediate phase teachers' perceptions'. *International Journal of Multilingualism* 22(4): 2876–2893.

Mayes, S.D., Gorman, A.A., Hillwig-Garcia, J., and Syed, E. 2013. 'Suicidal ideation and attempts in children with autism'. *Research in Autism Spectrum Disorders* 7(1): 109-119.

McHugh M. L. 2012. 'Interrater reliability: the kappa statistic'. *Biochemia medica* 22(3): 276–282.

Milton, D. 2012. 'On the ontological status of autism: The 584 "double empathy problem."' *Disability & Society* 585 27(6): 883–887

Meuter, R.F.I. and Gao, X. 2023. 'Language and emotion in health communication'. In G.L. Schiewer., J. Altarriba., and B.C. Ng. (Eds.) *Language and Emotion: An International Handbook*. Vol. 3. Berlin, Germany: De Gruyter Mouton. 2013-2029.

Mottron, L. and Bzdok, D. 2020. 'Autism spectrum heterogeneity: fact or artifact?' *Molecular Psychiatry* 25(12): 3178–3185.

Murphy, J., Gray, C.M., and Cox. S. 2007. 'Using 'Talking Mats' to help people with dementia to communicate'. Last accessed 13 May 2026, from:

<https://www.talkingmats.com/wp-content/uploads/2013/09/Dementia-and-Effectiveness-of-Talking-Mats-short-Findings-1.pdf>

Murphy, J., Mischo, S., Thummel, I., and Erdelyi, A. 2018. 'Talking Mats: from research to practice'. *Unterstützte Kommunikation* 1: 48-53

Muysken, P. 2000. *Bilingual Speech: A Typology of Code-Mixing*. Cambridge: Cambridge University Press.

Myers-Scotton, C. 1993. *Social Motivations for Code-Switching: Evidence from Africa*. Oxford: Clarendon Press.

Nuske, H. J., Pellecchia, M., Kane, C., Seidman, M., Maddox, B. B., Freeman, L. M., Rump, K., Reisinger, E. M., Xie, M., and Mandell, D. S. 2020. 'Self-regulation is bi-directionally associated with cognitive development in children with autism'. *Journal of Applied Developmental Psychology* 68: 101-139.

Oh, H.H. 2025. 'Between languages, beyond words: emotional expression and code-switching in bilinguals.' *Scholarly Review Journal* 14: 1-12.

Olson, D. J. 2024. 'Bilingual language dominance and code-switching patterns'. *Heritage Language Journal* 21(1): 1-29.

Özkara, B., Cedden, G., von Stutterheim, C., and Meyer, P. 2025. 'Code-switching and cognitive control: a review of current trends and future directions'. *Frontiers in Language Sciences* 4: 1-16.

Pavlenko, A. 2005. *Emotions and multilingualism*. Cambridge: Cambridge University Press.

Pavlenko, A. 2014. *The Bilingual Mind*. Cambridge: Cambridge University Press.

Pavlopoulou, G., Chandler, S., Lukito, S., Kakoulidou, M., Matejko, M., Jackson, I., Boyens, T., Poulton, D., Harvey-Nguyen, L., Glen, Z., Wilson, A., Ly, E., Macauley, E., Hurry, J., Baker, S., and Sonuga-Barke, E.J.S. 2025. 'Situating emotion regulation in autism and ADHD through neurodivergent adolescents' perspectives'. *Science Reports* 15: 1-14.

Paz, C., Hermosa-Bosano, C., and Evans, C. 2021. 'What happens when individuals answer questionnaires in two different languages'. *Frontiers in Psychology*. 1-7.

Peal, E. and Lambert, W. E. 1962. 'The relation of bilingualism to intelligence'.

Psychological Monographs: General and Applied 76(27): 1–23.

Pérez-Rojas, A.E., Brown, R.A., Cervantes, A., Valente, T.C., and Pereira, S.R. 2019.

"Alguien abrió la puerta:" the phenomenology of bilingual Latinx clients' use of Spanish and English in psychotherapy'. *Psychotherapy* 56(2): 241-253.

Poquérusse, J., Pastore, L., Dellantonio, S., and Esposito, G. 2018. 'Alexithymia and autism spectrum disorder: a complex relationship'. *Frontiers in psychology* 9: 1196.

Progovac, L. and Benítez-Burraco, A. 2025. 'Rigidity in autism spectrum disorder (ASD): a unified (evolutionary) account of salient linguistic and non-linguistic characteristics'. *Autism and Developmental Language Impairments* 10: 1-11.

Pullum, G. K. 1989. 'The great Eskimo vocabulary hoax'. *Natural Language & Linguistic Theory* 7(2): 275–281.

Radford, H., Reidinger, B., Kapp, S.K., and de Marchena, A. 2025. "There is just too much going on there": nonverbal communication experiences of autistic adults'.

PLoS One 20(7): 1-21.

Reid, B. and Batten, A. 2006. *B is for Bullied: The Experiences of Children with Autism and Their Families*. London: National Autistic Society.

Richards, N. and Crane, L. 2020. 'The development and feasibility study of a multimodal 'Talking Wall' to facilitate the voice of young people with autism and complex needs: a case study in a specialist residential school'. *Journal of Autism and Developmental Disorders* 50(12): 4267–4279.

Rutherford, M., Baxter, J., Grayson, Z., Johnston, L., and O'Hare, A. 2020. 'Visual supports at home and in the community for individuals with autism spectrum

disorders: a scoping review'. *Autism: The International Journal of Research and Practice* 24(2): 447–469.

Sánchez, M.J. and Pérez-García, E. 2020. 'Relationship between code-switching and emotional identity in Junot Diaz's short stories'. *Literatura y Lingüística*, 42: 91-117.

Santiago-Rivera, A. L., and Altarriba, J. 2002. 'The role of language in therapy with the Spanish-English bilingual client'. *Professional Psychology: Research and Practice* 33(1): 30–38.

Santiago-Rivera, A. L., Altarriba, J., Poll, N., Gonzalez-Miller, N., and Cragun, C. 2009. 'Therapists' views on working with bilingual Spanish–English speaking clients: a qualitative investigation'. *Professional Psychology: Research and Practice* 40(5): 436–443.

Schächinger Tenés, L. T., Weiner-Bühler, J. C., Volpin, L., Grob, A., Skoruppa, K., and Segerer, R. K. 2023. 'Language proficiency predictors of code-switching behavior in dual-language-learning children'. *Bilingualism* 26(5): 942–958.

Schrauf, R.W. and Rubin, D.C. 2001. 'Effects of voluntary immigration on the distribution of autobiographical memory over the lifespan'. *Applied Cognitive Psychology* 15(7): 75-88.

Sheppard, E., Pillai, D., Wong, G. T., Ropar, D., and Mitchell, P. 2016. 'How easy is it to read the minds of people with autism spectrum disorder?'. *Journal of Autism and Developmental Disorders* 46(4): 1247–1254.

Silani, G., Bird, G., Brindley, R., Singer, T., Frith, C., and Frith, U. 2008. 'Levels of emotional awareness and autism: an fMRI study'. *Social Neuroscience* 3(2): 97–112.

- Silva-Corvalán, C. and Treffers-Daller, J. 2015. *Language Dominance in Bilinguals*. Cambridge: Cambridge University Press.
- Stans, S.E.A., Dalemans, R.J.P., de Witte, L.P., and Beurskens, A.J.H.M. 2019. 'Using Talking Mats to support conversations with communication vulnerable people: a scoping review'. *Technology and Disability* 30(4):153-176.
- Stewart, K., Bradshaw, J., Beadle-Brown, J. 2018. 'Evaluating service users' experiences using Talking Mats®'. *Tizard Learning Disability Review* 23(2): 78–86.
- Stuart, N., Whitehouse, A., Palermo, R., Bothe, E., and Badcock, N. 2023. 'Eye gaze in autism spectrum disorder: a review of neural evidence for the eye avoidance hypothesis'. *Journal of Autism and Developmental Disorders* 53(5): 1884–1905.
- Sudipa, I.N. 2022. 'Balinese emotion lexicons: a natural semantic metalanguage approach'. *International Journal Linguistics of Sumatra and Malay* 1(1).
- Talking Mats Ltd. 2016. 'Effectiveness framework of functional communication'. Last accessed 13 May 2026, from: <https://www.talkingmats.com/wp-content/uploads/2016/07/EFFC-2016.pdf>
- Trundle, G., Jones, K. A., Ropar, D., and Egan, V. 2023. 'Prevalence of victimisation in autistic individuals: a systematic review and meta-analysis.' *Trauma, Violence & Abuse* 24(4): 2282–2296.
- Trelles, M. P. and Castro, K. 2019. 'Bilingualism in autism spectrum disorder: finding meaning in translation'. *Journal of the American Academy of Child and Adolescent Psychiatry* 58(11): 1035–1037.

Tsamitrou, S., and Plumet, M. H. 2024. 'The importance and challenges of observing social interactions in autistic preschoolers during inclusive educational settings: a scoping review'. *Autism & developmental language impairments* 9.

Wei, L. 2018. 'Translanguaging as a practical theory of language'. *Applied Linguistics* 39(1): 9–30.

Wei, L. and García, O. 2022. 'Not a first language but one repertoire: translanguaging as a decolonising project'. *Journal of Language Teaching and Research* 53(2): 313-324.

Weinreich, U. 1953. *Languages in Contact*. The Hague: Mouton.

Wierzbicka, A. 1998. 'Russian emotional expression'. *Ethos* 26(4): 456–483.

Wierzbicka, A. 2005. 'Universal human concepts as a tool for exploring bilingual lives'. *International Journal of Bilingualism* 9: 7–26.

Wild, H., Kyröläinen, A. J., and Kuperman, V. 2022. 'How representative are student convenience samples? A study of literacy and numeracy skills in 32 countries'. *PloS one* 17(7).

Williams, A., Srinivasan, M., Liu, C., Lee, P., and Zhou, Q. 2020. 'Why do bilinguals code-switch when emotional? Insights from immigrant parent-child interactions'. *Emotion* 20(5): 830–841.

Whorf, B.L. 1956. *Language, thought, and reality: selected writings*. Cambridge, Mass.:Technology Press of Massachusetts Institute of Technology.

Whorf, B. L. 1940. 'Science and linguistics'. *Technology Review* 42: 229-231.

Yim, O. and Clément, R. 2021. 'Acculturation and attitudes toward code-switching: a bidimensional framework'. *The International Journal of Bilingualism: Cross-disciplinary, Cross-Linguistic Studies of Language Behavior* 25(5): 1369–1388.

Appendix 1 – Effectiveness Frameworks

The Talking Mats® Effectiveness Framework of Functional Communication (2016)

can be accessed at the following link: <https://www.talkingmats.com/wp-content/uploads/2016/07/EFFC-2016.pdf>

Based on this resource, the researcher developed the Adapted Effectiveness Framework of Functional Communication:

Reviewer:		
Participant ID:		
Engagement	Did the thinker make purposeful and controlled eye contact with the listener/objects/visual stimuli connected with the interview at least 50% of the time?	Yes/No
	Did the thinker demonstrate open body language at least 50% of the time? E.g. facing the listener and/or mat	
	Did the thinker demonstrate active engagement - i.e. fully attending to the interview process and being responsive to interview prompts and stimuli	
Thinker (participant)'s understanding	Did the thinker ask for any cards to be rephrased?	Reverse score
	Did the thinker misunderstand any of the cards - i.e. taking the card out of context/confusion due to pronouns on card/interpreting abstract cards incorrectly (e.g. "starting to get overwhelmed as being overwhelmed")	Reverse score
Listener (researcher)'s understanding	Did the listener ask for clarification on any of the thinker's points?	Reverse score
	Was the listener able to complete the summary?	
Thinker on track	Was the thinker's response linked to the card at least 75% of the time?	
Symmetry	Did the thinker and listener take turns?	
	Did the thinker take control of the mat? E.g. rearranging their cards, adding blanks, etc.	
Real time	Were there significant pauses before an answer was given? (over 10 seconds)	Reverse score
	Were there any communication break downs? I.e. complete misunderstanding on either part	Reverse score
Listener Satisfaction	Did the interaction seem comfortable and easy for all parties?	
	Were there any communication difficulties?	Reverse score
		Total: /14

Appendix 2 – Blank Information Sheet and Consent Form

NEWCASTLE UNIVERSITY

UNITED KINGDOM

SCHOOL OF MODERN LANGUAGES & SCHOOL OF PSYCHOLOGY

Creating a bilingual resource for emotion communication among people with autism:

An Adaptation of Talking Mats®

Thank you for agreeing to take part in this research.

The researcher will provide a written document for you to read before you agree to take part.

If you have any questions after you have read the document, ask the researcher before you decide whether to take part.

Please tell the researcher if you would like a copy of the consent form to keep.

NEWCASTLE UNIVERSITY

UNITED KINGDOM

SCHOOL OF MODERN LANGUAGES & SCHOOL OF PSYCHOLOGY

Creating a bilingual resource for emotion communication among people with autism: An Adaptation of Talking Mats®

Researcher: Jessica Duff

Contact details: J.Duff2@newcastle.ac.uk

Supervisor: Dr Margreet Vogelzang

Supervisor Contact Details: Margreet.Vogelzang@newcastle.ac.uk

What is this document? This document explains what kind of study you are being asked to take part in, what your rights are, and what will be done with the information you provide. If there are any special benefits or risks to participation, they will be explained here. Please read the information carefully and retain it for your records.

The project: You are about to participate in a study for an undergraduate Dissertation in the School of Modern Languages at Newcastle University. Your session should last 30-40 minutes. You will complete 2 questionnaires independently at the beginning and end of your session, with an image-based task in between. The image-based task uses a Talking Mat to facilitate conversation about sensory and emotional experiences. It will be video recorded for peer review. Recordings will be stored on a passcode protected device within the researcher's University OneDrive account until July 2026, at which point they will be destroyed. You will be given full instructions before you begin.

Risks and benefits: The questionnaires and image-based task relate to personal and sensory situations which may be uncomfortable for some participants to discuss. If you do feel uncomfortable, you are free to inform the researcher, who will do their best to eliminate or minimise discomfort. You may also ask for breaks or clarification at any time. You can decline to answer any questions or discuss certain topics and are free to withdraw at any time. The only benefit to you personally is a £10 voucher, provided as a goodwill gesture for your contribution.

Right to Withdraw: Your participation is voluntary and are free to withdraw from the study at any time, without giving a reason. There will be no adverse consequences if you do withdraw. Upon withdrawing, all data associated with your ID code will be deleted immediately. To withdraw, please contact the researcher:

J.Duff2@newcastle.ac.uk.

Confidentiality: All data will be anonymised. Your real name will never be used, and any other information that identifies you will be anonymised or deleted.

Your Data: Any data you provide will be handled in accordance with the UK Data Protection Act of 2018. Your anonymous data will be securely stored and may be used only by the above-named researcher as well as by other qualified researchers for teaching or research purposes, and in professional presentations. Any identifying information you have provided during recruitment or on consent forms will only be accessible by the named researcher, stored separately from your response data, and not used as part of the research. After the study's completion date (July 2026) any identifying information will be deleted. Original recordings will be destroyed.

Contact Information: This research is being conducted by Jessica Duff at Newcastle University, who is supervised by Dr Margreet Vogelzang. The researcher can be contacted via email at J.Duff2@newcastle.ac.uk. This study was approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. If you have any concerns regarding your rights as a participant in this research, you can contact Newcastle University Research Ethics at res.policy@ncl.ac.uk, citing the ethics approval reference number of this project (68108/2023).

Jessica Duff

Newcastle University

J.Duff2@newcastle.ac.uk

NEWCASTLE UNIVERSITY
UNITED KINGDOM
SCHOOL OF MODERN LANGUAGES & SCHOOL OF PSYCHOLOGY

I confirm that I have read the information provided about the above research project and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw from the project at any time, without needing to give a reason.

I agree to participate in the study Creating a bilingual resource for emotion communication among people with autism: An Adaptation of Talking Mats®.

I understand that any data that are collected will be used and stored on Newcastle University OneDrive, in accordance with the UK Data Protection Act.

I understand that these data may be used in analyses, publications, and conference presentations by researchers at Newcastle University and their collaborators at other research institutions. I give permission for these individuals to have access to these data.

I understand that personal information (such as age, gender) will be collected as part of this research. All data will be anonymised by the researcher as soon as possible.

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

Appendix 3 – Script for TM Activity

“Thank you for completing the first questionnaire. I’ll introduce myself properly now before we get on with the rest of the session. I’m Jess, I’m an undergraduate student here at Newcastle University, and this research is for my undergraduate dissertation. I am a bilingual speaker of Spanish and English (*me da igual qué idioma prefieras*), so please feel free to use whichever language you are most comfortable in throughout the session.

Now that you’ve completed the first questionnaire, you will complete the image-based activity, and then one more short questionnaire at the end.

The image-based activity is called a Talking Mat®. When we start the activity, I will hand you a series of cards which represent different situations. I just need you to put them into the categories at the top – so, these faces represent “I feel good about this”, “I feel neutral or unsure about this”, and “I feel not good about this”.

BILINGUAL GROUP ONLY: The cards are double-sided, with one side in English and the other in Spanish. Please feel free to put either side down, based on whichever represents your feelings, opinions, or preferences the best.

When you put the cards into the categories, please feel free to tell me as much as you feel comfortable to about why you are putting the cards where you are.

BILINGUAL GROUP ONLY: You can also tell me as much about your choices in using the Spanish or English side as you feel comfortable to.

Once we’ve used all the cards, I will give you the option to add a blank card. This is completely optional, but this is just to give you the chance to add anything else that you feel might be relevant. After that, I will recap what you’ve told me, and we can make sure that you’re happy with where everything is.

Do you have any questions about that?

And are you still happy for the activity to be recorded?”