**Childhood Language Development and Alexithymia in Adolescence:**

**An Eight-Year Longitudinal Study**

*Supplementary Materials*

Categorisation of Language Impaired Groups at Different Time Points

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| **Time point** | **Total *N*** | **Language impaired group(s) (*n*)** | **Measures** |
| T1 (4-5 years old) | 229 | Boys (*n* = 62) and girls (*n* = 60) with low language function: scoring below 14th percentile on the CCC-2 short form | Teacher-reported CCC-2 short form, z-transformed by season of birth and sex |
| T2 (5-6 years old) | 229 | (i) Children with language disorder (*n* = 48): scoring -1.5 standard deviations on at least two out of five language composite scores on the language assessment battery  (ii) Children with DLD (*n* = 35): meeting the above criteria for language disorder, *and* neither having a biomedical condition (such as Down syndrome and epilepsy) nor a non-verbal ability composite score of -2 standard deviations suggestive of an intellectual disability | Language assessment battery testing expressive language, receptive language, vocabulary, grammar, and narrative skills (details see supplementary section Diagnostic Criteria for Language Disorder at T2 below) |
| T2 (5-6 years old) | 139 | Children with severe language impairments (*n* = 12) and children with moderate language difficulties (*n* = 37) across all language domains on the CCC-2 subscales; identified by the latent profile analysis | Subscales of parent-reported CCC-2 full form, z-transformed by sex to approximate T1 standardisation |
| T1-T3 (4-8 years old) | 139 | Children with persistent language impairments over time (*n* = 15), and children with moderate language concerns and showed less improvement over time (*n* = 18); identified by the latent growth curve analysis | Total scores of T1 teacher-reported CCC-2 short form, T2 parent-reported CCC-2 full form, and T3 parent-reported CCC-2 short form; all z-transformed as described above |

**Diagnostic Criteria for Language Disorder at T2**

To determine whether children met the criteria for language disorder, children were evaluated by the SCALES team based on their five composite scores on a language assessment battery at T2. These included expressive language (EOWPVT, SASIT, and ACE-Recall), receptive language (ROWPVT, TROG, and ACE-Comp), vocabulary (EOWPVT and ROWPVT), grammar (TROG and SASIT), and narrative skills (ACE-recall and ACE-comp). Higher scores reflect better performance. Children were considered meeting the criteria for language disorder if they scored -1.5 standard deviations on at least two of the five composite scores. Further details of these assessments can be found in the user guide of the SCALES dataset and the original reports referenced below.

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| **Assessment** | **Domain** | **Description** |
| Receptive One Word Picture Vocabulary Test (ROWPVT) (Martin & Brownell, 2010) | Receptive language / Vocabulary | Children were asked to hear a word and then pick the corresponding picture from a choice of four. |
| Expressive One Word Picture Vocabulary Test (EOWPVT) (Martin & Brownell, 2011) | Expressive language / Vocabulary | Contrary to the Receptive Test, children were required to name the actions/concepts/objects as shown on the test pictures. |
| Test of Reception of Grammar (TROG) (Bishop, 2003) | Receptive language / Grammar | Children were asked to listen to a sentence and then pick the corresponding picture from a choice of four. |
| School-aged Sentence Imitation Test (SASIT) (Marinis et al., 2011) | Expressive language | Children were asked to repeat 32 sentences. Their accuracy, number of function words, content words, and inflected verbs were scored. |
| Assessment of Comprehension and Expression – Narrative Recall (ACE-Recall) (Adams et al., 2001) | Expressive language / Narrative skills | Children were asked to listen to a story (monkey in a forest) and then retell the story to the examiner in the presence of story images. |
| Assessment of Comprehension and Expression – Narrative Comprehension (ACE-Comp) (SCALES team) | Receptive language / Narrative skills | Following the Recall Test above, children had to answer 12 comprehension questions about the story they had just retold. |

**Additional References for Behavioural Assessments**

Adams, C., Cooke, R., Crutchley, A., Hesketh, A., & Reeves, D. (2001). Assessment of comprehension and expression 6‐11. GL assessment. Available from: http://www.gl-assessment.co.uk/products/assessment-comprehension-and-expression-6-11

Bishop, D. V. M. (2003). *TROG-2 test for reception of grammar-2:* London: Harcourt.

Marinis, T., Chiat, S., Armon‐Lotem, S., Piper, J., & Roy, P. (2011). School‐age sentence imitation test‐E32. http://www.city.ac.uk/health/research/centre-for-language-communication-sciences-research/veps-very-early-processing-skills/veps-assessments

Martin, N. A., & Brownell, R. (2010). *Receptive One-Word Picture Vocabulary Test Fourth Edition (ROWPVT-4).* Novato: Academic Therapy Publications.

Martin, N. A., & Brownell, R. (2011). *Expressive One-Word Picture Vocabulary Test-4 (EOWPVT-4)*: Academic Therapy Publications.

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| **Table S1** Sample Characteristics of the Selected Sample (n = 139) | | | | |
|  | **Mean/*n*** | ***SD*/%** | **Min** | **Max** |
| T1 Child age (years) | 5.34 | 0.29 | 4.75 | 5.83 |
| T1 Female participants | 81 | 58.3 |  |  |
| T1 Child ethnicity |  |  |  |  |
| White | 131 | 94.2 |  |  |
| Other | 8 | 5.8 |  |  |
| T1 Deprivation quintile |  |  |  |  |
| 1st | 4 | 2.9 |  |  |
| 2nd | 14 | 10.1 |  |  |
| 3rd | 20 | 14.4 |  |  |
| 4th | 41 | 29.5 |  |  |
| 5th | 60 | 43.2 |  |  |
| T1 Language function |  |  |  |  |
| Low | 60 | 43.2 |  |  |
| High | 79 | 56.8 |  |  |
| T1 Child ASD diagnosis |  |  |  |  |
| Yes | 4 | 2.9 |  |  |
| No | 135 | 97.1 |  |  |
| T2 Mother’s education level |  |  |  |  |
| <=GCSEs | 32 | 23.2 |  |  |
| A-levels/Vocational qualification | 40 | 29.0 |  |  |
| Degree | 45 | 32.6 |  |  |
| Higher degree | 21 | 15.2 |  |  |
| T2 Father’s education level |  |  |  |  |
| <=GCSEs | 34 | 25.4 |  |  |
| A-levels/Vocational qualification | 52 | 38.8 |  |  |
| Degree | 33 | 24.6 |  |  |
| Higher degree | 15 | 11.2 |  |  |
| T2 Family medical history |  |  |  |  |
| >1 ASD/ADHD/CD/DCD | 18 | 12.9 |  |  |
| None | 121 | 87.1 |  |  |
| T1 Strength and difficulties |  |  |  |  |
| Total difficulties | 7.02 | 6.03 | 0 | 25 |
| T2 Non-verbal IQ |  |  |  |  |
| Block design | 26.38 | 4.20 | 15 | 40 |
| T2-T3 School support |  |  |  |  |
| Speech therapy |  |  |  |  |
| 0 | 96 | 69.1 |  |  |
| 1 | 2 | 1.4 |  |  |
| 2 | 41 | 29.5 |  |  |
| Special education needs |  |  |  |  |
| 0 | 87 | 68.5 |  |  |
| 1 | 29 | 22.8 |  |  |
| 2 | 11 | 8.7 |  |  |
| *Notes.* ASD = Autism Spectrum Disorder; ADHD = Attention Deficit Hyperactivity Disorder; CD = Conduct Disorder; DCD = Dyspraxia. | | | | |

Figure S1  
*Latent Profile Analysis Based on Children’s Parent-Reported Full CCC-2 Subscale Scores Assessing Multi-Domain Language Function at T2 (n = 139)*

**Chart

Description automatically generated**

*Notes.* Standardised scores are presented here. Higher scores indicate more language difficulties and impairments. Dotted lines denote individual language profiles across language domains. The latent profile analysis suggests a three-profile solution given the data, namely children with (red: *n* = 90), children with moderate language difficulties (blue: *n* = 37), and children with severe language impairments across all language domains (green: *n* = 12). SEMANT = semantics; COHER = coherence; INAPP = inappropriate initiation; STEREO = stereotyped language; CONTEX = use of context; NONVER = nonverbal communication.

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| A descriptive summary of the language Impairments by T2 latent language profiles (*n* = 139) is as follows: | | | | | | | | | | | | | | |
|  | Profile 1: TD (*n* = 90) | | | |  | Profile 2: Moderately impaired (*n* = 37) | | | |  | Profile 3: Severely impaired (*n* = 12) | | | |
|  | **Mean** | ***SD*** | **Min** | **Max** |  | **Mean** | ***SD*** | **Min** | **Max** |  | **Mean** | ***SD*** | **Min** | **Max** |
| T2 CCC-2 (parent, long) | 13.83 | 9.63 | 0 | 34 |  | 48.02 | 12.73 | 28 | 77 |  | 83.37 | 16.25 | 64 | 115 |
| Speech | 0.96 | 1.56 | 0 | 7 |  | 4.22 | 3.38 | 0 | 13 |  | 10.33 | 4.68 | 5 | 17 |
| Syntax | 0.68 | 1.31 | 0 | 6 |  | 3.95 | 1.90 | 0 | 10 |  | 10.33 | 4.27 | 3 | 18 |
| Semantics | 1.98 | 1.95 | 0 | 10 |  | 5.66 | 2.02 | 0 | 9 |  | 11.36 | 2.47 | 6 | 15 |
| Coherence | 0.78 | 1.07 | 0 | 4 |  | 5.16 | 2.18 | 2 | 11 |  | 11.17 | 3.10 | 6 | 16 |
| Inappropriate initiation | 2.50 | 2.39 | 0 | 10 |  | 6.64 | 3.44 | 0 | 13 |  | 11.17 | 5.01 | 5 | 21 |
| Stereotyped language | 0.98 | 1.35 | 0 | 6 |  | 3.23 | 2.13 | 0 | 9 |  | 7.33 | 3.45 | 3 | 15 |
| Use of context | 2.01 | 1.70 | 0 | 7 |  | 6.32 | 2.86 | 1 | 13 |  | 11.67 | 3.85 | 8 | 19 |
| Nonverbal communication | 0.69 | 1.21 | 0 | 7 |  | 3.84 | 2.19 | 0 | 9 |  | 6.00 | 3.86 | 0 | 12 |

*Notes.* Raw scores are presented here for descriptive purpose. CCC-2 = Children’s Communication Checklist 2; TD = Typically-developing.

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| **Table S2** Model Fit Information of Latent Profile Analysis (n = 139) | | | | | |  |  |  |  |  |  |  |  |  |  |
|  | AIC | ΔAIC | BIC | ΔBIC | ABIC | Entropy | VLMR LRT | LMR adjusted LRT | PB LRT | Best log likelihood value replicated? | Profile proportions ~10% | Profile 1 | Profile 2 | Profile 3 | Profile 4 |
| 1 Profile | 3171.6 | -- | 3218.56 | -- | 3167.93 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2 Profiles | 2570.02 | -601.58 | 2643.38 | -575.17 | 2564.29 | 0.976 | 0.0056 | 0.0062 | <.001 | Yes | Yes | 107 | 32 | -- | -- |
| **3 Profiles** | **2358.47** | **-211.56** | **2458.24** | **-185.15** | **2350.67** | **0.954** | **0.2499** | **0.2571** | **<.001** | **Yes** | **Yes** | **90** | **37** | **12** | **--** |
| 4 Profiles | 2284.83 | -73.631 | 2411.02 | -47.221 | 2274.97 | 0.977 | 0.3823 | 0.3865 | <.001 | Yes | No | 94 | 33 | 7 | 5 |
| *Notes.* AIC = Akaike Information Criterion; BIC = Bayesian Information Criteria; ABIC = sample-size adjusted BIC; VLMR LRT = Vuong-Lo-Mendell-Rubin likelihood ratio test; LMR adjusted LRT = Lo-Mendell-Rubin adjusted likelihood ratio test; PB LRT = parametric bootstrapped likelihood ratio test. | | | | | | | | | | | | | | | |

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| **Table S3** Sample Characteristics of T2 Latent Language Profiles (n = 139) | | | | | | | | | | | | | | |
|  | Profile 1: TD (*n* = 90) | | |  |  | Profile 2: Moderately impaired (*n* = 37) | | | |  | Profile 3: Severely impaired (*n* = 12) | | | |
|  | **Mean/*n*** | ***SD*** | **Min** | **Max** |  | **Mean/*n*** | ***SD*** | **Min** | **Max** |  | **Mean/*n*** | ***SD*** | **Min** | **Max** |
| T1 Child age (years) | 5.37 | 0.29 | 4.83 | 5.83 |  | 5.31 | 0.27 | 4.92 | 5.83 |  | 5.19 | 0.32 | 4.75 | 5.75 |
| T1 Female participants | 52 |  |  |  |  | 22 |  |  |  |  | 7 |  |  |  |
| T1 Child ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| White | 86 |  |  |  |  | 34 |  |  |  |  | 11 |  |  |  |
| Other | 4 |  |  |  |  | 3 |  |  |  |  | 1 |  |  |  |
| T1 Deprivation quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1st | 2 |  |  |  |  | 2 |  |  |  |  | 0 |  |  |  |
| 2nd | 5 |  |  |  |  | 5 |  |  |  |  | 4 |  |  |  |
| 3rd | 12 |  |  |  |  | 7 |  |  |  |  | 1 |  |  |  |
| 4th | 30 |  |  |  |  | 8 |  |  |  |  | 3 |  |  |  |
| 5th | 41 |  |  |  |  | 15 |  |  |  |  | 4 |  |  |  |
| T1 Language function |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Low | 27 |  |  |  |  | 23 |  |  |  |  | 10 |  |  |  |
| High | 63 |  |  |  |  | 14 |  |  |  |  | 2 |  |  |  |
| T1 Child ASD diagnosis |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 0 |  |  |  |  | 0 |  |  |  |  | 4 |  |  |  |
| No | 90 |  |  |  |  | 37 |  |  |  |  | 8 |  |  |  |
| T2 Mother’s education level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <=GCSEs | 16 |  |  |  |  | 15 |  |  |  |  | 1 |  |  |  |
| A-levels/Vocational qualification | 22 |  |  |  |  | 9 |  |  |  |  | 9 |  |  |  |
| Degree | 35 |  |  |  |  | 9 |  |  |  |  | 1 |  |  |  |
| Higher degree | 17 |  |  |  |  | 3 |  |  |  |  | 1 |  |  |  |
| T2 Father’s education level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <=GCSEs | 16 |  |  |  |  | 13 |  |  |  |  | 5 |  |  |  |
| A-levels/Vocational qualification | 34 |  |  |  |  | 14 |  |  |  |  | 4 |  |  |  |
| Degree | 25 |  |  |  |  | 7 |  |  |  |  | 1 |  |  |  |
| Higher degree | 13 |  |  |  |  | 1 |  |  |  |  | 1 |  |  |  |
| T2 Family medical history |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| >1 ASD/ADHD/CD/DCD | 6 |  |  |  |  | 6 |  |  |  |  | 6 |  |  |  |
| None | 84 |  |  |  |  | 31 |  |  |  |  | 6 |  |  |  |
| T1 Strength and difficulties |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Total difficulties | 5.39 | 5.09 | 0 | 18 |  | 9.49 | 5.87 | 1 | 25 |  | 11.67 | 8.23 | 1 | 24 |
| T2 Non-verbal IQ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Block design | 27.30 | 4.25 | 15 | 40 |  | 24.65 | 3.20 | 18 | 32 |  | 24.64 | 4.65 | 18 | 32 |
| T2-T3 School support |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Speech therapy |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | 73 |  |  |  |  | 21 |  |  |  |  | 2 |  |  |  |
| 1 | 2 |  |  |  |  | 0 |  |  |  |  | 0 |  |  |  |
| 2 | 15 |  |  |  |  | 16 |  |  |  |  | 10 |  |  |  |
| Special education needs |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | 73 |  |  |  |  | 14 |  |  |  |  | 0 |  |  |  |
| 1 | 10 |  |  |  |  | 14 |  |  |  |  | 5 |  |  |  |
| 2 | 3 |  |  |  |  | 4 |  |  |  |  | 4 |  |  |  |
| *Notes.* ASD = Autism Spectrum Disorder; ADHD = Attention Deficit Hyperactivity Disorder; CD = Conduct Disorder; DCD = Dyspraxia. | | | | | | | | | | | | | | |

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| **Table S4** Comparison of T5 Alexithymic Trait Domains between T2 Latent Language Profiles (n = 139) | | | | | | | | | | | | |
|  | Profile 1: TD (*n* = 90) | | | Profile 2: Moderately impaired (*n* = 37) | | | Profile 3: Severely impaired (*n* = 12) | | | Profile comparison | | |
| **T5 Alexithymia – EAQ** | **Mean** | ***SD*** |  | **Mean** | ***SD*** |  | **Mean** | ***SD*** |  | **χ2** | ***p*** | **ε2** |
| Differentiating emotions | 15.74 | 3.62 |  | 15.11 | 3.19 |  | 13.92 | 3.50 |  | 3.43 | 0.180 | 0.02 |
| Verbal sharing of emotions | 6.09 | 1.86 |  | 5.89 | 1.90 |  | 5.00 | 1.81 |  | 3.16 | 0.206 | 0.02 |
| Not hiding emotions | 9.93 | 2.64 |  | 10.22 | 2.78 |  | 9.33 | 2.46 |  | 0.97 | 0.616 | <.001 |
| Bodily awareness of emotions | 10.19 | 2.74 |  | 10.03 | 2.50 |  | 10.42 | 2.81 |  | 0.13 | 0.937 | <.001 |
| Attention to others’ emotions | 13.66 | 1.45 |  | 13.49 | 1.52 |  | 13.17 | 2.04 |  | 0.53 | 0.766 | <.001 |
| Analyses of own emotions | 11.06 | 2.38 |  | 11.08 | 2.56 |  | 11.42 | 2.15 |  | 0.22 | 0.898 | <.001 |
| *Notes.* EAQ = Emotion Awareness Questionnaire; TD = Typically-developing. | | | | | |  |  |  |  |  |  |  |

Figure S2  
*Latent Growth Curve Analysis Based on Children’s CCC-2 Total Scores from T1 to T3 (n = 139)*

A graph of a graph with lines and numbers

Description automatically generated with medium confidence

*Notes.* Standardised scores are presented here. Higher scores indicate more language difficulties and impairments. Dotted lines denote the language development trajectories of individuals from T1 (x-axis = 0) to T3 (x-axis = 3). The latent growth curve analysis suggests a four-trajectory solution given the data, namely children with minimal language concerns throughout (purple: *n* = 46), children who showed persistent language impairments (blue: *n* = 15), children with steady improvement and attained typical language over the years (green: *n* = 60), and children who showed less improvement with moderate language concerns (red: *n* = 18).

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| A descriptive summary of the language impairments by T1-T3 language development trajectories (*n* = 139) is as follows: | | | | | | | | | | | | | | | | | | | |
|  | Trajectory 1: TD (*n* = 46) | | | |  | Trajectory 2: Persistently impaired (*n* = 15) | | | |  | Trajectory 3: Improved (*n* = 60) | | | |  | Trajectory 4: Less improved (*n* = 18) | | | |
|  | **Mean** | ***SD*** | **Min** | **Max** |  | **Mean** | ***SD*** | **Min** | **Max** |  | **Mean** | ***SD*** | **Min** | **Max** |  | **Mean** | ***SD*** | **Min** | **Max** |
| T1 CCC-2  (teacher, short) | 1.61 | 2.06 | 0 | 8 |  | 27.40 | 11.25 | 0 | 39 |  | 16.50 | 8.17 | 5 | 39 |  | 21.17 | 8.31 | 3 | 38 |
| T2 CCC-2  (parent, long) | 13.80 | 11.98 | 0 | 39 |  | 64.75 | 22.49 | 28 | 107 |  | 22.13 | 15.00 | 2 | 56 |  | 60.46 | 23.36 | 20 | 115 |
| T3 CCC-2  (parent, short) | 1.13 | 1.45 | 0 | 6 |  | 19.95 | 2.77 | 16 | 25 |  | 2.40 | 1.80 | 0 | 7 |  | 10.40 | 2.18 | 6 | 13 |

*Notes.* Raw scores are presented here for descriptive purpose. CCC-2 = Children’s Communication Checklist 2; TD = Typically-developing.

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| **Table S5** Model Fit Information of Latent Class Growth Analysis (n = 139) | | | | | | | | | | | | | | | |  |
|  | AIC | ΔAIC | BIC | ΔBIC | ABIC | Entropy | VLMR LRT | LMR adjusted LRT | PB LRT | Best log likelihood value replicated? | Trajectory proportions ~10% | Trajectory 1 | Trajectory 2 | Trajectory 3 | Trajectory 4 | Trajectory 5 |
| 1 Trajectory | 1232.82 | -- | 1250.43 | -- | 1231.44 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2 Trajectories | 1039.29 | -193.53 | 1065.70 | -184.73 | 1037.22 | 0.95 | <.001 | <.001 | <.001 | Yes | Yes | 108 | 31 | -- | -- | -- |
| 3 Trajectories | 980.10 | -59.18 | 1015.32 | -50.38 | 977.35 | 0.98 | 0.019 | 0.023 | <.001 | Yes | Yes | 105 | 19 | 15 | **--** | **--** |
| **4 Trajectories** | **948.60** | **-31.50** | **992.62** | **-22.70** | **945.16** | **0.91** | **0.256** | **0.271** | **<.001** | **Yes** | **Yes** | **60** | **46** | **18** | **15** | **--** |
| 5 Trajectories | 928.82 | -19.79 | 981.64 | -10.98 | 924.69 | 0.94 | <.001 | <.001 | <.001 | No | No | 60 | 46 | 18 | 14 | 1 |
| *Notes.* AIC = Akaike Information Criterion; BIC = Bayesian Information Criteria; ABIC = sample-size adjusted BIC; VLMR LRT = Vuong-Lo-Mendell-Rubin likelihood ratio test; LMR adjusted LRT = Lo-Mendell-Rubin adjusted likelihood ratio test; PB LRT = parametric bootstrapped likelihood ratio test. | | | | | | | | | | | | | | | | |

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| **Table S6** Sample Characteristics of T1-T3 Language Development Trajectories (n = 139) | | | | | | | | | | | | | | |  |  |  |  |  |
|  | Trajectory 1: TD (*n* = 46) | | |  |  | Trajectory 2: Persistently impaired (*n* = 15) | | | |  | Trajectory 3: Improved (*n* = 60) | | | |  | Trajectory 4: Less improved (*n* = 18) | | | |
|  | **Mean/*n*** | ***SD*** | **Min** | **Max** |  | **Mean/*n*** | ***SD*** | **Min** | **Max** |  | **Mean/*n*** | ***SD*** | **Min** | **Max** |  | **Mean/*n*** | ***SD*** | **Min** | **Max** |
| T1 Child age (years) | 5.33 | 0.28 | 4.83 | 5.83 |  | 5.28 | 0.33 | 4.75 | 5.83 |  | 5.40 | 0.29 | 4.92 | 5.83 |  | 5.19 | 0.27 | 4.92 | 5.67 |
| T1 Female participants | 30 |  |  |  |  | 9 |  |  |  |  | 33 |  |  |  |  | 9 |  |  |  |
| Block design |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 Child ethnicity |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| White | 44 |  |  |  |  | 15 |  |  |  |  | 58 |  |  |  |  | 14 |  |  |  |
| Other | 2 |  |  |  |  | 0 |  |  |  |  | 2 |  |  |  |  | 4 |  |  |  |
| T1 Deprivation quintile |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1st | 1 |  |  |  |  | 0 |  |  |  |  | 2 |  |  |  |  | 1 |  |  |  |
| 2nd | 1 |  |  |  |  | 3 |  |  |  |  | 7 |  |  |  |  | 3 |  |  |  |
| 3rd | 4 |  |  |  |  | 3 |  |  |  |  | 12 |  |  |  |  | 1 |  |  |  |
| 4th | 13 |  |  |  |  | 4 |  |  |  |  | 17 |  |  |  |  | 7 |  |  |  |
| 5th | 27 |  |  |  |  | 5 |  |  |  |  | 22 |  |  |  |  | 6 |  |  |  |
| T1 Language function |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Low | 0 |  |  |  |  | 13 |  |  |  |  | 33 |  |  |  |  | 14 |  |  |  |
| High | 46 |  |  |  |  | 2 |  |  |  |  | 27 |  |  |  |  | 4 |  |  |  |
| T1 Child ASD diagnosis |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Yes | 0 |  |  |  |  | 3 |  |  |  |  | 0 |  |  |  |  | 1 |  |  |  |
| No | 46 |  |  |  |  | 12 |  |  |  |  | 60 |  |  |  |  | 17 |  |  |  |
| T2 Mother’s education level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <=GCSEs | 4 |  |  |  |  | 5 |  |  |  |  | 17 |  |  |  |  | 6 |  |  |  |
| A-levels/Vocational qualification | 11 |  |  |  |  | 8 |  |  |  |  | 16 |  |  |  |  | 5 |  |  |  |
| Degree | 18 |  |  |  |  | 1 |  |  |  |  | 20 |  |  |  |  | 6 |  |  |  |
| Higher degree | 13 |  |  |  |  | 1 |  |  |  |  | 6 |  |  |  |  | 1 |  |  |  |
| T2 Father’s education level |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <=GCSEs | 5 |  |  |  |  | 4 |  |  |  |  | 16 |  |  |  |  | 9 |  |  |  |
| A-levels/Vocational qualification | 15 |  |  |  |  | 7 |  |  |  |  | 26 |  |  |  |  | 4 |  |  |  |
| Degree | 16 |  |  |  |  | 2 |  |  |  |  | 11 |  |  |  |  | 4 |  |  |  |
| Higher degree | 9 |  |  |  |  | 1 |  |  |  |  | 5 |  |  |  |  | 0 |  |  |  |
| T2 Family medical history |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| >1 ASD/ADHD/CD/DCD | 3 |  |  |  |  | 5 |  |  |  |  | 5 |  |  |  |  | 5 |  |  |  |
| None | 43 |  |  |  |  | 10 |  |  |  |  | 55 |  |  |  |  | 13 |  |  |  |
| T1 Strength and difficulties |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Total difficulties | 3.39 | 4.10 | 0 | 17 |  | 10.93 | 7.13 | 0 | 24 |  | 7.78 | 5.30 | 0 | 24 |  | 10.50 | 6.88 | 1 | 25 |
| T2 Non-verbal IQ | 28.54 | 3.72 | 15 | 40 |  | 23.36 | 3.91 | 18 | 32 |  | 26.27 | 3.89 | 20 | 36 |  | 23.56 | 3.54 | 18 | 30 |
| T2-T3 School support |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Speech therapy |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | 44 |  |  |  |  | 4 |  |  |  |  | 43 |  |  |  |  | 5 |  |  |  |
| 1 | 1 |  |  |  |  | 0 |  |  |  |  | 1 |  |  |  |  | 0 |  |  |  |
| 2 | 1 |  |  |  |  | 11 |  |  |  |  | 16 |  |  |  |  | 13 |  |  |  |
| Special education needs |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0 | 40 |  |  |  |  | 1 |  |  |  |  | 43 |  |  |  |  | 3 |  |  |  |
| 1 | 2 |  |  |  |  | 8 |  |  |  |  | 10 |  |  |  |  | 9 |  |  |  |
| 2 | 1 |  |  |  |  | 4 |  |  |  |  | 3 |  |  |  |  | 3 |  |  |  |
| *Notes.* ASD = Autism Spectrum Disorder; ADHD = Attention Deficit Hyperactivity Disorder; CD = Conduct Disorder; DCD = Dyspraxia; TD = Typically-developing. | | | | | | | | | | | | | | | | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table S7** Comparison of T5 Alexithymic Trait Domains between T1-T3 Language Development Trajectories (n = 139) | | | | | | | | | | | | | | | |
|  | Trajectory 1: TD (*n* = 46) | | | Trajectory 2: Persistently impaired (*n* = 15) | | | Trajectory 3: Improved (*n* = 60) | | | Trajectory 4: Less improved (*n* = 18) | | | Trajectory comparison | | |
| **T5 Alexithymia – EAQ** | **Mean** | ***SD*** |  | **Mean** | ***SD*** |  | **Mean** | ***SD*** |  | **Mean** | ***SD*** |  | **χ2** | ***p*** | **ε2** |
| Differentiating emotions | 15.96 | 4.05 |  | 14.47 | 3.29 |  | 15.65 | 3.08 |  | 14.06 | 3.39 |  | 5.26 | 0.154 | 0.04 |
| Verbal sharing of emotions | 6.00 | 2.16 |  | 5.60 | 1.92 |  | 6.12 | 1.69 |  | 5.50 | 1.72 |  | 1.86 | 0.601 | 0.01 |
| Not hiding emotions | 9.41 | 2.82 |  | 9.60 | 2.64 |  | 10.38 | 2.59 |  | 10.22 | 2.34 |  | 3.72 | 0.294 | 0.03 |
| Bodily awareness of emotions | 10.00 | 3.08 |  | 10.47 | 2.59 |  | 10.33 | 2.44 |  | 9.78 | 2.49 |  | 0.86 | 0.836 | <.001 |
| Attention to others’ emotions | 13.87 | 1.42 |  | 13.07 | 1.98 |  | 13.57 | 1.41 |  | 13.22 | 1.63 |  | 3.71 | 0.294 | 0.03 |
| Analyses of own emotions | 11.15 | 2.52 |  | 10.80 | 2.76 |  | 11.13 | 2.38 |  | 11.06 | 1.95 |  | 0.26 | 0.965 | <.001 |
| *Notes.* EAQ = Emotion Awareness Questionnaire; TD = Typically-developing. | | | | | | | | | | | | | | |  |

**Sex Differences in Language-Alexithymia Relationships**

When repeating the dimensional tests within sex at T1 (*N* = 229), there was a significant correlation between T1 language function and difficulties differentiating emotions at T5 in boys, *r*(110) = -.19, *p* = .047 (girls: *r* = .07), which did not achieve statistical significance when adjusting for non-verbal reasoning and co-occurring socioemotional symptoms (Estimate = -0.44 [-1.16; 0.29], SE = 0.37, t = -1.18, *p* = .24). No other correlations were found for boys (*r*s = -.10 to .05) and girls (*r*s = -.16 to .17), as well as when analysing high and low functioning groups within boys and girls separately (*r*s = -.23 to .24).

For T2 data (*n* = 139), when repeating these analyses in boys only (*n* = 58), poorer language function overall (*r* = -.35, *p* = .006), and difficulties in speech (*r* = -.36, *p* = .006), syntax (*r* = -.45, *p* <.001), semantics (*r* = -.36, *p* = .005), and inappropriate initiation (*r* = -.36, *p* = .006) at T2 were significantly correlated with difficulties differentiating emotions at T5 (girls: *r*s = -.03 to -.07). When adjusting for verbal IQ and SDQ scores and controlling for age differences, T2 inappropriate initiation significantly predicted T5 differentiating emotions (Estimate = -1.09 [-2.09; -0.05], SE = 0.52, t = -2.05, *p* = .045, partial *r* = -.26). The association between T2 syntax and T5 differentiating emotions was approaching significance (Estimate = -1.37 [-2.71; -0.02], SE = 0.69, t = -1.99, *p* = .052, partial *r* = -.37). No other associations survived the adjustments (Estimates = -0.41 to -0.65, Ses = 0.40 to 0.46, *p*s = .13 to .31). No significant correlations were found for girls, *r*s = -.28 to .19.

Finally, for T3 data (*n* = 139), poorer language function at T3 was correlated with more difficulties differentiating emotions at T5 in boys, *r*(56) = -.43, *p* = .006 (girls: *r* = .05). This association was confirmed by robust linear regression when adjusting for non-verbal reasoning and SDQ scores and controlling for age differences in boys (Estimate = -1.34 [-2.59; -.10], SE = .64, t = -2.12, *p* = .04, partial *r* = -.32). No other significant associations were found (boys: *r*s = -.21 to .01; girls: *r*s = -.18 to .18).

**Dimensional Relationships between T2 Behavioural Language Assessment Variables and T5 Alexithymic Traits**

On a post-hoc basis, we performed Spearman correlations to explore the relationship between children’s performance on the language assessments at T2 and their alexithymic traits at T5 in the selected sample (*n* = 137). Since there were only two children (one boy and one girl) with missing data on these assessments, complete cases were used. To correct for multiple tests, we applied a Bonferroni correction of .05/ 6 EAQ outcome variables at T5 = .008 (two-tailed) to these analyses. As expected, children who met the diagnostic criteria for language disorder performed significantly worse on these language assessments than peers with typically-developing language abilities (ts = 7.83 to 9.78, *p*s <.001). The same group differences were found between children who further met the diagnostic criteria for developmental language disorder and peers (ts = 6.05 to 9.67, *p*s <.001).

Results indicated that better sentence imitation performance on the SASIT at T2 was significantly correlated with children’s higher self-perceived ability to differentiate emotions at T5, *r*(135) = .26, *p* = .002. Robust linear regression confirmed that this association remained significant after adjusting for non-verbal reasoning and co-occurring socioemotional symptoms and controlling for age differences, Estimate = 0.13 [0.03; 0.22], SE = 0.05, t = 2.59, *p* = .01, partial *r* = .26. No other correlations were found (*r*s = -.12 to .18).

Likewise, when repeating the analyses in boys only (*n* = 57), better sentence imitation on the SASIT was significantly correlated with higher levels of differentiating emotions (*r* = .59, *p* <.001), as well as more verbal sharing of emotions at T5 (*r* = .40, *p* = .002), both of which survived further adjustments in the robust linear regressions (differentiating emotions: Estimate = 0.23 [0.09; 0.37] , SE = 0.07, t = 3.20, *p* = .002, partial *r* = .51; verbal sharing of emotions: Estimate = 0.09 [0.03; 0.16], SE = 0.03, t = 2.94, *p* = .005, partial *r* = .19). This suggests that the same association found in the full analytic sample above is likely a product of this moderate to strong association between T2 SASIT performance and T5 differentiating emotions in boys. Boys’ higher receptive language abilities on the ROWPVT (*r* = .39, *p* <.001) and TROG (*r* = .43, *p* <.001) at T2 were significantly correlated with higher levels of differentiating emotions at T5. Both associations survived further adjustments (ROWPVT: Estimate = 0.07 [0.02; 0.13], SE = 0.03, t = 2.49, *p* = .02, partial *r* = .26; TROG: Estimate = 0.16 [0.03; 0.29], SE = 0.07, t = 2.35, *p* = .02, partial *r* = .30). There was a significant correlation between T2 ACE-Recall performance and T5 differentiating emotions in boys (*r* = .44, *p* <.001), but it only achieved marginal significance when adjusting for non-verbal reasoning and SDQ scores (Estimate = 0.26 [-0.002; 0.52], SE = 0.13, t = 1.95, *p* = .06).

For the analyses in girls only (*n* = 80), girls who had better expressive language on the EOWPVT at T2 reported paying more attention to others’ emotions at T5, *r*(78) = .29, *p* = .004. This association remained significant when adjusting for non-verbal reasoning and co-occurring socioemotional symptoms, and controlling for age differences (Estimate = 0.02 [0.01; 0.04], SE = 0.008, t = 2.80, *p* = .007, partial *r* = .27). No other correlations were found (*r*s = -.14 to .21).