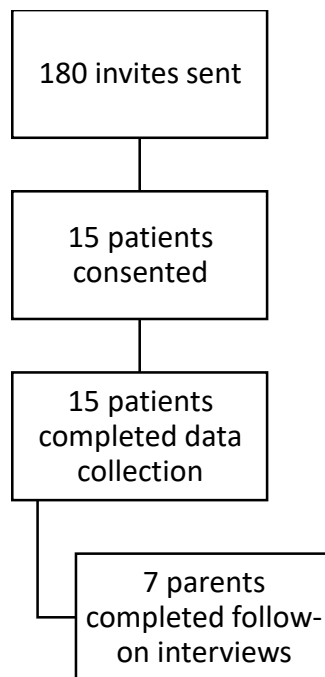


Participant Flow for clinical (DLD) sample



Baseline characteristics

Characteristics: age and gender of children in clinical sample (CE_DLD) and comparator groups recruited in Citizen Science work (CE_LD, CE_TD)

Group	Age (years; months)		Gender	
	Mean (SD)	Median (IQR)	Male/Female n	Male %/Female %
CE_DLD (n = 15)	6;06 (1;05)	7;02(2;11)	10/5	67/33
CS_LD (n = 29)	6;02 (1;02)	6;02 (2;02)	21/8	72/28
CS_TD (n = 599)	5;08 (1;02)	5;06 (1;08)	299/300	50/50

Primary outcome measures

Summary of first stage analysis and outcomes completed on Language Explorer

Story retell microstructure: utterance and word metrics	Do group mean differ in the predicted direction?	Extreme values in CS_TD group?	Sufficient variance ?	CS_TD distribution skew?	CS_TD distribution kurtosis?	include in matched groups analysis ?
MLU_words	No difference	no	Yes	no	no	yes
MLU_morphemes	No difference	no	Yes	no	no	yes
Max_length_utt_words	No difference	no	Yes	positive	no	yes
Max_length_utt_morphemes	No difference	yes	Yes	positive	positive	yes
Total_utt	No difference	yes	Yes	positive	positive	yes
Total_words	No difference	yes	Yes	positive	positive	yes
Keywords	No difference	no	Yes	no	positive	yes
TTR	Yes	no	Yes	no	positive	yes
Synonyms	No difference	no	No	positive	positive	no
Words_per_minute	No difference	no	Yes	no	no	yes
Questions	No difference	yes	No	positive	positive	no
Unique words	No difference	yes	Yes	positive	positive	yes
Story retell microstructure: error metrics	Do group mean differ in the predicted direction?	Extreme values in CS_TD group?	Sufficient variance ?	CS_TD distribution skew?	CS_TD distribution kurtosis?	include in matched groups analysis ?
Unintelligible_words	No difference	yes	Yes	positive	positive	yes
percentage_unintelligible	No difference	yes	Yes	positive	positive	yes
Mispronounced_words	Yes	yes	Yes	positive	positive	yes
percentage_mispronounced	No difference	yes	No	positive	positive	no
Count_of_mazes	difference in opposite direction	yes	Yes	positive	positive	yes
percentage_maze	difference in opposite direction	yes	Yes	positive	positive	yes
Intelligibility	No difference	yes	Yes	negative	positive	yes

Story retell microstructure: parts of speech	Do group mean differ in the predicted direction?	Extrem e values in CS_TD group?	Sufficien t variance ?	CS_TD distributio n skew?	CS_TD distributio n kurtosis?	include in matche d groups analysis ?
Nouns	difference in opposite direction	yes	Yes	positive	positive	yes
s_possessive	no difference	yes	No	positive	positive	no
Regular_plurals	no difference	yes	Yes	positive	positive	yes
Irreg_plurals	no difference	yes	No	positive	positive	no
Determiners	difference in opposite direction	no	Yes	positive	positive	yes
Articles	difference in opposite direction	no	Yes	positive	positive	yes
Pronouns	No difference	yes	Yes	positive	positive	yes
Relative_pronouns	No difference	yes	No	positive	positive	no
Subordinate_conjunctions	No difference	yes	Yes	positive	positive	yes
Coord_conjunctions	Difference in opposite direction	yes	Yes	positive	positive	yes
Verbs	No difference	yes	Yes	positive	positive	yes
Contractible_copula	Difference in opposite direction	yes	Yes	positive	positive	yes
Uncontractible_copula	No difference	yes	Yes	positive	positive	yes
Contractible_Auxiliary	No difference	yes	No	positive	positive	no
Uncontractible_Auxiliary	No difference	no	Yes	positive	positive	yes
Reg_past_tense_ed	No difference	yes	Yes	positive	positive	yes
Irreg_past_tense	No difference	yes	Yes	positive	positive	yes
Present_progressives	No difference	yes	No	positive	positive	no
third_person_reg_present	No difference	no	Yes	positive	positive	yes
third_person_irreg_prese nt	Difference in opposite direction	yes	Yes	positive	positive	yes
Adverbs	No difference	yes	Yes	positive	positive	yes
Adjectives	No difference	yes	Yes	positive	positive	yes
Particles	No difference	yes	No	positive	positive	no
Prepositions	Difference in opposite direction	no	Yes	positive	positive	yes
Comparatives	No difference	yes	No	positive	positive	no

Superlatives	No difference	no	No	positive	positive	no
Story retell macrostructure	Do group mean differ in the predicted direction?	Extreme values in CS_TD group?	Sufficient variance ?	CS_TD distribution skew?	CS_TD distribution kurtosis?	include in matched groups analysis ?
Character	yes	no	No	negative	no	no
Setting	No difference	no	No	no	no	no
Initiating_event	No difference	no	No	negative	negative	no
Internal_response	No difference	no	No	positive	positive	no
Plan	No difference	no	No	positive	no	no
Attempt	No difference	no	No	positive	negative	no
Consequence	No difference	no	No	negative	positive	no
macrostructure_total	yes	no	Yes	no	no	yes
Story comprehension	Do group mean differ in the predicted direction?	Extreme values in CS_TD group?	Sufficient variance ?	CS_TD distribution skew?	CS_TD distribution kurtosis?	include in matched groups analysis ?
comprehension total score	yes	no	Yes	negative	no	yes
Sentence Repetition	Do group mean differ in the predicted direction?	Extreme values in CS_TD group?	Sufficient variance ?	CS_TD distribution skew?	CS_TD distribution kurtosis?	include in matched groups analysis ?
repetition total score	yes	no	Yes	negative	positive	yes

Summary of LEX metrics where some group difference evident in matched groups analysis

Story retell microstructure: utterance and word	group difference in matched groups analysis?	outliers?
MLU_words	no	Yes
MLU_morphemes	no	Yes
Max_length_utt_words	no	No

Max_length_utt_morphemes	no	Yes
Total_utt	no	No
Total_words	no	Yes
Keywords	yes	Yes
TTR	yes	Yes
Words_per_minute	yes	Yes
Unique Words		
Story retell microstructure: error metrics	group difference in matched groups analysis?	
Unintelligible_words	yes	Yes
percentage_unintelligible	yes	Yes
Mispronounced_words	yes	Yes
percentage_mispronounced	yes	Yes
Count_of_mazes	yes but in opposite direction to predicted	Yes
percentage_maze	yes but in opposite direction to predicted	Yes
Intelligibility	yes	
Story retell microstructure: parts of speech	group difference in matched groups analysis?	
Nouns	no	Yes
Regular_plurals	yes	Yes
Determiners	yes but in opposite direction to predicted	Yes
Articles	yes but in opposite direction to predicted	Yes
Pronouns	yes	Yes
Subordinate_conjunctions	no	Yes
Coord_conjunctions	no	Yes
Verbs	no	Yes

Contractible_copula	yes but in opposite direction to predicted	Yes
Uncontractible_copula	yes	No
Uncontractible_Auxiliary	no	No
Reg_past_tense_ed	yes	No
Irreg_past_tense	no	No
third_person_reg_present	no	Yes
third_person_irreg_present	yes but in opposite direction to predicted	Yes
Adverbs	no	Yes
Adjectives	yes	No
Prepositions	no	Yes
Story retell macrostructure	group difference in matched groups analysis?	
macrostructure_total	no	No
Story comprehension	group difference in matched groups analysis?	
comprehension total score	no	No
Sentence Repetition	group difference in matched groups analysis?	
repetition total score	yes	No

Secondary outcome measures

Correlations between LEX metrics and CELF formulated sentences scores

LEX metrics	Formulated sentences
macrostructure_total	0.40
MLU_words	0.62
Nouns	0.67
Regular_plurals	-0.05
Determiners	0.47
Articles	0.49
Pronouns	0.54
Subordinate_conjunctions	0.56
Coord_conjunctions	0.51
Verbs	0.61
Contractible_copula	0.72
Uncontractible_copula	0.77
Uncontractible_Auxiliary	0.59
Reg_past_tense_ed	-0.30
Irreg_past_tense	0.73
third_person_reg_present	0.55
third_person_irreg_present	0.37

Correlations between LEX metrics and CELF word structure scores

LEX metrics	Word Structure
TTR	-0.08
MLU_words	0.38
Nouns	0.41
Regular_plurals	-0.02
Determiners	0.29
Articles	0.28
Pronouns	0.04
Subordinate_conjunctions	-0.04
Coord_conjunctions	0.47
Verbs	0.29
Contractible_copula	0.02
Uncontractible_copula	0.29
Uncontractible_Auxiliary	0.30
Reg_past_tense_ed	0.17
Irreg_past_tense	0.55
third_person_reg_present	0.12
third_person_irreg_present	-0.27
Adverbs	0.14
Adjectives	0.32
Prepositions	0.28

Mean scores for children with, and without, clinician judged difficulties in discourse and phonology scores.

Clinical judgement	Phonology Difficulty mean(s.e.m.)	No Phonology Difficulty mean(s.e.m.)	Discourse difficulty mean(s.e.m.)	No discourse difficulty mean(s.e.m.)
LEX sentence repetition score	6.286 (2.652)	7.589 (3.098)		
LEX total macrostructure score			11.143 (0.911)	6.333 (0.715)

Adverse events

There were no adverse events in this study.