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Development and Preliminary Validation of a Thought, Language, and Communication Scale for Tamil-Speaking Persons with Aphasia: Comparative and Theoretical Insights

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Abstract

Introduction: Aphasia impacts language and thought organisation, disrupting effective communication. Thought, Language, and Communication (TLC) are interrelated, and breakdown in one domain often affect the others. A comprehensive assessment tool is essential to understand and address these interlinks. This study aims to develop and preliminarily validate the TLCAS-PWA for Tamil-speaking PWA and to compare it with NTI.

Methods: The tool was developed through literature review and expert validation, comprising 14 parameters across communication, language, and thought domains, rated on a 5-point scale. It was administered to 20 PWA and 20 NTI.

Results: Among PWA, PCS showed the highest mean scores, while SR was the least frequent. At the domain level, both PWA and NTI had higher scores in Communication Disorder and lower scores in Language Disorder. Mann-Whitney U tests revealed significant differences between groups across all the domains. Psychometric analysis showed good internal consistency ($\alpha = 0.88$) and excellent inter-rater reliability (ICC = 0.98, 95% CI: 0.88-0.99). The test–retest reliability (ICC) showed excellent reliability for the communication and Thought domain and good for the Language domain.

Conclusion: TLCAS-PWA is a preliminarily validated tool that aids clinicians in assessing TLC, supporting diagnosis in PWA.

Keywords: TLCAS-PWA, Language and Thought Impairment, Aphasia, TLC interrelated

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1. Introduction

Aphasia is a language disorder that can lead to difficulties in organising thoughts and ideas, which affects the ability to communicate effectively. In Persons with Aphasia (PWA), cognitive impairment is frequently observed (Helm-Estabrooks, 2002). Cognition is the process of understanding and acquiring knowledge through thought, experience, and the senses (Dhakal & Bobrin, 2023). Thought is considered to be the central process involving semantic and syntactic facts, and language is a peripheral process (Moravcsik, 1981). The greatest storehouse of 'thought' is language, and the primary function of 'language' is to enhance communication, and the secondary function of language is thought enhancement. It implies that language is considered an "instrument of thought" (Jackendoff, 2002). Formulation of thought is the underlying process for language production. Language production begins once the speaker formulates the thought. For 'thought' and 'communication,' language is the semiotic system (Zlatev, 2012), showing the interlink of Thought, Language, and Communication. The interrelation between thought and language is also supported by findings from research on Persons with Thought Disorder (PWTD), although they were not part of the present study. Research evidence on the theoretical link between PWTD and PWA is supported by findings from neuroimaging studies and similarities in language characteristics. Radiological reports showing a decreased volume of the left posterior temporal gyrus in PWTD (Shenton et al., 1992). Based on positron emission tomography and fMRI, the correlations between thought disorder and the left superior temporal gyrus are reported. (Radanovic et al., 2012). Functional neuroimaging studies assessing formal thought disorders focus on different language and speech-processing aspects. The pronounced deficits were in the 'left superior temporal gyrus and superior and inferior frontal brain regions' (Wensing et al., 2017).

Clinically overlapping features have also been documented between PWA and PWTD. PWA experience difficulty in expressing their thoughts and feelings in words (Benson, 1973). Regarding the language characteristics, the research evidence showed an interrelation between thought and language disorders. The overlapping characteristics were 'perseveration, echolalia, neologism, paragrammatism, and word salad' (Benson, 1973), increased fluency in spontaneous speech, paraphasia, impoverishment of content and idiosyncrasies in the use of words, associative loosening, and incomprehensible and meaningless speech (Jilani et al., 2019). PWTD exhibited intermittent aphasia, and the language characteristics were found to be similar to fluent aphasia (Wernicke's aphasia). Theoretical evidence supports that language is an instrument of thought and a medium for communication (Jackendoff, 2002). As thought and language are closely related to each other, and this overlapping character of language and thought makes the speech-language pathologist treat them together, and cannot be treated separately (Lupyan, 2012). Empirical evidence further supports that similar language characteristics are observed in PWA and PWTD. The similarities can reflect the disturbance in language expression due to underlying thought disorganisation. By gaining a more profound understanding of the relationship between thought and language in aphasia, it becomes possible to develop a comprehensive protocol for assessment and intervention. The present study hypothesises that PWA may also exhibit characteristics associated with thought disorder and provides a strong theoretical and empirical foundation for the development of the Thought, Language, and Communication Assessment Scale for Tamil Speaking Persons with Aphasia (TLCAS-PWA).Thus, the present study aimed to develop and preliminarily validate the TLCAS-PWA for Tamil-speaking PWA, and the secondary aim is to compare PWA with Neurotypical Individuals (NTI).

2. Materials and methods

2.1 Material used for assessing Thought, Language, and Communication in Tamil-speaking Persons with Aphasia

2.1.1 Phase I: Development of the Thought, Language, and Communication Assessment Scale for Tamil-speaking Persons with Aphasia (TLCAS-PWA)

The TLCAS-PWA was developed as a clinician-administered tool for assessing Thought, Language, and Communication in PWA by a Speech-Language Pathologist. Evidence from the literature indicates that Thought, Language, and Communication are closely interrelated, and impairment of one has a greater impact on the other. The scales that are found to be majorly used in assessing Thought, Language, and Communication are the Thought, Language, and Communication (TLC) scale (Andreasen, 1986), Thought Disorder Index (Johnston et al., 1986), Bizarre – idiosyncratic thinking (Marengo et al., 1986), CLANG (Clinical Language Disorder Rating Scale) (Chen et al., 1966), Thought and Language Disorder (TALD) (Kircher et al., 2014), and Thought Disorder Questionnaire (Waring et al., 2003). From these scales, common parameters were identified, and based on their relevance to aphasia, 14 parameters were selected. They were divided into three domains based on the framework of the Thought, Language, and Communication (TLC) scale (Andreasen, 1986), as parameters related to Thought Disorder, Language disorders, and Communication disorders. Language disorders are shown in Table 1. The operational definitions were defined for each parameter based on the review of the literature and its appropriateness to PWA. Each parameter will be rated based on the frequency of occurrence on a 5-point scale. The rating scale consisted of a uniform rating where '0'

represented the absence of the occurrence of the TLC parameter, '1' represented mild (occurrence of the parameter of TLC for one time during the conversation), '2' represented moderate (occurrence of TLC parameter for two to four times during the conversation), '3' represented severe (occurrence of TLC parameter for five to ten times during the conversation),and'4'represented extreme (occurrence of TLC parameter for more than ten times during the conversation). The total score was calculated using the formula: Total score = Communication parameters + Language Parameters + Thought parameters. In the TLCAS-PWA, higher scores in each domain denote greater impairment and lower scores denote milder impairment across the Thought, Language, and Communication domains.

Table 1: Parameters of TLCAS-PWA under each domain

Parameters related to Communication Disorder	Parameters related to Disorder	Parameters related to Communication Disorder
Poverty of Content of Speech (PCS)	Incoherence (IC)	Poverty of Speech (POS)
Distractible Speech (DS)	Clanging (CLG)	Illogicality (ILGT)
Tangentiality (TGT)	Neologism (NLG)	
Loss of Goal (LOG)		
Perseveration (PSVT)		
Echolalia (ELL)		
Blocking (BLK)		
Self-reference (SR)		
Circumlocution (CIRCUM)		

2.1.2 Phase II: Content validation

The developed tool was validated by three professionals: two Speech-Language Pathologists and one Psychologist practicing with PWA for more than 3 years. The criteria used for validation of TLCAS-PWA were relevance, comprehensibility, and coverage of parameters. The relevance parameter assessed the applicability, comprehensibility assessed the understandability, and coverage of the parameter to check the inclusion of all the parameters related to TLC in PWA. The expert opinion was obtained, and the parameters of TLCAS-PWA were finalized.

2.1.3 Phase III: Administration of TLCAS-PWA

The semi-structured interview was carried out by asking the participants to talk about themselves (self-introduction) and engage in conversation on a neutral topic, such as the present 'COVID-19 PANDEMIC condition' or 'OUR COUNTRY INDIA'. The rationale for selecting the conversational prompts is that they are a naturalistic way to elicit conversation, neutral in content, and unlikely to trigger emotional response. All the participants were supported in sitting comfortably, and conversational samples were obtained on the above topics. For the clinical group, recordings were done in the presence of the caregiver to ensure the accuracy of the information provided, and verbal prompts were given to the clinical group by the examiner. The recordings were done in the absence of a caregiver for the control group. All the conversational samples were audio-recorded in a quiet room with no distractions during the recordings. The conversation samples were analysed for the presence or absence of the TLC parameter, and scoring was given from 0 to 4.

2.1.4 Phase IV: Psychometric analysis of TLCAS-PWA, Internal consistency and reliability measures

The internal consistency of TLCAS–PWA was evaluated using Cronbach's Alpha coefficient. In reliability measures, Test-retest reliability for 10% of the participants with an interval of two weeks, and inter-judge reliability by a Speech-Language Pathologist and a Psychologist, apart from the primary investigator, for 10% of the participants, was carried out. The raters' scoring the TLCAS-PWA were blinded to group assignment (PWA vs. NTI) to minimise observer bias during assessment. ROC/ AUC were also calculated to ensure the discriminative validity of TLCAS-PWA.

2.2 Participants

A total of 40 participants were considered for the present study. Out of 40, PWA and NTI. All the participants were native Tamil speakers with normal or corrected vision. Both monolingual and bilingual were considered; L1 was Tamil, and L2 and/ or L3 were English or other Indian languages. The age range of the participants of the current study was 42 to 65 years. The participants were recruited from Hospitals, Speech and Hearing Institutes, and Private clinics from Tamil Nadu and Pondicherry. The diagnosis of aphasia was confirmed by a Speech-Language Pathologist by the administration of

Western Aphasia Battery – R (Kertesz, 2007) by using Tamil as the language of administration. The PWAs were selected based on the AQ scores of WAB (Kertesz, 2007); both fluent and non-fluent types of aphasia, with severity ranging from mild to severe, were considered for the study.

The NTI were free from any neurological or psychological illness as per the administration of the General Health Questionnaire (Golderberg & Williams, 1988). The demographic details of the participants were shown in Table 2 (PWA) and Table 3 (NTI).

Table 2: Demographic Details of Persons with Aphasia

ID	Age	G	Education level	Handedness	L1	L2	Lesion site	TPO	Type of Aphasia
PWA 1	45	M	G	R	T	E	Lt MCA	1	Anomic
PWA 2	51	F	G	R	T	E	Lt GC	12	Anomic
PWA 3	42	M	G	R	T	E	Lt MCA	7	Anomic
PWA 4	64	F	G	R	T	E	Lt MCA	11	Anomic
PWA 5	57	F	G	R	T	E	Lt Temporal	11	TSA
PWA 6	36	M	G	R	T	E	Lt GC	21	Conduction
PWA 7	69	F	12th	R	T		Lt Thalamus	4	Wernicke's
PWA 8	77	M	12th	R	T		Lt MCA	4	Wernicke's
PWF 9	65	M	12th	R	T		LT WA	2	Wernicke's
PWA 10	45	F	G	R	T	E	Lt Temporal	3	TSA
PWA 11	61	M	G	R	T	E	Lt IC	8	Broca's
PWA 12	65	M	G	R	T	E	Lt MCA	9	Broca's
PWA 13	67	M	G	R	T	E	Lt frontal	14	Broca's
PWA14	38	M	PG	R	T	E	FTP	32	Broca's
PWA 15	30	M	PG	R	T	E	Lt MCA	18	Broca's
PWA 16	52	F	G	R	T	E	Lt CR	19	TMA
PWA17	49	F	G	R	T	E	Lt MCA	17	TMA
PWA18	43	M	G	R	T	E	Lt IC	11	TMA
PWA19	20	M	G	R	T	E	Lt GC	1	Broca's
PWA20	33	M	PG	R	T	E	FTP	2	Broca's

Note: *PWFA – Persons with Fluent Aphasia, PWNA – Persons with Non-Fluent Aphasia, M – Male, F – Female, G – Graduate, R – Right Handed, PG – Post graduate, T – Tamil, E – English, MCA – Middle Cerebral Artery, GC – Gangliocapsular Region, WA – Wernicke's Area, IC – Internal Capsule, FTP – Frontotemporopareital, CR-Corona Radiata*

Table 2: Demographic Details of Neurotypical Individuals

ID	Age	Gender	Education Level	Handedness	L1	L2
NTI1	47	M	PG	R	T	E
NTI2	61	M	PG	R	T	E
NTI3	51	F	PG	R	T	E
NTI4	42	M	G	R	T	E
NTI5	65	M	G	R	T	
NTI6	21	M	G	R	T	E
NTI7	64	F	G	R	T	
NTI8	43	M	G	R	T	E
NTI9	38	M	G	R	T	E
NTI10	30	M	G	R	T	E
NTI11	52	F	PG	R	T	E
NTI12	36	M	PG	R	T	E
NTI13	69	F	G	R	T	E
NTI14	57	F	PG	R	T	E
NTI15	49	F	PG	R	T	E
NTI16	67	M	G	R	T	E
NTI17	77	M	G	R	T	
NTI18	65	M	G	R	T	E
NTI19	66	F	G	R	T	
NTI20	45	M	PG	R	T	E

Note: *NTI – Neurotypical Individuals, M – Male, F – Female, G – Graduate, PG – Post graduate, R – Right-Handed, T – Tamil, E – English*

2.3 Ethical considerations

The present study was approved by the Ethical Committee for Bio-Behavioral Research involving human subjects. The participants were recruited for the study only after obtaining their written consent as per the ethical guidelines for bio-behavioral research involving human subjects (Reference code: No.DOR.9.1/Ph.D/LSM/928/2021-22). All the participants and their caregivers were informed about the procedure and the approximate duration required for the tests and assured of safety during testing.

2.4 Statistical analysis

Data analysis for this study was performed using the Statistical Package for the Social Sciences (SPSS) version 26. TLCAS–PWA scores are presented using descriptive statistics, including the mean, median, and standard deviation. Psychometric evaluation included internal consistency, reliability measures, and discriminative validity, which were calculated. Non-parametric tests Mann-Whitney U test were carried out to determine the significance of the difference between the PWA and NTI groups on the selected dependent variables, which included Thought, Language, and Communication domain scores.

3. Results

The primary aim of the study is to develop and preliminarily validate the TLCAS-PWA, and the secondary aim is to compare PWA with NTI. The results of the study are explained in three sections. Section A is the descriptive statistics presented, including mean, median, and standard deviation.

Each parameter of TLCAS-PWA is shown in Table 2, domains are shown in Table 3, and the frequency of occurrence is shown in Table 4.

Section B explains the comparison of TLCAS-PWA scores between PWA and NTI, and Section C explains the psychometric evaluation of TLCAS-PWA.

3.1 Section A: Performance on TLCAS-PWA by PWA and NTI

Among the mean scores of parameters of TLCAS-PWA, the mean scores were higher for the parameter PCS and lower for SR in PWA, and in NTI, the mean scores were higher for poverty of content of speech, as shown in Table 4.

Among the domains of TLCAS-PWA, the mean scores were higher for the communication disorder domain and lower for the language disorder domain in PWA, and the same pattern was observed in NTI, as shown in Table 5.

Among the parameters of TLCAS-PWA, poverty of content of speech (n=20) was observed to be present in all the PWA, and the parameter of TLCAS-PWA that is present least is self-reference (n=4).

Table 4: Mean, median, and SD of parameters of TLCAS-PWA

	PWA			NTI		
	Mean	**Median**	**SD**	**Mean**	**Median**	**SD**
Communication disorders						
PCS	2.2	2	0.60	0.5	0.5	0.5
DS	1	1	1.05	0.0	0	0.22
TGT	0.9	0	1.22	0	0	0
LOG	0.85	0.55	1.01	0.05	0	0.22
PSVT	0.45	0	0.74	0.05	0	0.22
ELL	0.35	0	0.57	0	0	0
BLK	1.6	2	0.80	0.65	1	0.48
SR	0.3	0	0.64	0	0	0
CIRCUM	1.3	1.5	0.78	0	0	0
Language disorders						
IC	1.3	1	1.05	0	0	0
CLG	0.7	1	0.56	0.3	0	0.46
NLG	0.4	0	0.66	0	0	0
Thought disorders						
POS	1.9	2	0.99	0.35	0	0.48
ILGT	1	1	1.14	0.05	0	0.22

Table 5: Mean and SD of domains of TLCAS-PWA

Domains	PWA			NTI		
	Mean	Median	SD	Mean	Median	SD
Communicatio``n disorders	8.85	7.00	3.44	1.3	1.5	1.05
Language disorders	2.4	2.00	1.43	0.3	0	0.46
Thought disorders	2.90	3.00	0.99	0.4	0	0.58
Total scores (TLC)	14.15	2.00	5.09	2	2	1.55

3.2 Section B: Comparison of TLCAS-PWA scores between PWA and NTI

The Mann-Whitney U test was administered to find the significance between PWA and NTI and the results revealed significant differences between groups for the domain Communication disorder ($U = 0$, $Z = -5.464$, $p < 0.001$), Language disorder ($U = 31$, $Z = -4.771$, $p < 0.001$), and Thought disorder ($U = 10.5$, $Z = -5.270$, $p < 0.001$) and is shown in Table 6. Effect size estimates indicated large differences in the Communication domain ($\delta = 1.00$, 95% CI [1.00, 1.00]), Thought domain ($\delta = 0.91$, 95% CI [0.76, 1.00]), and Language domain ($\delta = 0.67$, 95% CI [0.30, 0.93]). These findings indicate that individuals with PWA consistently scored higher than NTI across all domains of communication, language, and thought.

Table 6: Results of the Mann-Whitney Test for the domains of TLCAS – PWA for comparison between PWA and NTI.

Parameters related	/z/	p-value
Communication disorders	-5.464	0.000*
Language disorders	-4.771	0.000*
Thought disorders	-5.270	0.000*

Note: *Statistically significant at 5% level of significance*

3.3 Section C: Psychometric evaluation of TLCAS-PWA

The internal consistency of the questionnaire was measured using Cronbach's Alpha (α) and found to be 0.88, indicating good internal consistency. The analysis showed strong item–total correlations for both groups (PWA: $r = 0.86$–0.99; NTI: $r = 0.87$–1.00). PWA scores had minimal floor and ceiling effects (5%), whereas NTI scores showed marked floor (20%) and ceiling (30%) effects, indicating clustering at the extremes. Inter-rater reliability was assessed using a two-way mixed-effects intraclass correlation coefficient (ICC [3,1], single measures, absolute agreement) on ratings from three blinded raters for 5 participants (25% of the sample),and the results revealed excellent agreement (ICC = 0.98, 95% CI: 0.88-0.99) between the raters.Test-retest reliability was determined with an interval of two weeks using ICC (3,1). The ICC value was 0.93 (95% CI: 0.60-0.99) for the communication domain, 0.86 (95% CI: 0.34–0.99) for the language domain, and 0.93 (95% CI: 0.61–0.99) for the thought domain. ROC analysis demonstrated excellent diagnostic accuracy of the TLCAS-PWA. Communication and total scores achieved perfect classification (AUC = 1.00, 100% sensitivity and specificity), while Thought (AUC = 0.96) and Language (AUC = 0.86) also showed strong discriminative ability. Overall, the scale reliably distinguished PWA from NTI.

4. Discussion

The primary aim of the study is to develop and preliminarily validate the TLCAS-PWA, and the secondary aim is to compare PWA with NTI. The observation found that the parameters of TLC exhibited by PWA were similar to those of PWTD, where PWTD was not included in the study but served for comparison with PWA.

4.1 Exploring the Parameters of TLCAS-PWA in NTI

As the study was only conducted in a single institution, the data cannot be generalised. There is also the possibility of bias due to self-reporting and institutional recruitment.

Furthermore, the data was only collected from one family member, the mother, as is the case in most other studies in this area. In addition, the study did not use data on the degree of ID and other socio-demographic data of the parents (such as education, employment, marital status, material income, etc.), which should also be considered in future studies.

4.2 Exploring the Parameters of TLCAS-PWA in PWA

4.2.1 Parameters Related to Communication Disorders

The Poverty of Content of Speech (PCS) parameter was observed in all PWAs. Also termed alogia, it is characterised by sparse, effortful speech with short phrase length (Mpert et al., 1997). Participants in this study provided limited and fragmentary responses during the semi-structured interviews. This finding is consistent with previous research reporting reduced content, topic shifts, and tangential propositions in PWA (Linnik et al., 2016), and similar features in psychotic disturbances such as hebephrenic and paranoid states. Distractible speech (DS) was also present, with participants frequently switching mid-sentence. This resembles distractible speech documented in mania, schizoaffective disorder, and hebephrenia (Andreasen & Grove, 1986). Tangentiality (TGT) was evident when participants spoke irrelevantly or wandered away from the topic (Oh et al., 2002).

Loss of Goal (LOG), a difficulty maintaining focus on the main point, overlapped with distractible speech. In PWA, this appeared as digressions and fragmented thought flow, resembling the scattered but fluent speech patterns of mania (Andreasen & Grove, 1986). Perseveration (PSVT) was another frequent finding, manifesting as inappropriate repetition of words or phrases (Gotts et al., 2002). Perseveration in aphasia is well-documented (Albert & Sandson, 1986) and occurs in mania, schizoaffective disorder, and schizophrenia (Andreasen & Grove, 1986).

Echolalia (ELL) is the repetition of the interlocutor's utterances, which was observed mainly in participants with Wernicke's aphasia. It is common in transcortical aphasias and schizophrenia (Wallesch, 1990; Lee, 2004).

Blocking (BLK) is the sudden interruption of speech or thought, reflecting working memory deficits and retrieval difficulties in PWA (Potagas et al., 2011; Puttanna et al., 2022).

Blocking is also seen in schizophrenia (Sass, 2003). Self-Reference (SR) was observed particularly in anomic aphasia, where participants redirected speech to themselves during word-finding difficulties. Self-referential language has also been identified as a marker of psychosis (Fineberg et al., 2016). Circumstantiality (CIRCUM) was prominent in sensory aphasia, where speech became overly elaborative and meandering before eventually concluding. Similar features are linked to epilepsy syndromes, temporal lobe lesions, and neurodegenerative conditions (Balaram & Marwaha, 2024).

4.2.2 Parameters Related to Language Disorders

Incoherence (IC) was observed in PWA, marked by disorganised shifting from one topic to another without any clear connection and a lack of logical flow. Also, it is impossible to understand due to the disruption within or between sentences.

These findings are consistent with studies of Wernicke's aphasia, which show frequent coherence errors (Pallickal & Hema, 2020) and more global coherence errors in their speech compared to healthy individuals (Linnik et al., 2016).

Comparable incoherence is also found in PWTD (Oh et al., 2002). Clanging (CLG) is the pattern of speech where the choice of words is guided more by the rhyme than by their actual meaning.

It was evident when participants' word choices were driven by rhyme or sound rather than meaning, and it is considered a minor pragmatic/syntactic feature; it is also common in schizophrenia. Neologism (NLG) is the creation of new words or phrases whose origins or meanings cannot be easily understood. The participants of the present study used words that have no resemblance to real words and do not follow typical patterns of word formation. It was frequent in Wernicke's and conduction aphasia. Participants produced novel, non-standard words unrelated to real lexical forms, often stemming from impaired word retrieval and phonological processing (Blanken, 1993). Neologisms are also reported in schizophrenia (Rhodes, 2024).

4.2.3 Parameters Related to Thought Disorders

Poverty of Speech (POS) is conceptualised as a problem of thought and was observed as vague, laconic responses with semantic and pragmatic disruptions (Çokal et al., 2018). Similar findings have been reported in both PWA and PWTD, where the speech was observed as inappropriate, vague, and idiosyncratic word usage, with pragmatic and semantic disturbances (Landre et al., 1992). Illogicality (ILGT) is a pattern of speech where the speaker's conclusion does not follow any clear or logical reasoning.

This was particularly supported by the finding in sensory aphasia, where conclusions lacked logical connections. Such patterns are also seen in mania, schizoaffective disorder, and schizophrenia (Andreasen & Grove, 1986; Bearden et al., 2011).

To summarise, PWA parameters such as poverty of content, incoherence, neologisms, perseveration, echolalia, and blocking were prominent.

Many of these features, particularly poverty of speech and incoherence, overlap with those reported in PWTD (McKenna & Oh, 2005) and perseveration, echolalia, and neologism (Benson, 1973).

Notably, the language features of psychotic disorders with predominant thought disturbances often resemble those of Wernicke's aphasia (Jilani et al., 2019).

4.3 Limitations of the study

This study has certain limitations, as the psychometric properties of the scale were not fully established, and only preliminary validation was carried out. The sample size was small, and equal representation of

different types and severities of aphasia was not achieved, which may limit the generalisability of the findings. Another limitation of the study is the procedure difference in administration, where the PWA received caregiver support and prompts while controls were assessed independently, which may have influenced the speech samples and represents a potential source of bias. The convergent validity of the TLCAS-PWA was not assessed in the current study.

4.4 Future Directions

Future research should focus on comprehensive psychometric validation and inclusion of larger samples with equal representation of aphasia types and severities. Cross-linguistic adaptations, longitudinal studies to assess recovery, and comparisons with existing tools are recommended. Also, assessing the convergent validity in the future will help to further validate and provide stronger evidence for its clinical applicability.

5. Conclusion

TLCAS-PWA provides preliminary evidence of reliability, showing good internal consistency, test-retest reliability, and inter-rater agreement. Moreover, the scale effectively discriminates between PWA and NTI supporting its discriminative validity and clinical utility, providing an approach for Speech-Language Pathologists to assess discourse-level impairments in aphasia. This tool can assist clinicians in identifying specific patterns of Communication, Language, and Thought breakdown, guiding targeted intervention strategies, and tracking progress over time. Overall, TLCAS-PWA offers a reliable and valid measure for assessing thought, language, and communication disturbances in aphasia, contributing to both clinical practice and research in the field of communication disorders.

Conflict of interests

There is no conflict of interest between the authors of the study.

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