

Article

Development and Validation of a Scale to Detect Late Language Emergence in Spanish-Speaking Children

Verónica Martínez¹ , Paula Solano²  and José Carlos Núñez¹ 

¹ Universidad de Oviedo (Spain)

² Consejería de Educación de la Comunidad Autónoma del Principado de Asturias (Spain)

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ABSTRACT

Background: Detecting late talkers among children is important because they are at greater risk of subsequently manifesting persistent disorders in language development. Therefore, it would be beneficial to have quick measurement tools with adequate psychometric properties, which have not yet been developed. This study set out to develop, analyse and validate the factor structure of an observational scale for detecting Late Language Emergence (LLE) in Spanish-speaking children aged 2-3 years that could be applied not only by language professionals but also teachers in early childhood education centres for children aged 0-3 years. **Method:** The sample comprised 364 children aged 24-38 months ($M = 31.93$; $SD = 3.512$; 49.7% girls). **Results:** The estimated reliability coefficients ranged from $\omega = .77$ to $\omega = .97$. Factor analyses indicated that the best model explaining the scale's assessment criteria was articulated around five factors: phonology, lexical semantics, morphosyntax, comprehension and communication. The correlations between the dimensions of the scale and those of the MacArthur Communicative Development Inventory were statistically significant. **Conclusions:** The scale to detect late talkers among Spanish children appears to be a concise, simple instrument with suitable psychometric properties.

Desarrollo y Validación de una Escala para la Detección de Niños Castellanohablantes Tardíos del Lenguaje

RESUMEN

Antecedentes: La detección de niños hablantes tardíos es relevante por su mayor riesgo a manifestar posteriormente trastornos persistentes en el desarrollo del lenguaje. Sería conveniente disponer de instrumentos de medida breves y con adecuadas propiedades psicométricas, que hasta ahora no han sido elaborados. El objetivo fue desarrollar, analizar y validar la estructura factorial de una escala observacional para la detección de niños castellanohablantes de entre 2 y 3 años con Inicio Tardío aplicable por los profesionales del lenguaje y por las educadoras de los centros de Educación Infantil de 0 a 3 años. **Método:** La muestra está formada por 364 niños de entre 24 y 38 meses ($M = 31.93$; $DT = 3.512$; 49.7% niñas). **Resultados:** Los coeficientes de fiabilidad estimados oscilaron entre $\omega = .77$ y $\omega = .97$. Los análisis factoriales indicaron que el mejor modelo que explica los criterios de evaluación de la escala se articuló en torno a cinco factores: fonología, léxico-semántico, morfosintaxis, comprensión y comunicación. Las correlaciones entre las dimensiones de la escala y las del Inventario Comunicativo MacArthur son estadísticamente significativas. **Conclusiones:** La escala para detectar a los niños españoles hablantes tardíos parece ser un instrumento breve, sencillo y con adecuadas propiedades psicométricas.

Palabras clave:

Inicio Tardío del Lenguaje
Trastornos del Lenguaje
Detección
Validación
Escala

Language development is a fundamental process in early childhood, dependent on communicative and social processes necessary to exchange and construct meanings with others over the course of the child's evolutionary development (Karmiloff & Karmiloff-Smith, 2005). Children also need to attain a certain level of cognitive and communicative development to begin to master skills involved in the development of more formal aspects of language (phonology, semantics, morphology, and syntax). The appropriate development of cognitive, communicative and linguistic competence is necessary for later access to the precursor skills for learning to read and write, and for self-regulation.

Studies on language acquisition propose a division between the different domains of language which has given rise to a wealth of knowledge on how children acquire the structural aspects of language (phonology, morphosyntax, semantics), comprehension and communicative development. On the other hand, it has been pointed out that the structure of language comprises a series of processes that are related to each other thanks to interface systems, which would give rise to a relationship between different domains during development: grammar and lexical development (Devescovi et al., 2005; Serra, 2008), lexical and phonological development (Stoel-Gammon, 2011; Rose & Blackmore, 2018), and the relationship between communicative development and speech comprehension (Arachchige et al., 2021; Colonnese et al., 2010).

Language development occurs similarly in all children as a result of the complex interaction between different biological, psychological and social factors (Cuetos et al., 2015). However, there is a group of children who present persistent difficulties in their linguistic competence between the second and third year of the verbal stage of language development, which may affect all areas of their development, especially social and school development (Llorenç et al., 2021).

These children might show a pattern of late onset language development and communication, characteristic symptoms of which are the late appearance of the first words and/or combination of two or more words in their first sentences, and a scarce and slow vocabulary growth at the age of 24 months in the absence of other difficulties (Nouraey et al., 2021). These are called late talkers or children with late language emergence (Fisher, 2017; Mendoza, 2016; Rescorla, 2011), a term recently proposed by the American Speech-Language-Hearing Association [ASHA] (2018), with an estimated prevalence of 10-15% of children around 24 months old (Collison et al., 2016).

Late language emergence (LLE) is not currently a specific category in any diagnostic criteria manuals. The LLE is labelled by inclusion and specificity criteria (fewer than 50 words at 24 months and/or absence of word combinations) and by exclusion criteria related to the absence of other conditions that may confirm another type of disorder (hearing impairment, intellectual functional diversity, neurological damage, organic malformations or other neurodevelopment disorders that account for it). The ASHA (2018) states that LLE is labelled when language development trajectories are below age expectancies. However, it should be considered as a transitional label, as permanent language difficulties will be determined from the age of five.

Ever since the seminal studies by Thal and Bates (Thal, 1991; Thal & Bates, 1988), Paul (1991), and Rescorla (Rescorla, 1989; Rescorla et al., 1997), there has been broad interest in researching

both the causes and characterisation of LLE, which has led to significant progress in typifying it. Different studies have found that the characteristic signs of LLE are accompanied by other difficulties and particular courses of development in different linguistic-communicative dimensions, such as slower vocabulary acquisition, an absence of the lexical explosion period and a delay in receptive language (Auza & Murata, 2021; Chilosi et al., 2019; Desmarais et al., 2008; Paul, 1991; Rescorla et al., 1997; Thal, 1991; Thal & Bates, 1988).

There is a high percentage of children who present LLE may subsequently enjoy typical development between the ages of three and four (Rice et al., 2008; Sylvestre et al., 2017), the so-called Late Bloomers (Rescorla et al., 2000). Nevertheless, there is another significant percentage of children with LLE who will continue to manifest difficulties permanently beyond age 3 year (Chilosi et al., 2019; Perry et al., 2023). So it is that children with LLE make up a very important pre-clinical group, as they have a greater risk than their typically developing peers of manifesting persistent language development disorders at later ages, as well as difficulties in processes of learning, socialisation, and literacy acquisition (ASHA, 2018; Chilosi et al., 2019; Fisher, 2017; Hammer et al., 2017; Horvath et al., 2019, 2022; Kautto et al., 2021; Morgan et al., 2020; Rescorla & Dale, 2013; Rescorla et al., 2000, 2002; Sylvestre et al., 2017; Thal et al., 2013). However, as several research have noted (Desmarais et al., 2008, 2010; Rescorla, 2011), it is not known exactly which late talkers will become children with Developmental Language Disorder (DLD), a neurodevelopmental disorder that can affect one or more language domains at different levels, in both expressive and receptive language (Bishop et al., 2016).

Because of all of the above, early identification and detection of children with LLE is essential for two reasons. Firstly, it will permit timely monitoring and treatment measures in school, as part of a preventative response to intervention (RTI) model, leaving behind the widely-used *wait and see* approach that has contributed little scientific evidence (Capone, 2018; Moreno & Nieva, 2021); and secondly, individual or family intervention can then begin as early as possible, as in addition to producing immediate benefits in the family and the child, in the long term this is highly profitable in economic terms (Rydz et al., 2006).

In this identification, given that LLE is not a diagnostic category but rather a label that refers to children whose language development is not normotypical, fast and reliable detection instruments are necessary to identify the signs of delay in language acquisition in children between two and three years.

These detection instruments should be simple tests (valid and with little administration time) that make it possible to differentiate between children with and without LLE. They must include growth milestones or development indicators considered critical and predictive in proper language development, and it should be possible for them to be carried out by those people who are most in contact with the child, namely parents and early childhood education teachers.

The instruments most used in English-speaking contexts are language and communication checklists completed by parents or early childhood education teachers, which aim to identify early signs of delay or alteration in the growth milestones in question. These include the Language Development Survey (LDS; Rescorla, 1989; Rescorla & Achenbach, 2002) in which parents assess expressive vocabulary and word combinations in children aged 18 to 35

months, but this is not scaled in Spanish; another is the Children's Communication Checklist (CCC-2; Bishop, 2003) which makes it possible to detect difficulties only in pragmatic language use; lastly, there is the Preschool Language Scale (Zimmerman et al., 2011) which assesses language from birth to 6;11 years and is scaled for monolingual Spanish-speaking children.

However, no studies or systematic reviews have been found that focus on the analysis of early-detection screening instruments and tools at solely linguistic level, validated for Spanish speakers aged two to three years. Some authors have also observed that early predictors for LLE have never been analysed in terms of their specific, individual predictive and discriminating power (Sansavini et al., 2021).

Although the MacArthur Communicative Development Inventory (CDI) makes it possible to assess vocalizations, vocabulary and grammar use in Spanish-speaking children aged 16-30 months (López-Ornat et al., 2005; Mariscal et al., 2007), it cannot be considered as a screening test because it is time-consuming to complete. Although a brief CDI and CDIII assessments suitable for evaluating language skills in Mexican Spanish-speaking children aged 30-37 months have been developed, they have not yet been adapted and validated for other Spanish-speaking populations (Jackson-Maldonado et al., 2013, 2024). There are some approaches, such as the Language Observation Protocol for pre-school teachers (Ygual et al., 2011) based on teachers' contributions, but it is aimed at children aged 3;6 to 5;11 years.

Professionals frequently use general development evaluation or screening instruments and development inventories that include questions or items on language development and/or communication at the same time as other areas of development, such as motor, cognitive, socio-emotional, adaptive, etc. These include the Early Detection System for Development Disorders (Sistema de Detección Precoz de Trastornos del Desarrollo, SDPTD; Alcántud et al., 2015) and the Haizea-Llevant scale (Fernández et al., 1991) used in the context of Primary Health Care.

The objective of this study was to develop, analyse and validate the factor structure of an observational scale to detect Spanish-speaking children with LLE that could be applied not only by language professionals but also by early childhood education teachers in preschool education centres from age 0 to 3, to support and bolster the work of paediatricians in detecting this population. In terms of validity, a positive relationship is expected between this questionnaire to detect LLE and the MacArthur Communicative Development Inventory, which would make it possible to quickly and reliably detect the warning signs in language development between two and three years. Based on previous studies, it is assumed that the resulting scale's structure should be made up of five factors (phonology, lexical-semantic, morphosyntax, comprehension and communicative area), as these factors are interrelated. In addition to structural validity, the scale must show concurrent validity (the dimensions of the scale must be significantly correlated with the corresponding dimensions of the MacArthur Communicative Development Inventory). Lastly, the reliability of the scale's dimensions should be appropriate.

Method

Participants

The sample is formed by 364 children with an age range of 24 to 38 months ($M = 31.93$; $SD = 3.512$). Of the total sample, 183 are boys ($M = 31.87$; $SD = 3.452$) and 181 girls ($M = 31.98$; $SD = 3.580$). All of the children are registered in kindergarten for 2-3-year-olds in the first cycle (age 0-3) of early childhood education at different state centres in the Principality of Asturias, Spain. Of the sample, seventeen children attend weekly the early attention service in their areas. Twenty early childhood education teachers participated from the ten early childhood education schools that the children attend.

The selection criteria for the participants were children aged between 24 and 40 months enrolled in the first cycle of kindergarten. The exclusion criteria were that participants did not have diagnostic reports of ASD, hearing or vision disabilities, and/or intellectual disabilities.

Instruments

The Scale for the Detection of Speakers with Late Language Emergence (DHITLE-S, Detección de Hablantes con Inicio Tardío del Lenguaje) is a Likert scale made up of 43 items, in which three possible scores were established (1 = Never; 2 = Sometimes; 3 = Often). It is divided into five sections: phonology, lexical-semantic, morphosyntax, comprehension and communicative area. Each of the sections is formed by a given, different number of items (phonology = 7 items; lexical-semantic = 9 items; morphosyntax = 12 items; comprehension = 9 items; communicative = 6 items).

In the first page of the scale, the participants' personal details are taken, including their name, sex, date of birth as year, month and day, whether they receive any specialist attention, the date when the questionnaire was completed and the assessor's name. Basic instructions are included to explain the purpose of the scale. The early childhood education teacher completing the scale must choose the option that best describes the child's communicative and linguistic competence and evaluate whether the described behaviour was consolidated, in progress, or not yet present by the child. Thus, she/he to choose one of three options: 1 (never), indicating that the behaviour or information described by the item does not occur; 2 (sometimes), indicating that the behaviour or information occurs inconsistently or is still developing; and 3 (often), indicating that the behaviour or information occurs frequently or consistently. Lastly, four prior questions are included related to the prototypical symptoms of late onset with yes/no answers and a multiple-choice question, related to the sounds that the words they produce contain.

Each of the five sections begins with a brief explanation so that the early childhood education teachers know what they must assess at each stage. In the phonological section, the inquiry focuses on whether the child, spontaneously or in response to adult or peer demands, produced onomatopoeias, intoned slang, repeated syllables or words, simplified the structure of words and made

pronunciation errors. In the lexical-semantic section, we asked about the amount of vocabulary and the type of words that the child produced. In the morphosyntactic section, the inquiry focuses on the child's use of irregular verbs, the use of the plural, the description of events that happened to him/her, the use of prepositions, etc. In the comprehension section, the inquiry focuses on words and situations that the child should understand, such as whether he/she responds to his/her name or is able to follow simple instructions. In the communication section, inquiries were made regarding the acquisition of specific communicative competencies, including the use of the point gesture, the effective utilization of play materials, and the employment of pointing to request desired items or actions. The form of the items is always the same, i.e., a sentence, except in item 16 of the lexical-semantic section, which assesses the number of real words or approximations that the child produces, where the early childhood education teachers must choose from four options.

The MacArthur Communicative Development Inventory (CDI), adapted to Spanish (López-Ornat et al., 2005) was given to the parents of participating children to establish the children's level of early communicational and linguistic development in the areas of vocabulary, comprehension and grammar. This inventory, completed by the parents or carers, reflects typical process in early language acquisition and consists of two forms, based on the age group. This research used the CDI: Words & Sentences form, which is aimed at children aged 16 to 30 months, and can also be applied to older children with language delay. In Spanish, this form is made up of three parts: Part 0, Vocalizations, assesses the type of vocalizations that the child produces; Part 1, Words, assesses the early production, vocabulary development, the number of words the child understands and produces, and language use; lastly, Part 2, Grammar, assesses nominal morphology, the use of irregular verbs, overgeneralizations of morphological rules, word combinations and morphosyntactic complexity.

Procedure

To construct the DHITLE-S scale, the following steps proposed by Muñiz and Fonseca-Pedrero (2019) were followed.

The first version of the scale was designed by two of the authors of the study. The items are based on the review of the literature on language development and difficulties that children with developmental language disorder present.

The scale was then reviewed by two experts in the study of language acquisition and DLD, independent of the study. Those items considered by the two experts to have little content validity to detect children with LLE were removed (2 items), leaving the scale with 43 items with three possible answers. The distribution of the items in each of the sectors is unequal and more items assess morphosyntax, semantics and comprehension, making these more relevant (Muñiz et al., 2005), because children with DLD present more difficulties in these areas.

With the scale completed, the authors contacted the education authority for the first cycle kindergartens (age 0-3) in the area where the study was to be conducted. Having obtained authorization, a meeting was held with all the principals of the kindergartens to inform them of the aim of the study, show them the scale for

detecting LLE and request their cooperation. Then, in each of the ten participating schools a meeting was held with the teachers of the 2 to 3-year-olds to show them the goal of the study, request their participation and explain how to complete the questionnaire.

All the parents of the participating children were informed by letter of the aim of the study and were asked to answer the CDI that was sent to them. The purpose of using another measurement test, the CDI, was to confirm the validity of the participants' scores on the scale (Elosúa, 2003), as this test assesses the population under study.

Those families that participated in the study signed an informed consent form, authorizing the use of the data provided and stating the protection of the children's identities. When all the families had signed the informed consent, the early childhood education teachers covered each questionnaire for each child.

The conditions and characteristics of the present study were approved by the Research Ethics Committee of the University of Oviedo.

Data Analysis

The data resulting from this research was processed in various stages. Initially, the descriptive statistics and correlations matrix were analysed. There were few missing values in the scale items (0.74% in total). The maximum likelihood procedure was used to complete the information. To study the scale's factor structure, confirmatory factor analyses were conducted with the Mplus 8.7 program. Three models were fitted: a one-dimensional model (all the items of the scale are explained by a single general factor), a multifactorial model with three first-order factors (phonology, morphology-semantics and comprehension-communication), and a multifactorial model with five first-order factors (phonology, lexical semantics, morphology, comprehension and communication). A three-factor multifactorial model was fitted because it has been suggested that language development can be advanced through the interaction between different interfaces, morphological-semantic, lexical-phonological, and comprehension-communication (Arachchige et al., 2021; Serra, 2008; Stoel-Gammon, 2011). Specifically, it has been observed that the advances that occur in the morphosyntax of Spanish children between 16 and 30 months may be preceded by vocabulary growth (Serrat et al., 2010). It has also been found that there is a relationship between communicative and non-communicative gestures and language comprehension, not only at early ages (Bates et al., 1980) but also at 3 years (Alcock & Connor, 2021).

The results of establishing the factorial models were assessed according to criteria typically used: Chi-square (χ^2), Goodness of Fit (GFI), Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). There is evidence of a good fit when χ^2 has $p > .05$, GFI and TLI $\geq .90$, CFI $\geq .95$, SRMR and RMSEA $\leq .06$. The best model is selected based on the Akaike Information Criterion (AIC) statistic (the best model is that which presents lowest values in AIC). Having analysed the scale structure, concurrent validity was studied by analysing correlations and linear regressions (taking subscales as predictive variables and the five dimensions of the MacArthur Inventory as criteria variables). The reliability of the scale, and its dimensions, was estimated through α and ω , and interpreted according to Watkins (2017).

Results

Confirmatory Factor Analyses

Table 1 shows the results of the fit of the three models. As can be seen, taking into account the assessment criteria established, the multifactorial model fits better than the one-dimensional model. However, both the three-factor model and the five-factor model show a similar, moderate (albeit acceptable) fit. Given that we must choose the best fit from both models, the five-factor model shows a slightly better fit than the three-factor. Although almost all the statistics are very similar, AIC informs us that the five-factor model is a better fit: $AIC_{3F} - AIC_{5F} = 9.865, p < .001; d = 0.334$. Small effect.

Table 1
Statistics of Factorial Models Fit

	Unifactorial model	Three-factor model	Five-factor model
$\chi^2(gf)$	4347.933(666)	1578.034(528)	1560.168(528)
p_{χ^2}	.001	.001	.001
GFI	.966	.981	.983
TLI	.654	.890	.891
CFI	.673	.900	.901
SRMR	.113	.081	.075
RMSEA	.127(.124-.131)	.079(.074-.083)	.079(.074-.083)
AIC	16250.034	11137.807	11127.942

Note. Unifactorial model (a general factor), Three-factor model (phonology, morphology-semantics and comprehension-communication), Five-factor model (phonology, lexical-semantics, morphology, comprehension and communication). χ^2 = Chi-square; GFI = Goodness of Fit; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion.

Table 2 shows the statistics corresponding to the five-factor model (non-standardized factorial weights, standard errors, R^2 , p , standardized factorial weights). It can be seen that the factorial weights (amount of variance of each item explained by factor) are all statistically significant at $p < .001$. Furthermore, the estimation errors of these parameters are low.

The relationship between the five factors is all statistically significant (see Table 3). We can also observe that the phonology factor is negatively related to the other four factors (among which the relationship is positive). This is because the wording of the items in factor 1 (Phonology) is in the opposite direction to that of the other four factors.

Table 3
Factor Covariances

	Estimate	S.E.	z-value	p	95% Confidence Interval	
					Lower	Upper
Factor 1 ↔ Factor 2	-.502	.059	-8.565	< .001	-0.617	-0.387
Factor 1 ↔ Factor 3	-.661	.040	-16.622	< .001	-0.739	-0.583
Factor 1 ↔ Factor 4	-.183	.059	-3.104	.002	-0.298	-0.067
Factor 1 ↔ Factor 5	-.192	.066	-16.622	.003	-0.320	-0.064
Factor 2 ↔ Factor 3	.949	.015	64.957	< .001	0.921	0.978
Factor 2 ↔ Factor 4	.726	.045	16.103	< .001	0.638	0.814
Factor 2 ↔ Factor 5	.842	.044	19.167	< .001	0.756	0.928
Factor 3 ↔ Factor 4	.607	.036	16.994	< .001	0.537	0.677
Factor 3 ↔ Factor 5	.690	.040	17.304	< .001	0.612	0.768
Factor 4 ↔ Factor 5	.947	.035	27.125	< .001	0.878	1.015

Note. Factor 1 (Phonology), Factor 2 (Lexical-Semantic), Factor 3 (Morphology), Factor 4 (Comprehension), Factor 5 (Communication). The wording of the items in Factor 1 (Phonology) is in the opposite direction to that of the other four factors.

The Table 4 shows the final version of the Scale for Detection of Speakers with Late Language Emergence (DHITLE-S).

Reliability

The five factors on the scale show good and/or excellent reliability: Phonology ($\alpha = .82, \omega = .82$; limits: .78 - .84), Lexical-Semantics ($\alpha = .89, \omega = .90$; limits: .87 - .91), Morphosyntax ($\alpha = .97, \omega = .97$; limits: .96 - .97), Comprehension ($\alpha = .93, \omega = .93$; limits: .90 - .93) and Communication ($\alpha = .77, \omega = .77$; limits: .70 - .78).

Concurrent Validity

For the study of concurrent validity, correlation analyses were conducted between the five factors of this scale and the five CDI subscales. In addition, regression analyses were conducted to see the relevance of the five dimensions of the scale in predicting each of the CDI subscales. Table 5 shows the correlations and Table 6 the results of the regression analysis.

Table 6
Regression Analysis Results

	β	t	p	$R^2(p)$
Vocabulary				
PHO	.040	0.550	.583	
SEM	.322	2.776	.006	
MOR	.513	4.249	< .001	
CMP	-.034	-0.367	.714	
CMU	-.209	-2.527	.012	
				.509(< .001)
Word endings				
PHO	-.013	-0.172	.864	
SEM	.229	1.918	.057	
MOR	.621	4.977	< .001	
CMP	-.057	-0.582	.561	
CMU	-.200	-2.350	.020	
				.476(< .001)
Difficult verbs				
PHO	.103	1.194	.234	
SEM	.010	0.077	.939	
MOR	.523	3.679	< .001	
CMP	.081	0.728	.468	
CMU	-.248	-2.553	.011	
				.322(< .001)
Sentences				
PHO	.034	0.376	.707	
SEM	-.055	-0.387	.699	
MOR	.639	4.222	< .001	
CMP	.047	0.431	.667	
CMU	-.204	-2.153	.033	
				.332(< .001)
Complexity				
PHO	-.058	-0.599	.550	
SEM	.215	1.404	.162	
MOR	.424	2.675	.008	
CMP	-.052	-0.433	.666	
CMU	-.142	-1.298	.196	
				.230(< .001)

Note. PHO (Phonology), SEM (Lexical-Semantic), MOR (Morphology), CMP (Comprehension), CMU (Communication).

Table 2
Statistics of the Five-Factor Model

	Non- standardized factorial weights	Standard errors	R^2	p	Standardized factorial weights
F1: Phonology					
PHO1	.466	.033	.419	< .001	.648
PHO2	.491	.032	.605	< .001	.778
PHO3	.504	.031	.565	< .001	.752
PHO4	.527	.034	.537	< .001	.733
F2: Lexical-Semantic					
SEM1	.515	.040	.605	< .001	.778
SEM2	.554	.038	.618	< .001	.786
SEM3	.560	.030	.618	< .001	.786
SEM4	.641	.024	.615	< .001	.785
SEM5	.296	.031	.492	< .001	.701
SEM6	.580	.033	.643	< .001	.802
F3: Morphology					
MOR1	.695	.022	.744	< .001	.862
MOR2	.696	.024	.756	< .001	.869
MOR3	.679	.027	.745	< .001	.863
MOR4	.565	.034	.615	< .001	.784
MOR5	.763	.023	.825	< .001	.908
MOR6	.630	.030	.699	< .001	.836
MOR7	.557	.028	.591	< .001	.769
MOR8	.713	.023	.769	< .001	.877
MOR9	.732	.021	.813	< .001	.902
MOR10	.782	.019	.853	< .001	.924
F4: Comprehension					
COMP1	.309	.035	.644	< .001	.803
COMP2	.309	.032	.745	< .001	.863
COMP3	.294	.036	.734	< .001	.857
COMP4	.319	.036	.692	< .001	.832
COMP5	.211	.032	.564	< .001	.751
COMP6	.210	.025	.409	< .001	.639
COMP7	.248	.030	.534	< .001	.731
COMP8	.389	.040	.550	< .001	.741
COMP9	.356	.044	.373	< .001	.610
F5: Communication					
COMU1	.205	.025	.440	< .001	.663
COMU2	.420	.040	.496	< .001	.704
COMU3	.268	.037	.417	< .001	.646
COMU4	.319	.034	.407	< .001	.638

Note. R^2 = Coefficient of determination.

As can be seen in Table 5, the correlations of the dimensions of the scale with the CDI dimensions are all statistically significant, except the dimension of communication with the subscales of difficult verbs and mean length of utterances. However, only Morphology is observed as a good predictor of the five CDI subscales, while Communication predicts significantly four of the five dimensions (vocabulary, word endings, difficult verbs and mean length of utterances). Comprehension and Phonology do not predict any of the five CDI dimensions, and Lexical-Semantics only predicts Vocabulary. Lastly, in general the scales explain a significant amount of the variability of the five CDI subscales: Vocabulary (50.9%), Word endings (47.6%), Difficult verbs (32.2%), Mean length of utterances (33.2%) and Morphosyntactic complexity (23%) (Table 6).

Discussion

The present study was designed to develop, analyse and validate the factor structure of a scale to detect LLE in Spanish-speaking children, which could be applied not only by language professionals but also early childhood education teachers at preschool learning centres for children aged 0 to 3 years, to support and bolster the work of paediatricians in detecting this population. The results obtained generally indicate that the Scale for Detection of Speakers with Late Language Emergence to detect late talkers among Spanish-speaking children (DHITLE-S) presents suitable psychometric properties that allow it to be presented as a quick, simple and appropriate instrument for detecting this population.

Table 4*Final Version of the Scale for Detection of Speakers with Late Language Emergence (DHITLE-S)*

Item	Phonology
1	Often makes onomatopoeia of animals instead of their names or familiar sounds.
2	Can make approximations to simple words, even if he/she cannot say them correctly.
3	It simplifies the structure of words from a two-syllable word to a single-syllable word.
4	Reduces words of more than two syllables to shorter productions.
Item	Lexical-Semantic
1	Can name a minimum of four animals.
2	Can name at least four colors and four basic concepts.
3	Produces pronouns and determinants.
4	Produce adverbs.
5	Produces basic words of everyday life, names things he/she sees in class, repeats the names of classmates.
6	Choose one of the following options: - Produces less than 20 words. - Produces between 20 and 50 words. - Produces between 50 and 100 words. - Produces more than 100 words.
Item	Morphology
1	Use prepositions and connectives.
2	Uses verbs in the personal form.
3	Can use the plural appropriately.
4	If he/she is already using sentences or combinations of words, use the words in the correct order.
5	Makes combinations of three or more words.
6	Uses the masculine and feminine forms of words.
7	Uses irregular forms of verbs.
8	Can describe and narrate things he/she has done, anecdotes, things that have happened.
9	Can coordinate gender and number correctly when speaking.
10	Can describe what he/she has done when asked (in sentences of up to 4 words).
Item	Comprehension
1	Knows or identifies body parts, toys, food, clothing.
2	Responds to or follows instructions.
3	Is able to identify (point to or give) toys that represent objects, animals or people.
4	Responds verbally or gesturally with 'yes' or 'no' in appropriate contexts.
5	Can follow simple instructions or commands.
6	Responds to the word 'no'.
7	Responds to 'give', 'take', 'look', 'come' without adult pointing or gesturing.
8	Identifies or points to objects described by the adult by their functional use.
9	Understands some basic concepts of size, color or space.
Item	Communication
1	Is able to look where the adult points.
2	Points to an object that catches his/her attention by naming it or saying 'Look!'
3	Uses words or gestures spontaneously to say hello and goodbye at appropriate times.
4	Shares play with other children or adults.

Table 5*Correlation Matrix*

	PHO	SEM	MOR	CMP	CMU	VOC	WDE	VRB	MLU
SEM	.400**	----							
MOR	.597**	.848**	----						
CMP	.227**	.709**	.642**	----					
CMU	.046	.622**	.508**	.746**	----				
VOC	.500**	.626**	.684**	.410**	.240**	----			
WDE	.467**	.590**	.667**	.385**	.227**	.913**	----		
VRB	.449**	.415**	.522**	.280**	.097	.782**	.788**	----	
MLU	.436**	.431**	.547**	.290**	.109	.715**	.657**	.588**	----
MOC	.301**	.424**	.462**	.272**	.178*	.599**	.573**	.449**	.510**

Note. PHO (Phonology), SEM (Lexical-Semantic), MOR (Morphology), CMP (Comprehension), CMU (Communication), VOC (Vocabulary), WDE (Word endings), VRB (Difficult verbs), MLU (Mean length of utterances), MOC (Morphosyntactic complexity). VOC, WDE, VRB, MLU and MOC are scales in the MacArthur test. For this purpose, the phonology calculation was performed by recoding the items so that they all go in the same direction.

* $p < .05$; ** $p < .01$.

The study of the structure of the instrument provided data that support a model with five factors: phonology, lexical-semantics, morphology, comprehension and communication. In addition, the data obtained indicated concurrent validity, as statistically significant correlations were observed among the dimensions of the scale validated in this study and the CDI dimensions. Thus, it was observed that the Morphology dimension is a good predictor of the five CDI subscales, while Communication predicts significantly four of the five dimensions (Vocabulary, Word Endings, Difficult Verbs and Mean Length of Utterances), and Lexical-Semantics only predicts Vocabulary. CDI is a reliable and valid source of information about young children's language and have proven useful in both clinical and research setting (Jackson-Maldonado et al., 2024). Since three dimensions of the DHITL-S scale correlate significantly with the subscales of the CDI, it could be considered adequate to quickly detect children with LLE, despite the fact that both instruments were administered by different informants in different social contexts.

The data provided shows strong evidence of the reliability of the scores, with good or very good alpha and omega coefficients for the five factors.

This type of instrument is vital due to its practical implications, as in educational contexts it is essential to work from a preventative approach, focusing on the detection of possible risks that can be addressed with a response to intervention (RTI) model and an inclusive approach focusing on eliminating barriers and implementing facilitators.

The use of this instrument makes it possible to detect early risks in communicative-linguistic development that permit the implementation of clinical and educational intervention measures before or at the start of schooling in the second cycle (age 4-5) of preschool education. This type of tool is essential for two related reasons: firstly, it enables the implementation of proactive actions centred on the stimulation of linguistic competence systematically and consciously (Moreno & Nieva, 2021); and secondly, it minimizes medium- to long-term implications (ASHA, 2018; Collison et al., 2016; Morgan et al., 2020; Rydz et al., 2006), as those pupils who present risks or changes in their language development face important barriers for participating and progressing successfully in teaching and learning processes, given that this sustains the acquisition of knowledge and access to the curricular demands of each education stage (Auza & Murata, 2021; Hammer et al., 2017).

Although the results of the study are consistent, it is necessary to bear in mind some limitations. Specifically, the most important limitation of the study is the sample bias, as it was not done at random (it is not a probabilistic sample) but rather participants were selected from a single city, belonging to different socioeconomic classes. However, a broad sample size is used which would comply with the recommendation that there be 5 to 10 people for each item administered (Ferrando & Anguiano, 2010). Future research should address the following limitation: using multiple informants (parents, teachers in early childhood education, and educators) to triangulate information, especially when constructs are measured indirectly, as in this study with 2- and 3-year-olds. Finally, another limitation of the study, as well as a future line of research, would be to determine the level of specificity and sensitivity of the scale. This would allow reliable detection of LLE, thus reducing the occurrence of false positives and false negatives. Thus, future research should focus on gathering additional validity evidence for the intended uses of the

scale, particularly regarding test content, cognitive processes, and test consequences, as well as examining the scale's specificity and sensitivity for diagnostic purposes, in alignment with the Standards for Educational and Psychological Testing (AERA, APA, & NCME, 2014) and Sireci & Benítez (2023).

In short, the present study developed, determined the factor structure of, and validated the Scale for Detection of Speakers with Late Language Emergence (DHITL-S) for the early detection of Spanish-speaking children with LLE. This scale can be administered by early childhood education teachers in preschool centers serving children aged 0 to 3 years. It would be interesting to carry out future studies on the subject in different autonomous communities in Spain in other languages and also broaden the sample to assess the test. It may also be useful to follow up those children in whom LLE was detected and see how they evolve in linguistic competence. It is possible that this new and promising line of research may help to continue progressing in this field to pin down the predictors of language development disorder.

Author Contributions

Verónica Martínez: Conceptualization, Methodology, Investigation, Data Curation, Writing - Original Draft, Writing-Review and Editing. **Paula Solano:** Conceptualization, Methodology, Investigation, Data Curation, Writing - Original Draft. **José Carlos Núñez:** Methodology, Formal Analysis, Writing-Review.

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Declaration of Interest

The authors state that there is no conflict of interests in this study.

Data Availability Statement

The research data related to this article are available in the research team's databases that conducted the study. Interested parties must contact the team to request access.

References

- Alcantud, F., Alonso, Y., & Rico, D. (2015). *Sistema de Detección Precoz de Trastornos del Desarrollo (SDPTD). Construcción, validación y manual de uso (versión 1.0)* [Early Detection System for Developmental Disorders (SDPTD). Construction, validation and user manual (version 1.0)]. Madrid Real Patronato sobre Discapacidad.
- AERA, APA, & NCME (2014). *Standards for educational and psychological testing: National council on measurement in education*. American Educational Research Association.

- American Speech-Language-Hearing Association (ASHA). (2018). *Late Language Emergence*. American Speech-Language-Hearing Association. https://www.asha.org/practice-portal/clinical-topics/late-language-emergence/#collapse_8
- Alcock, K., & Connor, S. (2021). Oral motor and gesture abilities independently associated with preschool language skill: Longitudinal and concurrent relationships at 21 months and 3-4 years. *Journal of Speech, Language, and Hearing Research*, 64(6), 1944-1963. https://doi.org/10.1044/2021_JSLHR-19-00377
- Arachchige, K.G.K., Loureiro, I.S., Blekic W., Rossignol, M., & Lefebvre, L. (2021). The role of iconic gestures in speech comprehension: An overview of various methodologies. *Frontiers in Psychology*, 12, 634074. <https://doi.org/10.3389/fpsyg.2021.634074>
- Auza, A., & Murata, C. (2021). ¿Las clases léxicas y gramaticales de los hablantes tardíos podrían predecir a los futuros niños con TEL? [Could lexical and grammatical classes of late talkers predict the future children with SLI?] *Revista de Investigación en Logopedia*, 11(Especial), 39-51. <https://doi.org/10.5209/rlog.70268>
- Bates, E., Bretherton, I., Snyder, L., Shore, C., & Volterra, V. (1980). Vocal and gestural symbols at 13 months. *Merrill-Palmer Quarterly*, 26(4), 407-423.
- Bishop, D.V. (2003). *The children's communication checklist second edition (CCC-2) manual*. Harcourt Assessment.
- Bishop, D., Snowling, M.J., Thompson, P.A., Greenhalgh, T., & CATALISE consortium (2016). CATALISE: a multinational and multidisciplinary delphi consensus study. Identifying language impairments in children. *PLoS ONE*, 11(7), Article e0158753. <https://doi.org/10.1371/journal.pone.0158753>
- Capone, N. (2018). Late talkers: Why the wait-and-see approach is outdated. *Pediatric Clinics of North America*, 65(1), 13-29. <https://doi.org/10.1016/j.pcl.2017.08.018>
- Collisson, B.A., Graham, S.A., Preston, J.L., Rose, M.S., McDonald, S., & Tough, S. (2016). Risk and protective factors for late talking: An epidemiologic investigation. *Journal of Pediatrics*, 172, 168-174. <https://doi.org/10.1016/j.jpeds.2016.02.020>
- Colonnese, C., Stams, G., Koster, I., & Noom, M. J. (2010). The relation between pointing and language development: A meta-analysis. *Developmental Review*, 30(4), 352-366. <https://doi.org/10.1016/j.dr.2010.10.00>
- Cuetos, F., González, J., & de Vega, M. (2015). *Psicología del lenguaje [Psychology of language]*. Editorial Médica Panamericana.
- Chilosi, A.M., Pfanner, L., Pecini, C., Salvadorini, R., Casalini, C., Brizzolara, D., & Cipriani, P. (2019). Which linguistic measures distinguish transient from persistent language problems in Late Talkers from 2 to 4 years? A study on Italian speaking children. *Research in Developmental Disabilities*, 89, 59-68. <https://doi.org/10.1016/j.ridd.2019.03.005>
- Desmarais, C., Sylvestre, A., Meyer, F., Bairati, I., & Rouleau, N. (2008). Systematic review of the literature on characteristics of late-talking toddlers. *International Journal of Language & Communication Disorders*, 43(4), 361-389. <https://doi.org/10.1080/13682820701546854>
- Desmarais, C., Sylvestre, A., Meyer, F., Bairati, I., & Rouleau, N. (2010). Three profiles of language abilities in toddlers with an expressive vocabulary delay: Variations on a theme. *Journal of Speech Language and Hearing Research*, 53(3), 699-709. [https://doi.org/10.1044/1092-4388\(2009/07-0245\)](https://doi.org/10.1044/1092-4388(2009/07-0245))
- Devescovi, A., Caselli, M.C., Marchione, D., Pasqualetti, P., Reilly, J., & Bates, E. (2005). A crosslinguistic study of the relationship between grammar and lexical development. *Journal of Child Language*, 32(4), 759-86. <https://doi.org/10.1017/S0305000905007105>
- Elosúa, P. (2003). Sobre la validez de los tests [About test validity]. *Psicothema*, 15, 315-321.
- Fernández, E., Fernández, I., Fuentes, J., & Rueda, J. (1991). *Tabla de desarrollo Haizea-Llevant (0- 5 años) [Haizea-Llevant development table (0- 5 years)]*. Servicio Central de Publicaciones del Gobierno Vasco.
- Ferrando, P.J., & Anguiano, C. (2010). El análisis factorial como técnica de investigación en psicología [Factor analysis as a research technique in Psychology]. *Papeles del Psicólogo*, 31, 18-33.
- Fisher, E.L. (2017). A systematic review and meta-analysis of predictors of expressive-language outcomes among late talkers. *Journal of Speech, Language, and Hearing Research*, 60, 2935-2948. https://doi.org/10.1044/2017_JSLHR-L-16-0310
- Hammer, C. S., Morgan, P., Farkas, G., Hillemeier, M., Bitetti, D., & Maczuga, S. (2017). Late talkers: A population-based study of risk factors and school readiness consequences. *Journal of Speech, Language, and Hearing Research*, 60(3), 607-626. https://doi.org/10.1044/2016_JSLHR-L-15-0417
- Horvath, S., Rescorla, L., & Arunachalam, S. (2019). The syntactic and semantic features of two-year olds' verb vocabularies: A comparison of typically developing children and late talkers. *Journal of Child Language*, 46(3), 409-432. <https://doi.org/10.3390/children8111052>
- Horvath, S., Kueser, J. B., Kelly, J., & Borovsky, A. (2022). Difference or delay? Syntax, semantics, and verb vocabulary development in typically developing and late-talking toddlers. *Language Learning and Development*, 18(3), 352-376. <https://doi.org/10.1080/15475441.2021.1977645>
- Jackson-Maldonado, D., Marchman, V.A. & Fernald, L.C.H. (2013). Short-form versions of the Spanish MacArthur-Bates Communicative Development Inventories. *Applied Psycholinguistics*, 34, 837-868. <https://doi.org/10.1017/S0142716412000045>
- Jackson-Maldonado, D., Friend, M., Marchman, V., Weisleder, A., Auza, A., Conboy, B., Rubio-Codina, M., & Dale, P. (2024). The MacArthur Inventario del Desarrollo de Habilidades Comunicativas III: A measure of language development in Spanish-speaking two- to four-year-olds. *Language Development Research*, 4, 361-398. <https://doi.org/10.34842/12fb-qz93>
- Karmiloff, K. & Karmiloff-Smith, A. (2005). *Hacia el lenguaje [Towards language]*. Morata.
- Kautto, A., Jansson-Verkasalo, E., & Mainela-Arnold, E. (2021). Generalized slowing rather than inhibition is associated with language outcomes in both late talkers and children with typical early development. *Journal of Speech, Language, and Hearing Research*, 64(4), 1222-1234. https://doi.org/10.1044/2020_JSLHR-20-00523
- López-Ornat, S., Gallego, C., Gallo, P., Karousou, A., Mariscal, S., & Martínez, M. (2005). *Inventarios de desarrollo comunicativo MacArthur. Manual [MacArthur-Bates Communicative Development Inventories. Manual]*. TEA.
- Llorenç, A., Ahufinger, N., Igualada, A., & Sanz-Torrent, M. (2021). Descripción del cambio del TEL al TDL en contexto angloparlante [Description of the change from SLI to DLD in an English-speaking context]. *Revista de Investigación en Logopedia*, 11(Núm. Especial), 9-20. <https://doi.org/10.5209/rlog.70857>
- Mariscal, S., López-Ornat, S., Gallego, C., Gallo, P., Karousou, A., & Martínez, M. (2007). La evaluación del desarrollo comunicativo y lingüístico mediante la versión española de los inventarios MacArthur-Bates [Evaluation of communicative and linguistic development using

- the Spanish version of the MacArthurBates inventories]. *Psicothema*, 19, 190-197.
- Mendoza, E. (2016). *Trastorno específico del lenguaje [Specific language disorder]*. Pirámide.
- Moreno, R., & Nieva, S. (2021). Intervención logopédica naturalista con familias de hablantes tardíos: efectos en el lenguaje infantil y en los intercambios adultos [Language and speech naturalistic intervention with late talkers' families: effects on child language and adult exchanges]. *Revista de Investigación en Logopedia*, 11(1), 61-75. <https://doi.org/10.5209/rlog.68157>
- Morgan, L., Delehanty, A., Dillon, J.C., Schatschneider, C., & Wetherby, A. M. (2020). Measures of early social communication and vocabulary production to predict language outcomes at two and three years in late-talking toddlers. *Early Childhood Research Quarterly*, 51, 366-378. <https://doi.org/10.1016/j.ecresq.2019.12.005>
- Muñiz, J., & Fonseca-Pedrero, E. (2019). Diez pasos para la construcción de un test. [Ten steps for test development]. *Psicothema*, 31(1), 7-16. <https://doi.org/10.7334/psicothema2018.291>
- Muñiz, J., Fidalgo, A.M., García-Cueto, E., Martínez R., & Moreno, R. (2005). *Análisis de los ítems [Item analysis]*. La Muralla.
- Nouraei, P., Ayatollahi, M. A., & Moghadas, M. (2021). Late language emergence: A literature review. *Sultan Qaboos University Medical Journal*, 21(2), e182-e190. <https://doi.org/10.18295/squmj.2021.21.02.005>
- Paul, R. (1991). Profiles of toddlers with slow expressive language development. *Topics in Language Disorders*, 11(4), 1-13. <https://doi.org/10.1097/00011363-199111040-00003>
- Perry, L. K., Kucker, S. C., Horst, J. S., & Samuelson, L. K. (2023). Late bloomer or language disorder? Differences in toddler vocabulary composition associated with long-term language outcomes. *Developmental Science*, 26, Article e13342. <https://doi.org/10.1111/desc.13342>
- Rescorla, L. (1989). The language development survey: A screening tool for delayed language in toddlers. *Journal of Speech and Hearing Disorders*, 54, 587-599. <https://doi.org/10.1044/jshd.5404.587>
- Rescorla L. (2011). Late talkers: do good predictors of outcome exist? *Developmental Disabilities Research Reviews*, 17(2), 141-150. <https://doi.org/10.1002/ddrr.1108>
- Rescorla, L. (2002). Language and reading outcomes to age 9 in late-talking toddlers. *Journal of Speech Language and Hearing Research*, 45(2), 360-371. [https://doi.org/10.1044/1092-4388\(2002/028\)](https://doi.org/10.1044/1092-4388(2002/028))
- Rescorla, L., & Achenbach, T. M. (2002). Use of the language development survey (LDS) in a national probability sample of children 18 to 35 months old. *Journal of Speech, Language, and Hearing Research*, 45(4), 733-743. [https://doi.org/10.1044/1092-4388\(2002/059\)](https://doi.org/10.1044/1092-4388(2002/059))
- Rescorla, L. y Dale, P.S. (2013). *Late talkers. Language, development, interventions, and outcome*. Paul H. Brookes Publishing Co.
- Rescorla, L., Dahlsgaard, K., & Roberts, J. (2000). Late-talking toddlers: MLU and IPSyn outcomes at 3;0 and 4;0. *Journal of Child Language*, 27, 643-664. <https://doi.org/10.1017/s0305000900004232>
- Rescorla, L., Roberts, J., & Dahlsgaard, K. (1997). Late talkers at 2: Outcome at age 3. *Journal of Speech, Language, and Hearing Research*, 40, 556-566. <https://doi.org/10.1044/jslhr.4003.556>
- Rice, M. L., Taylor, C. L., & Zubrick, S. R. (2008). Language outcomes of 7-year-old children with or without a history of late language emergence at 24 months. *Journal of Speech Language and Hearing Research*, 51(2), 394-407. [https://doi.org/10.1044/1092-4388\(2008/029\)](https://doi.org/10.1044/1092-4388(2008/029))
- Rose, Y., & Blackmore, S. (2018). Questioning the role of lexical contrastiveness in phonological development: Converging evidence from perception and production studies. *Canadian Journal of Linguistics*, 63(4), 580-608. <https://doi.org/10.1017/cnj.2018.12>
- Rydz, D., Srouf, M., Oskoui, M., Marget, N., Shiller, M., Birnbaum, R., Majnemer, A., & Shevell, M. I. (2006). Screening for developmental delay in the setting of a community pediatric clinic: A prospective assessment of parent-report questionnaires. *Pediatrics*, 118(4), e1178-e1186. <https://doi.org/10.1542/peds.2006-0466>
- Sansavini, A., Favilla, M.E., Guasti, M.T., Marini, A., Millepiedi, S., Di Martino, M.V., Vecchi, S., Battajon, N., Bertolo, L., Capirci, O., Colatei, M. P., Frioni, C., Marotta, L., Massa, S., Michelazzo, L., Pecini, C., Piazzalunga, S., Pieretti, M., Rinaldi, P., ... Lorusso, M. L. (2021). Developmental language disorder: Early predictors, age for the diagnosis, and diagnostic tools. A scoping review. *Brain Sciences*, 11(5), Article 654. <https://doi.org/10.3390/brainsci11050654>
- Serra, M. (2008). Las interfaces entre los componentes del lenguaje: Tierra de nadie en un viaje obligatorio. In E. Diez-Itza (Ed.), *Estudios de desarrollo del lenguaje y educación [Studies on language development and education]* (pp. 511-51). Publicaciones de la Universidad de Oviedo.
- Serrat, E., Sanz-Torrent, M., Badia, I., Aguilar, E., Olmo R., Lara, F., Andreu, L., & Serra, M. (2010). La relación entre el aprendizaje léxico y el desarrollo gramatical [The relationship between lexical learning and grammatical development]. *Infancia y Aprendizaje*, 33(4), 435-448. <https://doi.org/10.1174/021037010793139590>
- Sireci, S., & Benítez, I. (2023). Evidence for test validation: A guide for practitioners. *Psicothema*, 35(3), 217-226. <https://doi.org/10.7334/psicothema2022.477>
- Stoel-Gammon, C. (2011). Relationships between lexical and phonological development in young children. *Journal of Child Language*, 38(1), 1-34. <https://doi.org/10.1017/S0305000910000425>
- Sylvestre, A., Desmarais, C., Meyer, S. F., Bairati, I., & Leblond, J. (2017). Prediction of the outcome of children who had a language delay at age 2 when they are aged 4: Still a challenge. *International Journal of Speech & Language Pathology and Audiology*, 2, 1-14. <https://doi.org/10.1080/17549507.2017.1355411>
- Thal, D. (1991). Language and cognition in normal and late-talking toddlers. *Topics in Language Disorders*, 11(4), 33-42.
- Thal, D., & Bates, E. (1988). Language and gesture in late talkers. *Journal of Speech, Language, and Hearing Research*, 31, 115-123. <https://doi.org/10.1044/jshr.3101.115>
- Thal, D., Marchman, V.A., & Tomblin, J.B. (2013). Late-talking toddlers: Characterization and prediction of continued delay. In L. A. Rescorla, & P. S. Dale (Eds.). *Late talkers. Language, development, interventions and outcome* (pp. 169-201). Paul H. Brookes Publishing Co.
- Watkins, M. W. (2017). The reliability of multidimensional neuropsychological measures: From alpha to omega. *Clinical Neuropsychologist*, 31(6-7), 1113-1126. <https://doi.org/10.1080/13854046.2017.1317364>
- Ygual, A., Cervera, J.F., Baixauli, I., & Meliá, A. (2011). Protocolo de observación del lenguaje para maestros de educación infantil. Eficacia en la detección de dificultades semánticas y morfosintácticas [Language observation protocol for teachers in pre-school education. Effectiveness in the detection of semantic and morphosyntactic difficulties]. *Revista de Neurología*, 52, 127-134.
- Zimmerman, I. L., Steiner, V. G., & Pond, E. (2011). *Preschool Language Scales-fifth edition (PLS-5)*. Pearson Assessments Inc.