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Language Skills in Cypriot-Greek Speaking Toddlers with Specific Language Delay

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Abstract

The current investigation examined longitudinally the emergence of specific linguistic parameters in toddlers with and without late onset of expressive language. The central aim of this investigation was to compare the linguistic skills of typically developing and late-talking toddlers while: (a) observing patterns of linguistic development between the two groups on specific parameters and (b) examining the impact of early language delay on language-specific parameters and comparing these with cross-linguistic data. The subjects were 18 Cypriot-Greek speaking toddlers classified as late-talkers (LTs), and 18 age-matched counterparts with normal course of language development (NLDs). Participants were assessed at 28 months, 32 months, and 36 months, using various linguistic measures such as receptive and expressive vocabulary, mean length of utterance as measured in words (MLU-W), and phonetic production. Overall, the two groups exhibited parallel developmental profiles, with a language lag favoring the LT group as compared to the NLD counterpart. The results of this study highlight the negative effect of early language delay on later language skills, even up to age three years and lend support to the current literature regarding the universal linguistic picture of early and persistent language delay. Finally, the findings are discussed in view of the need for further research with a focus on more language sensitive tools in testing later language outcomes.

Keywords

specific language delay, late-talkers, toddlers, Cypriot-Greek, mean length of utterance

1 Introduction

Language is one of the major developmental skills humans acquire. Its acquisition by young children occurs fast, effortlessly, and without particular instruction—given non-pathological conditions. Dramatic language changes and achievement of linguistic developmental milestones are observed through the early childhood development on a number of domains. Despite the individual linguistic variability seen in young children, certain milestones are expected to appear within the first and second year of life. Such skills include

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the onset of early meaningful words at around the age of 12 months followed by a vocabulary spurt at 20 months (Bates, Marchman, Thal, Fenson et al. 1994) and the combination of two words and the production of many consonants and vowels of the native language (for extensive overviews see Berko Gleason 1996). These patterns have been documented to occur cross-linguistically.

However, for some children the onset of expressive language is protracted as these children begin to talk much later than others. These youngsters are usually referred to as late-talkers (LTs hereafter), children with specific expressive language delay (SELD) (Paul 1991) or children with late language emergence (LLE) (Ellis Weismer, Murray-Branch & Miller 1994; Hadley & Short 2005; Paul 1993; Rescorla 1989; Rice, Taylor & Zubrick 2008; Thal, Oroz, & McCaw 1995; Zubrick, Taylor, Rice & Slegers 2007; Whitehurst & Fischel 1994).

Using a number of parentally reported diagnostic tools such as the Language Development Survey (LDS; Rescorla 1989) and the MacArthur Communicative Development Inventory: Words and Sentences (CDI:WS; Fenson, Dale, Reznick, Thal et al. 1993), with data consolidated from a number of investigations, the late onset of language emergence was estimated to affect approximately 10-19% of middle class preschool children. In these youngsters, an early linguistic delay is usually diagnosed on the basis of restricted expressive vocabulary (usually less than 50 words as a cut-off point between the 10^{th}-15^{th} percentiles) and/or the lack of two-word combinations around the age of 24 months, albeit with normal cognitive and emotional development for this age (Ellis Weismer 2007; Rescorla & Achenbach 2002). In addition, large-scale cohort studies in the United Kingdom (Roulstone, Loader, Northstone, Beveridge & the ALSPAC Team 2002) and in Australia (Zubrick et al. 2007) supported the 19% estimate for late language emergence on the basis of a composite score derived from a number of linguistic variables sampled with "The Ages and Stages Questionnaire" (ASQ; Bricker & Squires, 1999).

Early language delay in toddler groups constitutes the most frequent clinical scenario faced by parents and clinicians. As a group, LT children pose a challenge to researchers and clinicians for two reasons: 1) recovery rates and 2) the variable linguistic outcomes documented at different age levels. Recovery rates as documented by several longitudinal and prospective studies have been estimated to be around 70%, suggesting that although some children will eventually 'grow out' of early language, approximately 30% will continue to exhibit persistent linguistic and academic challenges which continue deep into the school years (Paul, Looney, & Dahm 1991; Rescorla & Schwartz 1990).

Conversely, a major question that rises is the following: Is early delay an indication of chronic persistent deficit or does it merely reflect a developmental variability within the normal distribution? A plethora of longitudinal and retrospective investigations suggests that LT toddlers are known to be at risk for persisting language problems, emotional and behavioral disorders, and later, learning and reading difficulties (Aram, Ekelman & Nation 1984; Bishop & Adams 1990; Rescorla 2002; Rescorla 2005). Nevertheless, the overall picture regarding linguistic outcomes remains fuzzy because of methodological differences and limitations applied by each investigation, including different sampling and data analysis procedures, age of intake and testing and small subject samples.

Data regarding language outcomes have mainly focused on preschool children at ages 3, 4, and 5 years. Language outcomes of subjects at the age of 3 indicated significant progress for lexical development but depressed morphological, phonological and syntactic skills (Ellis Weismer, Murray-Branch & Miller 1994; Fischel, Whitehurst, Caulfield & DeBarishey 1989; Hadley & Short 2005; Paul et al. 1991; Rescorla & Schwartz 1990; Rescorla, Roberts, & Dahlsgaard 1997). A phonological delay in the form of immature syllable structure use, restricted phonetic inventories, a small proportion of consonants produced correctly, and persistent use of phonological processes has been documented across studies (Paul & Jennings 1992; Mirak & Rescorla 1998; Rescorla & Ratner 1996; Thal, Oroz & McCaw 1995). Similarly, simple syllable structure, small consonantal and vowel inventories, small ratios of consonant to vowel targets, and reduced frequency of vocalizations were reported by subsequent studies for LTs ranging from 24-31 months (Pharr, Ratner & Rescorla 2000; Rescorla & Ratner 1996; Whitehurst et al. 1991).

Furthermore, word productions of late-talkers were characterized by small ratios of consonant to vowel targets and restricted consonant and vowel inventories (Rescorla & Ratner 1996). In a recent cross-linguistic study, Petinou and Okalidou (2006) presented language specific phonological restrictions in LT children in the form of persistent use of regressive assimilation and initial consonant deletion in Cypriot-Greek(CYG hereafter)-speaking three-year-olds with a history of late language emergence. In addition to phonological delays, the literature suggests a more circumscribed language delay in the areas of syntax and morphology. In a follow-up study, Rescorla, Roberts and Dahlsgaard (1997) found that LTs scored below age expected levels on mean length of utterance (MLU) and productive syntax as compared to age matched peers. Similar patterns were reported by Hadley and Short (2005) in three-year-old LTs who were also delayed in the use of grammatical tense marking.

Data from ages 4, 5 and 6 years support a more circumscribed deficit within the areas of expressive grammar, MLU, morphosyntax, and narrative skills. Delayed syntactic development has also been documented by Ellis Weismer, Marchman and Evans (2001) who found weaker correlations between vocabulary size and MLU in LTs' performance when compared to data from language matched counterparts. In a recent longitudinal investigation on LTs from ages 2;0 to 5;6 years, Moyle, Ellis Weismer, Evans and Lindstrom (2007) suggested that one of the issues related to the LT's morphosyntactic deficits might be related to the fact that LTs as a group did not utilize lexical information to abstract grammatical mental representations, a pattern that supported the operation of the single-mechanism account of language acquisition and the lack of syntactic bootstrapping. In other words, lexical skills did not facilitate syntactic skills as evidenced by the TD group.

The few studies on language outcomes beyond age 7 provide converging evidence regarding the persistent linguistic deficit associated with early language delay in the domains of expressive morphology, syntax and overall grammatical ability. Specifically, Paul (1993) reported delays in expressive syntax as measured by Developmental Sentence Scoring (DSS: Lee 1974) suggesting that an early delay in the onset of expressive vocabulary might lead to a more specific linguistic deficit at later point as well as difficulties in narrative skills (Paul & Alforde 1993; Paul & Smith 1993). Similarly, Rescorla (2002) reported limitations (in mophosyntax and MLU) during story-telling tasks in 9-year-olds with early language delay. In a recent investigation, 128 7-year-olds diagnosed as late-talkers at age 24 months scored below age-expected levels on an omnibus language battery testing and presented with particular difficulties in the use of grammatical tense marking (Rice et al. 2008). Taken as a whole, the above research findings suggest that some children with a late onset of expressive language may be at risk for long-term linguistic deficits, learning disabilities and academic difficulties (Aram et al. 1984; Bishop & Edmudson 1987).

Overall, the majority of investigations support the persistence of language deficits in relation to early linguistic delay and its relationship to phonological, morphological, grammatical, reading and academic challenges that manifest at later points in the child's development. The consensus suggests that in LT populations specific language deficits might appear at specific ages, with problems being more pronounced at earlier developmental stages. At later ages (e.g. beyond the age of 6 years) LT children perform within the normal limits on numerous standardized batteries, even though their scores may fall at the low end of the distribution.

2 Purpose of this study

The goals of the current study were the following: (a) To compare the linguistic skills between LT and NLD CYG-speaking toddlers across the ages 28, 32, 36 months; (b) to observe the development of various linguistic patterns as a function of time; and (c) and to examine the impact of early language delay on language-specific characteristics as compared to English data.

3 The Cypriot Greek Dialect

CYG is spoken on the island of Cyprus, located in the southeastern Mediterranean Sea. It is considered a southeastern dialect of Standard Modern Greek (SG) (Newton 1972). CYG is divided into the urban and village varieties, spoken in the city and in villages, respectively. The current literature describes specific differences and similarities between CYG and SG in linguistic domains regarding phonology, semantics and syntax. Several reports suggest that the linguistic differences between CYG and SG are considerable and do not render the two varieties mutually intelligible. In particular, CYG speakers are able to understand SG due to their exposure to the latter variety through formal schooling and the media. However, SG speakers in many cases find CYG unintelligible, especially the village variety (for details see Arvaniti 2006). In general, the CYG phonological inventory consists of 29 consonants defined according to features of place and manner of articulation. There are bilabial, labio-dental, dental/alveolar, palatal and velar phonemes. Regarding manner of articulation, there are stops, fricatives, affricates, nasals, liquids, and glides. The liquid segment /r/ is trilled. In CYG voiced stops are prenasalized with voiceless counterparts being either unreleased or aspirated. The /n/ and /s/ may also occur in word-final position. Currently, there are no published data regarding the syllable structure of CYG. Thus, for the purposes of the current investigations the authors analyzed the syllable structure of 600 target word items found in the Cypriot-Greek Lexical Acquisition List (CYLEX) (Petinou, Hadzigeorgiou & Minaidou 1999). A detailed description of the CYLEX is provided in the methods section. Percentages of syllable structure occurrences from the 600 uninflected words were as follows: CVCV (28%), CVCVCV (22%), CVCVCVCV (10%), CCVCV (8 %), CVCCV (6%) and VCV (6%). The rest of the word targets (20%) consisted of variable monosyllabic, trisyllabic, and other polysyllabic structures. Based on these observations it was concluded that the predominant syllable structure

one might encounter in CYG was the disyllabic CVCV and trisyllabic CVCVCV. Stress pattern analysis was also performed and results revealed 10 monosyllabic, 285 disyllabic (183 trochees (65%) and 102 (35%) iambs), 208 trisyllabic (28 targets stressed on the ultimate, 120 targets on the penultimate, 60 on the antepenultimate), and 97 multisyllabic words. In addition, the occurrence of geminates in medial position is a common phonological phenomenon (Newton 1972). This phenomenon renders the medial position acoustically more "salient" as suggested by acoustic measurement data. Specifically, it has been suggested that word-medial position geminate targets of CYG were significantly longer in duration when compared to their non-geminate counterparts, regardless of stress. (Arvaniti 2001; Tserdanelis & Arvaniti 1999).

Furthermore, CYG is a Tobler-Mussafia-type dialect/language where clitics follow the finite verb in various syntactic contexts, but immediately precede the verb in case of negation and mood (Petinou & Terzi 2001).

4 Methods

4.1 Participants

The participants for this study were 36 children (22 boys, 14 girls); 18 children with late onset of expressive language (LTs) and 18 children with normal language development (NLD).

All were selected from a cohort of 66 toddlers who at the time were participating in on-going language development project in Cyprus. Each group consisted of 11 boys and 7 girls, respectively. Participants between the groups were matched one-to-one on the bases of gender, chronological age, maternal education and socioeconomic status, as reported in the Statistical Abstract of Cyprus (SAC, 2001). For all children, the average SES status according to the SAC on the bases of maternal education and income was Middle (II) to High (I). All participants had unremarkable developmental and medical history as reported on developmental questionnaires filled by each child's primary caregiver at intake. Subjects came from monolingual CYG speaking environments with the mother as the primary caregiver. At intake, each child passed pure tone audiometric screenings measured with a GSI-38 portable audiometer. They all had normal non-verbal abilities according to informal cognitive assessment in the form of checklist performed by a developmental psychologist as part of the cohort testing protocol.

4.2 Procedure

4.2.1 Subject criteria

Criteria for classification of a child as an LT included the following: (a) an expressive vocabulary of less than 70 words based on the Cyprus Lexical List (CYLEX; Petinou, Minaidou, & Hadzigeorgiou 1999), which is a parentally reported vocabulary checklist; and (b) the lack of two-word combination at intake (between ages 24 to 26 months). The 70-word cut-off criterion was derived after *z*-score transformation of the raw number of words (expressive vocabulary of a sample of 66 two-year-old CYG-speaking children) and corresponded to the 10th percentile. For seven of the children in the late-talking group, parents expressed their concern about their child's expressive language as children were not producing many words at the time. For the rest of the LT subjects, the placement in the experimental (LT) group was based on the child's expressive vocabulary and word combination results (cut-off point mark).

4.2.2 Data gathering

Each child was assessed at the Cyprus Institute of Neurology and Genetics in three experimental sessions at 28, 32 and 36 months of age. Language testing was administered by two trained research assistants and the first author. Each session lasted approximately 45 minutes and was audio recorded using a *Marantz PMD-222* tape recorder and an *Audio-Technico* flat unidirectional microphone placed on the experimental table in front of the child.

Cognitive non-verbal ability was assessed based on clinical observations and a checklist adapted from the Bayley Scales of Infant Development (MDI) (1969) administered at the time of intake. A 'pass' or 'fail' score was based on the child's performance on 18 non-verbal tasks within the age bracket of 23-28 months. The 80% (correct performance of 14 out of the 18 items) was used as the cutoff point required for a 'passing' profile. All participants had unremarkable non-verbal ability skills.

The children's linguistic abilities were examined through naturalistic observations, through a spontaneous language sample collected during child-mother and child-examiner communicative interaction, and through formal testing. Play materials included plastic food items, dolls, plastic cups and plates, books, puzzles and pictures. The toys were held constant across all children and across all sessions.

Language measures included an adaptation of the Preschool Language Scale-3 (PLS-3: see Zimmerman, Steiner, & Pond 1992) used as the formal receptive and expressive language measure. Certain items from the PLS-3 were

adapted to fit child language characteristics and parameters of the CYG dialect. It should be noted that most of the adaptations were performed in the expressive domain of the test and included the linguistic parameters of phonology, plural inflections, definite and non-definite articles, grammatical agreement and the correct use of clitics (for details see Petinou & Terzi 2001; Petinou & Okalidou 2006).

In addition, size of expressive and receptive vocabulary as well as instances of word combinations were measured with the CYLEX, a vocabulary list designed on the basis of the MacArthur Communicative Development Inventory (CDI: see Fenson et al. 1992). The list consists of 600 words usually found in children's early words. The list includes content and function words, as well as 14 gestures that might be used by youngsters, and a section on which caregivers could provide examples of phrases and short sentences used by their child. The semantic categories included the following classes: onomatopoetic words, animal sounds, animal names, clothes, actions, places, foods, toys, tools, colors, numbers, definite articles, prepositions, conjunctions, and basic concepts. In addition, the list contained a section for 14 gestures that might be used by youngsters and a section in which caregivers could provide examples of phrases and short sentences used by their child.

MLU-W was calculated from spontaneous language sample collected for each child during interaction with the experimenter and/or the caregiver. All intelligible utterances were coded and measured for number of words.

Phonological skills were assessed through a spontaneous language sample collected during each experimental session. Furthermore, pictures depicting objects and actions were used to prompt the production of all possible singleton phonemes of CYG in all word positions.

All utterances were phonetically transcribed using the International Phonetic Alphabet broad transcription format (IPA 1999). Ill-recorded productions, such as productions overlapping with noise or with experimenter's own speech or softly uttered or whispered utterances were excluded from the analysis. Broad phonetic transcriptions were made for each recorded session including all consecutive different words or word-like targets produced by each child. Subsequently, speech samples were analyzed to obtain the mean length utterance in words elicited during the total sample. Independent analyses procedures were used in constructing each child's phonetic inventory (Stoel-Gammon, & Dunn, 1988).

4.2.3 Transcription reliability

Approximately 10% of recorded samples were randomly selected for the purposes of transcription reliability. The samples were phonetically transcribed by

the first author and were checked against comparable coding from an independent transcriber (a speech language-pathologist trained in phonetic transcription) who was unfamiliar with the purpose of the investigation. Reliability on the relevant phonetic categories was based on the number of agreements divided by agreements plus disagreements after the two transcribers had jointly listened to the tapes and had compared their transcriptions with regard to place and manner of articulation. Inter-rater transcription reliability for manner and place of articulation was approximately 90% and 84% respectively.

5 Results

5.1 Comparison of LTs and NLDs on all language patterns as a function of age level

A series of six separate ANOVAs were carried with Group as the between subject variable (LT vs. NLD) and Age Level as the within subject variable (28, 32, 36 months) for each separate linguistic parameter (PLS-3 auditory comprehension, PLS-3 expressive communication, vocabulary comprehension and expressive vocabulary as measured on the CYLEX, Mean Length of Utterance, and number of phonemes used). For the within-subjects analysis, assumption of sphericity was checked using the Mauchly's test. In cases of sphericity violation, degrees of freedom were adjusted according to the Greenhouse-Geisser effect. Means and standard deviations for all measures are reported on Table 1.

5.2 Group Differences

For PLS-3 auditory comprehension the analyses revealed significant group main effect, $\underline{F}$ (1, 34) = 17, 24, $p < .001$. As expected the NLD group exhibited higher performance than the LT counterpart. The age main effect was not significant, $F(2, 68) = .17$, $p > .001$. A group by age level interaction with post hoc analyses revealed significant differences between the two groups for ages for ages 28 months, $\underline{F}$ (1,34) = 17,24, $\underline{p} < .001$ and 32 months, F (1, 34) = 17,30, $\underline{p} < .001$, with higher performance in favor of the NLD group (Figure 1).

For PLS-3 expressive communication measures the group main effect was significant, $\underline{F}$ (1,34) = 40,25, $\underline{p} < .01$. The age main effect did not reach statistical significance despite a trend towards higher performance at age 28 and 32 months as compared to 32 months. The age-by-group interaction was significant, $\underline{F}(2, 68) = 28,2$, $\underline{p} < .001$. Post hoc planned comparisons between

Table 1. Group Means and Standard Deviations for Language Measures of Late-Talking and Normal Language Developing Children as a function of age.

Group	Late Talking		Normal Language Developing	
	M	*SD*	*M*	*SD*
Variable		Age 28 months		
PLS-3 Auditory comprehension	87,17	9,04	100,33	9,96
PLS-3 Expression	84,17	9,75	103,22	8,88
CYLEX Comprehension	320,61	178,25	431,00	123,57
CYLEX Expression	97,61	138,64	341,44	144,60
MLU-W	1,03	,40	1,91	,37
Phonemes Initial Word Position	4,44	4,02	16,00	4,64
Phonemes Medial Word Position	6,28	2,95	17,71	4,18
Phonemes Final Word Position	,28	,46	1,35	,84
		Age 32 months		
PLS-3 Auditory comprehension	85,67	5,34	95,28	7,47
PLS-3 Expression	80,94	7,08	95,83	7,07
CYLEX Comprehension	349,56	161,06	513,56	98,23
CYLEX Expression	145,11	135,27	439,06	125,81
MLU-W	1,40	,61	2,24	,36
Phonemes Initial Word Position	7,56	4,51	17,24	4,74
Phonemes Medial Word Position	9,50	4,71	18,94	5,93
Phonemes Final Word Position	,56	,78	1,59	,97
		Age 36 months		
PLS-3 Auditory comprehension	89,50	14,08	97,44	10,15
PLS-3 Expression	86,00	12,65	97,33	8,31
CYLEX Comprehension	442,22	166,55	588,33	73,69
CYLEX Expression	305,33	222,47	554,50	102,06
MLU-W	1,80	,72	2,45	,53
Phonemes Initial Word Position	9,61	4,88	20,12	4,43
Phonemes Medial Word Position	11,61	5,77	22,06	5,08
Phonemes Final Word Position	1,17	,79	1,88	,68

Note. PLS-3 scores between 85-115 indicate language abilities within normal range; CYLEX measure indicates number words understood and produced by the child, as reported by the parents; MLU-W indicates number of words per utterance produced by the child during a 100-word or 30 minute interaction with the experimenter; Phoneme measures are based on number of consonants produced in the various word positions by the child during a 100-word or 30 minute interaction with the experimenter. * $p < .05$.

the groups revealed significant differences at ages 28 months, $F(1, 34) = 23,9$, $p < .001$ and 32 months, $F(1,34) = 20,30$, $p < .001$. Overall, the NLD group's performance was superior as compared to the performance of the LT group especially at the earlier age levels (Figure 2).

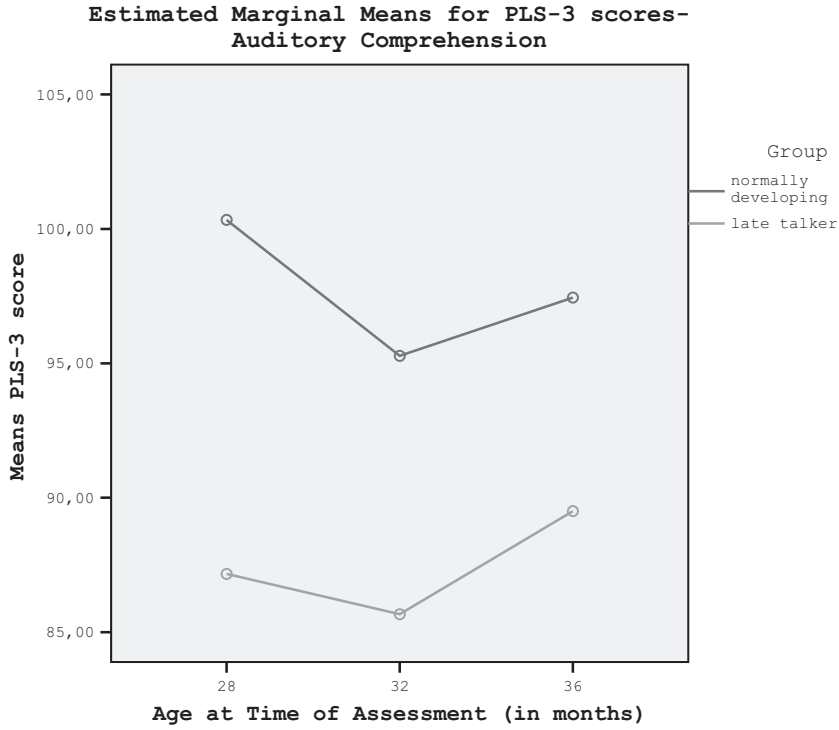

Figure 1. Developmental Profiles of Late Talking and Normal Language Developing Children on PLS-3 Auditory Comprehension.

Group main effect was revealed for vocabulary comprehension on the parentally reported CYLEX comprehension, F (1, 34,) = 14,2, p < .05. The age main effect was significant indicating that despite group types, receptive vocabulary increased as a function of age, F (2, 68) = 34,22, p< .05. Comparisons between the two groups as a function of age revealed significant differences between the two groups at 28 months, F (1,34) = 4.66, p < .01, at 32 months F (1,34) = 26.67, p< .01, and at 36 months, F (1, 34) = 18,65, p < .01. The group-by-age interaction was significant suggesting that the two groups followed parallel profiles. Comparable performance was revealed for parentally reported expressive vocabulary with a significant group main effect, F (1, 34) = 25,18, p < .05. The age effect was also significant indicating that expressive vocabulary increased as a function of age, F (2, 68) = 43, 8, p < .05. Between group comparisons suggested that the NLD group showed superior performance as compared to the LT counterpart across all age

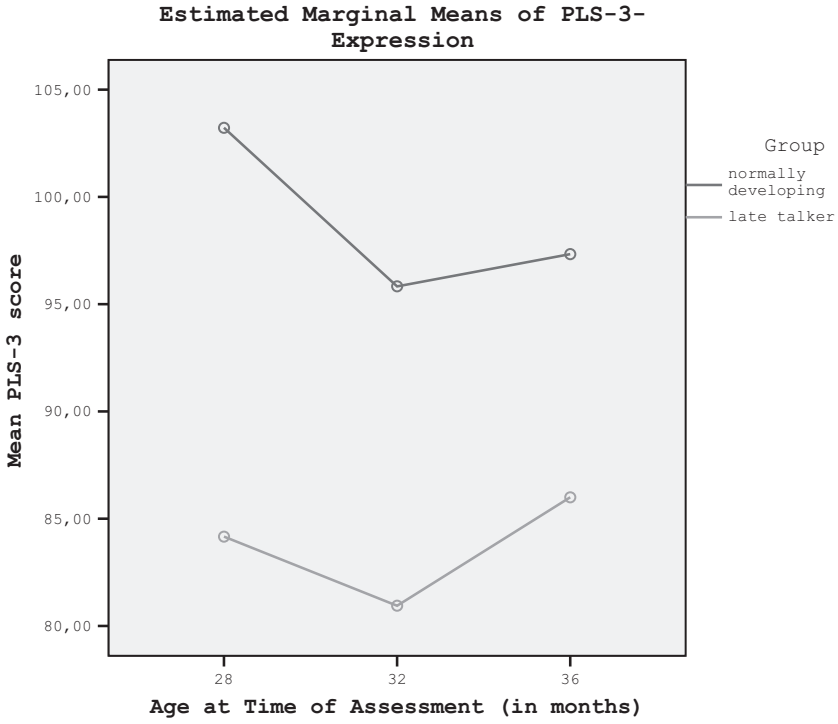

Figure 2. Developmental Profiles of Late Talking and Normal Language Developing Children on PLS-3 Expressive Vocabulary.

levels, at age 28 months, F (1, 34) = 26,18 p < .001, 32 months F (1,34) = 45.57, p < .001, and 36 months F (1,34) = 18.65, p < .001. The size of receptive and expressive vocabulary was larger in the NLD group compared to the LT counterpart, a pattern that was maintained across all age levels. The two groups showed parallel profiles in their vocabulary progress across age levels (see Figures 3 and 4).

For MLU-W scores the group main effect was significant, F(1, 34) = 18, p < .01, suggesting an advantage for the NLD group as compared to the LT group. The age main effect was significant, F (2, 68) = 12, 4, p < .01. The group-by-age interaction did not reach statistical significance, F (2, 68) = 1.3, p >.05. However, planned comparisons between the groups revealed that the NLD group remained at higher MLU levels as compared to the LT counterparts across all age levels F (1, 34) = <46,88 - 9,76>, p < .001. It was noted that the late talkers as a group at age 36 months had MLU scores similar to MLU number exhibited by the NLD's at age 28 months (Figure 5).

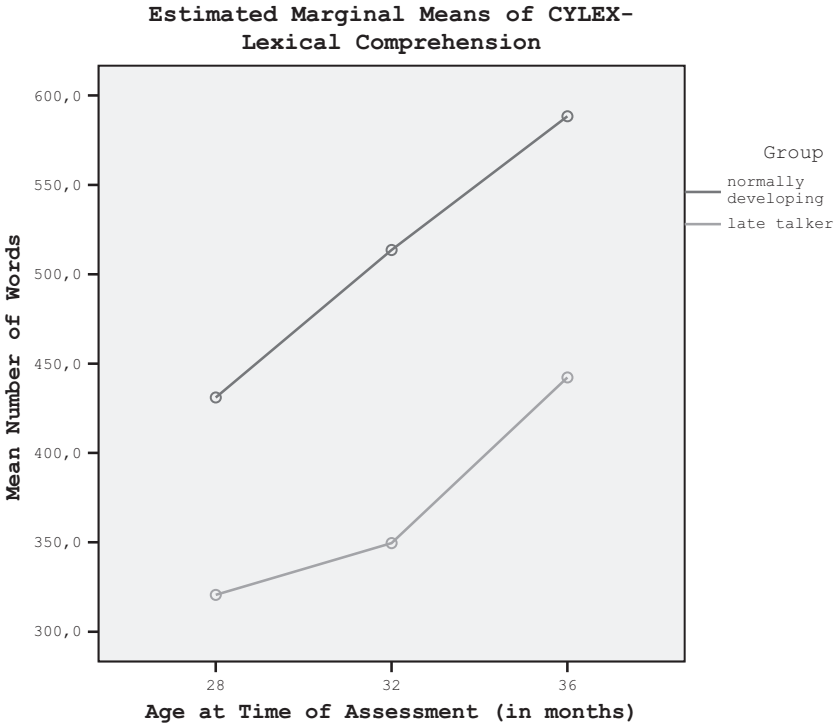

Figure 3. Developmental Profiles of Late Talking and Normal Language Developing Children on CYLEX Lexical Comprehension.

The final measure focused on the phonetic skills of the two groups. At age 28 months LTs produced significantly fewer phonemes at initial, medial and final word position, F(1,34) = 63,80, p < .001, F (1,34) = 89,78, p < .001, F (1,34) = 22,82, p < .001, respectively, as compared to the NLD's. The difference was maintained at age 32 months for word initial, F (1,34) = 39,31, p < .001, and for word medial positions, F (1,34) = 28,03, p < .001, and word final, F (1,34) = 12,29, p < .05. Similar results in favor of the NLD group were obtained for the age 36 months for all positions, F (1,34) = < 45,31-9>, p < .001 (see Figures 6, 7, 8).

Significant age level effects were identified for all measures except for the PLS-3 auditory comprehension measure at age 36 months, which demonstrated that LTs did not differ from their NLD counterparts. Children's mean scores significantly improved across time for all measures, with the exception of the PLS-3 auditory comprehension, and the PLS-3 expression measures, which dropped at age 32 months followed by an upward trend at age

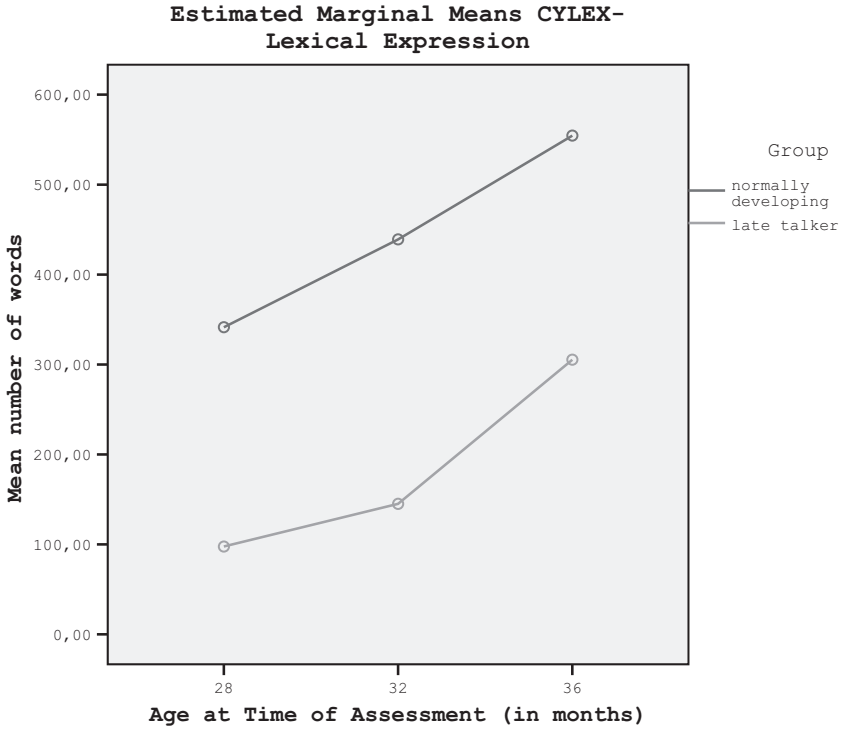

Figure 4. Developmental Profiles of Late Talking and Normal Language Developing Children on CYLEX Lexical Production.

36 months. This odd pattern could possibly be attributed to a number of plausible reasons including the choice of the PLS-3 battery for formal assessment. Since the PLS-3 was an adapted version of a standardized measure, this effect could be the result of a statistical artifact resulting by the increasing difficulty of test items, a fact that might have taxed the children's performance as a function of age.

In summary, we may conclude that linguistic skills of the LT participants did not resolve at age 36 months as suggested in the literature. These children remained delayed across all age levels on a number of major, albeit general, linguistic parameters. Although a trend towards a reduction in the gap between the two groups was observed for some of the measures (i.e., receptive vocabulary, receptive PLS-3 score), sizeable discrepancies between the LT and the NLD children remained throughout time, especially for Lexical Production, MLU-W, and production of phonemes. The results corroborate with data from cross-linguistic investigations suggesting that, at least at

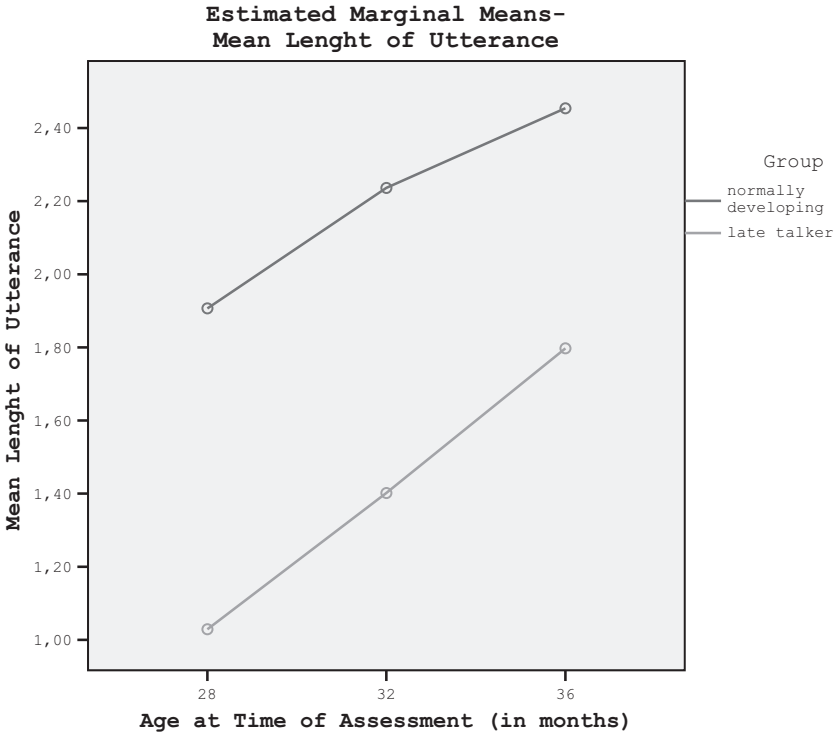

Figure 5. Developmental Profiles of Late Talking and Normal Language Developing Children on Mean Length of Utterance.

the early stages of early language delay, the LTs linguistic profiles resemble a developmental pattern consistent with language delay rather than language disorder.

An inspection of individual language profiles suggested remarkable variability among the LT participants. The parameters observed at intake included the wide range of expressive vocabulary, albeit below cut-off point (range 12-80 words), language comprehension scores below the normal range (below standard score of 85), CYLEX measures, and the number of phonemes produced in word-medial position (2-12). At intake, 7 of the LT participants (53 boys and 2 girls) presented with the smallest phonetic inventories, lowest expressive vocabulary, and lowest comprehension performance on the PLS-3 comprehension and expression components (ranges 72-80). It was noted that despite an increase in expressive vocabulary and in the number of phonemes produced as a function of age, these youngsters continued to lag behind on all language parameters as compared to their "more advanced" LT counterparts.

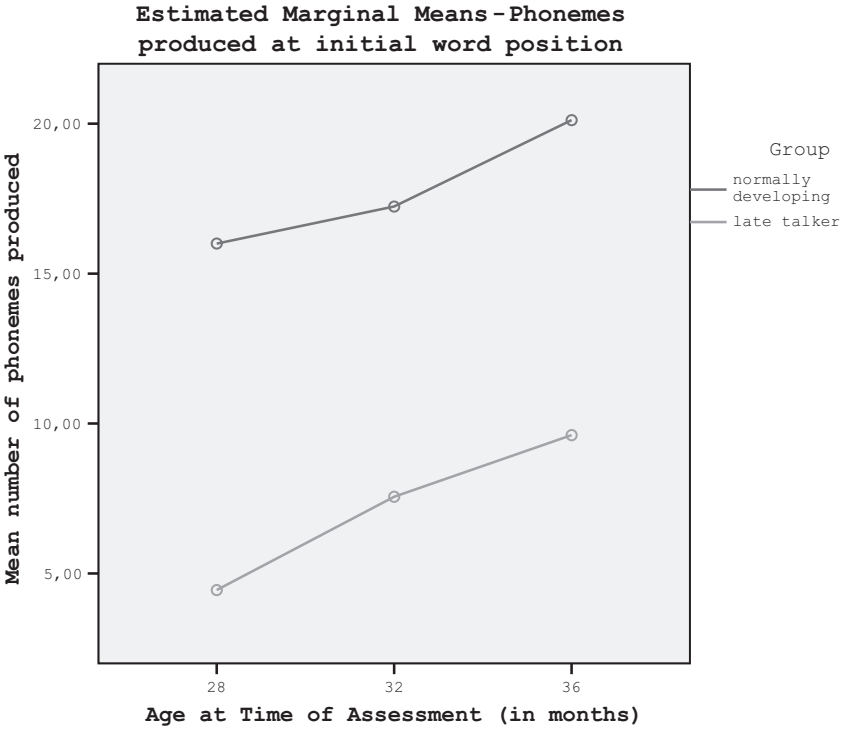

Figure 6. Developmental Profiles of Late Talking and Normal Language Developing Children on Phonemes produced at word initial, medial and final positions respectively.

It has been suggested (Paul 1992; Rescorla et al. 2000) that poor language outcomes in late-talkers might be related to a cluster of factors including the involvement of language comprehension in combination with the richness of phonetic inventories. The patterns observed in the current investigation, although preliminary, corroborate with results from similar studies. Overall, level of language comprehension, size of expressive vocabulary, and size of phonetic inventories as a cluster of factors might contribute to the prognosis of early language delay.

6 Discussion

The primary aim of the study was to examine whether late–talking toddlers and toddlers with typical linguistic development different significantly on a number of language measures at the ages of 28, 32, and 36 months.

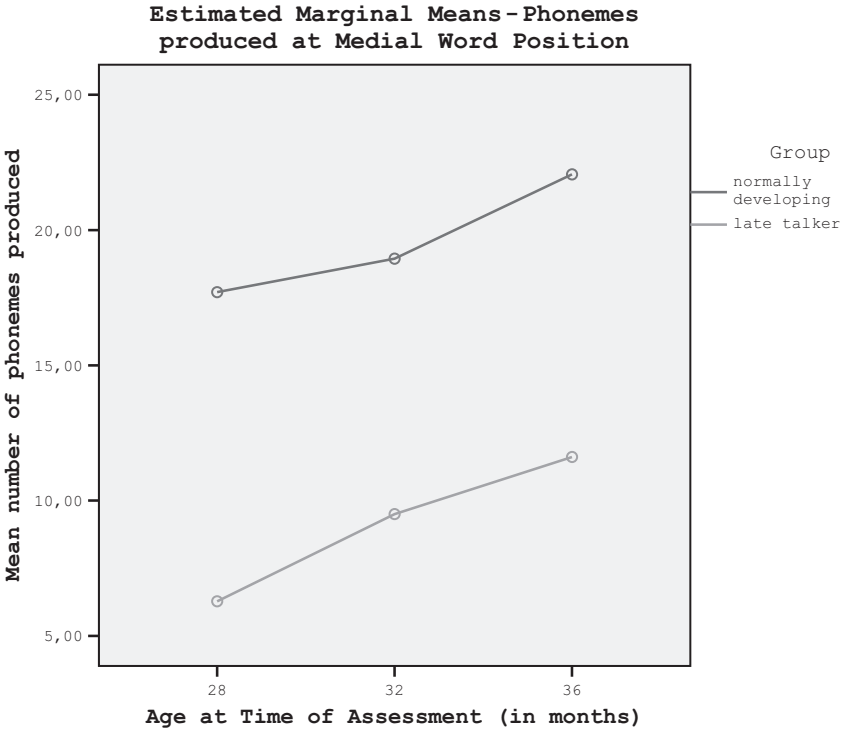

Figure 7. Developmental Profiles of Late Talking and Normal Language Developing Children on Phonemes produced at word initial, medial and final positions respectively.

Overall, the results indicated an across the board superior linguistic performance favoring the NLD group. Specifically, the LT group exhibited a language lag that persisted up to the age of 36 months. Significant differences were maintained across the time span of the study on all linguistic parameters with the exception of language comprehension skills that were isometric between the two groups at age 36 months, despite a difference between the groups at earlier age levels. Generally, the results from the current study corroborate with a considerable body of evidence regarding the linguistic skills and outcomes mainly from English-speaking LT populations. That is, as suggested by the majority of the investigations, for some children early language delay (e.g., at age 2 years) leads into chronic and persistent language deficit evident at ages 3 and 4 years as well as into school-age years.

In the domain of receptive and expressive vocabulary as measured with the adapted version of the PLS-3 language battery, the group main effect was robust across all age levels except for comprehension scores at the age of

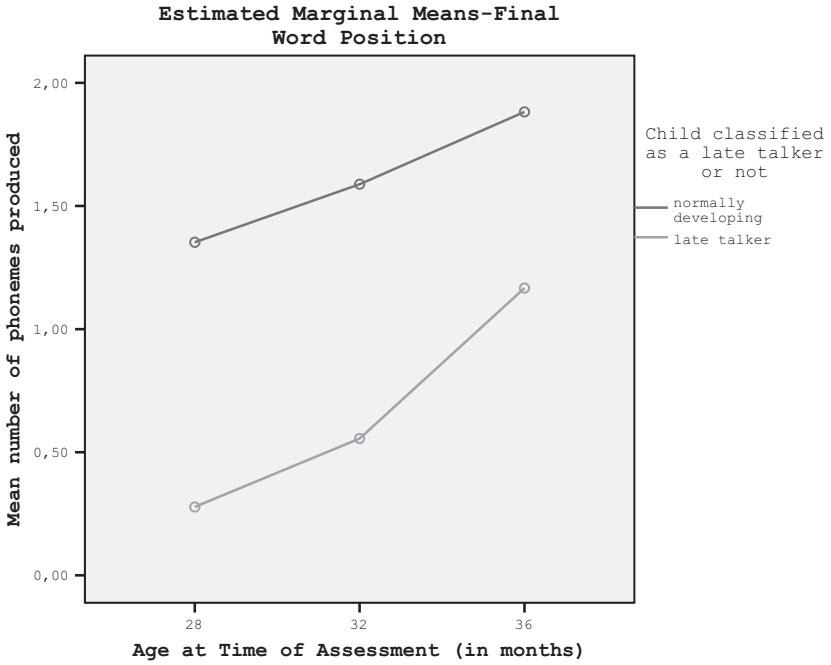

Figure 8. Developmental Profiles of Late Talking and Normal Language Developing Children on Phonemes produced at word initial, medial and final positions respectively.

36 months, at which group difference was not significant. The results suggested that, at least during the beginning of the study, the LT group presented with receptive language deficits. This result contradicts reports from previous investigations which included only children with expressive language deficits. Notably, the majority of toddlers with only expressive language delay appear to move into the normal range of language functionality (more than one SD above the mean on standardized batteries) and form the category of "late bloomers", as opposed to "true late-talkers".

It is well documented that receptive language deficits are closely related to negative predictive outcomes (Bishop, Price, Dale, & Plomin 2003; Dale, Price, Bishop, & Plomin, 2003; Rescorla & Schwartz 1990; Rescorla, Dahlsgaard & Roberts 2000). Consequently, the persistent language delay exhibited by our cohort might be attributed to the group's receptive language challenges. A similar picture was evident for the expressive language component. That the two groups showed a significant difference across all age levels. Interestingly though, a trend for reduction in the discrepancies between the

two groups was observed for both receptive and expressive measures at the age of 36 months, suggesting that LTs started, at least on the basis of PLS-3 measures, to move into normal range of scores, despite significant differences. We attributed this odd pattern to a number of factors.

First, such an observation might be related to the fact that around age 3 to 4 years LT children did begin to "move into appropriate age levels" on standardized tests despite an overall low performance on other linguistic measures such as phonology, syntax, MLU, etc. Second, a more plausible explanation might be related to a statistical artifact resulting by the use of PLS-3. It is possible this odd trend was observed because the study used an adapted as opposed to a standardized language tool for Cypriot-Greek populations. We assumed that the increased complexity of the PLS-3 versions used in the 32- and 36-month administrations, which include many more elaborate sentences and language specific syntactical features (e.g. clitic misplacement) as well as semantically loaded items, as compared to the 28 month version, accounting for this apparent decline. Alternatively, the reduced discrepancy between the mean scores of the two groups (LTs and NLDs), observed at 36 months, might be the result of a ceiling effect, since adapted assessment items were only available up to a certain level. Had children in the NLD group been administered all the items of the PLS-3 (even items beyond the age bracket of age 4 years), a more realistic picture regarding the maximum of their linguistic skills might have had emerged rendering the differences between the groups more robust.

In terms of receptive and expressive vocabulary measured with the CYLEX, the children in the LT group continued to lag behind across all age levels. Again, the current results were in contrast with data from comparable studies reporting the improvement of receptive and in some cases expressive vocabulary (for detailed review see Rescorla 2004). It should be noted that the CYLEX list included a large body of lexical items (around 600 words), including function words and free-standing morphemes (articles, personal pronouns, clitics), which exceeded the size used on English vocabulary lists (e.g. Rescorla's LDS; Fenson et al.'s CDI). Judging by the number of words with which these children had to 'catch up' within a time frame of 8 months, such temporal framework might have not been adequate for a positive language outcome, given the group's slow language endowment.

Similar patterns were observed for MLU data suggesting that grammar and syntactical growth might be compromised for a small proportion of 3 and 4 year-old LTs (Paul 1996; Rescorla et al. 2000). In our data the LT group exhibited restricted MLU-W as compared to the NLD group. Despite the fact that MLU-W focuses the syntagmatic linear ordering of words within the utterance as opposed to the paradigmatic morphosyntactic patterning of

words (i.e., grammatical agreement of functional categories) which poses particular difficulty for LTs, such a measure was considered sufficient to grasp the initial syntactic challenges of these children (i.e., the robust omission of free standing morphemes including articles, prepositions etc).

In the domain of phonology, the results of this study revealed restricted phonetic inventories in LTs — observations that were in agreement with data reported by Paul and Jennings (1992) and Rescorla and Ratner (1996), whose English-speaking LT subjects used correctly fewer consonants and presented with poorer phonetic profiles than their NLD counterparts at ages 3 and 4 years. In the current investigation though, it was noted that the number of phonemes established as a function of time differed in terms of the word position. From the LT data, it is clear that more phonemes were established first in word-medial position followed by word-initial position. Similar data have been reported by Petinou and Okalidou (2006) for CYG LTs. It has been argued that in the course of phonological development children might follow the "laws" of phonological universals (Jakobson 1958), but when it comes the correctness and establishment of phonological patterns, salient language-specific characteristics (i.e., stress, consonant germination) become the harness points in assisting the young learner (Vihman 1992).

Regarding the developmental pattern between the two groups the data suggested parallel developmental profiles as depicted on the respective figures. The discrepancies between the groups were maintained throughout the eight-month span of the study across most measures, yet patterns of linguistic gains were similar despite a slower progress exhibited by the LT group. However, the LTs did not appear to catch up by the age of 36 months. In each 4-month period that elapsed between data collection, the children's receptive and expressive vocabularies exhibited rapid growth, suggesting that this age may constitute a critical marker for language development. It is possible that the critical times at which children present rapid gains in language skills may vary for different groups of children. For instance, the LT group, but not the NLD group, appeared to be making rapid growth between 32 and 36 months on the expressive vocabulary measured on the CYLEX (see figure 4). This is slightly different from findings reported by Rescorla et al. (2000), where several late-talking toddlers showed a rapid vocabulary growth between the ages of 24 and 32 months. Methodological differences in language sampling and analyses might be partly responsible for the differences between our sample and investigations on English speaking toddlers.

In addition, the language testing tool used for the purposes of the current investigation (e.g., CYLEX) appears to be semantically and grammatically "more loaded" as compared to the Language Development Survey (LSD; Rescorla

1989) and CDI (Fenson et al. 1991). The CYLEX includes more function words (including grammatical morphemes), and content words as compared to the English language sampling tools. This difference might have been more demanding on the CYG LTs resulting in lower/poorest scores as compared to comparable English data. It is possible that the difficulties experienced by the late-talkers in our sample, are compensated in later years, for which assessments were not available from this study. Therefore, by the time the children in our sample reached their school years, their difficulties may have already been overcome. In contrast to their gains in vocabulary, LT children do not seem to be making as rapid progress as the NLD children in the production of phonemes at the initial and medial word positions between 32 and 36 months. As suggested by Stoel-Gammon (1989), phonemes are considered the building blocks of speech and language. It seems that, for this population, phonetic and phonological development might be even more difficult as compared to other linguistic parameters, and that difficulty affects their rate overall language improvement. It is possible that a critical period for the acquisition of this skill occurs later, but longitudinal follow-ups of children after three years of age are necessary in order to examine this hypothesis.

Finally, another aim of the study was accomplished, as suggested by a more qualitative inspection of the results. For the LT population a number of language challenges observed could be related to language specific characteristics. In other words, the structure of CYG might render the establishment of some linguistic parameters (i.e., phonological skills; inflectional morphology) more or less challenging as compared to English and vice-versa. LTs appeared to have reduced the gap for the final word phonemes around the age of 36 months. This is in contrast to English data from LT children who have been reported to omit final consonants (Paul & Jennings 1992). This maybe attributed to the fact that the CYG dialect, similarly to Standard Greek, has an open syllable structure of alternating consonants and vowels (CVCVC), and the final segment of a given syllable template is in the majority of cases either a vowel, or an /s/, or an /n/. Therefore, progress in the consonants at word-final position was more likely to be achieved by LT group compared to the phonemes in the initial and medial word positions, since it only required the mastery of one or two phonemes. In phonological development, CYG speaking toddlers mastered the final consonant as early as at the age of 28 months (Petinou & Okalidou 2006). By contrast, CYG-speaking LTs have been reported to omit more often word initial rather than word final consonants due to the reduced saliency of the former as compared to the latter segment related to the prosodic characteristics of the words in CYG. For syntactic and morphological data, robust clitic misplacement has been observed in the

language samples of LTs, suggesting again that the structure of the language (i.e., post verbal clitics as seen in CYG) might determine the linguistic phenotype one might observe in a particular language/dialect.

7 Limitations and future directions

This is one of the first developmental studies in Cyprus investigating linguistic parameters of CYG toddlers. However, a number of factors dictate that our results should be interpreted with caution. First, the small number of children in our sample does not allow the extraction of any generalizations. Second, our NLD group included some children who, despite meeting the criteria for inclusion in that group, scored in the low end of the normal range in most linguistic measures. This may have led to the underestimation of the actual magnitude of the differences between the groups. Furthermore, studies following children across larger time periods are necessary in order to accurately describe the trends and the times at which critical markers in language development appear. Understanding the contributions of early language difficulties to later speech, language, and reading problems that may relate to school-related problems is crucial in order to facilitate prevention and application of effective early interventions for these children.

Future research should focus on discerning the true linguistic deficits in children with early speech delay and persisting linguistic deficits at later years. Therefore, assessment methods that focus on more subtle and in-depth linguistic assessments, which are more closely linked to later outcomes, should be employed. Our future goal includes testing syntax, grammar, phonological awareness, and factors related to phonology, as these parameters are the basis for reading. Thus, the interaction between linguistic and academic skills and the negative impact of early language delay can be identified.

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