

Behavioral problems of Mandarin-speaking late-talking toddlers and preschool aged children

A prospective case–control study in Taiwan

Hsin-Hui Lu, PhD^a, Feng-Ming Tsao, PhD^{b,*}, Jeng-Dau Tsai, PhD^{c,d}

Abstract

This study aimed to examine whether Mandarin-speaking late-talking (LT) toddlers have a higher incidence of behavioral problems than typical language developing (TLD) children in toddlerhood and at preschool age from a community sample in Taiwan.

This prospective case–control study comprised 32 LT and 32 TLD toddlers. Participants' parents provided reports about their children at 2 and 4 years using the Child Behaviors Checklist, a component of the Achenbach System of Empirically Based Assessment.

The results indicated that compared to the TLD group, a higher percentage of the LT group was at risk of behavioral problems at both two and four years. Similarly, the chance of internalizing problems was higher in the LT group than the TLD group at both ages.

The findings indicated that LT toddlers are at risk for behavioral problems not only in toddlerhood, but also at preschool age. Thus, it is crucial to identify LT toddlers with behavioral problems and enroll them in early developmental evaluation programs in their communities and also include them in early intervention programs if necessary. In addition, the underlying mechanism of the association between language delay and behavioral problems in children needs to be longitudinally explored from a young age.

Abbreviations: LT = late-talking, TLD = typical language developing, MCDI-T = MacArthur-Bates Communicative Developmental Inventories Toddler Form, BSID-III = Bayley Scales of Infant and Toddler Development-III, CLDS-R = Child Language Disorder Scale-Revised, ASEBA (CBCL-MC) = Mandarin-Chinese version of the Child Behavior Checklist for Ages 1.5 to 5 years, a component of the Achenbach System of Empirically Based Assessment, WPPSI-IV = Wechsler Preschool and Primary Scale of Intelligence, Fourth Edition, Mandarin-Chinese version.

Keywords: early identification, behavioral problems, late-talking, longitudinal study

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1. Introduction

A late-talking (LT) toddler is characterized as exhibiting language delay despite having normal cognitive ability, no physical disabilities, no neurological disorders, or no neurodevelopmental disorders.^[1] LT toddlers is observed in approximately 10% to 15% of the toddler population,^[2,3] can be identified when a toddler is roughly two years old and LT toddlers may be reliably diagnosed as children with developmental language disorder at roughly four years old. Children with developmental language disorder often have difficulties in their social-emotional development and exhibit more behavioral problems than their typical language developing (TLD) counterparts.^[4]

LT toddlers have a considerably higher incidence of depressed and anxious expression or aggressive behavior in toddlerhood^[2,3,5,6] and the association between delayed language and behavioral problems is evidenced even at a very young age.^[7,8] Problematic behaviors at preschool age are predictors for socioemotional problems in later developmental stages.^[9] Whitehouse et al^[10] found that LT toddlers' behavioral problems improve and were not more prevalent than those of TLD toddlers at preschool age. More recent studies, however, did not confirm those results.^[11,12] This discrepancy made it unclear whether LT children are at a higher risk for behavioral problems than TLD toddlers when they reach preschool age. In addition, this discrepancy may be because these studies were population-based surveys and did not exclude some confounders such as cognitive developmental delay, using a norm-reference test, and other neurodevelopmental disorders.

We hypothesized that LT children have a higher incidence of behavioral problems than TLD toddlers, not only in toddlerhood, but also at preschool age, and the aim of this study was to test this hypothesis. We intended for the findings of this study to assist clinical practitioners, such as pediatricians, to identify LT toddlers with behavioral problems in the community early on. Furthermore, toddlers with language delay associated with other developmental delays, neurological disorders, and neurodevelopmental disorders were also excluded in this study. Thus, we designed a case-control study from a community sample. In addition, data of participants' behavioral problems were based on parental reports. The literature has found that parental reports of toddlers' or preschoolers' behavioral problems constitute crucial information, especially when obtained from mothers.^[13]

2. Methods

2.1. Participants

This prospective case-control cohort study, that included 24- to 33-month-old toddlers sourced from parenting websites or local pediatric clinics in Taiwan, was designed as a case-control study. To be enrolled in the study, all the toddlers had to have been born at full term (gestational age >36 weeks) with birth weights over 2500 g. Furthermore, there had to have been no complications during birth and pregnancy, no other critical incidents, no chronic diseases, and no sensory-motor deficits. None of the toddlers were screened as having autistic spectrum disorder by The Modified Checklist for Autism in Toddlers (M-CHAT)^[14] by child psychiatrists. All toddlers were also excluded from a diagnosis of cognitive delay assessed using the Bayley Scales of Infant and Toddler Development, Third Edition (BSID-III).^[15]

For consistency, adopting the inclusion criteria of the LT toddlers from other studies,^[5,10,16,17] toddlers were categorized into the LT group if their word production performance was at or below the 15th percentile on the Mandarin-Chinese version of the MacArthur-Bates Communicative Developmental Inventories Toddler Form (MCDI-T).^[17] The word production performance of toddlers categorized into the TLD group was at or above the 25th percentile on the MCDI-T. Initially, there were 35 LT and 35 TLD toddlers enrolled in this study, with 3 LT and 3 TLD toddlers did not receive subsequently follow-up and withdrawn from the protocol (Fig. 1). Ultimately, 32 LT toddlers (22 boys and 10 girls) and 32 TLD toddlers (23 boys and 9 girls) were included in the study. Among 32 LT children, 12 LT children (37.50%) were diagnosed as language disorder at age 4 years. All of them did not receive intervention for behavior problems and early childhood special educational services in school from age 2 years to age 4 years. We performed this study from February 2012 through May 2017 and analyzed from October 2018 to April 2020.

2.2. Measures

2.2.1. Language measures. At age 2, participants' vocabulary production was assessed using the MCDI-T, a commonly used parent-reported measure of children's expressive vocabulary, to identify LT toddlers.^[18-20] In addition, participants' receptive and expressive language abilities were assessed using both the receptive and expressive language subscales from the BSID-III.^[15] At age 4 years, the Child Language Disorder Scale-Revised (CLDS-R in Mandarin-Chinese)^[21] was administered, including the 2 core subtests of auditory comprehension and expressive communication.

2.2.2. Assessment of cognitive ability. The cognitive subscale of the BSID-III was used to assess the participants' cognitive ability at age 2 years.^[20] At age 4 years, the participants' cognitive abilities were measured using the Nonverbal Index of the Wechsler Preschool and Primary Scale of Intelligence, Fourth Edition, Mandarin-Chinese version (WPPSI-IV).^[22]

2.2.3. Assessment of behavioral problems. At ages 2 and 4 years, behavioral problems were assessed using the Mandarin-Chinese version of the Child Behavior Checklist for Ages 1.5 to 5 years, a component of the Achenbach System of Empirically Based Assessment (CBCL-MC).^[23] The CBCL is a parent-reported checklist consisting of 99 items related to children's behavioral problems. Parents rated each item as 0 = not true, 1 = somewhat or sometimes true, or 2 = very true or often true. Scores were calculated on eight symptom subdomains. Scores on the Emotionally Reactive, Anxious/Depressed, Somatic Complaints, and Withdrawn subscales were then calculated to produce the score for the Internalizing Problems scale. Similarly, scores on the Attention and Aggression subscales were calculated to produce the score for the Externalizing Problems scale. Finally, the Sleep Problems and Other Problems subscales were combined with the Internalizing Problems and Externalizing Problems scales to obtain the score for Total Problems. According to the CBCL's definition, a score below the 93rd percentile on the subscales is considered normal, whereas scores at or above the 93rd percentile (T-score ≥ 65) are borderline clinical range and clinical range. On individual subscales, 7% of children were categorized as borderline clinical range and clinical range based on a normal distribution. For the main scales, a score <85th percentile is considered normal, whereas scores at or above the 85th percentile (T-score ≥ 60) are borderline clinical range and clinical range. On individual main scales, 15% of children were categorized as borderline clinical range and clinical range based on a normal distribution. For each of the main scales and subscales, participants identified as having behavior problems were those categorized in the borderline clinical range and clinical range, whereas participants identified as having no behavior problems were those categorized in the normal range. It could be that parents vary in their interpretations of behavior depending on their experience as parents; thus, the same parents completed the inventories in both Waves 1 and 2; all were mothers except for one father in each group.

2.3. Procedure

All instruments were administered to the participants in a quiet, private room in a research university. At stage one, before testing, the researcher informed the participants' parents of the research procedures, following which the parents provided their informed consent. All participants were then assessed at age 2 years by the BSID-III^[20]. At stage 2, all participants were assessed at age 4 by the WPPSI-IV and the CLDS-R. The CBCL was applied to assess all the LT and TLD toddlers at ages 2 and 4 years. The BSID-III, the WPPSI-IV, and the CLDS-R tests were administered in Mandarin-Chinese and by a licensed clinical psychologist specializing in children.

2.4. Data analysis

We examined whether, at ages 2 and 4, LT children exhibited a considerably higher incidence of behavioral problems than TLD

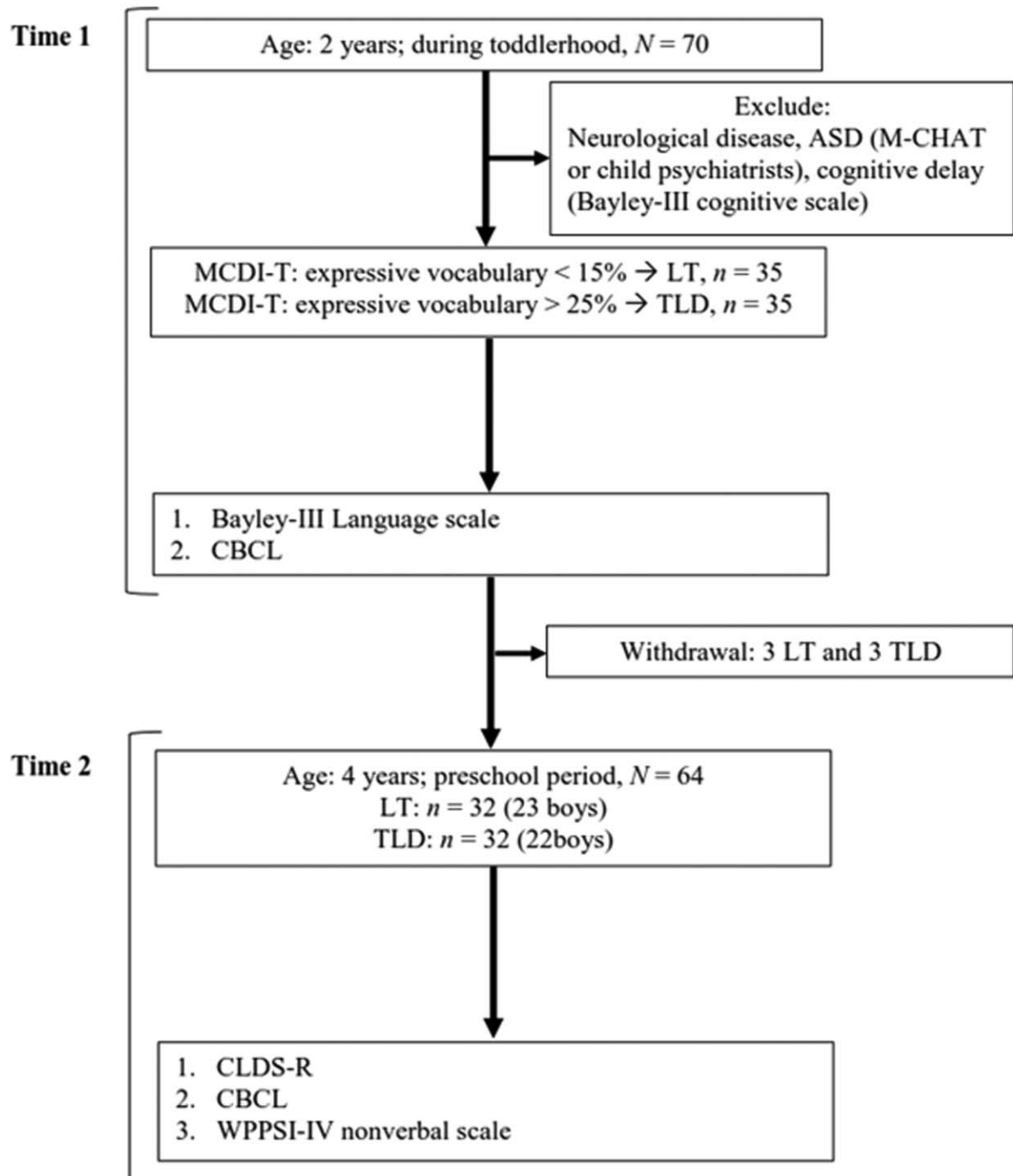


Figure 1. Flowchart of study design, $N = 64$. Notes: ASD = autistic spectrum disorders, CLDS-R = Child Language Disorder Scale-Revised, MCDI-T = Mandarin-Chinese version of the MacArthur-Bates Communicative Developmental Inventories Toddler, M-CHAT = Modified Checklist for Autism in Toddlers.

children. Binomial tests^[24] were separately conducted on the scales or subscales to examine whether the proportion was higher than the CBCL's default incidence rates of behavioral problems in the population (ie, 15% on the main scales and 7% on the subscales). It can be inferred that the participants in the sample were more likely to exhibit problematic behaviors than would be expected based on a normal distribution. The binomial test is a nonparametric statistic and is suitable for small ($10 < N < 30$)^[25] sample sizes. Thereafter, we examined whether more of the scales

and subscales, which percentages were higher than the CBCL's default incidence rates, were in the LT group than in the TLD group. These were examined using Fisher exact tests.

To address concerns regarding the comparison of multiple subscales, we calculated effect sizes in this study.^[26] Effect sizes, such as Cohen d , allow scholars to report on the magnitude of their effects and primers. Cohen^[27] provided a basic framework for interpreting those effects in terms of being comparatively small (Cohen' $d = 0.2-0.49$), moderate (Cohen $d = 0.5-0.79$), or

Table 1
Sociodemographic characteristics of participants at age two ($N=64$).

Variables	TLD, $n=32$	LT, $n=32$	P
Sex			1.000
Boy	23 (71.88)	22 (68.75)	
Girl	9 (28.13)	10 (31.25)	
The history of otitis media	5 (15.63)	2 (6.25)	.426
Birth order			.936
Only child	17 (53.12)	18 (56.25)	
First	4 (12.50)	4 (12.50)	
Second	11 (34.38)	9 (28.13)	
Third	0 (0.00)	1 (3.12)	
Attending daycare	2 (56.25)	6 (18.75)	.257
Caregiver, day/night		.737	
Parent/parent	19 (59.38)	16 (50.00)	
Grandparent/parent	7 (21.87)	8 (25.25)	
Nanny/parent	6 (18.75)	8 (25.25)	
Mother educational level			.196
Senior high school	1 (3.13)	5 (15.63)	
University and above	31 (96.87)	27 (84.37)	
Father educational level			.337
Junior high school	0	1 (3.13)	
Senior high school	4 (12.50)	7 (21.88)	
University and above	28 (87.50)	24 (74.99)	
Annual family income (NTD [*])		.481	
<650,000	4 (12.50)	7 (21.88)	
650,000–1,000,000	7 (21.88)	9 (28.13)	
>1,000,000	21 (65.62)	16 (50.00)	

LT = late-talking, TLD = typical language developing. Data are presented as n (%).
* NTD: Taiwan dollar.

large (Cohen $d \geq 0.80$). Binomial tests were conducted using R and all other analyses were carried out using IBM SPSS 22.0. For all binomial tests, Cohen d effect size was calculated using an online calculator.^[28] The online calculator has been cited in multiple published studies.^[26]

3. Results

3.1. Sample description

The mean participant age of TLD and LT groups in 2 data collections were as follows: 27.69 ($SD=2.57$) and 27.65 ($SD=2.63$) months at stage 1 and 51.08 ($SD=2.60$) and 51.42 ($SD=2.50$) months at stage 2, respectively. Table 1 presents the demographic characteristics of participants at age two. There is not statistic significant differences between the TLD and LT groups ($P>.05$), but the following was observed: 15.63% of TLD toddlers had a history of otitis media, whereas 6.25% of LT toddlers did; most TLD or LT toddlers were only a child in family; few TLD or LT toddlers had attended day-care; >50% of TLD and LT toddlers had their parents as their primary caregivers in the daytime and evening; for educational level, >70% of parents of TLD and LT toddlers were university and above; and >50% of TLD and LT toddlers were living in middle and high income families.

Table 2 presents the cognitive and language scores of participants at ages 2 and 4 years. No significant differences were noted in the cognitive ability at ages 2 and 4 of the LT and TLD groups ($P>.05$). However, the LT group exhibited lower receptive and expressive language skills than the TLD group at ages two ($P<.001$) and four ($P<.001$).

Table 2
Cognitive and language scores in the TLD and LT groups.

Scores	TLD, $n=32$	LT, $n=32$	P
Age 2			
Cognition [*]	11.00 (9.00 to 16.00)	10.00 (8.00 to 19.00)	.058
Receptive [†]	11.78 (9.00 to 15.00)	9.75 (7.00 to 15.00)	<.001
Expressive [‡]	9.75 (8.00 to 13.00)	5.94 (4.00 to 8.00)	<.001
Age 4			
Cognition [§]	98.00 (85.00 to 123.00)	98.00 (85.00 to 114.00)	.129
Receptive [§]	0.44 (−0.32 to 1.35)	−0.78 (−2.45 to 1.04)	<.001
Expressive [§]	−0.36 (−0.88 to 0.69)	−1.54 (−3.37 to −0.36)	<.001

LT = late-talking, TLD = typical language developing. Data are presented as median (range).

* BSID-III Cognitive Scale Score (10 ± 3).

† BSID-III Language Scale (10 ± 3).

‡ WPPSI-IV (Mandarin-Chinese version): Index of Nonverbal Cognition (100 ± 15).

§ CLDS-R (z scores).

3.2. Behavioral problems

Figure 2 displays the proportion of participants identified as having behavioral problems on each main scale and subscale of the CBCL at ages 2 and 4 years. The percentage of LT participants identified as having behavioral problems on the Total Problems ($n=11$, 34.38%) and Internalizing Problems ($n=9$, 28.13%) scales was significantly higher than 15% ($ps=0.005$, 0.041; $ds=0.48$, 0.35, respectively). Regarding the 7 subscales, the percentage of LT participants identified as having behavioral problems was >7% on the Emotionally Reactive subscale ($n=6$, 18.75%; $P=.022$, $d=0.49$). However, in the TLD group, the percentage of TLD participants identified to be having behavioral problems on the main scales or subscales was not higher than the baseline (all $P>.390$). In addition, the number of scales with a percentage larger than the CBCL's default value was not higher in the LT group (3 main scales/subscales) as compared to the TLD group (zero main scales/subscales) ($P=.105$).

For participants aged 4 years (Figure 3), the percentage of LT participants identified as having behavioral problems on the Total Problems ($n=13$, 40.63%) and Internalizing Problems ($n=14$, 43.75%) scales was >15% ($P<.001$ $d=0.61$; $P<.001$ $d=0.68$, respectively). Moreover, higher proportions of LT participants were identified as having behavioral problems on the Emotionally Reactive ($n=8$, 25.00%; $P=.001$), Anxious/Depressed ($n=6$, 18.75%; $P=.020$, $d=0.49$), Somatic Complaints ($n=6$, 18.75%; $P=.020$, $d=0.69$), and Withdrawn ($n=8$, 25.00%; $P=.001$) subscales than the proposed 7%. TLD participants identified as having higher behavioral problems on the Internalizing Problems scale ($n=10$, 31.25%; $P=.016$) than the baseline. Furthermore, the number of scales with percentages more than the CBCL's default value were higher in the LT group (6 main scales/subscales) than in the TLD group (only 1 main scale) ($P=.029$, $d=0.91$).

4. Discussion and Conclusions

This is a small-scale study; however, this is a rigorous case-control design and the effect sizes were moderate to large. Current results revealed that LT toddlers displayed a considerably higher incidence of parent-reported behavioral problems than TLD toddlers during preschool age. This finding was the same as the findings in a previous study of preschoolers with developmental language disorder with CBCL parental reports.^[29]

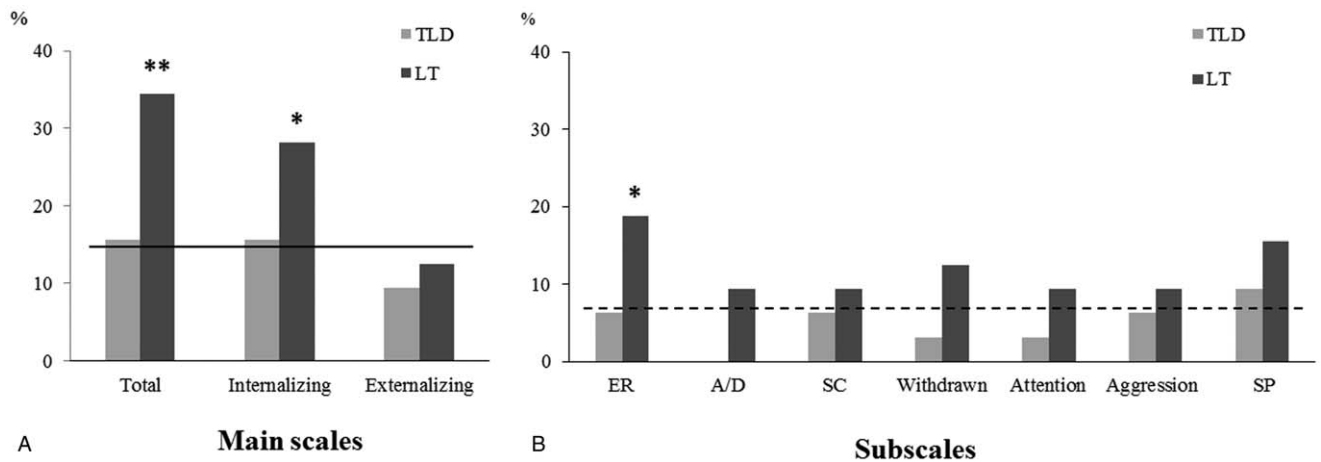


Figure 2. Histogram of the prevalence of behavioral problems for TLD ($n=32$) and LT ($n=32$) participants on the CBCL's individual main scales (A) and subscales (B) at age 2 years. Solid line, the CBCL's default value on the main scales (15%); dashed line, the CBCL's default value on the subscales (7%). A/D = anxious or depressed, ER = emotionally reactive, LT = late-talking, SC = somatic complaints, SP = sleep problems, TLD = typical language developing. Over CBCL's default value: * $P < .05$; ** $P < .01$; *** $P < .001$.

We also found that LT toddlers were more likely to be identified as having internalizing problems than TLD toddlers at preschool age. In addition, LT toddlers were more likely to be identified as having behavioral problems than TLD toddlers in toddlerhood. The significance of our finding is the same as other population-based survey research that also found that parents are more likely to rate LT toddlers as having behavioral problems in toddlerhood.^[5-7]

Specifically, the likelihood of parent-reported internalizing problems, especially for emotional reactivity, was higher for toddlers in the LT group than in the TLD group. These results are consistent with other studies demonstrating that a higher rate of LT toddlers have marked internalizing problems.^[3,6] In contrast to toddlers, preschool LT children had more scales and subscales with percentages higher than the CBCL default incidence rates as compared to their TLD counterparts. This implied that parent-

reported behavioral problems may be serious over time among LT toddlers.

In this study, the sex ratio was uneven. It was approximately 2:1 (male:female), which was similar to that of a previous report^[12]; hence, it might only represent the natural sexual distribution of late-talkers, rather than a selection bias. Furthermore, we designed the TLD group to match the LT group which itself is reflective of the greater likelihood of boys being late-talkers than girls. Given the evidence of greater likelihood of externalizing problems in boys than girls, only approximately 10% of the LT toddlers were identified as having externalizing problems in toddlerhood and at preschool age in this study; this differed from previous studies.^[7,30] Several reasons may account for this discrepancy.

First, the levels of language abilities participants demonstrate may differ across studies. In Conway et al,^[7] the cutoff point for

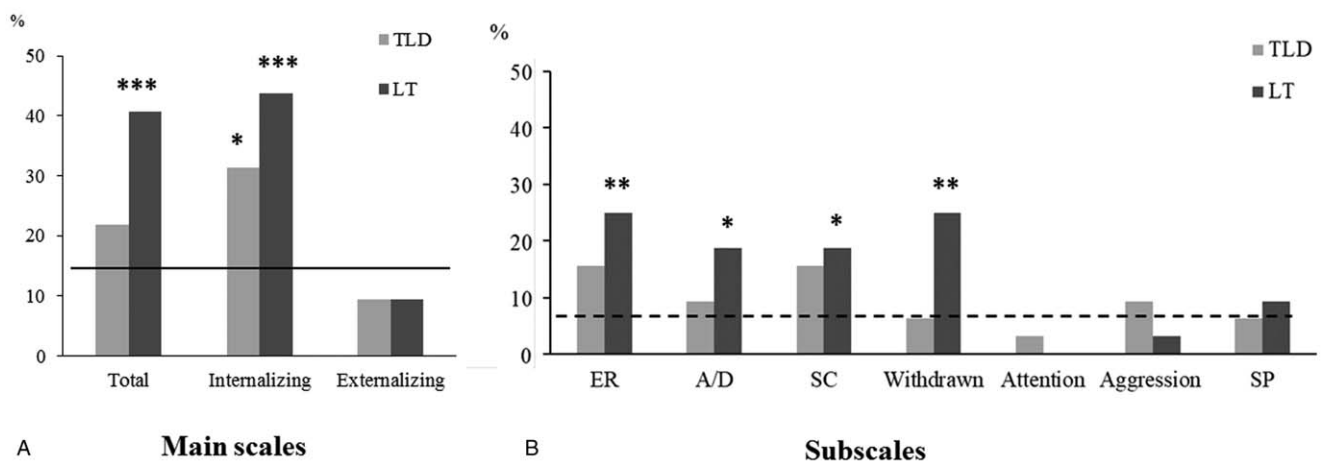


Figure 3. Histogram of the prevalence of behavioral problems for TLD ($n=32$) and LT ($n=32$) participants on CBCL's individual main scales (A) and subscales (B) at age 4 years. Solid line indicates the CBCL's default value on the main scales (15%); dashed line indicates the CBCL's default value on the subscales (7%). A/D = anxious or depressed, ER = emotionally reactive, LT = late-talking, SC = somatic complaints, SP = sleep problems, TLD = typical language developing. Over CBCL's default value: * $P < .05$; ** $P < .01$; *** $P < .001$.

screening language performance as LT toddlers was at or below the 20th percentile, whereas we used the 15th percentile as the cutoff based on population norms. Furthermore, 62.50% LT toddlers in this study achieved normal-range language skills in the preschool period, whereas Yew and O’Kearney^[30] only included children with a diagnosed developmental language disorder. Differential associations between the severity of language difficulties and specific behavioral problems may need further exploration. Second, the developmental stage at which behavioral problems of LT participants were assessed was also relevant. Present study focused on the early developmental stage from toddlerhood to preschool age. Yew and O’Kearney^[30] examined a later period extending from the preschool years to childhood and adolescence. It is therefore vital to explore whether higher rates of externalizing problems in the LT group, compared with the TLD group, occur later at an older developmental stage.

The low incidence of otitis media was in the LT group (15.63%). The sample size is so small that the difference (5 vs 2 children) may not be terribly meaningful; however, it could be that in this group, infection is less likely to be correctly diagnosed. These are children who are less able to explain what they are experiencing and therefore less able to tell someone they are in pain. Problematic behavioral response to the discomfort is also perhaps more likely in this group. In addition, at both ages, but particularly at age two, Figures 2 and 3 suggest sleep problems exceed the threshold of the default values. Lack of sleep also makes any human dysregulated and dysregulation can cause what others will label as behavior problems. As a clinicians of community need to be much more cautious about pathologizing behaviors of toddlers having a communication delay.

A major limitation of the present study is the sole measurement with CBCL used as the criterion for categorizing behavioral problems. Although CBCL is an effective and inexpensive instrument for screening children’s behavioral problems and being used in much research, these results apply only to general behavioral problems such as depression/anxiety, body complaints, or sleep problems. Based on these fundamental findings, future research could also apply the International Classification of Functioning, Disability and Health for Children and Youth model as a framework. Specifically, children’s other health indexes, such as activity, participation, quality of life, and psychosocial health, could be measured as outcome variables. In addition, were the children who had clinically significant behavior problems at age 2 also those children with behavior problems at age 4 within the LT group. The developmental continuous issue of LT toddlers’ early behavioral problems need to further study in the future. Despite the limitations of this study and the need for future research, this study also provided the groundwork on the association between LT toddlers and the risk of behavioral problems.

5. Conclusions

This 2-year prospective community study with a high retention rate examined LT toddlers and found that they are at risk for behavioral problems, which may extend to preschool age. Young children’s early behavioral problems can cause suffering for both themselves and their families, weaken the developing foundation of their mental health, and have the potential for long-term adverse consequences. Therefore, LT toddlers with behavioral problems have to be identified in early developmental evaluations and referred to early intervention programs if necessary.

Furthermore, clinical practitioners should assess the behavioral problems of LT toddlers and pay attention to the developmental patterns of those behavioral problems beyond toddlerhood. In the community, the behavioral problems of LT toddlers need to be monitored.

Being slow to talk is often as frustrating for the child as it is for the parent who struggles to understand what children mean. We do children no service at all by targeting behavior if the real issue is communication, so the importance of support for speech and language (parent or therapist led) in response to the challenges that are exhibited as behavior that is seen as a problem by the adults around the child. This provides the foundation for more specific studies on this topic including the underlying mechanism of the association between language delay and behavioral problems in children from a young age and over time.

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