

Outcomes at late childhood of Chinese-speaking preschoolers with developmental language disorders comorbid with behavioral-emotional

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Abstract

As part of an ongoing clinical service program for children with developmental delay in morphosyllabic Chinese-speaking Taiwan, we investigated the late childhood cognitive, functional and psychiatric outcomes of a specific cohort of preschool children with developmental language delay comorbid with behavioral-emotional problems. The institutional database of a developmental clinic was reviewed and preschoolers meeting the inclusion criteria were invited to be subjects. Follow-up evaluations included Wechsler Intelligence tests, parents' version of the Child Behavioral Checklist and psychiatric interview of the adolescents themselves. Of the eligible subjects (initial preschool visit at average of 3.8 ± 1.3 years old), 44 individuals completed follow-up evaluations at average of 11.8 ± 1.5 years old. The follow-up results showed that 75% of the late childhood children still had problems in language and 38.6% had problems in academic performance. The mean nonverbal cognitive score at follow-up was 83.9 ± 15.4 while the mean verbal cognitive measure was 83 ± 17.3 . Total 75% of the subjects had current psychiatric disorders and the most frequent diagnosis was attention deficit

/hyperactivity disorder, which was noted to be increased from 50% in the preschool period to 70.5% in late childhood.

We concluded that the majority of Chinese-speaking preschoolers with language delay and behavioral-emotional problems turned out to have communication and psychiatric conditions when they reached late childhood. Western researches on developmental course of preschool children with alphabetic language impairment could be extended to morphosyllabic Chinese. Specialized services are warranted for this group of preschool children to lessen prolonged vulnerabilities. Our findings may be helpful in the context of an Asian developing country, so that priorities can be established for the allocation of finite resources for intervention.

Keywords : developmental language disorder, attention-deficit hyperactivity disorder, preschool

Introduction

Developmental language disorder (DLD) is a common disorder estimated to occur in as many as 3-7% of otherwise normal children (Tomblin et al., 1997). This term is applied to children who

have (1) a significant deficit in language ability, (2) an absence of other cognitive impairments (3) no hearing difficulty, (4) no neurological abnormalities or related medications for seizures, cerebral palsy or brain trauma, and (5) no impairment of phonological structures or psychosocial relationship disorder. DLD may occur in conjunction with other developmental disorders, especially mental retardation, autism spectrum disorders (Hall, 1997), and childhood psychiatric diagnoses such as attention-deficit/hyperactivity disorder (ADHD), conduct disorder, oppositional defiant disorder (ODD), anxiety disorder, and depression (Sundheim & Voeller, 2004).

DLD usually has a favorable outcome, with spontaneous improvement occurring without treatment (Bishop & Edmundson, 1987), but it has also been reported in recent Western longitudinal studies that academic and social difficulties associated with DLD can sometimes persist into adolescence or adulthood (Clegg, Hollis, Mawhood, & Rutter, 2005; Johnson, Beitchman, & Brownlie, 2010; Snowling, Bishop, Stothard, Chipchase, & Kaplan, 2006; Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998; Whitehouse, Watt, Line, & Bishop, 2009). However, little has been reported on the longitudinal course of preschool children with DLD comorbid with psychiatric conditions.

As part of an ongoing clinical service program for children with developmental delay in Chinese-speaking Taiwan, it is our belief that such information is needed in a country with finite early intervention resources so that resource allocation priorities can be established for prevention, treatment, and future research.

Objective

To investigate the outcomes of a subgroup of preschool children with DLD comorbid with behavioral-emotional problems as they reached late childhood. Obtaining an understanding of the long-term profile of preschoolers with DLD comorbid

with emotional-behavioral problems has both theoretical and practical implications in the context of an Asian developing country.

Methods

For participant enrolment, we retrospectively reviewed the medical records of preschool children visiting the developmental clinic of a university-affiliated medical center in southern Taiwan, beginning from the center's inauguration date (April, 1997). This developmental clinic is a government-designated regional referral center for preschool children suspected to have developmental problems. Preschool children born before Dec 31, 2000 and with the initial diagnosis of DLD with comorbid behavioral-emotional problems, based on registered records, were selected as potential subjects. This cohort was chosen so that children entering the survey would be at least 10 years of age. At the initial assessment, the diagnostic evaluation of DLD was performed by consensus agreement of one pediatric neurologist and one child psychologist. It is of note that we did not use standardized language tests to determine the subject's language ability because suitable tools, such as the Mandarin-Chinese Communicative Development Inventory-Taiwan, were not available until 2010. In addition, the children's nonverbal cognitive ability as ascertained by the standardized cognitive tests had to be above 70. Behavioral-emotional problems during the preschool period were defined as parental complaints about the child's frequent and severe temper tantrums, aggression, constant noncompliant behavior or extreme shyness causing functional impairment at both school and home. Furthermore, the Screening Scale of Developmental Delay-II (Huang, Shieh, Chen-Yu, & Jong, 2002), a Chinese-language developmental screening scale with established validity, would reveal the child to be delayed in the social/emotional domain; also, a child psychiatrist was consulted for joint management. Children with

an initial diagnosis of autistic disorder, gross neurological impairment, global developmental delay, hearing impairment or known genetic syndromes (e.g., Fragile X) were excluded.

The medical chart of each eligible subject was reviewed and we extracted the following data when available: gender, age, parental age at admission, parental socioeconomic status, results of standardized cognitive testing given in the preschool period and, if applicable, the preschool psychiatric diagnosis according to the Diagnostic and Statistical Manual of Mental Disorders, 4th edition-text revision criteria (American Psychiatric Association, 2000). The status of preschool nonverbal cognitive ability was recorded using the performance IQ (PIQ) from Wechsler Preschool and Primary Scale of Intelligence-revised-Chinese (WPPSI-R) (Wechsler, 2000) that was arranged during the preschool visit. Parental socioeconomic status was coded according to Hollingshead's Two Factor Index of Social Position, based on a combination of the parents' education and occupation (Rin, Schooler, & Caudill, 1973). There were 5 classes in all: I the highest, V the lowest.

Sixty-six eligible subjects registered in the institutional databank fulfilled the above criteria. The number was relatively small because this developmental clinic had been established for only 14 years. Between January, 2010 and December, 2010, follow-up was attempted with all 66 cases. Letters were sent to all families, followed by personal contact when the family agreed to participate. The follow-up attempts revealed that one boy had died due to accident at the age of 8, and that 44 (31 boys, 13 girls) subjects were willing to participate, with a follow-up rate of 68.2%. For the 44 children completing the survey, the average age at the initial visit was 3.8 ± 1.3 years. The average current age was 11.8 ± 1.5 years, with an average follow-up duration of 8 years 2 months \pm 1 year 8 months. The mean nonverbal cognitive score at initial assessment was $83.8 \pm$ onths. Informed

consent was obtained from the families who agreed to enter the study, which was approved by the hospital's Institutional Review Board.

Follow-up measures

Cognitive ability

The Wechsler Intelligence Scale for Children (WISC-IV)(Wechsler, 2003) was arranged for the study participants. The WISC-IV is an individually administered and norm-referenced instrument designed to measure intelligence, and has been in clinical use in Taiwan since 2007, when the translation and standardization was completed. The WISC-IV is arranged into 4 indexes (the Verbal Comprehension Index, the Perceptual Reasoning Index, the Working Memory Index and the Processing Speed Index) and one Full-Scale IQ (FSIQ), which ranges from a low of 40 to a high of 160 points. Indexes of the Verbal Comprehension Index (VCI) and the Perceptual Reasoning Index (PRI) were used in this survey for final analysis, each representing the subject's verbal cognitive ability and nonverbal cognitive ability at late childhood.

Emotional-behavioral domains and verbal communication ability

Parents of the participating children were asked to complete the Taiwanese version of the Child Behavior Checklist (CBCL) in the Achenbach System of Empirically Based Assessment (Achenbach & Rescorla, 2001), based on the status of the children in the preceding 2 months. The CBCL consists of 140 behavioral/emotional items, and the Taiwanese version with normative data has been available since 2009. The factor analysis yields 8 syndromes, including Aggressive Behavior, Anxious/Depressed, Attention Problems, Delinquent Rule-Breaking Behavior, Social Problems, Somatic Complaints, Thought Problems, and Withdrawn. A Competence Scale was computed based on the children's activities, social functioning and academic performance. The CBCL-parent

version was used to measure problem child behavior with T scores (standardized by age and gender), and thresholds indicative of “clinical significance” referred to maladaptive behavior that fell within a defined clinical range for behavioral problems.

Status of current language ability was derived from the parental report in item 79 of the CBCL questionnaire, together with the clinician’s judgment after interview. In short, the child’s current language ability would be coded as “impaired” if the parent replied to the question “Verbal communication problem (describe)” as “sometimes” or “most of the time” with appropriate provision of the required description. Also, the nature of conversation between the child and the psychiatrist during the diagnostic interview would help the clinician to judge whether the child was poor in verbal communication.

Psychiatric diagnosis

Interviews were arranged by a child psychiatrist using the Chinese version of the Schedule for Affective Disorders and Schizophrenia for School-Age Children – Epidemiologic Version (Chinese K-SADS-E) to obtain the current psychiatric diagnosis, if present. The inter-rater reliability of this instrument had been examined by 9 staff child psychiatrists in a previous epidemiological study of which one of the authors was among the research team. The generalized kappa coefficients were reported to range from 0.73 to 0.96 for all mental disorders included (Chong, Chan, & Cheng, 1999). Further interviews with the parents and data collection would be arranged for confirmation of the initially suspected clinical diagnosis. For example, a rating scale such as the Chinese version of the Swanson, Nolan and Pelham IV scales (SNAP-IV)(Gau et al., 2008) would be obtained from the parents and teachers when a ADHD diagnosis was highly suspected.

Data analysis

In addition to whole group analysis for investigation, the subjects were further classified by either gender or initial (i.e., preschool) psychiatric status and comparisons were made between groups. Besides descriptive statistics, t-tests and χ^2 statistics were used in comparison. All statistical tests were performed at the 2-tailed significance level of 0.05.

Results

There were no significant differences between the subjects participating and those not participating in terms of the demographic factors of initial age, gender, parental age and socioeconomic status. Fathers were mainly from class IV, while mothers were mainly from class III. However, non-participating children had a higher preschool nonverbal cognitive ability than those who participated ($p=0.03$). A detailed description of the adherence analysis can be found in Table 1.

Whole group analysis

For the 44 children completing the survey at late childhood, the mean nonverbal cognitive measure as indexed by the Perceptual Reasoning Index (PRI) from the WISC-IV was 83.9 V was , and the mean Verbal Comprehension Index (VCI) from the WISC-IV was 83 -IV w. Nine subjects could be put into the diagnostic category of intellectual disability (Full IQ < 70) by late childhood, and 75% (33/44) of the subjects still had problems in verbal communication as reported on the parental CBCL and in the clinician’s judgment. Overall, 65.9% (29/44) had behavioral problems in any CBCL syndrome domain (i.e., T score above 68). As for daily function and performance, the CBCL Competency scores revealed 31.8% of the subjects had problems in the social domain (i.e., T scores less than 30), while 38.6% had problems in academic performance (i.e., T scores less than 30). Verbal cognitive scores (i.e., VCI) showed a positive

correlation with CBCL school performance ($r= 0.46$, $p=0.003$).

As for the psychiatric status, 52.3% (23/44) of the preschool children could be given a DSM-IV psychiatric diagnosis at the initial visit, and all but one (22/23) were diagnosed as having ADHD, hyperactive-inattentive subtype (ADHD-HI). Follow-up evaluation revealed that 75% (33/44) of the subjects in late childhood could be given a DSM-IV psychiatric diagnosis and 6 of them had more than one diagnosis. All but 2 of the late-childhood subjects were diagnosed as having ADHD (31/33), with 11 subjects having the combined subtype, and 20, the inattentive subtype.

Subgroup analysis by initial ADHD status and gender

In addition to whole group analysis, the subjects were further compared between groups, using the diagnostic status of preschool ADHD, i.e., those with a preschool diagnosis of ADHD-HI ($n=22$) and those without ($n=22$). In the preschool period, there were no differences between these 2 subgroups in gender and age. Both subgroups had language impairment during the preschool period, but the preschool-ADHD subgroup had lower nonverbal cognitive abilities ($p=0.02$). At follow-up, the preschool-ADHD subgroup had lower verbal ($p= 0.08$) and nonverbal ($p<0.005$) cognitive IQ scores than those of the other group. Diagnostic interviews revealed that 86.4% (19/22) of the preschool ADHD-HI subgroup had a current psychiatric diagnosis, and the most frequent diagnosis was ADHD, combined subtype (ADHD-CT) (50%). Three children in this group were free of any psychiatric diagnosis when grew up, and the other 19 had changed subtype, with 11 ADHD-CT and 8 ADHD-inattentive (ADHD-I) subtypes. Five of these late childhood subjects were currently receiving continual medication treatment for ADHD. As for the preschool non-ADHD group, 63.6% (14/22) had a current psychiatric diagnosis, and all but

two were ADHD-I subtype (54.5%, 12/22). Three children in this group were receiving continual medication treatment for ADHD.

Subgroup comparison by gender (31 boys, 13 girls) revealed that the only significant difference was that more boys than girls had academic performance problems ($p=0.04$) by late childhood.

Conclusion and discussion

Our follow-up results showed that the overall rates of language impairment and psychiatric disorders by late childhood were high in this specific self-selected group of DLD preschoolers with comorbid emotional-behavioral problems; also, the rate of psychiatric diagnoses increased from 53% in the preschool assessment to 75% in the late-childhood follow-up, and ADHD was the most common diagnosis. These children belonged to a special subgroup with developmental problems in both language and behavioral-emotional domains that deserved multidisciplinary attention from early on, so our finding bears importance for developing countries with limited early intervention resources and is deserving of further discussion.

The experience of Western countries has shown that expressive vocabulary delay at age 2 is associated with temperamental difficulties, such as increased levels of shyness, fearfulness, and disruptive behaviors (Irwin, Carter, & Briggs-Gowan, 2002). Prospective follow-up studies in alphabetic language-speaking (e.g., English) countries have also demonstrated that there is a heightened risk of psychiatric disorders in children with speech-language impairments, especially ADHD (Baker & Cantwell, 1987; Beitchman et al., 2001; Cohen et al., 2000). One study surveyed 71 adolescents (aged 15-16 years) with a preschool history of language delay and found that children whose language delay had resolved by the age of 5.5 years had a good psychiatric outcome. For those whose language difficulties persisted through the

school years, there was an increased incidence of attention and social difficulties (Snowling et al., 2006). Our finding that 75% of late-childhood subjects still had problems in the verbal communication domain indicated that they would be in a poor prognostic group, based on Western experience, and the resulting high rate of psychiatric disorders in this group supported this view.

Nevertheless, the association between language impairment and psychiatric disorder is not a straightforward one. Various hypotheses have been proposed to account for the relationship between these domains. One recent study used Structural Equation Modeling to integrate findings from 3 lines of research on the association between social cognition, externalizing psychopathology, and language functioning. The study found language functioning to be the proximal intervening variable in the association between social cognitive maturity and externalizing psychopathology. And the influence of social cognitive maturity on externalizing psychopathology is transmitted by language competence (Zadeh, Im-Bolter, & Cohen, 2007).

Another interesting result of our study is the instability of the DSM-IV subtypes of ADHD from preschool through late childhood. It has been noted in previous Western studies that young children who met the criteria for ADHD-HI likely shifted to ADHD-CT over time as their cognitive abilities were increasingly challenged in school and elsewhere (Lahey et al., 1994). Lavigne et al reported that almost all the cases of hyperactive-impulsive subtype (ADHD-HI) were found in 4- to 6-year-olds (Lavigne et al., 1996). Our investigation found that many of the preschoolers who were previously diagnosed as having ADHD-HI had changed to the ADHD-CT (57.9%) and ADHD-I (42.1%) subtypes by the late childhood. This further corroborated a previous Western report of 118 preschoolers who met DSM-IV criteria for ADHD and were followed for 8 years. The authors concluded that preschool

children rarely remain in the ADHD-HI classification over time; rather, they sometimes desist from ADHD, but mostly shift to ADHD-CT in later years (Lahey, Pelham, Loney, Lee, & Willcutt, 2005).

Using the parent-reported CBCL, we found that 65.9% of the adolescents had behavioral problems reaching clinical concern in one or more of the syndrome domains. However, 75% of the adolescents could be given a clinical DSM diagnosis after psychiatric interview. The possible reasons for this discrepancy were 1) the parents were asked to fill out the CBCL according to the status of the adolescents in the preceding 2 months, while the psychiatrist decided the diagnosis based on the condition reported in the previous one year; and 2) 8 children were currently receiving psychiatric medication and were considered as treatment responsive, thus the parent-reported CBCL might reflect improved behaviors after pharmacological intervention

It is of note that we did not use standardized language tests to determine the subject's language ability. Rather, we relied on the impressions of expert clinicians and parental concern to decide on the subject's language ability during the preschool period and follow-up. Previous research has supported the validity of the impressions of expert clinicians for identifying DLD (Aram, Morris, & Hall, 1993). Also, we believe that parents possess valuable information regarding a child's language performance that might not be captured through brief testing. In addition, the Autism Diagnostic Interview-Revised and Autism Diagnostic Observation Schedule diagnostic tools were not used at the participants' initial clinic visit to diagnose autism spectrum disorders because these tools were not clinically available in Chinese. However, it is believed that even though differentiating various autistic entities inside the autism spectrum remains problematic using the DSM-IV criteria, expert clinicians are reliable and accurate in differentiating autistic disorders and

non-autistic disorders in the preschool period (Mahoney et al., 1998)

The findings of this study should be interpreted in the context of 4 caveats. First, our sample size was relatively small, which renders the findings preliminary. Second, as we were not able to compare participants and non-participants in terms of current status, we do not know the possible direction of bias, if any. It is possible that increased parental concern led the parents to agree to participate in this follow-up survey. Also there was a baseline difference in nonverbal cognitive ability between the participants and the non-participants. Hence there is the potential for non-responder bias. Nevertheless, we recruited 68.2% of the desired subjects; 60% is within the range often reported for survey research (Asch, Jedrzejewski, & Christakis, 1997). Third, the relationship among the poor outcomes reported

in this survey, preschool language delay and early emotional-behavioral difficulties could not be further analyzed using the current study design without a control group.

In conclusion, this study has provided developmental information for a specific Chinese-speaking group of preschool children comorbid with emotional-behavioral problems. Our results suggest that the majority of these children still have language problems and psychiatric disorders when they reach late childhood. Specialized services are warranted for children with similar preschool conditions to lessen the prolonged vulnerabilities. Interventions across the lifespan, such as systematic and periodic reassessments temporally associated with key transition points in life, should be provided for these children from early on.

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