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Developmental Dyslexia – A Brief Update

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Over the past two decades, much has been learned about developmental dyslexia and specific learning disabilities (SLD) through advances in molecular genetics, neuroimaging and cognitive science, as well as familial and cross cultural observational and experimental studies on reading processes and their intervention.

The oral foundations of literacy include both phonology as well as language components essential for reading comprehension. Children who enter school with poor phonology are at risk of decoding difficulties, while children with broader language impairments are at risk of reading comprehension difficulties.[1]

Biological underpinnings of dyslexia are related to language systems and multifactorial genetic and environmental risk factors. Earlier genetic linkage mapping identified candidate genes which affect neuronal migration and axon guidance.[2] Superior temporal gyrus and adjoining temporoparietal brain circuits are implicated.[3] On the neuronal level, genetic risk was associated with reduced activation in the bilateral temporal, tempo-parietal and inferior temporal-occipital regions, as well as the bilateral inferior and middle frontal gyri. Subcortically, hypoactivation was found in the bilateral thalami, caudate, and right putamen in family history positive cases.[4] Alterations were seen in white matter in young prereading children who subsequently developed a reading disability.[5,6] Following reading intervention, changes in neural patterns typically occur.[7] This may show up as normalisation in the activity of pathways deficient in people with dyslexia,[8] or increases in the activation of pathways not involved in reading.[9] Researchers have also found atypical neural signatures in those who do not end up compensating.

Low-level sensory processing deficits precede and underlie phonological problems. Recent studies suggest that reading disability risk genes increase neural excitability in cortical networks, leading to increased neural noise that may affect and disrupt processes for phonological awareness and integration of visual symbols with sound that require precise timing.[10]

Early signs of dyslexia can be observed in preschool and possibly earlier through robust precursors of dyslexia.[11] Family risk is shown to influence accuracy and fluency through its effect on preliteracy skills. After the start of literacy acquisition, an additional contribution of family risk to the prediction of accuracy and fluency is found,[12] matching the finding that new genes become active during early development of word reading.[13] Gene-environment correlations and pooled cumulative risks were shown to be significant predictors of reading readiness.[14]

Future research that uses DNA information to create individual-specific genetic scores for understanding individual differences in reading ability could provide potential for early prediction of reading problems, enabling intervention and possible prevention by identifying those at particular genetic risk. It could also provide information on individual differences in resilience to developing reading difficulties, and on developmental mediators and moderators of the risk and resilience.[15] Meanwhile, intact cognitive skills in oral language and executive functioning, self-efficacy, sense of control over their lives, strong parental relationships and teacher and peer support all contribute to resilience and positive reading and socioemotional outcomes.[16]

Until the 1990s, the field of dyslexia was fragmented in Hong Kong, where medical, education, social services and respective research were based on different terminology, practice and theoretical understanding. Dyslexia was often considered as

minimal brain damage in medical sector, academic underachievement in educational sector, and as negative psychosocial consequences in the social welfare sector. Differences in orthography of the Chinese language provide opportunity to study how this writing system influences reading processes and its impairments. In Hong Kong, both Chinese and English are official languages, where Chinese is written in traditional Chinese characters applying Modern Standard Chinese vocabulary and grammar, and pronounced in Cantonese. Reading and writing are taught early during preschool years, with written Chinese and English both introduced simultaneously.

Increasing research into reading processes and their deficits in Chinese provided insight into the prevalence and psycholinguistic processes underlying Chinese reading difficulties. Local prevalence estimation of specific reading impairment of 9.7-12.6%, was shown during norming studies, compatible with overseas experience.[17] Cognitive processes related to dyslexia in Chinese became better understood, including deficits in orthographic knowledge, rapid naming, phonological awareness and morphological awareness.[18,19] Persistent reading difficulties in older students were shown to be associated with verbal working memory and syntactic awareness.[20] At risk preschool Chinese children showed deficits in morphological awareness and rapid naming.[21-23] Causal models for language and reading disorders explore the close and important relationships between oral language and reading decoding and comprehension processes.[24,25]

Over the last two decades in Hong Kong, much work was done on strategic and applied research on reading and writing in Chinese, on service development, professional preparation especially teachers, and on advocacy and related public policies. Standardised and officially recognised measures for diagnosis and special support eligibility continue to be developed from the early 2000's. It is gratifying to note that the field of reading disabilities, from those fragmented beginnings, has grown into one with strong inter-sectoral collaboration. Tertiary institutions joined forces in the research on neurological, genetic and cognitive underpinnings, gathering of epidemiological data, as well as in developing assessment and intervention tools for teachers, psychologists, and parents. Government departments worked alongside these institutions. Funding bodies provided support to the research and development resultant research products, teacher training and community services. Professional bodies such as the Hong Kong Society of Child Neurology and Developmental Paediatrics provided platforms for multidisciplinary professional learning and exchange, including the hosting of international and local scientific activities as well as production of position papers on Dyslexia and Specific Learning Disabilities. Parent groups and political advocates worked with the government to lobby for administrative and policy changes.[26]

The Hong Kong Examination and Assessment Authority initiated a special panel in 2003 to review applications for accommodations at secondary school exit examination, and witnessed the exponential growth in number of applicants from single digits to over a thousand applicants for the Hong Kong Diploma of Secondary Education (HKDSE) examination in recent years. The range of accommodations offered for eligible students including speech-to-text software and screen readers in examinations, as well as accommodations regularly offered to students in learning, are testimony to the increased understanding in the field. Rehabilitation public policy was changed in 2007 to include Specific Learning Difficulties as an official category of disabilities in Hong Kong, with wide-reaching implications for students and adults with reading disabilities in terms of rights and protection.

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CAS Epidemiological Data on Dyslexia and At Risk for Dyslexia from 2007 to 2017

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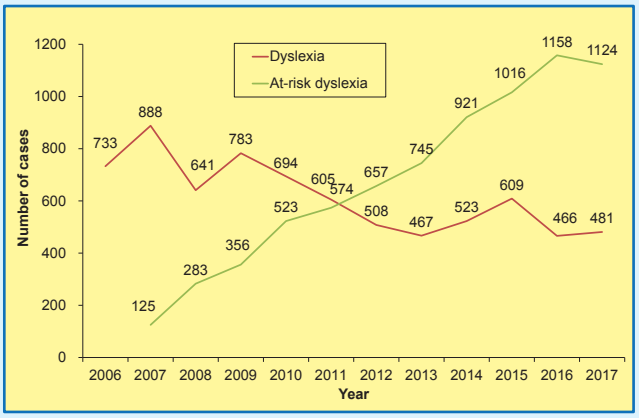
It has been exactly ten years since we last wrote on Dyslexia in CASER. The epidemiological data on the topic from CAS and other services for preschool children at risk for dyslexia have undergone drastic changes during these years. Yet, what has been unchanged is the definition of Dyslexia adopted by the International Dyslexia Association (IDA) since 2002. "*Dyslexia is characterised by difficulties with accurate and / or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.*"[1]

Incidence

In Hong Kong, with increased public awareness of this neurodevelopmental disorder and the publication of the Hong Kong Test of Specific Learning Difficulties in Reading and Writing (HKT-SpLD)[2] assessment tool, the number of children diagnosed with dyslexia has significantly increased. Given the division of labour between the Education Bureau and Child Assessment Service (CAS) of the Department of Health in providing assessments for school aged children with suspected dyslexia, the number of children diagnosed with Dyslexia and Mathematics Disorder in CAS has decreased from 888 in 2007 to 481 in 2017, representing a drastic reduction of 46%. At CAS, the focus of service has shifted to preschool children at risk for dyslexia. Over these ten years, the number of children identified as at risk for dyslexia increased from 125 to 1124 representing an eight-fold increase (Figure 1). The reasons for this increase in incidence are plentiful. The enhancement of the Developmental Surveillance Scheme by Family Health Service, Department of Health in 2008 contributed to the increase in referrals of kindergarten students with suspected developmental problems by their teachers. The development of new assessment tools over these years equipped clinicians for early and accurate identification of at-risk cases. These tools include The Hong Kong Reading Ability Screening Test for Preschool Children (RAST-K),[3] The Hong Kong Comprehensive Assessment Scales for Preschool Children (HKCAS-P)[4] and The Hong Kong Dyslexia Early Screening Scale (HKDESS).[5] Last but not the least, the increase in public awareness and parental and teacher concerns over young children's literacy development in early years contribute to early identification.

Figure 1 Trend of incidence in CAS, 2007-2017



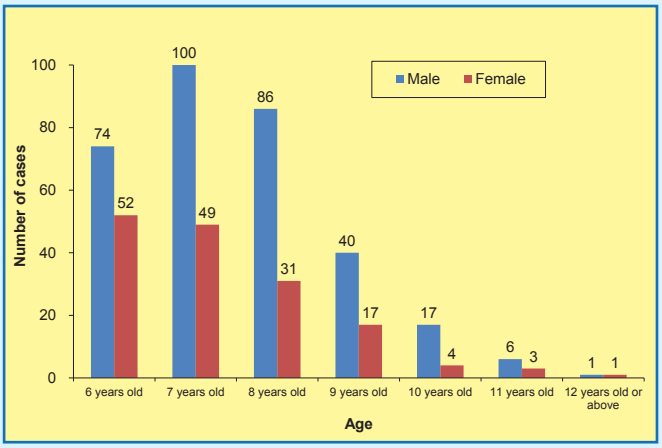
In the following paragraphs, the characteristics of children diagnosed with dyslexia in CAS and the profile of preschool children assessed to be at risk of dyslexia will be analysed.

Age and Gender Distribution of Children with Dyslexia

Throughout these years, the majority of cases were diagnosed between the ages of 6 to 8 years, corresponding to the elementary primary school years of Primary 1 to 3. It is understandable that children's learning difficulties became more noticeable as they proceeded to primary school with formal curriculum and demand on literacy performance. In CAS, referrals were received from general practitioners for evaluation of elementary primary school aged children on their learning and attention problems soon after they promoted to primary schools. Moreover, there were also some children who were noticed to have problems in word

learning and were referred to our service when they were in K3. With waiting time, they were diagnosed with dyslexia when they were in primary one. All these explain why most of the children were diagnosed between ages 6 to 8 in CAS and these constituted over 81% of the total number of children diagnosed in 2017 (Figure 2).

Figure 2 Incidence of children with dyslexia by gender and age, 2017

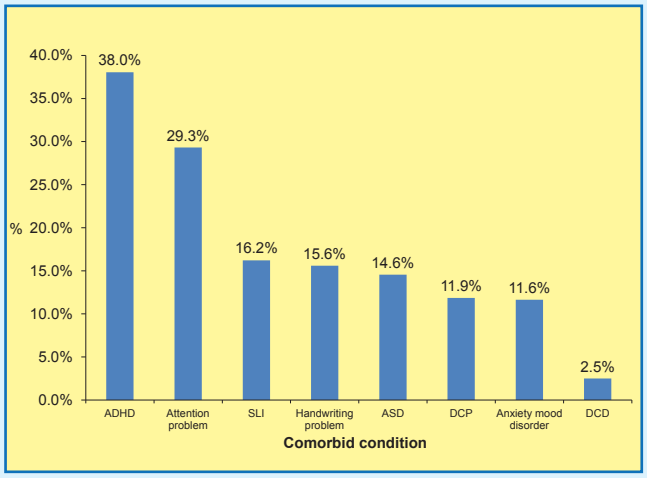


In our previous report of epidemiological data in CASER in 2008, among children diagnosed with dyslexia in CAS, the boys to girls ratio was 2.7 to 1. With reference to the data of 2017, the boys to girls ratio dropped to 2.1 to 1. Still, there are more boys diagnosed than girls. This is consistent with the findings of the recent meta-analysis conducted by Quinn,[6] in which males are 1.83 times more likely than females to have reading difficulties.

Comorbid Conditions with Dyslexia

Currently, children with pure learning difficulties are advised to receive attention and assessment service by schools' educational psychologists. EDB supports educational psychology services in government and government subsidised schools. On the other hand, CAS accepts referrals for children with learning problems when other developmental issues are present along with the learning difficulties. As a result, children diagnosed with dyslexia at CAS often also show comorbid neurodevelopmental problems.

Figure 3 Comorbid conditions with dyslexia, 2017



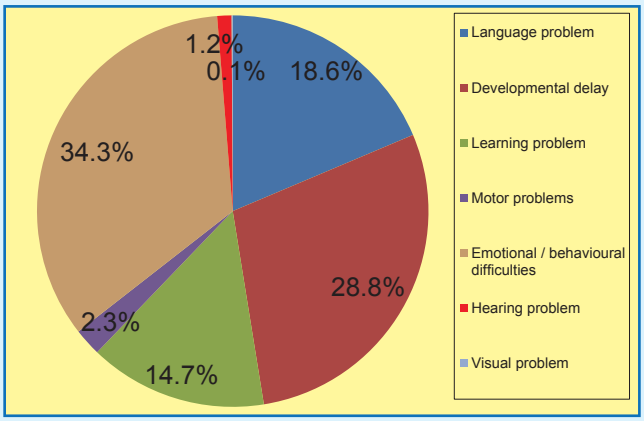
As shown in the above graph (Figure 3), Attention Deficit Hyperactivity Disorder (ADHD) remains to be the most common comorbid condition in the present (38%) as well as in the previous report (22%). The percentage of attention problems that do not reach disorder level is also very high (29%). As such, a total of around 67 % of children diagnosed with dyslexia in CAS have comorbid attention problems or ADHD. Meanwhile, the percentages of motor related problems, i.e. Developmental Coordination Disorder (DCD) (3%), Developmental Coordination Problem (DCP) (12%) and handwriting problems (16%) have been rather consistent throughout these years. Although dyslexia is a language-based developmental disorder, only 16% of children with dyslexia were shown to have comorbid Developmental Language Disorders (DLD). This is likely to be an under estimation since assessment by speech therapist may not be arranged at CAS if the children are already receiving school based speech therapy service. Other comorbid conditions included autism spectrum disorder and anxiety / mood disorder.

Referral Reasons for Children At Risk for Dyslexia

In 2007, the Family Health Service launched a reform on the Developmental Surveillance Scheme in all maternal and child health centres (MCHCs). Since December 2008, a referral and reply system, together with training and support, have been established between MCHCs and all pre-primary institutions in Hong Kong to facilitate pre-primary teachers to identify and refer children with physical, developmental, behavioural and learning problems to MCHCs for preliminary assessment. Referral would then be made to CAS for comprehensive assessment after screening by doctors. In this way, preschool children with various suspected problems were referred by kindergarten teachers to CAS. As shown in the following pie chart, among the children who

were found to be at risk for dyslexia in the year of 2017, most were presented with emotional / behavioural difficulties (34%), followed by developmental delay (29%) and language problem (19%), while only 14% of the preschoolers presented as having learning problem (Figure 4). This may be because literacy development constitutes only part of the kindergarten curriculum and kindergarten teachers showed more concern over young children's emotional and behavioural performance. At the same time, preschool children at risk for dyslexia may feel frustration in learning which is expressed as emotional and behavioural problems. These children may also be misunderstood as having developmental delay since language problem is commonly associated with the risk for dyslexia.

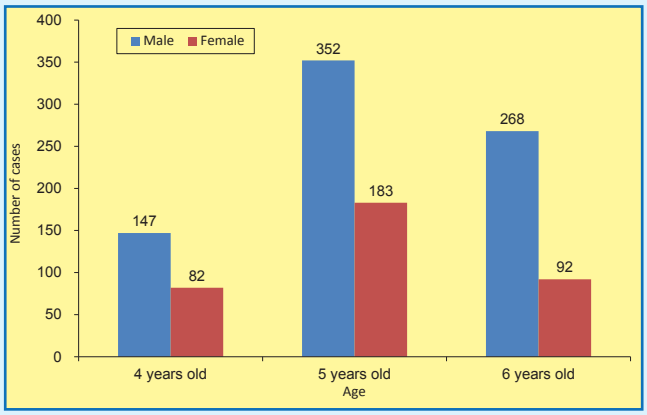
Figure 4 Referral reasons for children at risk for dyslexia, 2017



Age and Gender Distribution of Preschool Children At Risk for Dyslexia

Among the preschool children assessed to be at risk for dyslexia in 2017, most were assessed at the age of 5 when they were studying the second term of K2 or first term of K3. Moreover, again more boys than girls showed the problem with the boys to girls ratio being 2.1 to 1 (Figure 5).

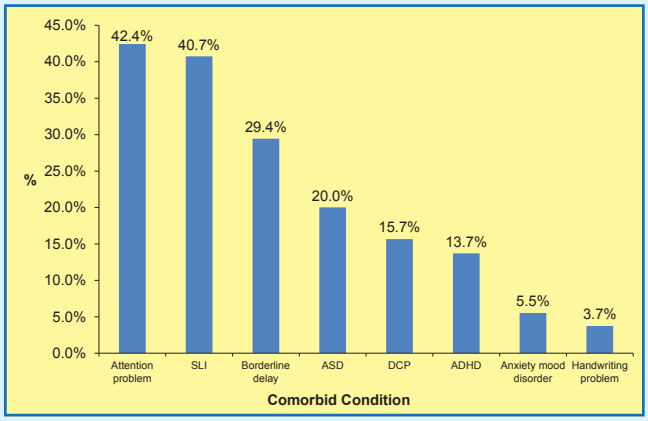
Figure 5 Incidence of children at risk of dyslexia by gender and age, 2017



Comorbid Conditions with At Risk for Dyslexia

As shown in the Figure 6, 42% of the children at risk for dyslexia have attention problem while only 14% were diagnosed with ADHD. It is common for clinicians to reserve giving the diagnosis of a behavioural disorder when the child is in preschool years. It is important to note that while more than half of the children at risk for dyslexia also have ADHD / attention problem, their inadequate attention control may further exacerbate their learning difficulties. Thus it is suggested that we need to screen for young children's attention problem when doing assessment on early literacy. Early intervention should be provided to both their learning and attention problems. The second most common comorbid condition for children at risk for dyslexia is DLD (41%). As dyslexia is a language-based learning disorder, young children at risk for dyslexia are commonly found to show language problems. According to Snowling,[7] "For children with persistent language difficulties, reading problems are highly likely to ensue." Again, for comprehensive assessment of preschool children, we should also evaluate or at least observe the child's language performance during our assessment for children presented with suspected literacy difficulties. Meanwhile, 29% of the children at risk for dyslexia also have borderline developmental delay. Although at school age the operational criteria for dyslexia diagnosis include at least low average intelligence, for preschool children at CAS, children with borderline developmental delay may also be considered as at-risk cases, since the operational definition does not apply at this stage, and the children's intelligence have still to be determined when they are close to school age. What is more important is to provide these children with timely interim support service and referral for early intervention. Around 20% of the preschool children having early signs of dyslexia also have ASD. Finally, 16% of the children have DCD / DCP while only 4 % have handwriting problems. This pattern of around 16 to 20 % of at risk cases having some motor problem is the similar to those with dyslexia.

Figure 6 Comorbid conditions of children at risk for dyslexia, 2017



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Preschool Word Learning Group

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Recent development of screening tools for dyslexia makes possible the early identification of preschool children at risk for dyslexia. In alphabetic script, studies suggest intensive interventions are most effective in training early literacy skills in kindergarten or first grade.[1] Untreated, early signs of dyslexia may lead to avoidance of learning. Children with dyslexia were shown to have an increased incidence of internalising anxious and depressive symptomatology,[2] and less likely to enroll in higher education.[3]

Studies suggest that cognitive profiles of children with dyslexia may differ with different orthographies[4] Chinese, being a morphosyllabic script, is different from alphabetic script. Rapid naming deficits and orthographic deficits, rather than phonological deficits are the two most dominant types of cognitive deficits in Chinese developmental dyslexia.[5] Children's skills in word reading, rapid naming, and morphological awareness are among the most sensitive predictors of subsequent literacy performance; other correlated factors include syllable deletion, tone detection, and visual skills.[6]

Parents' attitudes and involvement in literacy practices have a positive effect on children's language and literacy development and learning interest,[7] Earlier parental involvement in children's literacy practices provides more profound and longer lasting effects.[8] In a study by Dilnot[9] home literacy environment predicted reading readiness.

The Preschool Word Learning Group, developed by the Child Assessment Service Dyslexia Subspecialty Team, targets K2 and K3 children identified with word learning difficulties. It comprises of one preview session for parents followed by three sessions for children's active participation with parents as observers. The group aims to increase children's word learning motivation through joyful and interactive activities, incorporating the major cognitive-linguistic components underpinning Chinese word learning. These include (1) Relating Chinese words with its orthographies, (2) Rapid

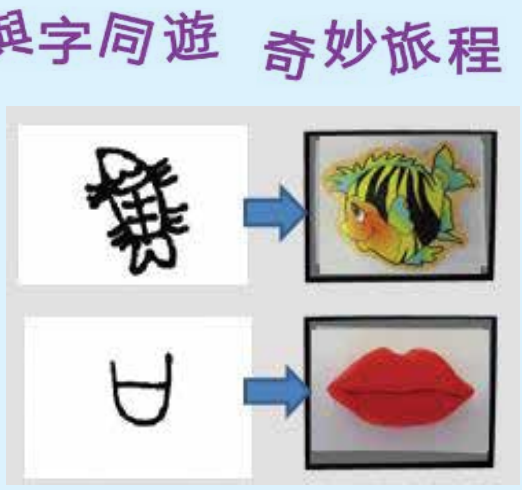
Naming, (3) Morphological Awareness, (4) Phonological Awareness, (5) Phonological Memory (6) Language facilitation, and (7) Orthographic Structure. Other non-cognitive factors such as (1) Paired reading (2) Daily Scheduling, (3) Modeling and (4) Pleasure in reading activities, which constitute the home literacy environment, are incorporated as the non-cognitive conducive components (Figure 1). These three sessions are spaced out in a 3-week interval for the participants' generalisation of the skills to be practiced at the daily home environment.

Preliminary findings based on a pilot study suggested that the treatment group boded positive results. Using a within-subject comparison design, results indicated significant improvement in word reading level: $t(84)= -8.861$, $p=0.000$. Results also showed significant changes overtime in the numerous cognitive-linguistic factors measured, suggesting increase in home support which facilitated children's literacy development. Yet, without a wait-list control group comparison or a randomised control design, the impact of the group intervention requires further rigorous study.

Early screening followed by timely and evidence-based intervention is crucial for children at risk for dyslexia and families to reduce future academic failure. It is strongly advocated that early intervention should supersede the current practice of "wait-to-fail-approach", and requires dedicated effort from clinicians, educators as well as parents to work together to ensure children at risk for dyslexia can "learn to read" and thus can benefit from "read to learn" in the coming years.

Figure 1 Material used in Preschool Word Learning Group

(a)



(b)

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Development of the Hong Kong Dyslexia Early Screening Scale

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Dyslexia is diagnosed when children have received adequate word learning exposure and formal primary education and fulfill the diagnostic criteria of respective standardised testing. In Hong Kong, the diagnosis of dyslexia is usually made no earlier than after the first school term of primary one. However, early signs of dyslexia can be detected during preschool years. Dyslexia as a reading disorder is characterised by impairments in various cognitive-linguistic skills. With the aim of identifying and further understanding the factors underpinning reading disability, CAS dyslexia subspecialty team collaborated with scholars of local universities over ten years ago to conduct a series of studies.[1-3] In particular, we investigated two groups of children who were potentially at risk for dyslexia: one group of children who had early oral language difficulties and another group of children having at least one sibling who had been diagnosed with dyslexia. Using a longitudinal design, we followed these children from their entrance into K2 until primary one when they could be tested for dyslexia. From these studies, measures of Chinese word reading, English letter naming, morphological awareness and rapid naming tested on these children in K2 were found to be predictive of future dyslexia status. From our clinical observation, children's Chinese word dictation performance was also noted to be a good predictor of dyslexia. These findings were then applied to construct the Hong Kong Dyslexia Early Screening Scale (HKDESS).

The HKDESS was published in June 2016 by Child Assessment Service. It is a locally developed, validated and standardised instrument for identifying preschool children at risk for dyslexia, so as to allow early intervention and to prevent learning failure in the future. There are five subtests in the HKDESS, namely the Chinese Word Reading, Chinese Word Dictation, English Letter Naming, Digit Rapid Naming and Morphological Awareness. The combined result of the subtests yields a risk probability of future developmental dyslexia, for the information and attention of parents and preschool teachers. Moreover, the subtest results provide cognitive profiles of the at-risk children through which early intervention may be guided.

The HKDESS was designed for use by clinicians including developmental-behavioural paediatricians and clinical or educational psychologists working in clinics and preschool settings with preschool children. Eligible HKDESS users must show satisfactory completion of the training workshops run by CAS. As of April 2018, a total of five training workshops were run with 268 professionals accredited. Among these about 85% are clinical / educational psychologists with the rest being paediatricians. The clinical usefulness and efficacy of the scale will be observed and reviewed as experience accumulates. For the time being, the feedback from the clinicians on HKDESS has been very positive.

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The Effect of Print Size and Coloured Paper on Reading Performance of HK Chinese Children with Dyslexia

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Developmental dyslexia is a language-based learning disability. Children with dyslexia, when compared with their normal counterparts, need more time and effort in reading and they make more reading errors. Although the characteristics of the reading materials do not help to improve reader's decoding ability or comprehension of the reading content, they do contribute to the legibility which facilitates reading performance. There are some studies showing that modifying the legibility of reading materials can improve the reading speed and accuracy for children with dyslexia.[1-6] With the development of the Chinese reading acuity chart of Hong Kong Children by our optometrist investigators,[7] we would like to study the relationship between the print size and the reading performance in HK Chinese children with and without dyslexia. We would also like to compare the reading performance of children with dyslexia when the reading materials are printed in coloured paper.

Method

Thirty-nine children with dyslexia and 39 children without dyslexia studying in Primary 2 to 5 in local primary schools participated in the study. All children (n = 78) were confirmed to have visual acuity of 6/6 or better with best refractive correction and all were normal in binocular function. All children with dyslexia were administered with standardised assessment tools by a clinical psychologist to exclude borderline or below intelligence (children with full scale IQ below 80) and confirm the diagnosis of dyslexia.

The participants' reading speed and reading accuracy were measured across 17 print sizes ranging from 20/400 to 20/10 Snellen letter sizes at a fixed reading distance of 40cm under standard illumination of 80-100 cd/m^2. Each sentence had 18 characters printed in 微軟正黑體, which was one of the common fonts in reading materials for Chinese children. The sentence was formatted into 3 lines with a punctuation mark in each line. All sentences were randomly selected from textbooks or storybooks in kindergarten or Primary 1 level. Sentences were read in descending order of print size.

In group of control subjects, each participant was asked to read one of the three reading charts randomly. The sentences were all black print in white paper. For children with dyslexia, each participant was requested to read 3 reading charts with black print in white, ivory and yellow papers in a random order. Participants were asked to read each sentence as quickly as possible, and to read as many words as possible. The reading time and the number of reading errors were recorded by the examiner.

Data Analysis

All statistical analyses were performed with SPSS for Windows version 22 (SPSS IBM, New York, USA) and R (version 3.3.1). Descriptive statistics were used to examine the demographic and reading performance data. Four functional measures including maximum reading speed (MRS), critical print size (CPS), reading error per sentence and reading acuity (RA) were derived from analyses of reading time and print size. The reading speed was defined as the number of correct words read per minute. The MRS was the average of maximum reading speeds with print sizes corresponding to CPS or larger. CPS was the smallest print size yielding 80% of the MRS, and where reading speed declined rapidly below the CPS. Reading errors per sentence was defined as the average number of reading errors per sentence that the participant was able to read. Reading errors included omission and substitution of words. Transposition of words and addition of extra word were not counted as errors since both did not affect the number of correct words per minute, thus not affecting the calculation of reading speed. Reading acuity (RA) was the smallest readable print size managed by the participant, which was computed as "1.4 - (sentences x 0.1) + (reading errors x 0.0056)."

Results

Children with dyslexia read significantly more slowly than children without dyslexia (2.04 ± 0.03 vs. 2.25 ± 0.01 logWPM, t=6.82, p<0.01). Comparing with the control group, children with dyslexia made significantly more reading errors (Mann-Whitney U, Z=-2.52, p=0.02) and required to read significantly larger print size (reading acuity = 0.36 ± 0.03 vs. 0.30 ± 0.01 logMAR, t=-2.0, p=0.05). In contrast, the required CPS to achieve MRS was not significantly different between the groups (0.44 ± 0.03 vs. 0.40 ± 0.02 logMAR, t=1.60, p=0.11).

Significant effect of color was only found in MRS ($F_{1.2,76}$=3.9, p=0.05) and CPS ($F_{1.2,76}$=5.14, p=0.01), but not in RA ($F_{1.2,76}$=0.56, p=0.55). MRS in ivory paper was significantly faster than white and yellow, but the difference was not clinically significant (average difference from 0.9 to 2.4 WPM). However, CPS in ivory paper was significantly larger than white by a mean difference of 0.01 logMAR, which was considered as non-clinically significant as well.

Discussion

In the current study, it is confirmed that children with dyslexia require a larger print to read (reading acuity), although the study results did not find a significant difference in the critical print size between the children with and without dyslexia. Such finding supports the accommodation of magnifying the words for some children with dyslexia. A larger print may be particularly important for Chinese characters which are orthographically complex and this explains the discrepancy between our result and some study results in alphabetic language. Visual configuration of a Chinese character is markedly different from that of an alphabetical word. A Chinese character generally represents one syllable of spoken Chinese; it may be a word on its own or a part of a polysyllabic word. Each character is composed of one or more components and which can be further subdivided into strokes. Therefore, Chinese characters cannot be too small even before a normal fluent reader can recognise the words to attain their maximal reading speed.

The study design may also affect the result. Print size may have a bigger effect on reading performance when the child is demanded to read a longer paragraph. The spacing between the words can also be a contributing factor in reading performance. Moreover, we did not specify the severity of dyslexia in our participants; print size may have different effect in children with different degree of severity in dyslexia.

The findings of the effect of coloured papers on the reading performance in children with dyslexia were inconclusive as those results in many other studies. Children with dyslexia, although can read faster on ivory paper, they required a larger critical print size on ivory paper.

Conclusion

Although the study results did not find a significant difference in the critical print size between the children with and without dyslexia, we observe that children with dyslexia required a larger print to read. The findings of the effect of coloured papers on the reading performance in children with dyslexia were inconclusive. Such findings supported the accommodation of magnifying the words for some children with dyslexia. Future study is needed to further delineate the relationship of print size in different severity group of dyslexia.

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Recent Publications and Scientific Presentations

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Scientific Presentations

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Understanding typical and disordered development in speech sound system (phonology) in children. How can teachers identify and support children with speech sound system problems in schools? on 29 May 2018 at Thematic Course on Education of Students with Hearing Impairment and Speech and Language Impairment, The Education University of Hong Kong by CHEUNG Sau-ping, Pamela.

Understanding the aim, scope, and procedures on screening and assessment of oral language functions in pre-school and school-age children. How can teachers identify children with oral language difficulties in schools? and **How to enhance the oral language skills of school-age children with language impairment** on 23 May 2018 at Thematic Course on Supporting Students with SEN – Sensory, Communication and Physical Needs, The Education University of Hong Kong by NG Kwok-hang, Ashley.

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Certification workshop of Copying Speed Test for Hong Kong Secondary Students on 25 February 2018 at Hong Kong Occupational Therapy Association by FONG Kin-han.

Certification workshop of Copying Speed Test for Hong Kong Secondary Students on 25 February 2018 at Hong Kong Occupational Therapy Association by NG Wai-fong.

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