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# Developmental Dyslexia and Other Specific Learning Disabilities

## The State of Practice: International and Hong Kong Perspectives

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### Abstract

The past 2-3 years saw an increase in interest and activities related to specific learning disabilities in Hong Kong. Despite many recent advances in the understanding of scientific and neurological underpinnings of these disorders, application of such knowledge to clinical and educational practice remains limited in many places, and specific learning disabilities often remain a "hidden handicap". This is also the situation in Hong Kong where there is still much confusion and disagreement on conceptual framework and practices among various professionals involved in this multidisciplinary subject. Many lay people and professionals alike still hold the view that specific learning disabilities are uncommon among the Chinese population. A recent review of clinical experience at Child Assessment Service speaks strongly against this belief, with over 200 children diagnosed with one or more specific learning disabilities in 1998 alone. Although these children showed serious difficulties in learning, over 80% of this cohort were not receiving the specific professional attention that they required. Today there is a wealth of research data pertaining to the neuroanatomical, physiological, genetic, psychological and educational aspects of respective specific learning disabilities types. Different disciplines who have legitimate concern in these conditions, including neuroscientists, neurologists, psychologists and education professionals, often do not share common definitions and terminology in research, rendering communication and sharing of results all but futile. Professional territory and personal factors contribute further to the endless polemics. Meanwhile, many children with specific learning disabilities, dyslexia or otherwise, continue to suffer without recognition and effective help, here in Hong Kong as in many parts of the world. With the progress in knowledge of brain mechanisms for learning, paediatricians who are advocates for children are duty bound to address this subject and to take an active role in advancing the understanding of these conditions and promoting services for these children.

### Key words

Specific learning disabilities; Dyslexia; Specific learning disabilities in Hong Kong

### Introduction

The recent rapid increase in the awareness of specific learning disabilities (SLD) in Hong Kong might be traced back to a number of events. In 1997, as part of a documentary series, local television networks reviewed current status and practices relating to the subject. This led to a cycle of rising public interest, further media

attention and increased number of parents seeking help for children with suspected specific learning disabilities. Parent groups also helped to promote the understanding of these conditions through organizing public education activities. Academics and clinicians were often called upon to speak on the subject and to comment on the state of local services. Partly in response to rising demands, various service providers reviewed current practices in order to meet these children's needs.

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Received July 21, 1999

### International Perspectives

#### **What are Specific Learning Disabilities?**

"Specific Learning Disabilities" (also referred to as "Specific Learning Difficulties" in the United Kingdom

and "Learning Disabilities" in the United States) is a generic term which refers to a group of learning disorders with specific, respective underlying cognitive deficits.

Specific learning disabilities often exist in spite of adequate intelligence, normal sensory and motor apparatus, normal emotional health and adequate educational opportunity; but could occur concomitantly with handicapping conditions or extrinsic influences (cultural differences, insufficient or inappropriate instruction) although they are *not* the result of these conditions.

Specific learning disabilities thus is a heterogenous group of disorders of constitutional origin. Due to differences in definitions used by different countries' education system, reported prevalence generally range from around 5% to 15%. The conditions subsumed under this term include the following:

***Dyslexia:*** One of the most prevalent types of specific learning disabilities. It is a developmental *language-based* disorder which affects an individual's ability to learn and remember written words. The impairment in recognizing and recalling words causes enormous difficulty for the child in reading, dictation and spelling.

Dyslexia is a constitutional disorder and is hence lifelong. It often occurs in families. It is not an all-or-none phenomenon but occurs as a continuum as most biological disorders.

Current literature quotes an average of 10% of individuals being affected by specific reading difficulties, with around 5% being severely affected. This would mean that 2 children per class of 40 students may be significantly affected!

***Specific language impairment:*** These individuals exhibit various linguistic difficulties which could be outwardly subtle. They may affect different aspects of language, including phonology (speech sounds), semantics (meaning), grammar and so on, and present as disorders of expressive language and comprehension which affect academic achievement and social communication.

***Specific Learning Disability in Mathematics:*** Impairment in ability to learn mathematics may result from a variety of deficits, including those related to the ability for step by step thinking, ability to rapidly recall of learned facts such as those for arithmetic computation, language ability to understand word mathematics problems, visual-spatial abilities for managing geometry concepts, and general problem solving skills for complex

tasks.

***Developmental Coordination Disorders (DCD):*** Individuals with DCD have specific problems in gross and fine motor planning, coordination, postural control and graphomotor skills. They are commonly described as "clumsy" children.

***Non-Verbal Learning Disabilities:*** This represents a group of impairments which frequently occur together in some individuals with SLD. These individuals are motorically awkward, have poor social awareness, poor perceptual organization and weak visuo-spatial memory. Mathematics calculation disorders may also be a feature.

#### ***Visual spatial organization and Perceptual Disorders***

Individuals with these disorders have difficulty in understanding spatial relations, left/right concepts, and in perceptual organization of writing. Because Chinese characters are more icon-like, it was often thought that they are processed through a visual perception ability. This notion however has *not* been supported by research which studies the role of perceptual versus language brain mechanisms in Chinese word reading.

#### ***Co-Occurrence and Comorbidity***

The above specific learning disabilities may occur alone or together in various combinations.

While problems such as attention deficit disorder are not specific learning disabilities per se, they may also exist as comorbid conditions in an individual with specific learning disabilities.

#### ***Non-validated general definitions are still often being used. These include:***

***"Exclusionary Criteria"*** which defines an individual as having a specific learning disability when he demonstrates difficulty in learning *despite* not being mentally retarded, not suffering from sensory handicaps, not being emotionally or socially deprived etc. Such a definition is not helpful in delineating *what* the nature of the disorder is. It results in a collection of extremely varied conditions, and cannot contribute to specific intervention prescription or prognostication.

***"IQ-Achievement Discrepancy Criteria"*** which uses the discrepancy between general cognitive potential and recorded school achievement for definition. There is increasing evidence that this feature per se lacks valid psychometric significance pertaining to underlying process differences.

*"Operational Definitions"* are often used by education administrators for resource gate keeping, and bear limited relation to theoretical considerations.

### ***What are the Underlying Deficits?***

It is easily apparent that different SLD have different underlying deficits.

The underlying deficits of Dyslexia has been extensively studied is believed to be due to a central nervous system dysfunction leading to a failure to rapidly, accurately and automatically recognize and recall written words.

Both major gene form and polygenic modes of transmission are supported for this condition. In some families genetic markers on chromosome 15 have been detected, and chromosome 6 is possibly implicated in other families.

The left planum temporale on the superior temporal lobe of the brain, which is believed to be responsible for language processing, is anomalous in dyslexic individuals. Ectopias within the left perisylvian cortical area were detected, and the usual asymmetry between the left and right brains has been noted to be absent.

Studies in brain electrical activity mapping recordings have shown aberrant physiology in cortical areas usually involved in speech and reading in dyslexic individuals.

Positron emission tomography (PET) scanning has shown functional alterations in dyslexic adults during the act of reading, while Xenon-133 photon emission computed tomography (SPECT) has indicated decreased regional cerebral flow (rCBF) in left prefrontal and perisylvian regions in children with developmental language learning disabilities.

Most recently, fMRI studies of the neurobiology of reading have suggested a neuroarchitecture for word reading which is disturbed in individuals with dyslexia.

Other SLD have also been demonstrated to involve respective functional differences of the brain, including those which respectively subserve language, motor coordination and planning, spatial perceptual manipulation and so on.

### ***What are some common non-validated or erroneous beliefs about SLD?***

The following are some commonly held non-validated notions of SLD and dyslexia:

That dyslexia is a handwriting motor problem.

That dyslexia consists of mirror writing due to visual perceptual problems.

That Chinese characters, being "picture-like", is

interpreted through visual-spatial processes. Research evidence indicates that Chinese reading involves linguistic skills in the same way as other alphabetic languages.

That individuals will "grow out of" dyslexia. Being a constitutional difference, dyslexia persists in individuals. These individuals may however compensate successfully plus excel in their other areas of strength. Those who are more severely affected or who are not given appropriate intervention may be permanently handicapped.

That dyslexic individuals cannot read well because of eye problems. Abnormal ocular movement or light sensitivity may cause difficulties in reading, but do not cause word learning or language comprehension problems. Recommendations for various vision corrective devices or training should be taken in the correct perspective.

That dyslexia is contributed by a peripheral hearing anomaly. Current data do not support the role of a peripheral hearing problem, be it hearing impairment or hypersensitivity, as the underlying deficit for word recognition difficulties.

That sensory integration therapy treats language and reading skills. They may be appropriate for specific types of sensorimotor and coordination disorders but do not impact on reading and language domains.

That medications could be prescribed to cure dyslexia. Quotations have included herbs, trace elements, psychotropic drugs etc. While medications might help co-morbid conditions such as inattention, there is no evidence that intrinsic biological differences underlying dyslexia could be changed through medication.

### ***Interventions and their implications on prognosis***

#### ***Interventions***

Although specific learning disabilities are biological in origin, the interventions are more often educational. Parents, teachers and professionals are often perplexed by the multitude of treatments and therapies which claim to help or cure SLD. Many of these lack evidence whilst others are theoretically non-feasible. Some of the caveats have been mentioned in the previous section. Research, policy and practice must tie in together objectively for effective intervention.

Today's desirable intervention should consist of high quality remedial instruction combined with the appropriate adaptations of curriculum and classroom-based instruction. The individual educational plans for each child should be based on clear understanding of his underlying deficits and strengths, and should be co-designed by both general and special educators. Factors critical to the success of intervention for children with specific learning disabilities include 1) individualized quality remedial programme as part of supported inclusion as described above; 2) effective progress monitoring and the availability of intervention across settings (school, home), across the year (school, holidays), and across the years as the child goes from grade to grade; 3) the teaching of learning strategies to these children for use in context of the subject contents; and 4) the availability of accommodations such as extended time on tests and compensatory strategies such as digital recorders according to what is required of their particular learning disability. These are especially essential as the children go into secondary grades. The children and parents should also be guided to understand their own special needs and to develop an ability to mobilize resources to meet ongoing challenges.

Much as scientific progress should bring uniformity in understanding, often it did not lead to coherence in practical application. In countries where legislation has been formulated to safeguard educational rights of children with learning disabilities, uneven implementation of these laws and continuing lack of required standards in practice have led to the lamentable outcomes for many affected individuals.

**Outcomes**

Outcomes for individuals with SLD have been found in many places to be far from favourable. Many assumptions and instruments used in measurement of learning parameters did not meet professional standards, and many accepted and expensive interventions could not be validated. The absence of effective identification and intervention for individuals with SLD has been known to pose an enormous price not only on the individuals. The life long issues of those affected impact correspondingly on society. The United States' Education Department and their national institutes' figures attest to the negative implications of inadequate or unavailable intervention:

35% of students identified as having SLD drop out of high school. This figure did not include students who were not identified and dropped out.

50% of juvenile delinquents tested were found to have undetected SLD.

Up to 60% of adolescents in treatment for substance abuse have SLD.

31% of adolescents with SLD will be arrested 3-5 years after leaving high school.

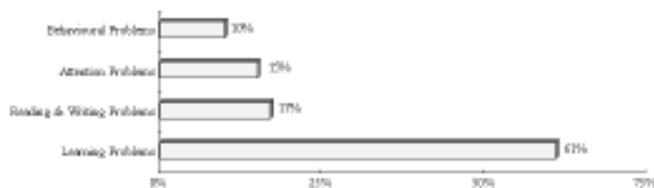
These are unacceptably high prices for our children and society to pay, particularly when measures to intervene are available but not taken.

**Experience in Hong Kong from Child Assessment Service in 1998**

During 1998 in CAS, 203 children were diagnosed to have one or more of the conditions subsumed under the group of specific learning disabilities. While most of these children were referred to CAS during the year 1998, a number of them were "old cases" who have presented earlier with developmental language delay, clumsiness as a preschooler, behavioural problems etc., and subsequently brought to attention again because of school difficulties. In 1998, the number of children of school-age referred to CAS increased 150% for 5-6 year olds and 360% for 9-10 year olds.

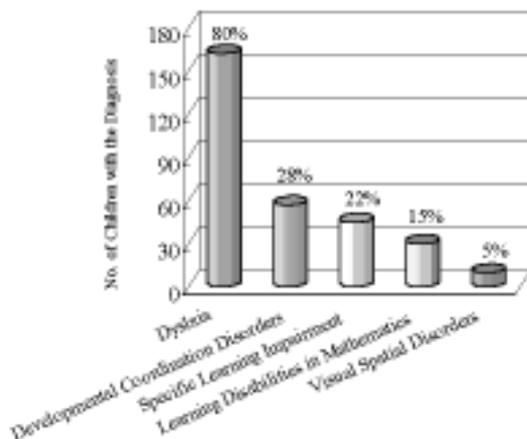
In this cohort, parents reported that their children's learning difficulties have on average been noticed at 4-5 years, although the median age of presentation to CAS was delayed until 7-8 years when these children were in primary 2-3 with significant school failure. According to parents, most have not been given direct specific intervention at school, and parents had to look elsewhere for help.

At the time of seeking help, complaints included both general and specific complaints about school performance and behaviour. For access to CAS service, physicians in private and public outpatient services were often approached for making this referral. Unfortunately it was uncommon for the suspicion of learning disabilities to have been brought up by these children's primary care physicians. Reasons for referral to CAS in this group included "Learning Problems" in 61%, "Reading and Writing Problems" in 17%, "Attention Problems" in 15%, and general "Behaviour Problems" in 10%. (Figure 1)



**Figure 1** Chief Complaints at Referral to CAS

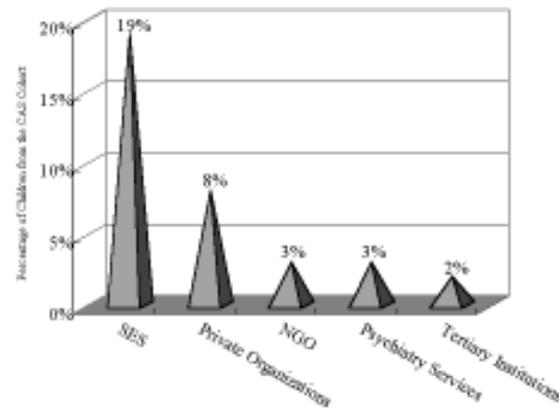
In this 1998 cohort, one or more types of SLD were diagnosed in each child. Boys out-numbered girls by 2.6:1. Conditions within this heterogeneous group with the highest incidence were dyslexia and developmental coordination disorder. The degree of co-occurrence of SLD conditions within individuals was high: 46% of children with dyslexia had at least one other co-occurring learning disability. TMCAC, one of the centres within CAS, analysed its cases from this cohort and found that dyslexia occurred in over 80%, developmental coordination disorder in 28%, specific language impairment in 22%, specific mathematics learning disability in 15% and visual spatial disorder in under 5%. Attention deficit with or without hyperactivity were also present in many of these children as a comorbid condition, which further confounded presenting symptoms. (Figure 2)



**Figure 2** Incidence of Individual Learning Disabilities in Children with SLD from the CAS Cohort

In Hong Kong, teachers of primary 1 and 2 are provided with a Checklist by the Education Department for referring children with learning problems. These children would then be evaluated by their Special Education Section. For the school year 1997-98, a total of 144 children were considered by the Special Education Section as having Specific Learning Difficulties. This compared with this paper's 203 children from CAS in the same year, of which only 38 (19%) were known to the Education Department at their time of presentation to CAS.

Aside from the education sector, 8% of this cohort were known to private organizations which take care of children with developmental and learning problems, 3% to various non-government organizations for psychosocial support, 3% to Child Psychiatry services, and 2% to tertiary institutions where different projects for SLD conditions were available at that time. (Figure 3)



**Figure 3** Services Known to Children with SLD at the Time of Referral to CAS

After full evaluation at CAS, children with SLD were referred by CAS to the Education Department for further educational support. Meanwhile, interim support was provided within CAS for 53% of these children and families in the form of individual or group training and therapy, parent guidance and psychosocial support. Support was given to facilitate the development of parent self-help groups, and parent education seminars within centres or in the community were conducted regularly on the subject.

### Conclusion

Specific learning disabilities are neither mild nor rare. Without the necessary attention, children with SLD could be handicapped for life, whereas given timely and appropriate intervention, many could accommodate and compensate for much of their disability and look forward to succeeding later in life through their other areas of strength. Recent experience at CAS strongly suggested that dyslexia and other learning disabilities are seriously under-identified in Hong Kong. The 1998 review of SLD cases diagnosed in CAS showed that despite existing mechanisms within the medical and education sectors for identifying and evaluating these children, many are not reached. Even more concerning is that, after evaluation, children with clear diagnoses of significant specific learning deficits have difficulty getting the help they need within current structures.

In short, children with dyslexia or other specific learning disabilities who cannot acquire reading or other critical skills for coping with regular education curriculum are being *deprived of an equal opportunity to learn*. Coupled with the sense of failure which accumulates from year to year in school, many of these bright but frustrated and

poorly equipped children end up as delinquents on the wrong side of the law.

It is felt that the current situation facing Hong Kong's children with dyslexia and other specific learning disabilities is *urgently in need of attention* from both the medical and educational sectors. We devote much attention to visible impairments such as physical handicap from cerebral palsy and muscular dystrophies, hearing and visual loss and mental handicap. These conditions are easily understood by the public and appeal to them for support. A developed society as Hong Kong should have professionals who can identify conditions which are less apparent but no less handicapping and deserving of attention, and have equal resources to support these affected individuals. Sadly today, many Hong Kong's professionals are still not aware of the evidence which science has brought along, and claim that these conditions are in fact rare or not important. Even more distressing is that professionals often put blame on these children and their parents for wanting to "use labels" as excuses for school failure.

Much needs to be done in raising the medical profession's awareness of these conditions, especially among paediatricians who provide longitudinal care and support to developing children. Learning disabilities are legitimate concerns and responsibilities of those in medicine, neuroscience, speech and language, occupational and physical therapy, education and clinical psychology and of education generally. For this subject to advance both in its fundamental scientific understanding as well as their applications, the various disciplines must be willing to communicate openly, align theoretical framework and definitions, share practical experience, collaborate to achieve smooth interfacing of services, and contribute to compiling epidemiological data on these conditions.

Hong Kong's child health care has now evolved from the era of merely saving lives, through one which aims at treating and preventing disease, to today's stage where promotion of health, maximizing potential for self fulfillment and protection of children's rights are targets. In these respects, paediatricians' role towards these children with special developmental needs cannot be denied.

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