

# Abbreviating a Learning Difficulties Checklist for Clinical Use



**DYSLEXIA ASSOCIATION OF SINGAPORE**  
HELPING DYSLEXIC PEOPLE ACHIEVE



## Introduction

The Dyslexia Association of Singapore (DAS) conducts psycho-educational assessments for dyslexia and other specific learning differences. The assessment process entails the triangulation of background information about a child's learning from significant others as well as standardised test results.

The Learning Difficulty Checklist (LDC), which was created by the DAS and used as part of the formal assessment process, was found to be effective in discriminating children with any learning disorder from those who did not have them. However, it was less effective in discriminating children with dyslexia from those with other learning disorders. As such, it was timely to do further analyses to remove items that may be redundant to the assessment process and to shorten the LDC to make it easier for parents to complete.

## Aim

To abbreviate the LDC without compromising information crucial for formal assessments, as parental feedback suggested that completing the LDC is time consuming and tedious.

## Method

- We extracted parental ratings from 200 completed LDCs from DAS' archival database. Parents had completed the LDC as part of the application process for an assessment for dyslexia.
- The LDC consisted of 53 items from 6 categories, with each item rated on 6 point scale - Writing/Spelling, Reading, Motor Skills, Speech, Behaviour, & Other Related Symptoms.
- We derived standardized scores from formal assessment of the child's literacy skills to indicate level of dyslexic difficulties. These include scores in Word Reading, Phonological Decoding, and Spelling.
- We conducted an exploratory factor analysis (EFA) to extract 6 factors from the LDC and conducted correlation analyses between the factor scores and standardized (literacy) scores.
- Based on the initial factor and correlation analysis, items were deleted if they (a) had low factor loadings or (b) did not correlate significantly with the standardized (literacy) scores. However, some items were still retained despite non-significant correlations due to both clinical and operational judgments. Overall, 20 items, including all items from the Other Related Symptoms section were removed.
- We conducted correlation analyses between the new factor scores and standardized scores to determine if the shortened LDC was effective.

## Results

Table 1. Items with Factor Loadings > .550 For 6 Factor Extraction for Initial 53 Items

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
<b>Items Extracted</b>	7 Behaviour Items	5 Writing/Spelling Items + 3 Reading Items	7 Speech Items	4 Motor Skills Items	3 Writing/Spelling Items + 4 Reading Items	3 Other Related Symptoms Items
<b>Cumulative Variance</b>	29.152	37.032	42.498	47.330	51.506	55.348

Table 2. Items with Factor Loadings > .550 For 5 Factor Extraction for Subsequent 33 Items

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Note:
<b>Items Extracted</b>	7 Behaviour Items	7 Speech Items	5 Writing/Spelling Items + 3 Reading Items	3 Writing/Spelling Items + 4 Reading Items	4 Motor Skills Items	For both exploratory factor analyses, the method of extraction was principal components with varimax rotation
<b>Cumulative Variance</b>	32.270	42.756	49.961	56.385	61.804	

Table 3. Correlation of Standardized Scores with Initial 6 Factor Scores

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
<b>Word Reading</b>	.096	-.046	-.049	.063	-.235**	-.025
<b>Phonological Decoding</b>	-.006	-.209**	-.052	-.024	-.152	.075
<b>Spelling</b>	.123	.024	-.036	.080	-.151	.041

Table 4. Correlation of Standardized Scores with Subsequent 5 Factor Scores

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Note:
<b>Word Reading</b>	.076	-.038	-.073	-.212**	.101	** Significant at .01 level
<b>Phonological Decoding</b>	.001	-.055	-.220**	-.123	-.026	* Significant at .05 level
<b>Spelling</b>	.119	-.021	-.015	-.127	-.103	

## Discussion & Future Directions

- Results of the analyses suggest that it is possible to create a shortened version of the DAS' LDC while still retaining its overall usefulness in predicting dyslexic outcomes.
- When examining the pattern of correlations between the standardized and factor scores between the original LDC and that of the shortened LDC, they seemed comparable, suggesting the shortened LDC could be used in place of the original LDC. The statistical analyses also gave further information as to which factors correlated with standardized scores indicating level of dyslexic difficulties.
- Based on the EFA, we were able to group items into more meaningful categories within the LDC. Although some factors such as "Behaviour" were not highly predictive of dyslexia per se, these were kept as they give useful information for clinical evaluations of other issues that may interfere with learning and necessary for holistic evaluations of the child's profile.
- The new shortened version of the LDC comprising 34\* items will be used in place of the current 53-item version, thus effectively making it more practical and useful for parents and DAS psychologists.
- Surprisingly, factor scores in which some spelling items loaded onto did not correlate significantly with standardized scores of spelling. We could explore refining the items regarding spelling on the LDC for future research.
- Future research can also explore refining items in Writing & Spelling and Reading sections to achieve higher correlations with standardized scores of formal assessment.

## Items on the Learning Difficulty Checklist

WRITING & SPELLING		
Poor handwriting	2	3
Poor spelling	2	3
Messy, badly organised work	2	3
Puts figures or letters the wrong way round e.g. 6 / 9, b / d		
Cannot write in a straight line	2	3
Has trouble copying from the board in class	2	3
Puts letters in the wrong order in words e.g. todl for told	5	4
Mixes capital and small letters within words e.g. dysLexia	5	4
Spells a word several different ways in the same piece of work	5	4
Poorly organised compositions		
Writes poorly compared to spoken language ability		
Has trouble remembering the order of strokes in Chinese characters		

SPEECH		
Finds it difficult to express thoughts	3	2
Communicates more with gestures rather than words	3	2
Pauses during speech to find the words he wants to use, gives up in mid-sentence	3	2
Uses words without attaching the usual meaning to them	3	2
Says irrelevant things during conversations	3	2
Mixes sounds in or between words e.g. tebbie-dare for teddy bear		
Has difficulty reporting events in their correct order	3	2
People who do not know your child well have difficulty understanding what he says	3	2

BEHAVIOUR		
Gives up easily		
Easily distracted and appears inattentive	1	1
Has difficulty sitting still on a chair for more than 5 minutes	1	1
Cannot concentrate for more than 20 minutes	1	1
Misplaces and loses personal items	1	1
Throws tantrums for no apparent reason	1	1
Refuses to follow instructions despite being able to understand them	1	1
Can't wait to take turns	1	1

MOTOR SKILLS		
Has difficulty catching a ball	4	5
Has difficulty colouring within lines	4	5
Has difficulty cutting along lines with scissors	4	5
Is unusually clumsy	4	5

OTHERS RELATED SYMPTOMS		
Confuses left and right		
Unable to remember the days of the week in order		
Unable to remember the months of the year in order		
Has difficulty with Maths		
Has difficulty organising tasks and activities		
Does not finish work on time in class		
Forgets to bring books to school		
Makes careless mistakes		6
Understands schoolwork but does badly in tests		6
Learns and understand something but has forgotten it by the next day		6
Has difficulty remembering and carrying out instructions in order		

### Legends

- Denotes items with factor loading > 0.55 for initial 6 factor extraction, number within denotes the factor in which the item loaded onto (see results section)
  - Denotes items with factor loading > 0.55 for subsequent 5 factor extraction, number within denotes the factor in which the item loaded onto (see results section)
  - Denotes items with low factor loading (i.e., < 0.55) for initial 6 factor extraction and thus not included in subsequent 5 factor extraction
  - Not included in exploratory factor analysis but retained in LDC due to clinical and operational value
- Note: All items in "Other Related Symptoms" section not included in subsequent factor analysis

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### References

Lim, L., Chua, M.Q., Sim, W.J., Tan, J., Tan, J., Liow, J. J., & Tan, W. P. (2015). Screening of Dyslexia in Singapore: The Use of Computerized Screening and Parental Ratings on a Checklist Investigated. *Poster presented at 66<sup>th</sup> International Dyslexia Association Conference, Grapevine, Texas.*

## References

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