

# Singapore Longitudinal Early Development Study (SG LEADS)



## Panel Survey Wave 2

### Technical Report 10

#### Evaluation of the Interviewer Effect in Woodcock-Johnson Test of Achievement in SG LEADS in Wave 2

Chen Xuejiao, Weijun Jean Yeung

Centre of Family and Population Research  
National University of Singapore

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In the Wave 2 of Singapore Longitudinal EARly Development Study (SG LEADS), children aged 3 years and above participated in the Woodcock-Johnson IV Test of Achievement (WJ IV-ACH). The assessment includes four subsets: (1) Letter-Word Identification, (2) Passage Comprehension, (3) Calculation, and (4) Applied Problems. The WJ Test is administered only if the child is able to speak or understand English. Among the 3,968 SG LEADS children aged 3 and above, 4 did not participate in the WJ assessment because they do not understand English. Therefore, we end up with 3,964 children for the assessment. Table 1 shows the age distribution of eligible children and participants.

Table 1. Age Distribution of the Sample

Age	Children aged 3 and above	Children who took WJ test
3	606	603
4	702	702
5	689	688
6	653	653
7	635	635
8	591	591
9	92	92
Total	3,968	3,964

During the fieldwork of SG LEADS, trained interviewers, who had undergone one week of training for the study, administered the WJ test in person at the child’s home. The interviewers were instructed to request for a quiet area, for example, a room or a quieter corner in the house - to administer the test whenever possible. The interviewers explained the test to the parents or other adults present at home and requested no interference or assistance from adults during the test. The interviewers were instructed to spend some time building rapport with the child first before administering the test. Then the interviewers explained to the child what the test entails and what the rules are, and a short example test was administered to demonstrate the rules. The interviewers were instructed to start the test and record the duration of each test with the help of the CAPI system only when the child understands the rules. A colored test easel was presented to the child, and the child was asked to respond verbally to the questions and the interviewers recorded the child’s answer in a response booklet. The child was allowed to skip any questions he or she does not know. Scoring was done back in the central office after the response booklet was submitted to the office to reduce scoring errors.

The number of WJ assessments completed by each interviewer is presented in Table 2. As seen, 26 out of 29 interviewers have completed more than 10 assessments, with 24 interviewers completing more than 50 assessments. In total, assessments conducted by these 26 interviewers account for 99.6% of all the assessments.

Table 2. Number of Assessment Completed by Each Interviewer in Descending Order (n=3,964)

Interviewer ID	Freq.	Percent	Interviewer ID	Freq.	Percent
14071B	4	0.1	77391Z	122	3.1
32850D	5	0.1	48652H	148	3.7
24812G	7	0.2	31989I	163	4.1
32656C	14	0.4	40203D	174	4.4
71278D	14	0.4	39782Z	188	4.7

07493Z	56	1.4	29846F	194	4.9
32550D	56	1.4	32259G	211	5.3
51394J	56	1.4	28479I	225	5.7
52523E	57	1.4	32187I	232	5.9
7550111	59	1.5	07131Z	247	6.2
40083A	74	1.9	53247I	269	6.8
78903Z	87	2.2	88828A	288	7.3
43008D	93	2.4	46560E	316	8.0
36909F	104	2.6	47114J	388	9.8
82525E	113	2.9			

The description of the duration the child spent on each test by age is presented in Table 3. As seen in Figure 1, the average duration of each subtest increases as the child ages. This is consistent with the fact that older children have relatively better development in their verbal and numeracy skills, thus answer more questions and spend more time on the test (for the developmental trend of each test by the child's age, refer to the technical report on the WJ test Singapore norming).

Table 3 Duration (in minutes) of Each Subtest by Age

Age in years	n	Mean	Min	P25	Median	P75	P99	Max
<b>3</b>								
Letter-Word Identification	592	3.0	0.1	2.0	2.5	3.5	11.7	30.9
Applied Problems	589	3.8	0.1	2.3	3.4	4.8	10.2	24.1
Passage Comprehension	587	4.4	0.1	2.7	3.9	5.5	11.5	22.7
Calculation	593	1.3	0.1	0.5	0.9	1.6	7.3	12.2
<b>4</b>								
Letter-Word Identification	692	3.2	0.3	2.1	2.7	3.5	11.1	61.5
Applied Problems	694	4.5	0.2	2.9	4.0	5.6	12.5	19.8
Passage Comprehension	694	4.9	0.2	3.1	4.4	6.0	13.3	21.0
Calculation	694	3.2	0.1	1.2	2.3	4.4	14.4	23.6
<b>5</b>								
Letter-Word Identification	676	3.7	0.6	2.5	3.2	4.2	15.3	32.8
Applied Problems	680	6.1	0.2	3.9	5.4	7.5	19.3	29.0
Passage Comprehension	678	6.2	0.6	4.0	5.6	7.9	16.2	19.0
Calculation	679	4.7	0.2	2.6	4.2	6.2	13.5	33.8
<b>6</b>								
Letter-Word Identification	646	3.8	0.6	2.6	3.4	4.3	11.1	41.5
Applied Problems	647	8.3	0.1	4.7	7.3	10.7	26.3	39.2
Passage Comprehension	646	7.7	0.7	5.3	7.2	9.4	18.1	29.1
Calculation	645	5.7	0.1	3.8	5.3	7.3	13.0	19.3
<b>7</b>								
Letter-Word Identification	626	3.6	0.6	2.4	3.2	4.2	9.8	14.9
Applied Problems	631	11.5	0.6	6.8	10.4	15.0	30.7	65.1
Passage Comprehension	627	8.4	0.7	5.9	7.8	10.1	19.5	28.9
Calculation	632	6.6	0.1	4.7	6.2	8.1	16.3	23.8
<b>8</b>								
Letter-Word Identification	576	3.3	0.8	2.2	3.0	3.8	9.1	60.8

Applied Problems	583	13.5	0.6	9.2	13.0	17.8	31.0	39.1
Passage Comprehension	583	9.3	0.6	6.6	8.7	11.2	23.8	35.9
Calculation	582	7.3	0.1	5.3	6.8	9.0	17.6	21.3
9								
Letter-Word Identification	90	3.0	1.2	2.2	2.8	3.5	7.5	7.5
Applied Problems	92	14.6	2.1	10.7	14.0	18.5	27.0	27.0
Passage Comprehension	92	8.4	2.1	6.6	7.9	9.9	18.8	18.8
Calculation	91	7.3	1.3	5.2	6.6	8.7	24.7	24.7
Total								
Letter-Word Identification	3,898	3.4	0.1	2.3	3.0	4.0	11.1	61.5
Applied Problems	3,916	8.0	0.1	3.8	6.1	10.8	26.6	65.1
Passage Comprehension	3,907	6.8	0.1	4.2	6.2	8.7	18.5	35.9
Calculation	3,916	4.8	0.1	2.1	4.5	6.8	14.7	33.8

Note: P25 refers to the 25 percentile, and P75 refers to the 75 percentile.

For each test, cases where the duration is of the test is negative or 0 minutes, or the duration is less than 0.5 minute while the child had at least one correct answer were excluded from the analysis of the duration shown in this table. These short durations may happen due to interviewer error.

For the full assessment, 75% of all the children spend 30.1 minutes or less (Table 4). The 75<sup>th</sup> percentile of duration for 3- to 5- year-olds are below 30 minutes, while it is 30 to 40 minutes for 6 to 9 years.

Table 4. Total Duration of the Whole Assessment

Age in Years	n	Mean	P1	P25	P50	P75	P99
3	568	12.4	4.0	8.7	11.4	15.2	28.3
4	672	15.7	5.9	11.0	14.1	19.2	41.2
5	659	20.8	8.0	14.9	19.5	25.1	49.5
6	630	25.6	9.9	18.7	24.1	30.8	56.9
7	619	30.2	12.3	22.7	28.8	35.4	61.0
8	568	33.5	11.4	26.0	32.4	39.9	63.3
9	89	33.3	11.3	27.4	33.0	39.1	54.3
Total	3,805	23.2	6.0	14.1	21.3	30.1	55.7

Note: P25 refers to the 25 percentile, and P75 refers to the 75 percentile.

Total duration only includes cases with no missing values in time stamps of all 4 subtests.

Next, we employed the Multilevel Modelling (MLM) to examine the interviewer effect on children's achievement scores measured by Wscore generated by the WJ offline solution. The SG LEADS adopts a multi-stratified sampling strategy where the sample is nested within 34 planning areas across five planning regions in Singapore. In Wave 2, households in 32 planning areas are successfully re-interviewed. For the MLMs, we nested the interviewers within the 32 W2 planning areas. Two models were built to test the interviewer-level effect for each subtest: a null model without any control, and a control model with several individual level controls. The controls include the child's age in months, gender, the child's race, biological/adoptive parents' educational level and housing type (refer to appendix 1 for the MLM results).

The intra-class correlation (ICC) of the interviewer-level effect for each subtest is presented in Table 5. As shown in model 2 in Table 5, the interviewer-level effect accounts for 1.3% of the variance observed in the Letter-Word Identification subset, 0.7% for that of the Applied Problems subset, 2.5% in the Passage Comprehension subset and 0.9% in the Calculation

subset. Overall, the interviewer effect is less than 3% for the subsets, which suggests a satisfactory level of standardization of the SG LEADS cognitive assessment.

Table 5 Intra-class Correlation (ICC) of Interviewer-level effect by Subtest

	Model 1 without controls	Model 2 with individual-level controls
Letter-Word Identification	1.2%	1.3%
Applied Problems	2.0%	0.7%
Passage Comprehension	1.6%	2.5%
Calculation	0.9%	0.9%

Appendix A. MLM on the Interviewer-level Effect for Each Subtest

	Letter-Word Identification		Applied Problems		Passage Comprehension		Calculation	
Age in months	2.848***		1.615***		1.837***		1.916***	
	(0.0281)		(0.0175)		(0.0233)		(0.0165)	
Boy	0.302		-0.632		2.041**		-1.573**	
	(1.160)		(0.724)		(0.962)		(0.680)	
Children's race (ref. Chinese)								
Malay	-5.238***		-14.17***		-7.155***		-8.911***	
	(1.592)		(0.991)		(1.325)		(0.933)	
Indian	-4.888**		-11.59***		-5.199***		-7.728***	
	(2.080)		(1.297)		(1.727)		(1.219)	
Others	0.108		-6.800***		-1.991		-6.392***	
	(3.292)		(2.051)		(2.737)		(1.928)	
Mother's education	3.619***		2.428***		2.449***		1.496***	
	(0.399)		(0.249)		(0.331)		(0.234)	
Father's education	2.739***		1.551***		1.243***		1.155***	
	(0.406)		(0.253)		(0.337)		(0.238)	
Housing type (ref. HDB 1- and 2-room flats)								
HDB 3-room flats	7.412***		5.697***		3.234*		2.153	
	(2.302)		(1.434)		(1.913)		(1.350)	
HDB 4-room flats	13.27***		8.622***		6.756***		5.312***	
	(2.360)		(1.469)		(1.963)		(1.387)	
HDB 5-room flats	17.19***		11.55***		9.847***		6.856***	
	(2.593)		(1.614)		(2.156)		(1.525)	
Condos and Landed Properties	16.07***		12.03***		10.46***		6.572***	
	(2.884)		(1.795)		(2.400)		(1.695)	
Constant	418.2***	167.0***	436.5***	295.2***	424.8***	264.5***	425.3***	273.0***
	(1.273)	(3.857)	(0.827)	(2.403)	(0.889)	(3.204)	(0.783)	(2.269)
Observations	3,948	3,930	3,964	3,930	3,964	3,930	3,964	3,930
Number of groups (planning area)	32	32	32	32	32	32	32	32
ICC planning area	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.003
ICC interviewer	0.012	0.013	0.020	0.007	0.016	0.025	0.009	0.009

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1