

POPULATION-LEVEL ASSESSMENT OF READINESS TO LEARN AT SCHOOL FOR 5-YEAR-OLDS IN CANADA: RELATION TO CHILD AND PARENT MEASURES

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(Presented at the SRCD Meeting, Minneapolis, April 2001)

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INTRODUCTION

There has been an increased interest in establishing a reliable, psychometrically sound, acceptable and reasonably priced measure of children’s readiness to learn at school that could be easily interpretable at a group level.

In 1998 we began developing a population-level instrument measuring children’s readiness to learn at school before entry to Grade 1. The measure, called the Early Development Instrument (EDI), is a teacher-completed checklist focusing on five developmental domains relevant to children’s readiness to learn at school: physical health and well-being; social competence; emotional maturity; language and cognitive development; and communication skills and general knowledge. All items are characteristics of the child’s observable performance or behaviour in kindergarten. Preliminary versions of the instrument have been tested for validation purposes with small samples in early 1998. However, since the EDI is being used in an increasing number of communities, and the data gleaned from the EDI results are based solely on teacher information, there is a continuing need to carry out supplemental validation studies in order to ensure that the EDI maintains the expected properties and relation to independently-obtained child and family characteristics.

Here we present the results of one such validation study. In addition to teacher-completed EDI, data was completed directly from students on their cognitive functioning, and parents were interviewed about many aspects of the children’s life. Detailed socioeconomic data is also available on these families.

METHODS

In April of 1999, teachers in the former Toronto and North York cities of the amalgamated Toronto District School Board in Ontario, Canada, completed the Early Development Instrument (EDI) for all Senior Kindergarten children. In the city of North York, this resulted in data for 4528 children in 86 schools. The mean age at testing was 5.9 years.

In collaboration with the National Longitudinal Study of Children and Youth (NLSCY) carried out by the Human Resources Development Canada, a representative sample of 480 children was selected from the above group.

The table below lists the characteristics of the children and families in the sample. For some analyses, the sample was split into children who were classified as speaking English as the Second Language (ESL) and those who were not ESL. This classification was based on school board requirements in terms of additional instruction in English and therefore is not synonymous with classification based on the first language.

	Full sample	Non-ESL	ESL
N	480	353	127
Age (mean)	5.8 years	5.8 years	5.8 years
Gender (% girls)	49.2%	50.7%	45.0%
% Children born in Canada	84.7%	90.2%	68.5%
N people in household (mean)	4.4	4.3	4.7
% One-parent families	22.4%	24.9%	15.5%
Income in \$10,000 increments (median)	\$50,000-59,999	\$50,000-59,999	\$30,000-39,999

	Full sample	Non-ESL	ESL
Mother's age (mean)	34.9 years	35.1 years	34.1 years
Father's age (mean)	39.2 years	39.4 years	38.6 years
Mother's education in years (mean)	13.0 years	13.2 years	12.2 years
Father's education in years (mean)	13.9 years	14.1 years	13.4 years
First language (three most frequent):	English: 52.7% Tamil: 7.3% Cantonese: 5.4%	English: 72.0% Tamil: 4.3% Urdu: 2.6%	Tamil: 18.9% Punjabi: 10.4% Urdu: 9.4%

Families whose children were classified as Non-ESL had significantly less people in households, more single-parent families, higher income, mothers and fathers with more years of education than families of ESL children. Other variables were not statistically significant.

DIRECT COGNITIVE MEASURES

The children were tested directly for their cognitive and language abilities with two tests:

- **Peabody Picture Vocabulary Test (PPVT)** (Dunn & Dunn, 1988) is a test of receptive language which provides a brief index of cognitive functioning. The PPVT score is considered to be a reasonably reliable approximation of the IQ.

- **Who Am I** (De Lemos et al. 1999) is a nonverbal language assessment, which provides a reliable measure of development and is valid across different cultural groups, including children whose knowledge of English is limited. It comprises three scales: copying circle, cross, square, triangle, diamond), symbols (printing name, letters, numbers, words, sentences), and drawing (a picture of self). The Who Am I is suitable for children age 3-7.

PARENT INTERVIEW

Interview questions for parents covered issues in several categories:

- **family socioeconomic status:** income, education, immigration status, intact family status, etc.
- **health:**
 - parental: history of illnesses, smoking, drinking
 - child: illnesses, hearing, vision, visits to the doctor etc.,
- **parent support of child's literacy-related activities:** frequency of reading to/with child, frequency of visiting a library, etc.
- **parent perceptions of neighbourhood:** frequency of contacts with neighbours, perception of availability of resources, and of neighbourhood quality

ANALYSES

While direct answers were used for some analyses, sometimes variables were derived from the parent interview. For example:

Health Utility Index: a generic health status index, providing a description of an individual's overall functional health, based on eight attributes: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), and pain and comfort. The values range from 0-1 with 1 representing high overall function.

Sometimes, answers were combined into *low/high* to allow for categorical analyses. For example:

Family income: Low – below Can\$ 30,000 per year, High – Can\$ 30,000 per year or higher.

Two types of analyses were carried out. First, for continuous variables, correlation coefficients with the EDI domain scores were calculated. Second, for categorical variables, chi-square tests were calculated comparing children who scored very poorly on the EDI (see below for definition) with those who did not.

EARLY DEVELOPMENT INSTRUMENT (EDI)

The Early Development Instrument (EDI) is a teacher-completed checklist assessing a child's developmental outcome in five domains: physical health and well-being, social competence, emotional maturity, language and cognitive development, communication and general knowledge. It measures readiness to learn at school, conceptualized as a child's ability to meet the task demands of school, such as being cooperative, sitting quietly and listening to the teacher, and to benefit from the educational activities that are offered by the school (Doherty 1996, Janus & Offord 2000).

The instrument was first used on a large scale in 1998/99 school year, providing data on over 16,000 students in Canada. In 1999/2000, data was collected for over 45,000 children. In the 2000/1 we expect to have data on further 25,000 of children; in some communities the data collection will have occurred in three consecutive years.

Each domain is scored on the 0-10 scale, where 0 is the worst, and 10 the best score. The results for each domain were divided into percentiles (based on all 4528 students) to facilitate interpretation. **Children with scores in the lowest 10% of the data (below the 10th percentile) in one or more domains were considered as having serious problems.**

Thus, the percentage of children in the population who score in the lowest 10th percentile in one or more domains could be interpreted as an indication of how many children are "not ready to learn at school", or have "increased needs" in comparison with the rest of the population. While there is not very much variation in this percentage among various communities (it usually ranges between 21% and 26%, with an average of 24.5%), it varies from 0 to as much as 75% among schools within communities and provides a reliable indicator of areas where children are at risk for social and academic problems.

In the whole sample of the 4528 kindergarten students in North York, 1209 or 26.7% scored in the lowest 10% in one or more domains. In the current subsample of 480, 102 or 21.2% students scored in the lowest 10% in one or more domains.

Below are average descriptions of children who scored in the lowest 10% on each of the five domains:

Physical health and well-being

A child with average or poor fine (e.g., holding a pencil, manipulating objects) and gross (e.g., climbing stairs) motor skills, often tired, usually clumsy, with flagging energy levels, and average or poor overall physical development.

Social competence

A child with poor overall social skills, with regular serious problems in more than one area of getting along with other children, accepting responsibility for own actions, following rules and class routines, respect for adults, children, and for other people's property, with self-confidence, self-control, adjustment to change, usually unable to work independently.

Emotional maturity

A child with regular problems with managing aggressive behaviour, prone to disobedience, and/or easily distractible, inattentive, impulsive, usually unable to show helping behaviour towards other children, and who is sometimes upset when left by the caregiver.

Language and cognitive development

A child with serious problems with both reading/writing and numeracy, unable to read and write the simplest words, uninterested in trying and often unable to identify letters and attach sounds to letters, has

difficulty with remembering things, counting to 20, recognising and comparing numbers, shapes, and with time concepts and is usually not interested in numbers.

Communication skills and general knowledge

A child with poor communication skills and articulation, whose command of English is poor or very poor, who has difficulties in talking to others, understanding, and being understood, has poor general knowledge.

RESULTS

CORRELATIONS OF THE EDI DOMAINS WITH THE RESULTS OF TWO DIRECT COGNITIVE TESTS

The table below shows correlations between the results of direct cognitive testing of students and the EDI scales (Pearson r).

EDI Scales	PPVT-R			Who Am I		
	Full Sample	Non-ESL	ESL	Full Sample	Non-ESL	ESL
Physical health and well-being	0.05	0.03	0.05	0.14**	0.15**	0.12
Social competence	0.22**	0.20**	0.20*	0.38**	0.36**	0.45**
Emotional maturity	0.11*	0.11	0.12	0.36**	0.36**	0.34**
Language and cognitive development	0.26**	0.25**	0.23*	0.46**	0.44**	0.56**
Communication and general knowledge	0.57**	0.48**	0.40**	0.22**	0.23**	0.45**

* correlation significant at the p<.05 level; ** at the p<.01 level; *** at the p<.001 level

The EDI scales were all positively correlated with children’s language and cognitive abilities; the strongest correlations were found, as expected, between the two language/cognition related scales (Language and cognitive development, Communication skills and general knowledge) and the PPVT and Who Am I test scores.

CORRELATIONS OF THE EDI DOMAINS WITH FAMILY AND SCHOOL VARIABLES FROM THE PARENT INTERVIEW

PART I – SES/FAMILY CIRCUMSTANCES

Variables	SES/Family circumstances							
	Income		Education		Times moved in child’s lifetime		Health Utility Index (HUI)	
	Non-ESL	ESL	Non-ESL	ESL	Non-ESL	ESL	Non-ESL	ESL
N	265	108	350	127	352	128	226	92
Physical health and well-being	0	.06	.04	0	0	-.10	.11	.09
Social competence	0	-.05	.14*	0	0	-.12	.25***	.03

Variables	SES/Family circumstances							
	Income		Education		Times moved in child's lifetime		Health Utility Index (HUI)	
	Non-ESL	ESL	Non-ESL	ESL	Non-ESL	ESL	Non-ESL	ESL
Emotional maturity	0	0	.04	0	0	-.19*	.33***	.22*
Language and cognitive development	.12*	-.06	.19***	.23*	0	-.05	.26***	.21*
Communication skills and general knowledge	.32***	0	.21***	.09	-.07	-.21*	.21**	.22*

* correlation significant at the p<.05 level; ** at the p<.01 level; *** at the p<.001 level

- “ESL” – English as a Second Language families
- Income – categorical variable, varying from 1 (less than Can \$10,000) to 9 (Can \$80,000 or more) in Can \$10,000 increments.
- The Health Utility Index (HUI) – a generic health status index, providing a description of an individual’s overall functional health, based on eight attributes: vision, hearing, speech, mobility (ability to get around), dexterity (use of hands and fingers), cognition (memory and thinking), emotion (feelings), and pain and comfort. The values range from 0-1 with 1 representing high overall function.

CORRELATIONS OF THE EDI DOMAINS WITH FAMILY AND SCHOOL VARIABLES FROM THE PARENT INTERVIEW

PART II – INTERACTION WITH PARENTS/SCHOOL

Variables	Interaction with parents				School	
	Frequency reading with child		Frequency talking with child about books		Times contacted by school re negative behaviour	
	Non-ESL	ESL	Non-ESL	ESL	Non-ESL	ESL
N	337	116	340	128	352	128
Physical health and well-being	.09	.14	.14**	-.06	-.12*	-.12
Social competence	.14**	.05	.12*	-.11	-.29***	-.08
Emotional maturity	.11*	.16	.07	-.08	-.32***	-.35**
Language and cognitive development	.22***	.28**	.20***	-.10	-.14**	-.36**
Communication skills and general knowledge	.18**	.25**	.16**	-.05	-.12*	-.22*

* correlation significant at the p<.05 level; ** at the p<.01 level; *** at the p<.001 level

- “ESL” – English as a Second Language families
- Frequency – from “No more than a few times a month” (1) to “Daily” (7).
- Times contacted by school re negative behaviour – from “Never” (1) to “Five times or more” (4)

VARIABLES CONTRIBUTING TO CHILDREN'S LOW SCORES ON THE EDI
(LOW READINESS TO LEARN)

1. Child-related variables and percent of children scoring in the lowest 10th percentile in one or more domains.

Variable	Categories	N scoring in lowest 10 th percentile	Percent	χ^2 (df=2)	p
Child's health	Fair/poor N=80	27	33.8%	8.44	.01
	Good/excellent N=326	74	18.5%		
Child's gender	Boy N=243	68	30.0%	13.44	.001
	Girl N=237	33	13.9%		
Attended JK	No N=33	11	33.3%	2.36	0.12
	Yes N=442	90	20.4%		
Age started day care	Less than 6 months N=30	10	33.3%	2.39	0.12
	7 months & up N=125	23	18.4%		

2. Parent/family-related variables and percent of children scoring in the lowest 10th percentile in one or more domains.

Variable	Categories	N scoring in lowest 10 th percentile	Percent	χ^2 (df=2)	p
Mother's health	Fair/poor N=137	38	27.7%	4.91	.02
	Good/excellent N=276	61	18.1%		
Father's smoking	Yes N=83	22	26.5%	5.61	.01
	No N=288	42	14.6%		
Low family income	Less than \$30,000/year N=77	21	27.3%	5.31	.02
	\$30,000/year or more N=296	45	15.2%		
Intact family (same two-parent family from birth)	No N=120	37	36.6%	8.46	.01
	Yes N=360	64	17.8%		
Father's health	Fair/poor N=86	22	25.6%	4.58	.03
	Good/excellent N=283	42	14.8%		

Variable	Categories	N scoring in lowest 10 th percentile	Percent	χ^2 (df=2)	p
Mother's smoking	Yes N=52	14	26.9%	<1	ns
	No N=422	85	20.1%		
Mother's country of birth	Not Canada N=304	66	21.7%	<1	ns
	Canada N=121	21	17.4%		

3. Neighbourhood-related variables and percent of children scoring in the lowest 10th percentile in one or more domains.

Variable	Categories	N scoring in lowest 10 th percentile	Percent	χ^2 (df=2)	p
Neighbourhood quality (including playgrounds, safety, health, transport, families with children etc.)	Low N=65	22	33.8%	3.39	.02
	Middle/high N=323	64	19.8%		
Parent's perception of presence of resources in neighbourhood	Absent N=55	11	20.0%	<1	ns
	Present N=348	75	21.6%		
Frequency of contacts with neighbours (talking, visiting)	Rarely/never N=76	24	31.6%	5.52	.01
	Sometimes/ Frequently N=395	75	19.0%		

CONCLUSIONS

Validation with independent measures

- The two most cognitively-oriented Early Development Instrument scales (Language and Cognitive Development, and Communication Skills and General Knowledge) showed acceptable correlations with direct tests of children's cognitive abilities (range 0.22 to 0.57). These correlations held for children classified as learning English as a Second Language (ESL).

Validation with parent report:

- The EDI scales showed a number of expected correlations with parent responses. For example, the EDI results were clearly better if the parents were more educated, healthier, and read more frequently with child. In some areas, however, the Non-ESL sample showed different patterns than the ESL sample. For example, the income was significantly correlated with child's EDI results only in the Non-ESL sample, but the number of times family moved was significantly related to the EDI scores only in the ESL sample.
- The EDI results showed expected patterns in relation to child's health or gender: children with poorer health scored worse than healthy children, and girls scored better than boys.

- A number of child and family-related factors appeared to have significant impact on children's low scores. Some of the most striking factors are: child's age at the beginning of non-parental care, father's smoking, and neighbourhood quality.
- In this particular sample, some other aspects expected to show impact on children's readiness-to-learn levels, did not do so. E.g., parent immigration status or country of birth were not related to children's low scores. While a previous study on a smaller sample showed that the number of changes in non-parental care arrangements had a negative impact on children's EDI scores, this relationship was not repeated here.

In conclusion:

This study indicates that the EDI, a teacher-completed checklist, has promising validity when compared with data collected independently from families. Since this sample comes from one urban setting, more work is needed to ensure that similar relations between EDI and direct measures exist in other populations. Based on the information we have thus far, however, we feel confident in recommending the EDI as a population-level indicator of children's readiness to learn at school.

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ACKNOWLEDGMENTS

This study was funded by the Human Resources Development Canada

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