Normative parameters of the Early Development Instrument data for the 4-year-old cohort of children

Technical Report

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The Early Development Instrument (EDI) is a 103-item questionnaire completed by kindergarten teachers in the second half of the school year that measures children's ability to meet age-appropriate developmental expectations in five general domains: physical health and well-being; social competence; emotional maturity; language and cognitive development; and communication and general knowledge. The domain scores on the EDI are measured on a scale (0 to 10) where a higher score indicates greater ability. If a child's score falls below the 10th percentile distribution cut-off in a given domain, they are identified as *vulnerable* in that domain. Children who are vulnerable in one or more domains are considered vulnerable overall on the EDI.

The instrument was originally developed in Ontario to capture the development of children in kindergarten.[1] In Ontario, children could enter kindergarten the year they turned 4 years old (Junior Kindergarten (JK) or Year 1), or the year they turned 5 (Senior Kindergarten (SK) or Year 2). While the EDI was developed and validated for children 3.5 to 6.5 years old to encompass the 2-year span of attendance, it has been adopted for wide use for the 5-year cohort, as this is the level universal in Canada. Over the past two decades, the EDI has proven to be a valid and reliable measurement of children's developmental health, within Canada and internationally.[2] While there exists a well-established EDI normative reference population for use with students who enter school in the year they turn 5 years old, it is not appropriate to apply the same developmental expectations and the corresponding statistical reference points to younger children. Since EDI data are being collected for children younger than 5, especially in jurisdictions where there are universal school options for that age, there is a need for universally applicable vulnerability indicators for a younger population.

In order to establish a normative reference group for younger children an EDI dataset which includes children who attended Kindergarten in the year they turned 4 years old (the JK cohort), comprised of 24,849 children was analyzed. These data were collected in 2003 and 2004 in Ontario, Canada and represent children from 17 different school boards across 12 regions (see Table 1 for the vulnerability rates by region). To help establish the validity of the JK data, the descriptive statistics were compared to those for the Ontario SK Cycle 1 EDI data collected from 2004 to 2006 used to create the EDI Ontario baseline.[3] The JK data had a similar sex distribution to the Cycle 1 Ontario data (female: 49.1%; 49.5%, male: 49.5%; 50.3%, respectively) and the mean age was almost exactly 1 year younger (4.73 years vs 5.70 years). The JK data had a higher percentage of children with English/French as a second language (E/FSL) than the Cycle 1 Ontario data (18.72% vs 11.49%). All domain scores were lower for the JK data than for the Cycle 1 Ontario data (see Figure 1 for domain means, where error bars represent the standard deviation and Table 2 for descriptive statistics for the JK data). While younger children are expected to have lower domain scores, having a higher percentage of E/FSL children in the JK data could also be associated with lower scores on the EDI, as having E/FSL status is an indicator of a child's level of fluency in the school's language of instruction. This is especially relevant for the two EDI domains related to language and cognitive development and communication and general knowledge.

[1] Janus, M., & Offord, D. R. (2007). Development and psychometric properties of the Early Development Instrument (EDI): A measure of children's school readiness. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 39*(1), 1.

[2] Janus, M., & Reid-Westoby, C. (2016). Monitoring the development of all children: the Early Development Instrument. *Early Childhood Matters*, *125*(1), 40-45.

[3] Early Development Instrument. (n.d.). *EDI in Ontario 2004-2018*. Https://Edi.Offordcentre.Com. Retrieved March 17, 2021, from https://edi.offordcentre.com/partners/canada/edi-in-ontario-2004-2018/

Table 1. Vulnerability rates of Junior Kindergarten children by region with 100 or more children in the dataset

	N	Physical health and well-being	Social competence	Emotional maturity	Language and cognitive development	Communication and general knowledge
Total JK dataset	**24849**	**10.9%**	**10.9%**	**9.8%**	**9.9%**	**10.3%**
Regions:						
Toronto	15601	12.4%	12.2%	9.8%	12.4%	14.1%
Durham	2868	6.7%	9.4%	9.2%	5.2%	3.8%
Peterborough	1948	9.9%	9.4%	10.5%	6.6%	3.5%
Chatham-Kent-Lambton	1286	8.5%	7.9%	9.9%	7.0%	3.3%
Thunder Bay-Atikokan	1185	7.4%	7.3%	9.0%	5.4%	4.6%
Haliburton Victoria Brock	599	7.5%	5.8%	8.3%	4.3%	2.2%
Renfrew-Nippissing-Pembroke	524	9.2%	7.8%	9.5%	5.0%	4.4%
Parry Sound-Muskoka	402	12.9%	10.4%	10.4%	5.5%	6.5%
Cochrane-Timmins-James Bay	285	13.3%	12.3%	14.0%	5.3%	7.7%
Timiskiming	110	12.7%	5.5%	12.7%	2.7%	2.7%

Figure 1. Mean domain scores for Junior Kindergarten vs Cycle 1 Ontario Senior Kindergarten

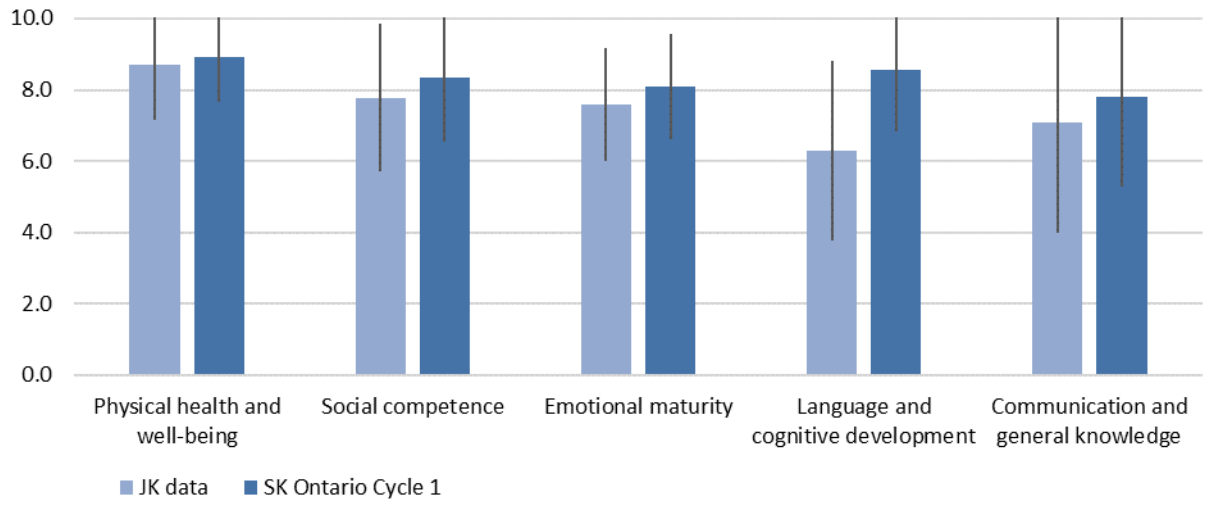

Table 2. Junior Kindergarten EDI descriptive statistics and 10th and 25th percentile distribution cut-points

		Physical health and well-being	Social competence	Emotional maturity	Language and cognitive development	Communication and general knowledge
Mean		**8.69**	**7.77**	**7.60**	**6.30**	**7.08**
StDev		1.52	2.07	1.58	2.52	3.08
Cut-point	10th percentile	6.54	4.81	5.34	2.50	1.88
	25th percentile	8.08	6.35	6.67	4.62	5.00

Junior Kindergarten Norms in perspective

Two analyses were conducted to examine the face validity of the JK norms.

First, we explored the association of JK Norms-based vulnerability with the socioeconomic status (SES) of their neighbourhood of residence. Ten socioeconomic and demographic variables, that focus on the features most important to children in their early years, available from the Canada Census and income tax data were combined into the CanNECD SES Index.[4] The index was aggregated to custom-defined neighbourhoods covering all of Canada and integrated into the EDI database. The CanNECD SES Index values were split into 5 quintiles, and neighbourhoods categorized as the highest 20th percentiles (top quintile) through the lowest 20th percentiles (lowest quintile).

As shown on Figure 2, there is a marked gradient in vulnerability in all five EDI domains in relation to neighbourhood SES, with seemingly the steepest slope on Communication and general knowledge, and the least steep in Emotional maturity. Figure 3 shows the gradients in overall vulnerability, and in vulnerability in 2 or more domains. Only 16% of children living in the highest SES neighbourhoods are vulnerable, while 35.5% of those living in the lowest SES are. The corresponding figures for SK-level neighbourhood data are 20.5% vs. 34.3%, which are remarkably similar.[5] Additionally, we conducted a regression analysis using data aggregated at the neighbourhood level and identified that neighbourhood-level socioeconomic status accounted for 29.8% of the variability in overall vulnerability. Similarly, analyses using SK-level neighbourhood data found that SES accounted for between 12% and 42% of the variance depending on province (and specifically 38% in Ontario).

Second, we explored data from the Australian version of the EDI, the Australian Early Development Index (AEDI, now Australian Early Development Census, or AEDC).[6] In Australia, children may start kindergarten at age 4 or 5 years (similar to Ontario's JK and SK levels), and therefore norms were created for each cohort. Table 3 compares the 10th percentile cut-points for each cohort between the two country datasets by age group. The only two domains that do not show remarkable similarity are the language and cognitive development, and the communication domains for JK/4-year olds, where cut-points are lower for Ontario than for Australia. Considering the contribution of almost 20% of sample by children in Ontario whose language of instruction was not English or French, these two differences appear justified.

[4] Forer, B., Minh, A., Enns, J., Webb, S., Duku, E., Brownell, M., Muhajarine, N., Janus, M., and Guhn, M. (2019). A Canadian neighbourhood index for socioeconomic status associated with early child development. *Child Indicators Research*, 1-22.
[5] Forer, et al., 2019.
[6] Brinkman, S., Goldfeld, S., Harley, S., Harper, M., Johnston, S., Kline, J., ... & Sayers, M. (2009). *A snapshot of early childhood development in Australia–AEDI national report 2009* (Doctoral dissertation, Royal Children's Hospital Centre for Community Child Health).

Figure 2. Junior Kindergarten EDI domain vulnerability rates split by neighbourhood-level SES (highest to lowest)

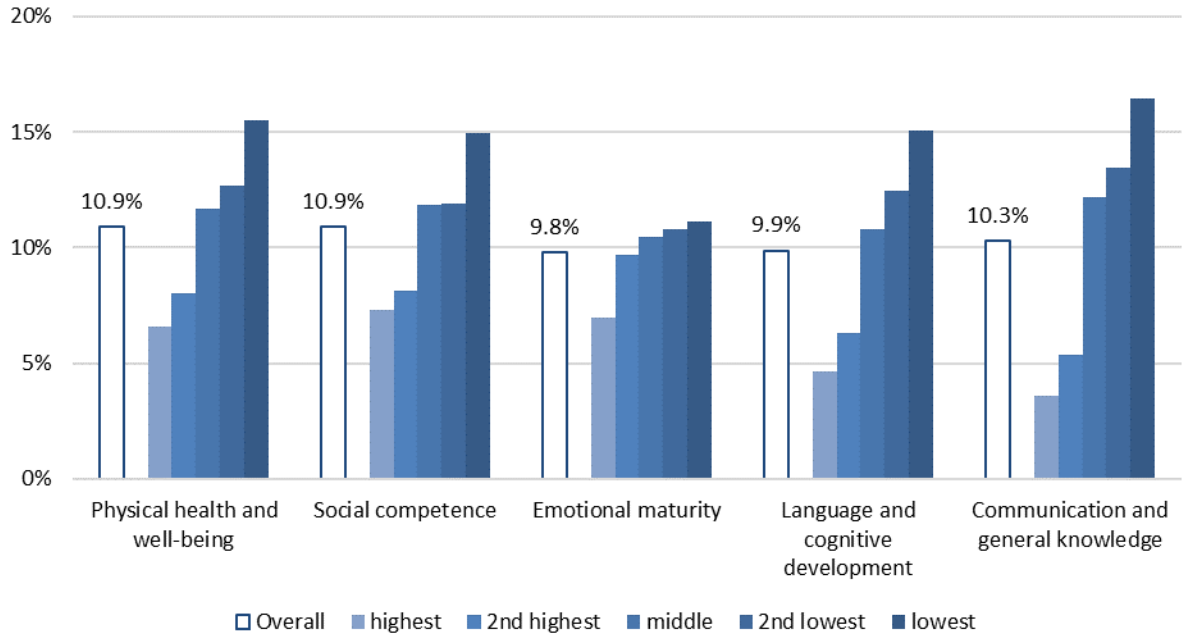

Figure 3. Junior Kindergarten overall vulnerability rates split by neighbourhood-level SES (highest to lowest)

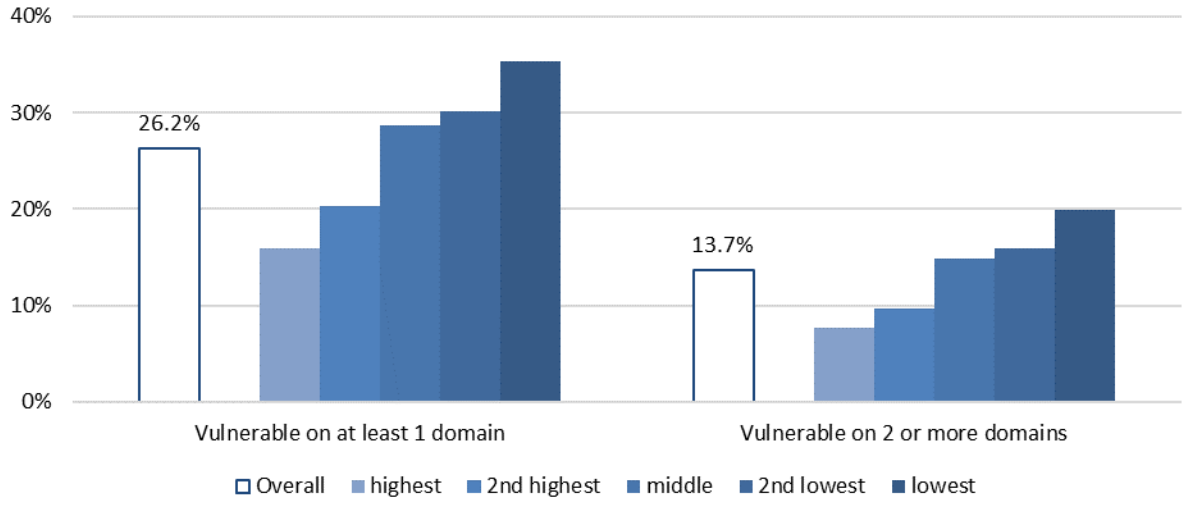

Table 3. EDI domain 10th percentile cut-points split by country and age group

	EDI		AEDI	
	JK data	**SK Cycle 1**	**4 years**	**5 years**
Physical health and well-being	6.54	7.31	6.50	7.27
Social competence	4.81	5.58	4.79	5.79
Emotional maturity	5.34	6.00	5.45	5.95
Language and cognitive development	2.50	6.15	4.21	5.71
Communication and general knowledge	1.88	4.38	3.57	4.38

In conclusion, we believe that with some caution the JK/4-year-cohort norms and cut-points can be applied to EDI scores of JK-level children to indicate the same construct of vulnerability as the baseline norms are for the SK/5-year-cohort.