Early Development Instrument (EDI) Technical Report

Alberta 2009*

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*This is based on the Updated Normative II cut-offs

ECMap
Early Child Development
Mapping Project Alberta

ACKNOWLEDGEMENTS

CONTACT INFORMATION

REFERENCING THIS REPORT

Krishnan, V., Wang, H., Babenko, O., & Lynch, S. (2011). Early Development Instrument (EDI) Technical Report, Alberta 2009. Community-University Partnership (CUP), Faculty of Extension, University of Alberta, Edmonton, Alberta, Canada.

CONTENTS

EXECUTIVE SUMMARY

This report provides the results from the analysis of Wave 1 (2008/9) Early Development Instrument (EDI) data of teachers' assessment of kindergarten children in Alberta. Wave 1 data provide a snapshot of 7,938 preschoolers in terms of their development in five areas–physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication and general knowledge–in a systematic manner at an aggregate level.[1] The insights obtained from the data and information collected in various waves can help policymakers, planners, and practitioners in coordinating and targeting services and programs to those children who are in need of assistance and consequently support all to lead a happier and healthier life, and to have more rewarding experiences throughout their life.

The report is an attempt to analyze all or most of the variables, which will hopefully be a useful starting point in developing community reports and a guiding post to those engaged in EDI research across the province. ECMap invites any suggestions to improve the ongoing reports.

The first wave of the EDI data in Alberta showed interesting findings:

- Approximately one-fifth of the children had their first language reported as non-English/non-French, with Punjabi being the most spoken language.
- Four out of every 100 children repeated kindergarten, with half being over 6 years of age.
- Every second child who was reported having special problems had some kind of speech impairment.
- Almost one-fifth of the children experiencing special problems were related to problems at home.
- One-third of all children were reported to have attended a pre-school or nursery program.
- More than one-third of all the children were in non-parental care prior to kindergarten entry, with the majority attending centre-based (licensed, profit, or non-profit) care arrangements.

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[1] The term domain will generally be called area of development or developmental area in future writings, and the category, *language and cognitive development* will be called *language and thinking skills.*

- Proportionately more children in Alberta fell below the 10th percentile in the area of physical health and well-being (14.4%), emotional maturity (11.4%), communication skills and general knowledge (15.4%) compared to their Canadian counterparts.

KEY LESSONS LEARNED

a. Through this project, the research team learned the importance of having a written document or a guide outlining the measurement of variables. Such a guide would have made information dissemination much easier. There were situations where certain variables were way out of limits; there were children with negative ages and over 20 years of age.

b. Of the 103 items falling into the five different domains, there were many that fell into more than one domain. If this happens, cross-loading items induce bias in overall domain scores; the mean scores can be inconsistent or unstable.

c. In the case of some variables (e.g., Aboriginal status), there were not adequate data to estimate the domain scores.

d. There can be teacher bias, which needs to be addressed in future projects of similar nature.

CHAPTER 1

BUILDING THE FOUNDATION FOR THIS REPORT

The flowchart (Figure 1.1), presented below explains how Early Child Development Mapping (ECMap) project collaborates with the Alberta Ministry of Education (AE), McMaster University's Offord Centre (OC) for Child Studies, and various school authorities in the province, in building the foundation for this report. Once child information is received from school authorities by the OC:

- OC assigns an EDI number to each questionnaire.
- OC distributes questionnaires to schools to conduct the survey.
- The completed questionnaires are sent back to OC directly from the teacher.
- OC prepares and distributes reports for each school authority.
- OC transfers the micro database to AE.
- ECMap accesses the database for in-house analyses.
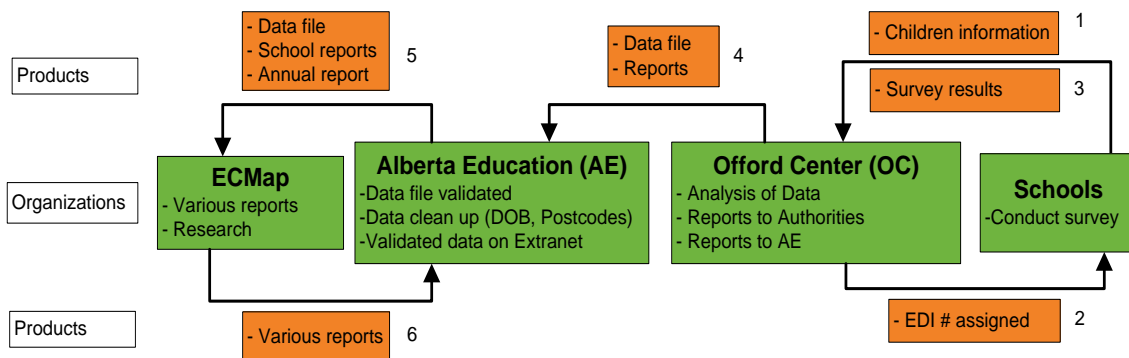
1. School authorities send children information (name, address, teacher name, school name etc.) to Offord Center after Sep 30 final count.
2. Offord Center assigns ID numbers for children, teachers, and schools and sent this information back to schools; Teachers in each school conduct surveys.
3. Schools send questionnaires to Offord Center (electronic or paper versions). Offord Center analyzes data and writes reports based on school authorities. Reports are sent to school authorities and Alberta Education.
4. Offord Center sends Data file and reports to Alberta Education. AE validates the data and conducts data cleanup, and puts the data on Extranet.
5. Alberta Education sends cohort reports and school authority reports to ECMap. ECMap does further cleaning and recoding of variables, if necessary. It is responsible for producing various reports.
6. ECMap prepares technical reports and summaries.

Figure 1.1: Processes Involved in EDI Information Transfer

CHAPTER 2

THE EARLY DEVELOPMENT INSTRUMENT (EDI) IN ALBERTA

> **At a Glance**
>
> - Seven school districts in Alberta participated in the 2008/9 (Wave 1) survey.
> - Wave 1 data had 7,938 valid cases (children in class more than one month without special needs and not missing more than one EDI domain).
> - 84% (6,690 out of 7,938) of the children were from Edmonton Public/Catholic schools.

This chapter provides information on who took part in Wave 1 data collection and what criteria were applied to arrive at the sample that was used in the analyses that follow.

2.1 What is the Early Development Instrument (EDI)?

The Early Development Instrument (EDI) was developed at the Offord Centre for Child Studies at McMaster University as a tool to assess children's level of development in their pre-school years (Janus & Offord, 2007). The EDI questionnaires are completed by teachers for all children in kindergarten classes in selected communities. It measures five different areas of children's early development:

- Physical health and well-being
- Social competence
- Emotional maturity
- Language and cognitive development
- Communication skills and general knowledge

Since 1999, the EDI data have been collected for over 550,000 kindergarten children in Canada and beyond. The provinces of Ontario, British Columbia, Manitoba, Saskatchewan, Prince Edward Island and New Brunswick have full EDI coverage. The results from the survey are interpreted for groups of children, and not individual children. The EDI neither provides any diagnostic information on individual children nor measures a school's performance. It is intended to identify areas of strengths and weaknesses in children's

development at a macro-level, enabling communities to mobilize their resources to support children's development in their first five years of life.

2.2 Why this Report?

Many of the results presented in this report have been adapted from the Offord Centre's Alberta Cohort Report (2008/9). However, this report addresses all the sections and questions on the survey questionnaire, in some detail. More specifically, two main objectives determined the course of this report:

1. To synthesize and communicate information ranging from demographics to developmental aspects of children in Alberta, using EDI 2008/9 data.
2. To explore particular elements about EDI, such as how the developmental areas are formed, what cut-off points are used in delineating children's developmental difficulties, and what the patterns emerge from the five developmental areas, using a multivariate analysis.

2.3 The EDI in Alberta

In 2008/9, the following seven school authorities in Alberta participated in the EDI data collection:

1. Edmonton Public
2. Edmonton Catholic
3. Red Deer Public
4. Red Deer Catholic (within the city of Red Deer only)
5. Elk Island Catholic
6. Sherwood Park Kindergarten
7. New Horizons

Wave 1 (2008/9) covered only a small proportion of children in their kindergarten years in the province (See, Saturation Map for Wave 1). The city of Lloydminister has the EDI data collected, but is not included in this report. The results are presented in a Community Information Package (CIP). This means, meaningful generalizations of results can be somewhat problematic because it excludes 439 valid EDIs, collected in 2009.
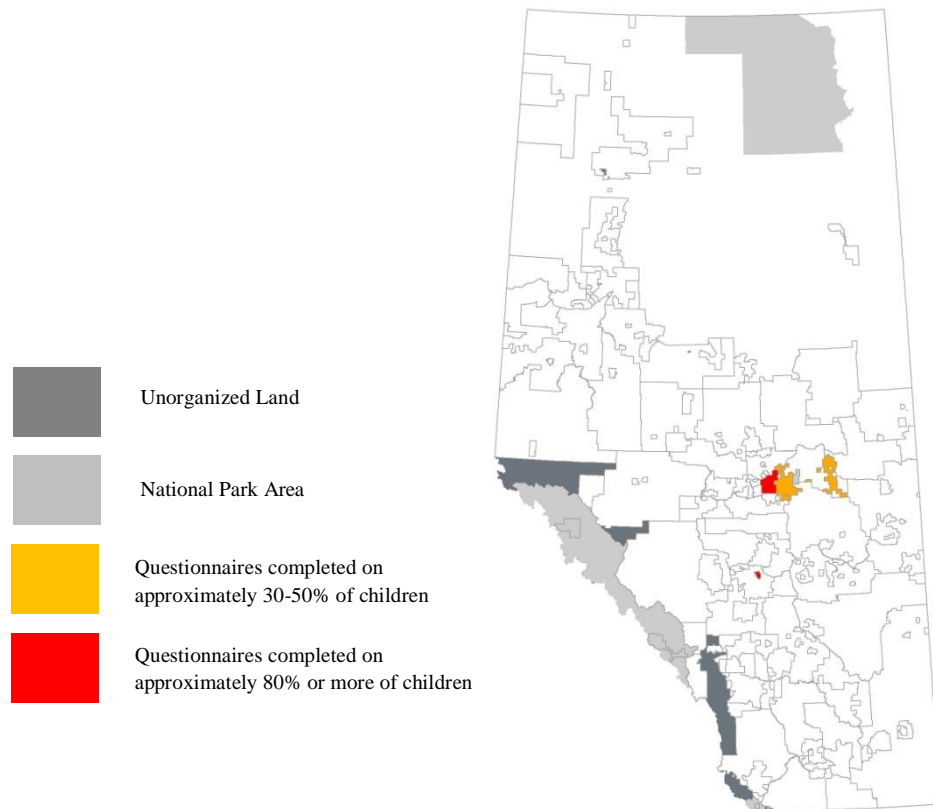
Figure 2.1: Percentages of Children with Completed EDI Questionnaires

The number of children surveyed by school authority is presented in Table 2.1. Figure 2.1 shows the percentage distribution of the child population that was included in analyses by school authority (based on criteria set by the Offord Centre). Those who met the eligibility criteria are referred to as the valid EDI (see Section 2.4).

Table 2.1: EDI Participation by School Authority, Alberta 2009

School Authority	EDIs Received	Valid EDIs	Percentage of Valid EDI	Percentage out of the Total
Edmonton Public	5,704	4,665	81.78%	58.77%
Edmonton Catholic	2,476	2,025	81.79%	25.51%
Red Deer Public	691	598	86.54%	7.53%
Red Deer Catholic	331	252	76.13%	3.17%
Elk Island Catholic	399	360	90.23%	4.53%
Sherwood Park	19	18	94.74%	0.23%
New Horizons	21	20	95.24%	0.25%
Total	**9,641**	**7,938**		**100.00%**

As Table 2.1 and Figure 2.2 indicate, of the 7,938 valid cases, 6,690 (84%) were from either Public or Catholic schools in Edmonton. Almost 11% were from Red Deer. Rural areas are vastly under- represented in Wave 1.
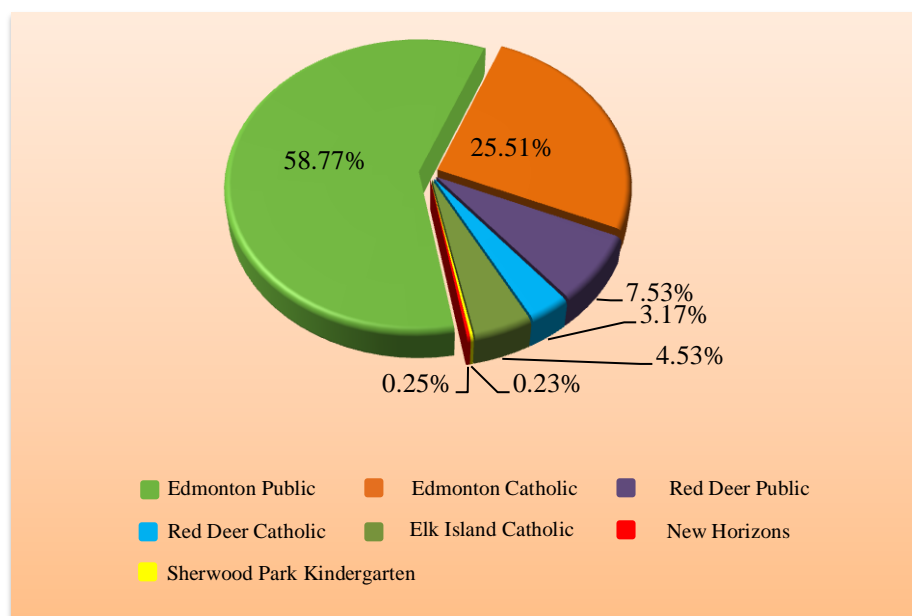
Figure 2.2: Percentage Distribution of EDI Questionnaires by School Authority, 2009

2.4 What is a Valid EDI?

In 2008/9, a total of 9641 EDI questionnaires were completed, of which 7,938 questionnaires were treated as valid for reporting purposes based on three criteria:

- Children were in class more than one month
- Children had no diagnosed special needs
- Not missing more than one EDI domain

No information on parental consent was recorded in 2009, although this information is available in future years.

Children with no diagnosed special needs:

Question #7 on the first page of the questionnaire allows us to know whether or not a child has exceptional or special needs. By special needs, we mean all those children who were *identified already* as needing special assistance due to chronic medical, physical, or mental disabling conditions (e.g., autism, foetal alcohol syndrome, down syndrome). Severe delay involving language and mild/moderate disability/ delay were not included. Further, if the teacher suspects that the child may be suffering from a disabling condition, or the condition is not severe enough for the child to be classified as "special needs", he or she falls under the "special problem" category. This is further discussed in the section on special problems.

Not missing more than one EDI domain:

The three sections of the questionnaire, A, B, and C, included all the items/questions useful in assessing children's developmental levels. Thus, the third criterion that was used to screen valid questionnaires was based on the five domains. Specifically, the criterion refers to none or only one domain missing when domain scores are calculated. A domain is considered missing if more than 25% of questions are left blank or has "I don't know" responses. For example, if a domain has 30 questions, in order for the domain to be considered "not missing", it should have at least 8 (30*.25=7.5) questions with scores on them.

An algorithm for arriving at the valid cases (for analysis and reporting purposes) is presented below (Figure 2.3). This enables us to understand why only 7,938 cases were available for reporting purposes although we had 9,641 completed questionnaires.
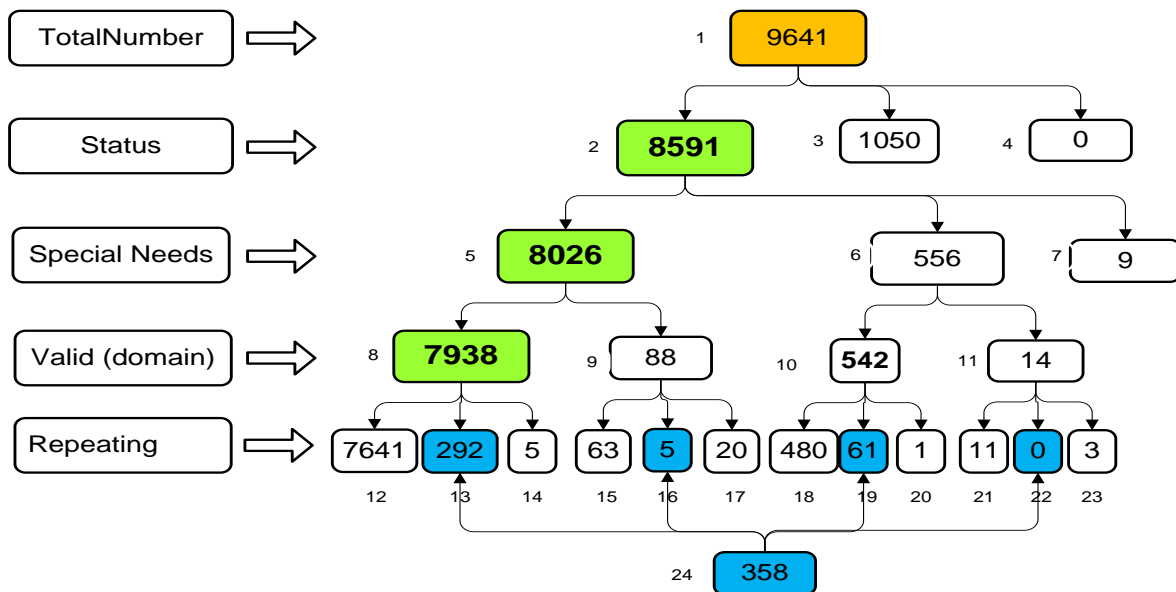
Figure 2.3: Valid EDI Flowchart (see notes on next page)

2.5 Data Analysis

The data collected in Wave 1 (2008/9) were analyzed using various descriptive statistics. For the purposes of this report, only those children who met the criteria for inclusion in the study, namely 7,938 children were considered. Readers are cautioned that the results of the analysis of 7,938 children are not representative of all kindergarten children in the province, at the time of the survey; they came from the seven participating school authorities, an overwhelming majority from the city of Edmonton, and they represent only approximately 20% of the provinces total.

1. Total questionnaires received and scanned.

2. Children in class more than one month.

3. Children not in class more than 1 month, including "in class less than 1 month", "moved out of class", "moved out of school", "no consent" and "other".

4. Missing or incorrect JK/SK assignation.

5. Children in class more than one month, without Special Needs and with correct JK/SK assignation.

6. Children in class more than one month, with Special Needs and with correct JK/SK assignation.

7. Children in class more than one month but with missing Special Need assignation.

8. Children in class more than one month, without Special Needs and not missing more than one domain.

9. Children in class more than one month and without special needs, but missing more than one domain.

10. Children in class more than one month, with special needs and not missing more than one domain.

11. Children in class more than one month and with special needs but missing more than one domain.

12. Children in class more than one month, without Special Needs, not missing more than one domain, and no repeating kindergarten.

13. Children in class more than one month, without Special Needs, not missing more than one domain and repeating kindergarten.

14. Children in class more than one month, without Special Needs, not missing more than one domain, and without specifying repeat or not.

15. Children in class more than one month and without special needs, but missing more than one domain, and no repeating kindergarten.

16. Children in class more than one month and without special needs, but missing more than one domain, and repeating kindergarten.

17. Children in class more than one month and without special needs, but missing more than one domain, and missing specifying repeating or not.

18. Children in class more than one month, with special needs and not missing more than one domain, and no repeating kindergarten.

19. Children in class more than one month, with special needs and not missing more than one domain, and repeating kindergarten.

20. Children in class more than one month, with special needs and not missing more than one domain, without specifying repeating or not.

21. Children in class more than one month and with special needs but missing more than one domain, and no repeating kindergarten.

22. Children in class more than one month and with special needs but missing more than one domain, and repeating kindergarten.

23. Children in class more than one month and with special needs but missing more than one domain, without specifying repeating or not.

24. All children who repeated kindergarten.

CHAPTER 3

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF CHILDREN

At a Glance

- 85.9% of the children were between the ages, 5 years 2 months and 6 years 1 month.
- Boys outnumbered girls by a small margin (50.8% vs. 49.2%).
- 18.6% of the children had their first language reported as non-English/non-French, with Punjabi being the most common language outside of English.
- 11.2% of children in Anglophone schools were in French immersion.
- 6% of children were of Aboriginal ancestry (self reported).
- 3.7% of children repeated kindergarten, almost half of whom were over 6 years of age.

This chapter takes a closer look at the information provided on page 1 of the questionnaire, mainly in terms of the characteristics of the child population surveyed.

3.1 Child's Age at Completion of the Questionnaire

Children's age was the most problematic variable in the data set; many were either too young or too old to be included in the study. Corrections done by Alberta Education helped to increase the number of cases available for analyses to a greater extent, although the issue was not resolved completely; age variable was missing for more that 1% of children.

In Alberta, the starting age for children entering Kindergarten varies and is at the discretion of the individual school authorities – public, separate, independent, Francophone, etc. Provincial funding is available for virtually all school authorities who operate Kindergartens and begins in the year prior to Grade 1 entry. Grade 1 entry age also varies as long as children are entering Grade 1 by the time they are six years of age. Thus, the starting age for funding Kindergarten enrolees is anywhere between 4 years 6 months and one day short of 6 years.

Age of children at the time of teacher assessment (Feb, 2009 – Mar, 2009) is divided into 3-month intervals. The categories are expressed as year-months of age: for example, 5-11

means age 5 years and 11 months. A large majority of children (85.9%) were between 5 years and 2 months and 6 years and 1 month (Table 3.1).

Table 3.1: Age Distribution of Children, Alberta 2009

	Frequency	Percent
5-1 and below	487	6.1%
5-2 to 5-4	1,424	17.9%
5-5 to 5-7	1,935	24.4%
5-8 to 5-10	1,948	24.5%
5-11 to 6-1	1,514	19.1%
6-2 and older	525	5.9%
Missing	105	1.3%
Total	**7,938**	**100.0%**

There were 5 children below age 4-10 and 55 children above age 6-5. Because they were fewer in number, the two age-groups were not treated separately (Table 3.1 and Figure 3.1), but were included in the lower and upper age groups, respectively.
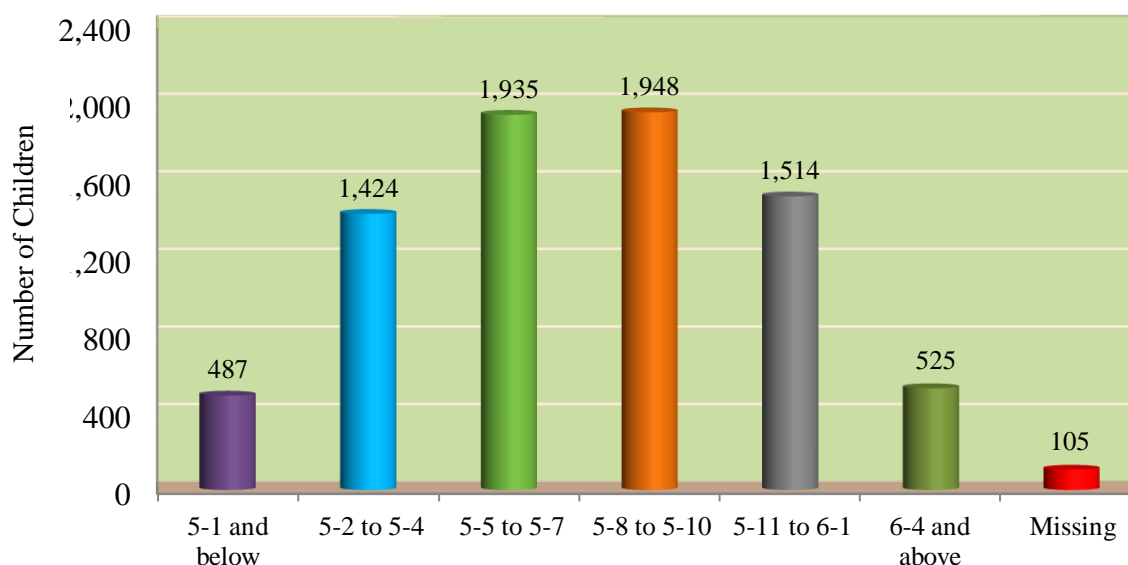
Figure 3.1: Age Distribution of Children

NOTE: Months were rounded down for ages less than 15 days, and up for more than 15 days. Therefore, children aged less than 6 years 1.5 months belong to the 5-11 to 6-1 category, and children aged from 5 years 1.5 months to 5 years 4.5 months belong to the 5-2 to 5-4 category.

3.2 Child's Sex

Boys outnumbered girls only by a small margin. There were 4,029 boys and 3,909 girls, constituting 50.9% and 49.2%, respectively of the valid cases. Females outnumbered males only in two age groups, 5-1 and below and 5-2 to 5-4 (Figure 3.2).

Table 3.2: Sex of Children, Alberta 2009

	Number	Percent
Girl	3,909	49.24%
Boy	4,029	50.76%
Total	**7,938**	**100.00%**
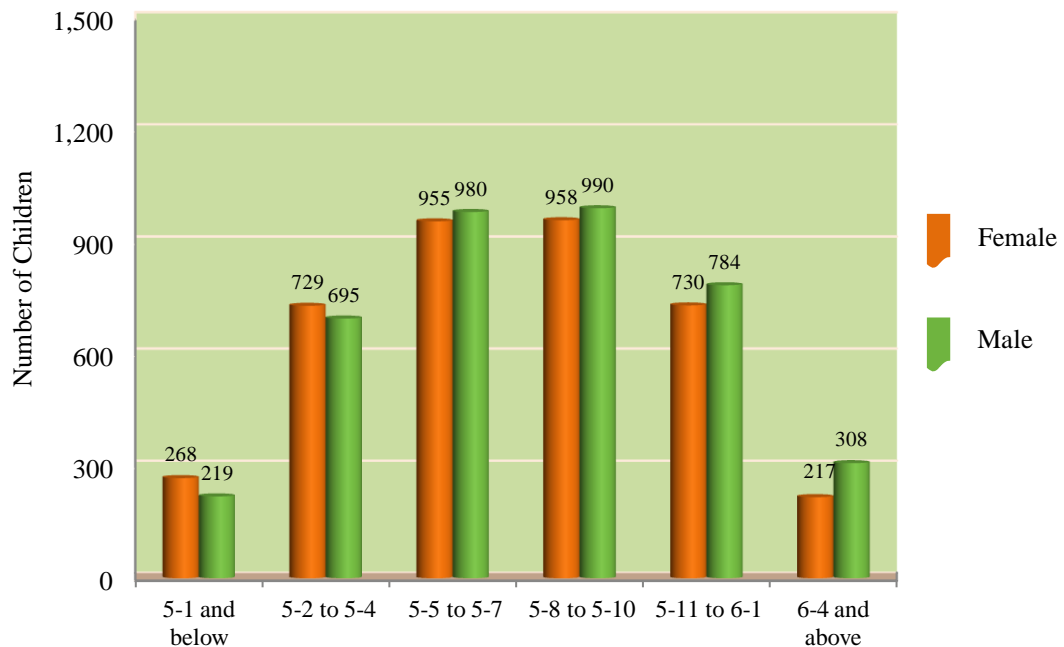
Figure 3.2: Sex Distribution by Age

3.3 Child's First Language(s)

The Offord's definition of a child's first language refers to the language a child learned first in her/his development, and still can understand (and/or speak). Out of a total of 7,938 children, 6,116 children (77.05%) had their first language reported as either English or French and 1,457 (18.35%) children had their first language reported as non-English (e.g., French and other). Only 27 children were truly bilingual with both English and French as their first languages (Table 3.3).

Punjabi, Arabic, Urdu, and Cantonese were the most common other languages reported as child's first languages; the numbers of children in each of these languages were 460, 156, 119, and 119, respectively (not shown in Table).

Table 3.3: Child's First Language, Alberta 2009

	Number	Percent
English or French	6,116	77.05%
Other only	1,046	13.18%
English & French (Bil)	27	0.34%
English & Other (Bil)	312	3.93%
French & Other (Bil)	2	0.03%
Two other lang. (Bil)	70	0.88%
Missing	365	4.60%
Total	**7,938**	**100.00%**

3.4 Child's English as Second Language (ESL) Status

A child for whom English is not his or her first language is considered as a child for whom English is a Second Language (ESL). A total of 1,058 children (13.3%) were considered as ESL, with a large majority falling into the non-ESL category (Table 3.4).

Table 3.4: English as a Second Language (ESL), Alberta 2009

	Number	Percent
ESL	1,058	13.33%
Non ESL	6,877	86.63%
Missing	3	0.04%
Total	**7,938**	**100.00%**

3.5 French Immersion

The information on French immersion is applicable to only those in Anglophone schools, and not the Francophone classes/schools. Of the 7,938 children, 893 children (11.2%) were reported attending French immersion (Table 3.5).

Table 3.5: Children in French Immersion, Alberta 2009

	Number	Percent
French Immersion	893	11.25%
Non-French Immersion	7,043	88.73%
Missing	2	0.03%
Total	**7,938**	**100.00%**

3.6 Aboriginal Status

As Table 3.6 shows, 94% (7,458) of children were of non-Aboriginal background with only 6% (473) of the children belonging to the Aboriginal ancestry (North American Indian, First Nations, Métis, or Inuit). This is based on families' "self report", and it is not based on any official records on ancestry.

Table 3.6: Child's Aboriginal Status, Alberta 2009

	Number	Percent
Aboriginal	473	5.96%
Non-Aboriginal	7,458	93.95%
Missing	7	0.09%
Total	**7,938**	**100.00%**

3.7 Child Repeating Kindergarten

Out of the total number of the "valid" questionnaires, there were 292 (3.68%) children who repeated kindergarten (Table 3.7). As one would expect, almost half of those who repeated (47.3%) were 6 years or older with only 19 children repeating kindergarten belonged to age 5-4 or younger. This raises the question of whether or not to consider the repeaters separately, especially in more detailed analyses involving domain scores. We will take up this issue again in our discussion of domains, later in this report.

Table 3.7: Child Repeated Kindergarten or not by Age, Alberta 2009

	Not Repeated	Repeated	Total
4-2 to 4-4	1	0	1
4-5 to 4-7	1	0	1
4-8 to 4-10	3	0	3
4-11 to 5-1	477	5	482
5-2 to 5-4	1,408	14	1,422
5-5 to 5-7	1,909	26	1,935
5-8 to 5-10	1,926	22	1,948
5-11 to 6-1	1,424	87	1,511
6-2 to 6-4	359	111	470
6-5 to 6-7	21	20	41
6-8 to 6-10	3	5	8
6-11 and Up	4	2	6
Missing			110
Total	**7,536**	**292**	**7,938**

CHAPTER 4

SPECIAL SKILLS AND TALENTS

At a Glance

- Literacy skill or talent was at the top of all special skills or talents, followed by numeracy.
- Music was the least frequent of all special skills or talents (3%).
- Other special skills included, speak more than three languages, read grade two levels, or drawing in detail.

Section B of the questionnaire, Language and Cognitive Skills (Q1 to Q40), comprises language and cognitive development domain (b8-b33 or 26 items) and special or exceptional skills (b34-b40 or seven questions). The focus here is on the last seven questions, specifically addressing a child's talent that is noticeable to others.

A child with special skills/talent is one who demonstrates unique skills that are not expected for his/her age capability/aptitude in an area; a skill or a talent that is greater than the level expected for a typical student. Figure 4.1 shows the distribution of children based on their special skills and talents. Compared to any other area, most children demonstrated their skills and talents in literacy (see also Table 4.1). The least frequent area of special skills and talents was music. Approximately 6.6% of children were reported to have special skills or talent in art, including drawing, storytelling and acting skills, greater than the level expected for a typical student. Finally, almost two percent (1.7%) of children were reported to have special skills or talent in other areas (e.g., strong vocabulary, speaking two or more languages, drawing, technology, and reading at a level greater than a typical child).
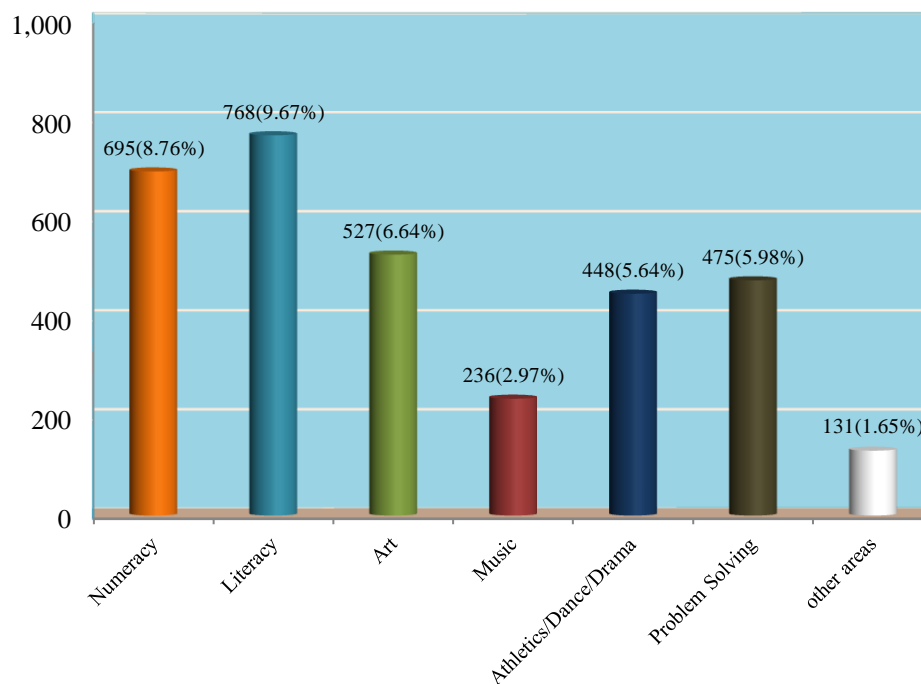
Figure 4.1: Distribution of Children by Special Skills and Talents

Table 4.1: Number of Children with Skills or Talents in Different Areas, Alberta 2009*

	YES (% of the total valid EDIs (7,938))	NO	Missing
Numeracy	695 (8.76%)	7,149	94
Literacy	768 (9.67%)	7,079	91
Art	527 (6.64%)	7,320	91
Music	236 (2.97%)	7,569	133
Athletics/Dance/Drama	448 (5.64%)	7,383	107
Problem solving	475 (5.98%)	7,354	109
Other areas	131 (1.65%)	7,938	393

*May or may not include multiple skills.

CHAPTER 5

SPECIAL CONCERNS

At a Glance

- Speech impairment was the most often noted special problem, followed by home environment; 54.3% of all those with special problems had some kind of speech impairment and 9.1% had problems at home.
- Behavioural problems were noted among 7.6% of children with special problems.

5.1 Special Needs Children

We made reference to special needs, earlier in the report. Alberta differs from its other provincial counterparts in terms of special education coding criteria. Using the coding system adopted in Alberta, definitions of children who should be designated exceptional/special needs are as follows:

Alberta Special Education Coding Criteria, 2008-2009

1. Gifted and talented (Code 80).
2. Mild/moderate Disability/Delay (Code 30)
3. Severe Disabilities
   a. Severe cognitive disability (Code 41)
   b. Severe emotional/behavioural disability (Code 42)
   c. Severe multiple disability (Code 43)
   d. Severe physical or medical disability (Code 44)
   e. Deafness (Code 45)
   f. Blindness (Code 46)
   g. Severe delay involving language (Code 47)

From the flow chart (Figure 2.2) that was presented earlier, we found that there were 542 children in class more than one month with domain scores reported for at least two domains, but were identified as special needs. These children were excluded from all our analyses, reported in this report.

5.2 Children with Special Problems

Section D of the questionnaire refers to special problems (d1, d2a to d2i, & d3), basing answers on teachers' observation or medical diagnosis and/or parent/guardian information. The focus of this section is on variables derived from d2a to d2i, and the discussion below is based on Figure 5.1and 1027 children who were reported to have special problems. Our focus here differs from discussion of special needs by the Offord Centre.

Although some children are not identified as having special needs, they still can have special problems. Our interest here is to identify those children. The question is: if special needs children are taken out, how many children are experiencing difficulties and what are those difficulties? A schematic presentation of the variables considered is as follows (Figure 5.1):

Special Needs
(Question 7a: SN)

Yes

No/DK/Missing

Special Problems
(Question d1)

d1: Yes

d1: No

Special Problems
(Questions d2a to d2i)

Analyzed here (N=1,027)
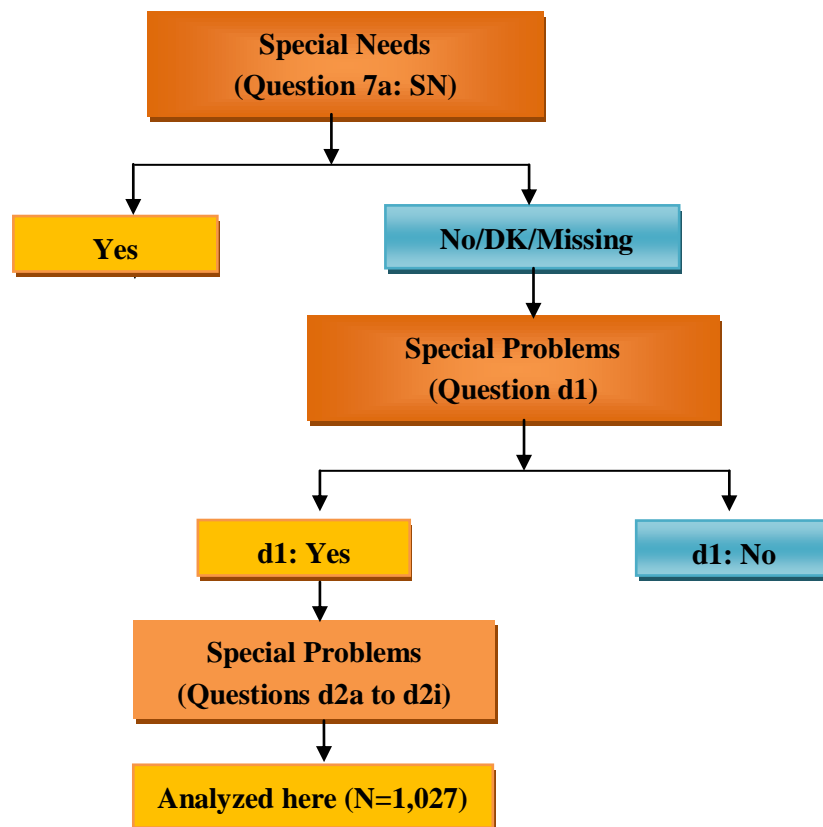
Figure 5.1: Relationships between Special Needs and Special Problems

Of 7,938 children, 1,027 children were identified as having special problems. Figure 5.2 shows some of the problem areas in terms of their percentage distributions. Of those 1,027 children, 729 (70.2%) had just one problem, 223 (21.5%) had two problems, 46 (4.4%) had three, 24 (2.3%) had four and 5 (0.5%) had five problems (not shown here). Among those who had only one special problem, the most common problem had to do with speech

(54.3%), followed by home problem (9.10%). The third most noted problem among children having special difficulties was behavioral (7.60%).

Often cited special problems, other than those that are presented in Figure 5.2 included: poor motor control, severe speech/language delay, severe attention difficulties, occupational therapy, mother's absence due to divorce/death, diabetes, FAS, ADHD, autism, neurological problems, to name a few.
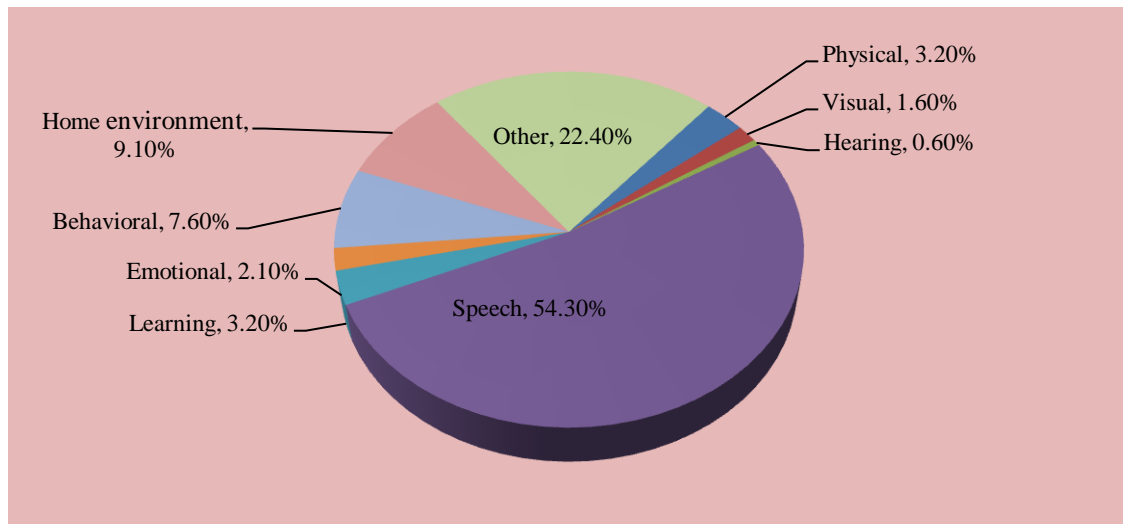
Figure 5.2: Percentage Distribution of Children with Special Problems
(Children with Special Needs are not included)

5.3 Special Problems and Domain Scores

One-way Analysis of Variance (ANOVA) showed statistically significant differences between the mean scores (p = 0.000) (not shown here); children who reported to have multiple problems scored significantly lower on all domains, compared to their counterparts with none or just one special problem (Figure 5.3). The differences are worth noting, especially for the communication and general knowledge domain.
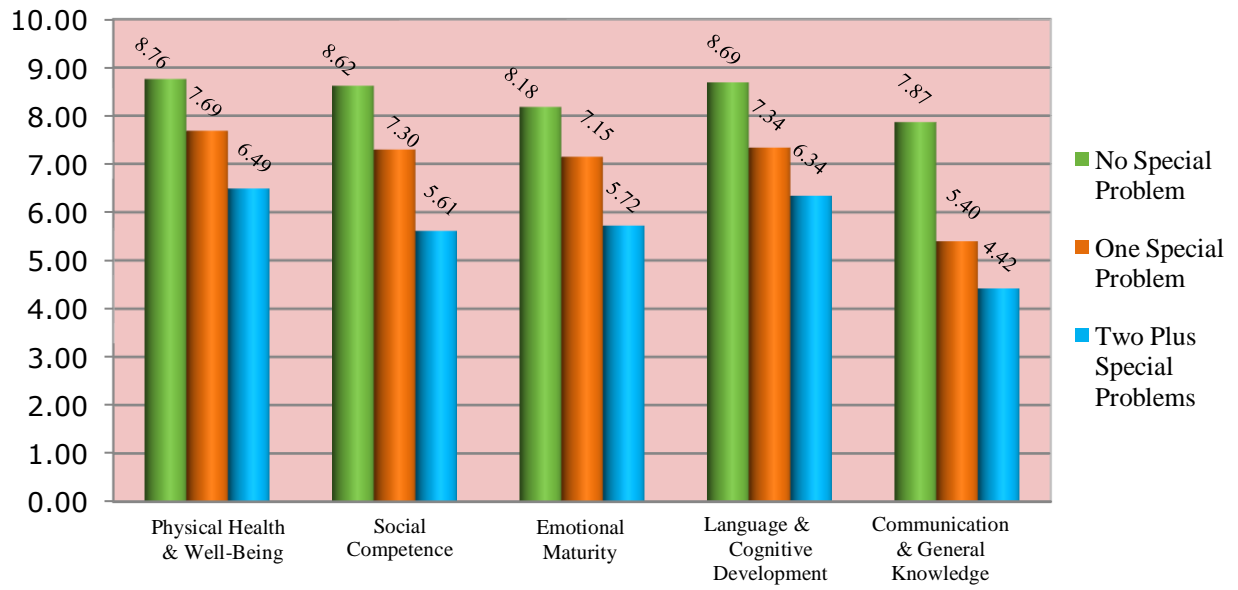
Figure 5.3: Domain Scores of Children without Special Problems and
Children with Special Problems

CHAPTER 6

SPECIFIC PROGRAMS ATTENDED BY CHILDREN

At a Glance

- Almost 11% of the children are reported to have attended an early intervention program, and an equal percentage attended language or religion classes.
- More than one-third of all children (35%-36%) are reported to have attended pre-school or nursery programs.

This chapter is devoted to questions in Section E of the questionnaire that includes additional information on a child's background, specifically to questions 1, 3, and 4. Results based on Question #2 will be presented in the next chapter.

Early intervention program includes speech/language therapy, parents' attendance of a parenting program, a Head Start program, a school-based program funded by Mild/Moderate or Program Unit funding, or if child has had similar in-home services .

Out of a total of 7,938 children, 847 (10.7%) were involved in an early intervention program, 868 (10.9%) were involved in language or religion classes, 2,747 children (34.6%) were reported to be in the part-time pre-school/nursery school, and 2,840 children (35.8%) were reported to be in the pre-school program (Table 6.1). Programs, other than the ones listed above included: Hand-in-Hand, Getting Ready for Inclusion Time (GRIT), Fun with Sounds, and 100 Voices.

Table 6. 1: Early Intervention Program, Alberta 2009

Early Intervention	Number	Percent
Yes	847	10.67%
No	6,761	85.17%
Missing	330	4.16%
Language or Religion Classes	**Number**	**Percent**
Yes	868	10.93%
No	6,011	75.72%
Missing	1,059	13.34%
Part-time Pre-school/Nursery School	**Number**	**Percent**
Yes	2,747	34.61%
No	4,027	50.73%
Missing	1,164	14.66%
Pre-School Program	**Number**	**Percent**
Yes	2,840	35.78%
No	4,000	50.39%
Missing	1,098	13.83%

CHAPTER 7

CHILD CARE ARRANGEMENTS BY TYPE OF CARE

At a Glance

- 35.3% of children were in non-parental care prior to kindergarten entry.
- Centre-based (licensed, profit, or non-profit) child care arrangement was noted as the most common type of arrangement (22.2%).
- About 10% of children were taken care of in home-based environment (own home, relatives or non-relatives).

Section E deals with four additional questions, specifically on early intervention programs (Q1), child care arrangements prior to entering kindergarten (Q2a to 2i), and attendance at language and religion classes (Q3) and organized preschool/nursery school (Q4). This chapter presents results on childcare arrangements or analyses of 2a to 2i.

7.1 Non-parental Care

Of 7,938 children, 2,803 children (35.3%) were reported to have been in a non-parental care prior to kindergarten entry (Table 7.1).

Table 7.1: Children in Non-parental Care, Alberta 2009

	Number	Percent
Non-parental care	2,803	35.31%
Parental care	4,371	55.06%
Missing	764	9.62%
Total	**7,938**	**100.00%**

7.2 Types of Non-parental Care Arrangement

Prior to kindergarten entry, children can be in non-parental care, including centre-based, licensed, for profit and non-profit care centers, home-care (licensed or unlicensed, relative or non-relative), and child's home (relative or non-relative). Table 7.2 shows the number of children who attended a certain type of non-parental care during their pre-kindergarten years. A short description of each type of non-parental care arrangement is provided below.

Centre-based and Licensed Care (Profit or Non-Profit): Children in centers operated by parents, a voluntary board of directors, or a non-profit organization such as the YM/YWCA, a college, university, school board, or municipal government for non-profit, or those commercial centers that are private businesses operated by an individual, a partnership, or a corporation are included in this type of care arrangement. A total of 1,758 (22.2%) children were reported to have attended such centers at the time of the survey.

Other home-based (Licensed or Unlicensed): In this type of care arrangement, children are looked after in home-based care, either licensed or unlicensed, in relatives' or non-relatives' home. Of 7,938 children, 767 (9.7%) were reported to be in this type of home-based arrangement.

Own-home (Relative or Non-relative): In this type of care arrangement, children are looked after in their own home either by a nanny, a regular baby-sitter (excluding occasional evenings) who is unrelated to the child, or a relative. A total of 736 children (9.3%) were reported to be in this type of care arrangement.

Table 7.2: Number of Children Who were in Non-parental Child Care During Their Pre-kindergarten Years, Alberta 2009

	YES (% of the total valid EDIs (7,938))	Other
Centre-based, licensed (profit or non-profit)	1,758 (22.15%)	6,180
Other home-based (licensed or unlicensed)	767 (9.66%)	7,171
Own home (relative or non-relative)	736 (9.27%)	7,202

CHAPTER 8

THE FIVE DEVELOPMENTAL AREAS

At a Glance

- Girls performed better than boys in all developmental areas as evidenced by the mean and median scores.
- The older the children, the better they are in their average scores on all developmental areas with a tendency for scores to decrease after age 6.
- Alberta's children performed the same or better in all areas except for social competence, compared to Canadian children.
- In the area of social competence, proportionately more children in Alberta fell below the 10th percentile, compared to their Canadian counterparts (9.8% in Alberta vs. 8.8% in Canada).

The focus of this chapter is on sections A, B, and C in the EDI questionnaire or Q2-13 from section A, Q1-40 from section B, and Q1-58 from section C.

8.1 Sections and Items that Comprise the EDI Domains

The EDI comprises 103 items or questions on the development of kindergarten children in five broad areas of development[2]:

Physical health and well-being (13 items: a2 to a13 and c58)

Social competence (26 items: c1 to c25 and c27)

Emotional maturity (30 items: c28 to c57)

Language and cognitive development (26 items: b8 to b33)

Communication skills and general knowledge (8 items: b1 to b7 and c26).

In the EDI questionnaire, the five developmental domains are organized into three sections as follows:

Section A: Physical Well-being (13 questions)

Section B: Language and Cognitive Skills (40 questions)

Section C: Social and Emotional Development (58 questions).

More specifically, except for the first question, all the questions in Section A as well as the last question in Section C are included in the domain of Physical health and well-being. Out

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[2] Results from a Principal Component Analysis (PCA) of the 103 items can be found in Appendix A.

of the 40 questions in Section B, 26 questions are included in the domain of Language and cognitive development. Also, 7 other questions from Section B go into the domain of Communication skills and general knowledge, and the remaining 7 questions from Section B go into what is called Special Skills or Talents. The 58 questions from Section C are included in four out of the five domains, with the break-down of questions as follows: physical health and well-being (1), social competence (26), emotional maturity (30), and communication and general knowledge (1).

8.2 Descriptive Statistics for the Five Domains

Table 8.1 shows measures of central tendency and spread of the distributions of scores for the five domains. Generally, most children tend to score very high, as all the summary measures in Table 8.1 indicate. Each distribution is skewed to the left (as is evident from the mean, median, and mode values), and therefore, the usual mean would not be the most useful summary measure to characterize the "typical" score in a particular area; in normal distributions, mean, median, and mode should coincide.

Table 8.1: Descriptive Statistics for the Five Developmental Areas, Alberta 2009

Developmental Area	N	Mean	Median	Mode	Std. Error	Std. Deviation
Physical Health and Well-Being	7,935	8.57	8.85	10	0.017	1.47
Social Competence	7,937	8.37	9.04	10	0.02	1.77
Emotional Maturity	7,923	7.98	8.17	10	0.017	1.53
Language and Cognitive Development	7,937	8.46	8.45	10	0.02	1.76
Communication Skills and General Knowledge	7,938	7.5	7.5	10	0.03	2.68

8.3 Differences in Domain Scores by Age and Sex

The mean scores for different age groups of children by the developmental areas are presented in Table 8.2. In general, the older the children are, the better they score on the developmental areas. However, the scores tend to decrease after age 6. As noted earlier, age 6 and up had proportionately more children repeating grades, and this might explain the tendency for scores to go down.

Table 8.2: Mean Scores by Age Group for the Five Developmental Areas, Alberta 2009

Developmental Area	Age Group					
	3-8 -- 5-1 (487)	5-2 -- 5-4 (1,424)	5-5 -- 5-7 (1,935)	5-8 -- 5-10 (1,948)	5-11-- 6-1 (1,514)	6-2 & up (525)
Physical health and well-being	8.15	8.28	8.54	8.64	8.86	8.74
Social competence	7.88	8.05	8.33	8.45	8.73	8.46
Emotional maturity	7.70	7.78	7.94	8.02	8.22	8.00
Language and cognitive development	7.66	8.09	8.38	8.60	8.85	8.83
Communication and general knowledge	6.63	6.95	7.38	7.69	8.06	7.78

In Table 8.3 are presented three different measures of the mean scores by sex and domain. In general, girls performed better than boys in all developmental areas, and in social and language and cognitive skills, in particular. Whereas the median scores on these two areas were 9.04 and 9.23 for girls, they were 6.92 and 8.46 for boys, once again pointing to the skewness of the data.

Table 8.3: Summary Statistics for all Five Areas, Girls and Boys, Alberta 2009

		Physical	Social	Emotional	Language	Communication & GK
Female	Mean	8.22	8.35	8.27	8.93	6.78
	Median	8.08	9.04	8.50	9.23	6.25
	Harmonic Mean	8.00	7.83	8.04	8.75	5.19
	Geometric Mean	8.11	8.13	8.16	8.85	6.10
Male	Mean	7.38	6.75	7.25	7.77	5.49
	Median	7.69	6.92	7.17	8.46	5.63
	Harmonic Mean	6.87	5.76	6.82	6.69	a
	Geometric Mean	7.14	6.28	7.04	7.33	-
Total	Mean	7.86	7.66	7.84	8.43	6.23
	Median	8.08	8.27	8.08	8.85	5.63
	Harmonic Mean	7.47	6.78	7.47	7.73	a
	Geometric Mean	7.68	7.28	7.66	8.16	-

Practical applications of the three means – arithmetic, geometric, and harmonic – vary. However, they are presented here in order to draw the attention of readers to the variability in scores and how averages vary depending upon the nature of the distribution.[3] Variability measures are not attempted here to make it easy for those with little or no statistical background.

8.4 Domain Scores Compared: Alberta and Canada

In Table 8.4a, the means, range, and the four percentile boundaries for the five domains are shown. The interpretation of the percentiles is as follows: the 10th percentile divides the bottom 10% of the data from the upper 90% (i.e., 100-10%); the 25% divides the bottom 25% of the data from the upper 75%; and so on.

Table 8.4a: Mean, Range, and Percentile Boundaries for Each Developmental Area, Alberta 2009

Developmental Area	Items	Min-Max	Mean	Percentile Boundaries			
				75%	50%	25%	10%
Physical health and well-being	13	0.38 - 10.00	8.57	10.00	8.85	7.69	6.54
Social competence	26	0.00 - 10.00	8.37	9.81	9.04	7.50	5.77
Emotional maturity	30	0.86 - 10.00	7.98	9.17	8.17	7.17	5.83
Language and cognitive development	26	0.00 - 10.00	8.46	9.62	9.20	7.92	5.77
Communication and general knowledge	8	0.00 - 10.00	7.50	10.00	8.75	5.63	3.75

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[3] Technically, the "average score" is the score that could replace all others. The arithmetic mean is the most common type of average. However, it is a crude measure that is affected by outliers; it doesn't represent data with extreme values. The arithmetic mean of items with scores, say, 3, 4 and 8 is 5. The geometric mean is useful to describe a situation of this sort: most children score 4 on an item, but some score 9 on the same item. Using the example above, the geometric mean would yield a value of 4.579 (= $\sqrt[3]{3 \times 4 \times 8}$). The harmonic mean, unlike the arithmetic mean tends to lean toward the lowest score. The harmonic mean is useful in a situation of this sort: fewer children score high while most children score low; it takes into account the weight by giving a higher weight to those scoring low and lower weight to those scoring high. Using the same example above, the harmonic mean of 3, 4, and 8 is, 4.26 (= $\frac{3}{\frac{1}{3}+\frac{1}{4}+\frac{1}{8}}$). Datasets containing at least one pair of unequal values, the harmonic mean gives the least value, arithmetic mean gives the greatest value, and geometric mean gives a value in between the other two. The arithmetic mean score of physical health and well-being, for example, answers the question: "if all the items had the same value, what would that value be in order to achieve the same total?"; the geometric mean answers the question, "if all the items had the same value, what would that value to be in order to achieve the same product?"; and the harmonic mean answers the question, "if all items had the same value, what would that value to be in order to achieve the same rate?"

The percentile cut-off values, based on Updated Normative II (Canada), are presented on Table 8.4b.[4] It is important to interpret the percentile scores in Table 8.4a, in comparison to that from Table 8.4b. The interpretation of the 25th percentile score for the physical health and well-being domain, for example, is as follows: whereas 25% of children in Canada scored 8.08 or lower out of 10, 25% of Albertan children scored 7.69 or lower out of 10. Similarly, whereas 10% of Canadian children scored 4.38 or lower out of 10 on communication and general knowledge, the same percentage of Albertan children scored 3.75 or lower out of 10.

Table 8.4b: Updated Normative II (Canada) Percentile Boundaries for Each Developmental Area

Developmental Area	10%	25%	50%	75%
Physical health and well-being	7.0833	8.0769	9.2308	10.0000
Social competence	5.5769	7.3077	9.0000	9.8077
Emotional maturity	6.0000	7.1667	8.3333	9.1667
Language and cognitive development	5.7692	7.6923	9.2000	9.6154
Communication and general knowledge	4.3750	5.6250	8.7500	10.0000

Table 8.4c contains the 10th percentile values used as cut-offs for each developmental area, based on Alberta and Canada. This information is helpful in understanding the concept of 'vulnerability' (the lowest 10% of students) from a comparative perspective. Thus, Alberta children fall behind the 10th percentile Canadian benchmark in all four domains except the social competence domain. For the purposes of this project, the term 'experiencing great difficulty' will be used in future reports instead of 'vulnerability' as originally coined by the Offord Centre.

**Table 8.4c: The 10th Percentile Cut-off Values for the 2009 Alberta Cohort
and Updated Normative II (Canada)**

Developmental Area	Alberta	Canada (Updated Normative II)
Physical health and well-being	<=6.54	<=7.0833
Social competence	<=5.77	<=5.5769
Emotional maturity	<=5.83	<=6.0000
Language and cognitive development	<=5.77	<=5.7692
Communication and general knowledge	<=3.75	<=4.3750

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[4] Only the domains,and not the sub-domains were affected by the Updated Normative II cut-offs.

Figure 8.1 shows the mean scores on the five areas of development for the 2009 Alberta cohort, as compared to the Updated Normative II (Canada) cohort. The differences are very small and are likely due to the under-representation of children assessed in Alberta.
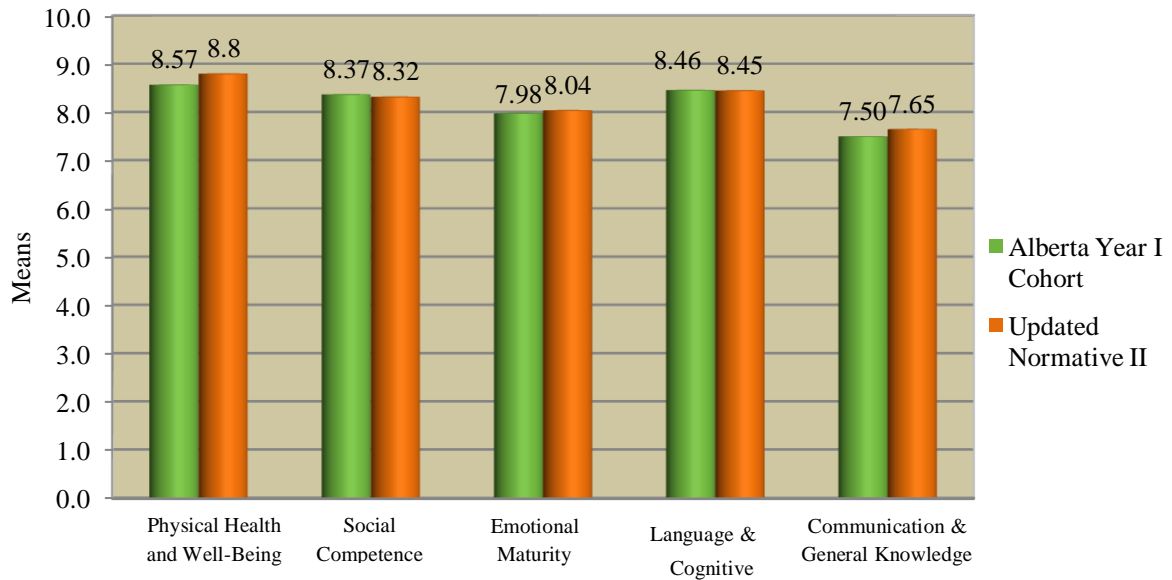
Figure 8.1: Mean Scores of the 2009 Alberta Cohort and Updated Normative II (Canada) on Each Developmental Area

8.5 How do Repeaters Differ in terms of their Domain Scores?

Table 8.5 presents the 'vulnerability' levels (below the 10th percentile) by age groups and developmental domain (compared to their own cohort) for all children, those who repeated kindergarten, and those who did not repeat kindergarten. Generally, older children are more likely to be repeating kindergarten. Not surprisingly, children younger than 5-1 years are at a greater disadvantage than older children in terms of vulnerability. Because the repeaters are smaller in number in 2009, significant differences in vulnerability levels cannot be expected between the two groups. However, a separate analysis of the two groups can be valuable, especially in large samples.

Table 8.5: Frequency and Percentage of Children Experiencing Great Difficulty by Age Group for Each Developmental Area (Compared to Their Own Age Cohort), Alberta 2009*

All	5-1 and low		5-2 to 5-4		5-5 to 5-7		5-8 to 5-10		5-11 to 6-1		6-2 and up		Total	
Domain	Number	% within group	Number	% within group	Number	% within group	Number	% within group	Number	% within group	Number	% within group	Number	% within group
Physical	107	21.97%**	270	18.96%	285	14.73%	259	13.30%	153	10.11%	61	11.75%	1135	14.51%
Social	69	14.17%	179	12.57%	161	8.32%	155	7.96%	86	5.68%	40	7.71%	690	8.82%
Emotion	68	13.96%	203	14.26%	222	11.47%	212	10.88%	132	8.72%	62	11.95%	899	11.51%
Language	85	17.45%	162	11.38%	182	9.41%	135	6.93%	66	4.36%	29	5.59%	659	8.42%
Communication	119	24.44%	283	19.87%	326	16.85%	254	13.04%	162	10.70%	66	12.72%	1210	15.46%
Total	487		1424		1935		1948		1514		519		7827	
Low on at least 1 scale	219	45.06%	516	36.36%	598	30.95%	533	27.40%	341	22.63%	133	25.63%	2340	29.97%
Low on at least 2 scale	124	25.51%	275	19.34%	305	15.79%	255	13.11%	148	9.82%	67	12.91%	1174	15.04%
No Repeated Only														
Physical	106	21.99%	266	18.89%	278	14.56%	255	13.24%	129	9.06%	31	8.09%	1065	14.15%
Social	68	14.11%	175	12.43%	156	8.17%	153	7.94%	70	4.92%	23	6.01%	645	8.56%
Emotion	68	14.11%	198	14.06%	219	11.47%	210	10.90%	114	8.01%	36	9.40%	845	11.24%
Language	83	17.22%	161	11.43%	177	9.27%	132	6.85%	62	4.35%	17	4.44%	632	8.39%
Communication	117	24.27%	277	19.67%	316	16.55%	252	13.08%	142	9.97%	30	7.83%	1134	15.06%
Total	482		1408		1909		1926		1424		383		7532	
Low on at least 1 scale	215	44.70%	507	36.14%	585	30.69%	526	27.35%	303	21.38%	74	19.32%	2210	29.32%
Low on at least 2 scale	122	25.36%	269	19.17%	297	15.58%	252	13.10%	125	8.82%	35	9.14%	1100	14.64%
Repeated Only														
Physical	1	20.00%	4	28.57%	7	26.92%	4	18.18%	24	27.59%	30	22.06%	70	24.14%
Social	1	20.00%	4	28.57%	5	19.23%	2	9.09%	16	18.39%	17	12.50%	45	15.51%
Emotion	0	0.00%	5	35.71%	3	11.54%	2	9.09%	18	20.69%	26	19.12%	54	18.62%
Language	2	40.00%	1	7.14%	5	19.23%	3	13.64%	4	4.60%	12	8.82%	27	9.31%
Communication	2	40.00%	6	42.86%	10	38.46%	2	9.09%	20	22.99%	36	26.47%	76	26.21%
Total	5		14		26		22		87		136		290	
Low on at least 1 scale	4	80.00%	9	64.29%	13	50.00%	7	31.82%	38	42.68%	59	43.38%	130	44.83%
Low on at least 2 scale	2	40.00%	6	42.86%	8	30.77%	3	13.64%	23	26.44%	32	23.53%	74	25.52%
	5-1 and low		5-2 to 5-4		5-5 to 5-7		5-8 to 5-10		5-11 to 6-1		6-2 and up		Total	

Note. The term 'experiencing great difficulty' is adopted instead of the term 'vulnerability' as originally coined by the Offord Centre.

*Based on the Updated Normative II cut-offs.

**21.97% = (107/487)*100%

8.6 Readiness and Vulnerability[5]

Based on the range of percentile scores in each of the five EDI areas, the readiness and vulnerability thresholds or cut-offs are decided. Children who score in the top 25% of the distribution are considered to be *very ready* for school, those falling between the 75th and 25th percentiles of the distribution are considered to be *ready*, those falling between the 25th and the lowest 10th percentiles of the distribution are considered to be *at risk,* and those children who fall below the 10th percentile are considered *vulnerable.* The definition of vulnerability is: a child is, on average, more likely to be limited in his or her development than a child who scores above the 10th percentile cut-off. Percentage of vulnerable children is determined in each domain as well as percentage of children vulnerable in one or more domains, or two or more domains. Whereas children who are determined to be very ready or ready for school are referred to as being *on track*, at risk and vulnerable children are referred to as *not on track.*
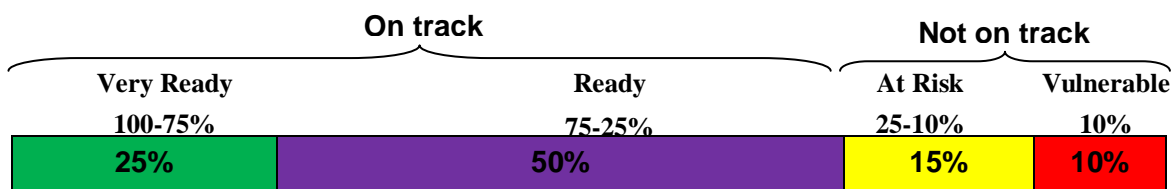
On track		Not on track	
Very Ready	**Ready**	**At Risk**	**Vulnerable**
100-75%	**75-25%**	**25-10%**	**10%**
25%	**50%**	**15%**	**10%**

Table 8.6 presents the cut-off points (i.e., percentile boundaries) based on Updated Normative II (Canada), for each domain.[6] Table 8.7 presents the percentages of children who fall into each of the four categories – very ready, ready, at risk and vulnerable – by domain, based on the Updated Normative II cut-offs. This information is presented in Figures 8.2A to 8.2E by each domain.

Table 8.6: Updated Normative II (Canada) Cut-off Points by Domain

Developmental Area	Vulnerable 10%	At risk 25-10%	Ready 75-25%	Very ready 100-75%
Physical health and well-being	<=7.0833	7.0833<p<=8.0769	8.0769<p<9.9999	p>=9.9999
Social competence	<=5.5769	5.5769<s<= 7.3077	7.3077<s<9.8077	s>=9.8077
Emotional maturity	<=6.0000	6.0000<e<=7.1667	7.1667<e<9.1667	e>=9.1667
Language and cognitive development	<=5.7692	5.7692<l<=7.6923	7.6923<l<9.6154	l>=9.6154
Communication and general knowledge	<=4.3750	4.3750<c<=5.6250	5.6250<c<9.9999	c>=9.9999

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[5] The terminology used in this report is the original terminology developed by the Offord Centre. Alberta is looking into some changes to these and similar ones as earlier noted.
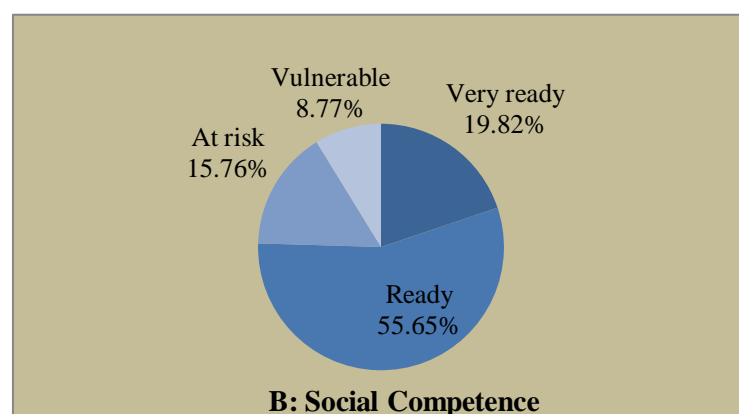
[6] For additional information on the normative sample, please refer to: www.offordcentre.com/readiness.

Table 8.7: Number and Percentage of Children Who are 'on Track' or 'Not on Track' for School, Alberta 2009*

Developmental Area	On Track				Not on Track			
	Very Ready 100-75%		Ready 75-25%		At risk 25-10%		Vulnerable 10%	
	N	%	N	%	N	%	N	%
Physical health and well-being	2359	29.72%	3522	44.37%	910	11.46%	1144	14.41%
Social competence	1573	19.82%	4417	55.64%	1251	15.76%	696	8.77%
Emotional maturity	1813	22.84%	3914	49.31%	1290	16.25%	906	11.41%
Language and cognitive development	1627	20.50%	4660	58.70%	983	12.38%	667	8.40%
Communication and general knowledge	2718	34.24%	2681	33.77%	1315	16.58%	1221	15.39%

* Based on the Updated Normative II cut-offs.

Proportionately more children were found in the very ready category of communication and general knowledge (34.24%) than any other area of development. In terms of vulnerability, communication and general knowledge is an area where the percentage was the lowest (8.40%) in 2009.

A: Physical Health & Well-being

B: Social Competence

C: Emotional maturity

D: Language & Cognitive skills

E: Communication & GK
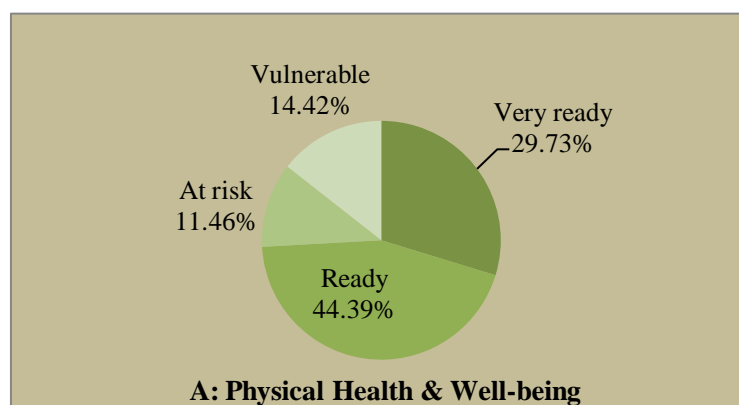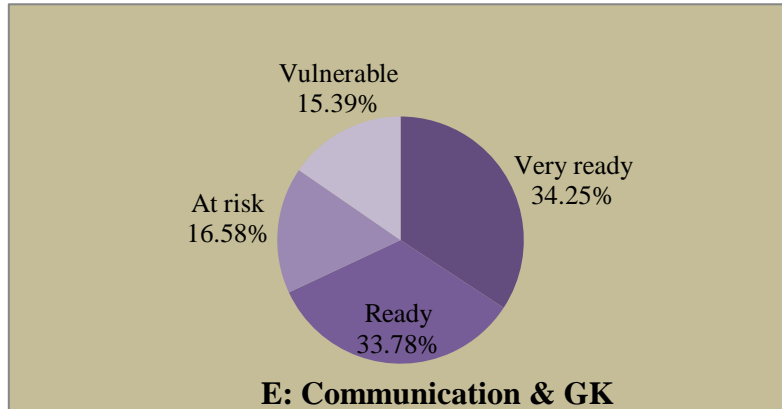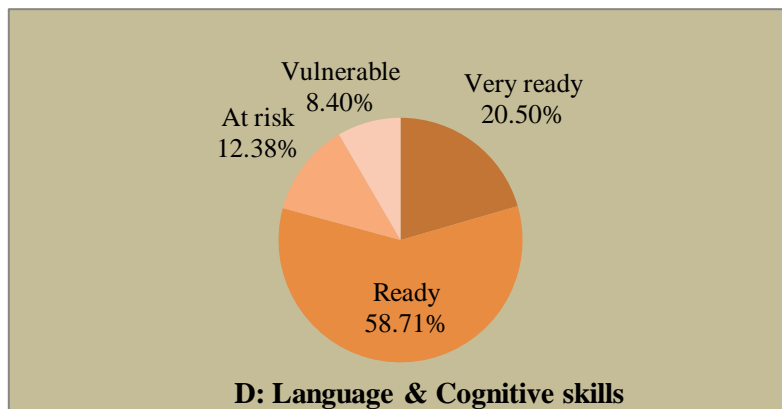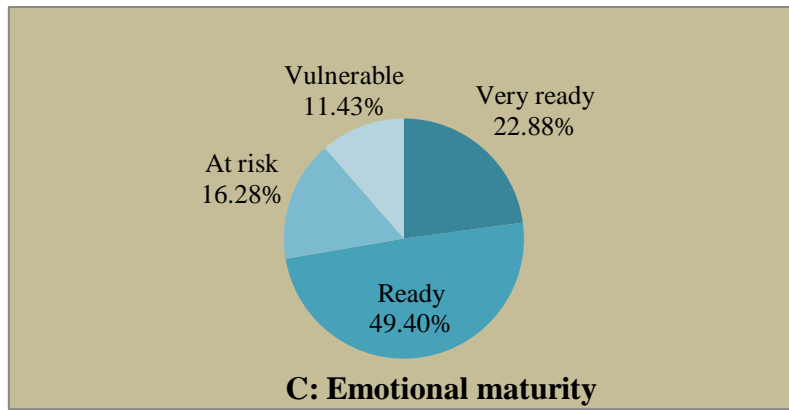
Figure 8.2 A-E: Percentage of Children Who are Very Ready, Ready,
At Risk, and Vulnerable by Domain, Based on the Updated Normative II cut-offs

The percentages of Alberta Year I Cohort who fell below the 10th percentile cut-off based on Alberta cut-offs and the Updated Canadian (Normative II) cut-offs are presented in Table 8.8 and Figure 8.3 by each developmental area. Using Updated Normative II cut-offs, proportionately more children in Alberta fell below the 10th percentile in the area of physical health and well-being (14.4%), emotional maturity (11.4%), communication skills and general knowledge (15.4%) (the right most column in Table 8.8) as compared to their Canadian counterparts.

Table 8.8: Percentages of Vulnerable Children in Alberta in 2009, based on the Provincial and National Cut-offs, by Domain*

Developmental Area	Vulnerable Percentage	
	2008/2009 (Alberta Year I cut-offs)	2008/2009 (Updated Normative II cut-offs)
Physical health and well-being	11.3%	14.4%
Social competence	9.8%	8.8%
Emotional maturity	9.0%	11.4%
Language and cognitive development	8.4%	8.4%
Communication and general knowledge	12.1%	15.4%

*Numbers in column 1 are adapted from the Offord Centre's School Readiness to Learn Summary Report, Spring 2009, Report #1, Page 6.
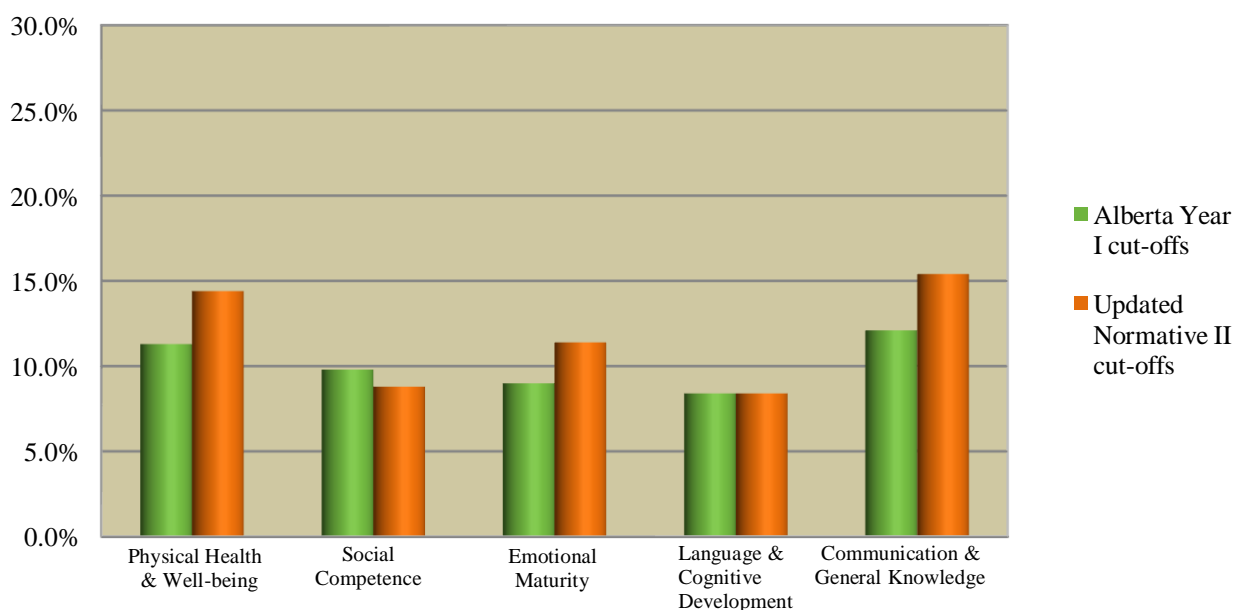
Figure 8.3: Percentages of Vulnerable Children by
Domain based on the Provincial and National (Updated Normative II) Cut-offs

Table 8.9 and Figure 8.4 show percentages of children who fell below the 10th percentile in at least one area of development and who fell below the 10th percentile in two or more areas, based on the provincial and national cut-offs. Proportionately more children in Alberta scored low in at least one area as compared to the Updated Normative II cohort (29.8% vs. 25.4%). Similarly, more children in Alberta scored low in at least two areas as compared to the Updated Normative II cohort (14.9% vs. 12.4%).

Table 8.9: Percentages of Children low in at Least one and at Least two Areas

Low	Percentage		
	2008/2009 (Alberta Year I, based on Alberta Year I Cut-offs)	Canadian (Updated Normative II)	2008/2009 (Alberta Year I, based on Canadian Updated Normative II Cut-offs)
Low in at least **one** area	26.1%	25.4%	29.8%
Low in at least **two** areas	13.0%	12.4%	14.9%
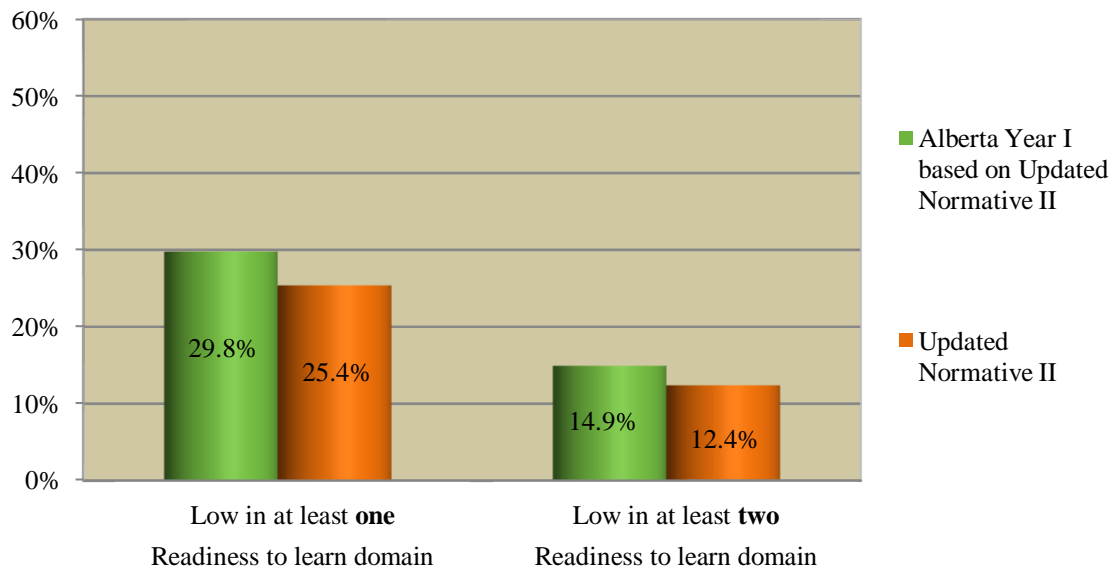
Figure 8.4: Percentages of Children Who Fell Below the 10th Percentile Cut-off in 'At Least One' and 'At Least Two Domains'

CHAPTER 9

THE EDI SUB-DOMAINS

At a Glance

- The first four out of the primary five areas in EDI are further subdivided into 15 sub-domains, with some of the sub-domains representing skills that children are supposed to have mastered already (e.g., physical independence) and other sub-domains representing skills that children are acquiring (e.g., pro-social behaviour).
- Among the children who were classified as not ready for school, the sub-domains with relatively large percentages of children were: gross and fine motor skills, overall social competence, pro-social and helping behaviour, and basic numeracy.

9.1 Sub-domains and Their Structure

Except for the communication skills and general knowledge, each primary EDI domain consists of several sub-domains as determined by the Offord Centre using factor analysis (Table 9.1).

Table 9.1: The Primary Areas and the 16 Sub-domains Within

Area	Sub-domain
Physical Health and Well-being	1. Physical readiness for school day 2. Physical independence 3. Gross and fine motor skills
Social Competence	1. Overall social competence 2. Responsibility and respect 3. Approaches to learning 4. Readiness to explore new things
Emotional Maturity	1. Pro-social and helping behaviour 2. Anxious and fearful behaviour 3. Aggressive behaviour 4. Hyperactivity and inattention
Language and Cognitive Development	1. Basic literacy 2. Interest in literacy/numeracy and memory 3. Advanced literacy 4. Basic numeracy
Communication Skills and General Knowledge	1. Communication skills and general knowledge

Using the Alberta data, factor analysis (namely Principal Component Analyses (PCA)), was performed to examine the structure of principal domains. The PCA results from four separate analyses are presented in Table 9.2 (A to D). A detailed examination of the domains in terms of the items loading on each sub-domain (i.e., sub-domain) reveals some important findings. First, many of the items tended to load on more than one sub-domain, thus making sub-domains to overlap. The domain of social competence had the most sub-domain overlaps. Second, in the language and cognitive development domain, a fifth sub-domain emerged, which is tentatively referred to "interest in readings".

Generally, cross-loading items, if removed, might produce cleaner domain structures, and perhaps fewer sub-domains. The rule of thumb is to drop an item with a loading >.32. Using this rule, 26 items (physical health and well-being, 1; social competence, 14; emotional maturity, 4; and language and cognitive development, 7) were identified as having cross-loadings or loaded on more than two sub-domains.

Table 9.2A: PCA Using Varimax Rotation of Physical Health and Well-being Sub-domains

Items	Physical Health & Well-being		
	Gross and Fine Motor Skills	Physical Readiness for School Work	Physical Independence
Qa13: overall physical	.880	.152	.060
Qa10: manipulates objects	.872	.038	.171
Qa11: climbs stairs	.866	.041	.082
Qa9: proficient at holding pen	.798	.021	.200
Qa12: level of energy	.771	.292	-.016
Qa5:hungry	.050	.719	.065
Qa3: too tired	.187	.700	.067
Qa2:dressed inappropriately	.043	.694	.074
Qa4:late	.059	.532	.018
Qa7: hand preference	.164	-.042	.686
Qa6: washroom	-.035	.012	.679
Qa8: well coordinated	.391	.105	.515
Qc58: sucks thumb	.041	.204	.340
Variance accounted for after rotation: 54.52%			

Note. A row shaded in brown indicates item loading on more than one sub-domain.

Table 9.2B: PCA Using Varimax Rotation of Social Competence Sub-domains

Items	Social Competence			
	Respect and Responsibility	Independence and Adjustment	Overall social competence	Readiness to explore new things
Qc10: respect for children	.829	.142	.218	.096
Qc09: respect for adults	.772	.202	.136	.126
Qc06: respects property	.766	.280	.129	.090
Qc07: self-control	.718	.328	.233	.002
Qc11: accept responsibility	.713	.304	.252	.092
Qc05: follows rules	.666	.454	.219	.076
Qc27: tolerance for mistake	.593	.218	.216	.177
Qc16: takes care of materials	.557	.507	.038	.147
Qc15: independent	.174	.786	.260	.167
Qc14: completes work on time	.152	.769	.193	.160
Qc13: follows directions	.409	.706	.194	.130
Qc23: follow simple instructions	.208	.657	.210	.262
Qc12: listens	.416	.651	.148	.125
Qc17: works neatly	.313	.651	.090	.130
Qc24: follow class routines	.410	.643	.214	.113
Qc25: adjust to change	.312	.562	.336	.200
Qc22: independent solve problems	.204	.513	.482	.262
Qc01: overall soc/emotional	.294	.305	.749	.118
Qc02: gets along with peers	.461	.196	.708	.082
Qc04: plays with various children	.443	.144	.636	.217
Qc08: self-confidence	.006	.349	.623	.284
Qc03: cooperative	.572	.200	.583	.154
Qc20: eager new game	.098	.107	.146	.895
Qc19: eager new toy	.086	.077	.115	.891
Qc21: eager new book	.166	.283	.111	.749
Qc18: curious	.104	.323	.200	.672
Variance accounted for after rotation: 66.99%				

Note. Rows shaded in brown indicate items loading on more than one sub-domain.

Table 9.2C: PCA Using Varimax Rotation of Emotional Maturity Sub-domains

Items	Emotional Maturity			
	Pro-social and helping behaviour	Hyperactive and inattentive behaviour	Aggressive behaviour	Anxious and fearful behaviour
Qc32: comforts upset	.882	.068	.100	.066
Qc35: helps sick	.871	.081	.082	.073
Qc31: offers help	.845	.166	.065	.111
Qc33: spontaneously helps	.828	.140	.126	.033
Qc30: stop quarrel	.815	.106	.028	.146
Qc34: invite bystanders	.813	.074	.035	.154
Qc28: help hurt	.812	.093	.152	.059
Qc29: clear up mess	.802	.147	.149	.026
Qc43: distractible	.146	.845	.187	.122
Qc44: fidgets	.112	.838	.201	.093
Qc42: restless	.102	.833	.255	.057
Qc50: inattentive	.218	.775	.179	.117
Qc49: can't settle	.096	.772	.273	.134
Qc47: impulsive	.110	.631	.501	.073
Qc48: difficulty awaiting turns	.114	.586	.485	.078
Qc38: bullies or mean	.121	.156	.781	.046
Qc39: kicks etc.	.076	.147	.774	.093
Qc37: gets into fights	.082	.178	.763	.096
Qc40: takes things	.062	.205	.643	.089
Qc45: disobedient	.124	.438	.636	.103
Qc41: laughs at others	.151	.198	.606	.016
Qc46: temper tantrums	.053	.192	.556	.313
Qc52: fearful	.079	.074	.013	.815
Qc53: worried	.079	.070	.003	.814
Qc55: nervous	.036	.168	.146	.661
Qc51: seems unhappy	.143	.145	.215	.654
Qc54: cries a lot	.039	.068	.235	.605
Qc56: indecisive	.186	.374	.007	.521
Qc57: shy	.210	-.078	-.253	.517
Qc36: upset when left	-.029	-.017	.135	.503
Variance accounted for after rotation: 61.90%				

Note. Rows shaded in brown indicate items loading on more than one sub-domain.

Table 9.2D: PCA Using Varimax Rotation of Language and Cognitive Development Sub-domains

Items	Language and Cognitive Development				
	Basic Literacy and Numeracy	Complex Literacy Skill	Interest and Memory	Basic Literacy	Interest In Reading
Qb30: recognizes 1-10	.759	.142	.110	.043	.049
Qb29: counts to 20	.690	.196	.090	.023	.015
Qb31: compares numbers	.686	.109	.158	.177	.057
Qb11: identify letters	.660	.203	.003	.170	.205
Qb12: sounds to letters	.627	.376	.043	.061	.231
Qb28: 1 to 1 correspondence	.584	.001	.252	.345	.035
Qb13: rhyming awareness	.542	.407	.113	.051	.185
Qb32: recognizes shapes	.502	.025	.138	.285	.080
Qb24: remembers things	.440	.345	.292	.096	.139
Qb33: time concepts	.436	.139	.118	.295	.075
Qb14: group reading	.387	.256	.124	.204	.335
Qb17: reads sentences	.248	.745	.063	-.002	.058
Qb23: write simple sentences	.072	.682	.046	.309	-.030
Qb16: reads complex words	.137	.669	.039	-.111	.002
Qb15: reads simple words	.439	.584	.094	.092	.171
Qb20: writing voluntarily	.143	.475	.228	.175	.221
Qb26: interested in number games	.244	.110	.854	.059	.133
Qb25: interested in maths	.268	.125	.834	.084	.146
Qb21: write own name	.265	.049	.029	.609	.056
Qb22: write simple words	.152	.531	.048	.535	.012
Qb19: writing directions	.271	.155	.144	.483	.206
Qb27: sorts and classifies	.418	.010	.328	.418	-.005
Qb18: experiments writing	-.054	.295	.336	.346	.170
Qb9: interested in books	.100	.058	.133	.059	.828
Qb10: interested in reading	.253	.188	.262	.085	.713
Qb8: handles a book	.040	-.063	-.088	.397	.410
Variance accounted for after rotation: 52.27%					

Note. Rows shaded in brown indicate items loading on more than one sub-domain.

9.2 Sub-domains and School Readiness

Detailed descriptions of children being *ready for school* and *not on track* (based upon the classification scheme, presented as a horizontal bar with four categories in Section 8.5) are provided for each sub-domain in Tables 9.3A to 9.3E. Note that the definition for the 'middle' category was not originally provided by the Offord Centre, and thus, not provided in Tables 9.3A to 9.3E. The percentages of children in Alberta falling into the 'middle' category were, however, computed, in addition to the percentages of children who are 'ready for school' and 'not on track', and shown for each sub-domain in Figures 9.1A to 9.1E.

Among those who were classified as not ready for school, the sub-domains with relatively large percentages of children in Alberta in 2009 were gross and fine motor skills, overall social competence, pro-social and helping behaviour, and basic numeracy (Figures 9.1A to 9.1E).

Table 9.3A: Sub-domain Descriptions for Physical Health and Well-being*

Sub-domain	Category	Physical Health and Well-being
Physical readiness for school day	Ready for school	Children who never or almost never experienced being dressed inappropriately for school activities, coming to school tired, late or hungry
	Not on track	These children have at least sometimes experienced coming unprepared for school day by being dressed inappropriately, coming to school late, hungry, or tired.
Physical independence	Ready for school	Children who are independent looking after their needs, have an established hand preference, are well coordinated, and do not suck a thumb/finger
	Not on track	These children vary from those who have not developed one of the three skills (independence, handedness, coordination) and/or suck a thumb to those who have not developed any of the skills and suck a thumb.
Gross and fine motor skills	Ready for school	Children who have an excellent ability to physically tackle the school day and have excellent or good gross and fine motor skills.
	Not on track	These children range from those who have an average ability to perform skills requiring gross and fine motor competence and good or average overall energy levels, to those who have poor fine and gross motor skills, poor overall energy levels and physical skills.

*Due to the distribution of scores in the Physical Readiness for School Day and the Physical Independence sub-domains do not have a middle category (see Offord Centre's School Readiness to Learn Profiles, Normative II, Page.1).
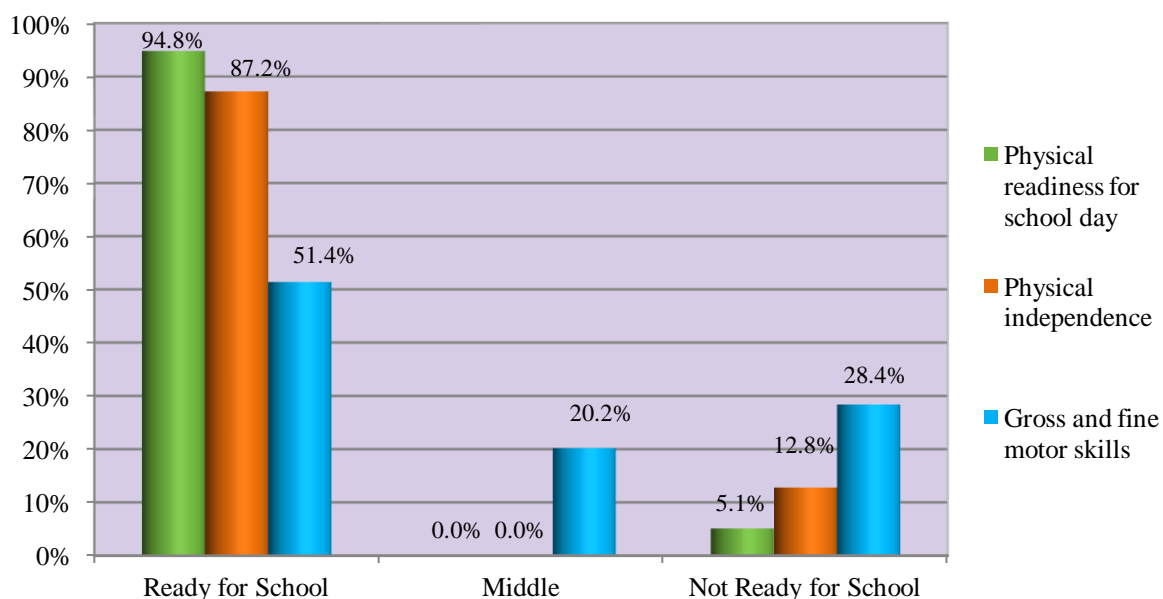

Figure 9.1A: Physical Health and Well-being Sub-domains by Children's Readiness for School

Table 9.3B: Sub-domain Descriptions for Social Competence

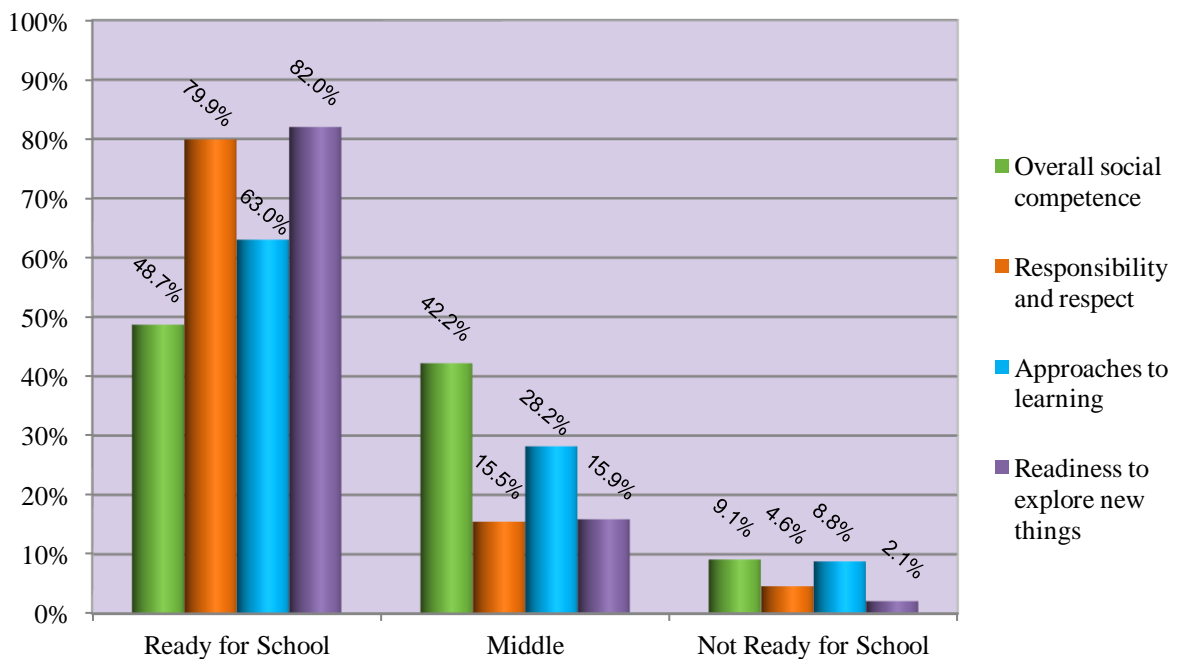| Sub-domain	Category	Social Competence
Overall social competence	Ready for school	Children with excellent or good overall social development, very good ability to get along with other children and play with various children, usually cooperative and self-confident
	Not on track	Children who have average to poor overall social skills, low self-confidence and are rarely able to play with various children and interact cooperatively
Responsibility and respect	Ready for school	Children who always or most of the time show respect for others, and for property, follow rules and take care of materials, accept responsibility for actions, and show self-control
	Not on track	Children who only sometimes or never accept responsibility for actions, show respect for others and for property, demonstrate self-control, and are rarely able to follow rules and take care of materials
Approaches to learning	Ready for school	Children who always or most of the time work neatly, independently, and solve problems, follow instructions and class routines, easily adjust to changes
	Not on track	Children who only sometimes or never work neatly, independently, are rarely able to solve problems, follow class routines and do not easily adjust to changes in routines
Readiness to explore new things	Ready for school	Children who are curious about the surrounding world, and are eager to explore new books, toys and games.
	Not on track	Children who only sometimes or never show curiosity about the world, and are rarely eager to explore new books, toys and games.

Figure 9.1B: Social Competence Sub-domains by Children's Readiness for School

Table 9.3C: Sub-domain Descriptions for Emotional Maturity

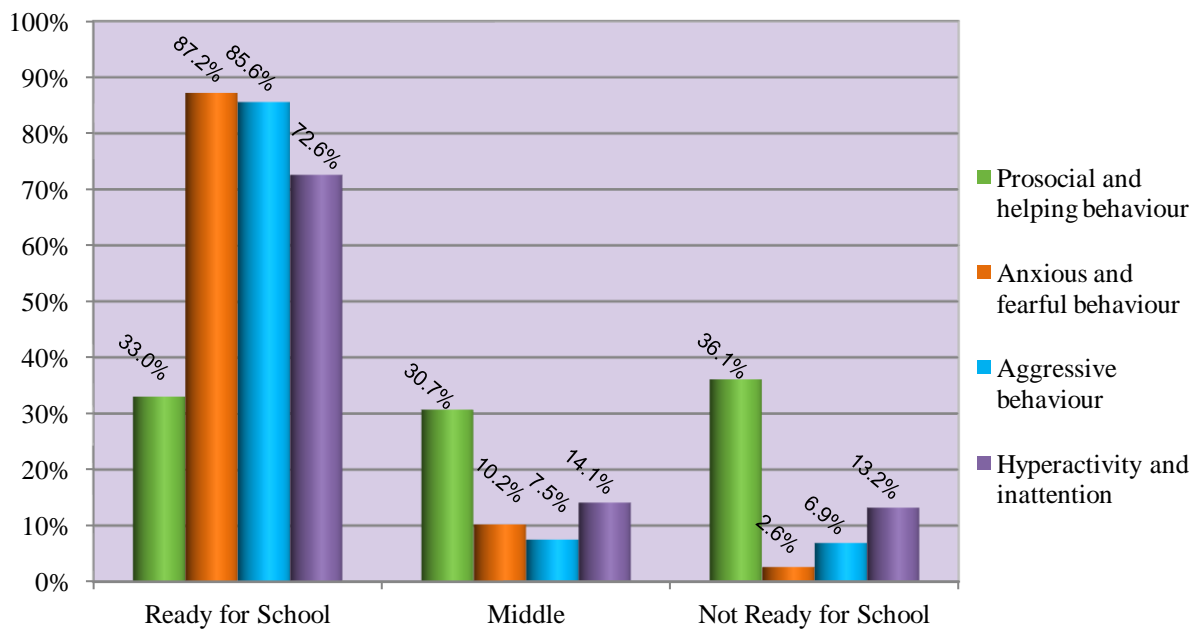| Sub-domain	Category	Emotional Maturity
Pro-social and helping behaviour	Ready for school	Children who often show most of the helping behaviours: helping someone hurt, sick or upset, offering to help spontaneously, invite bystanders to join in
	Not on track	Children who never or almost never show most of the helping behaviours; they do not help someone hurt, sick or upset, spontaneously offer to help, do not invite bystanders to join in
Anxious and fearful behaviour	Ready for school	Children who rarely or never show most of the anxious behaviours; they are happy and able to enjoy school, and are comfortable being left at school by caregivers
	Not on track	Children who often show most of the anxious behaviours; they could be worried, unhappy, nervous, sad or excessively shy, indecisive; and they can be upset when left at school
Aggressive behaviour	Ready for school	Children who rarely or never show most of the aggressive behaviours; they do not use aggression as means of solving a conflict, do not have temper tantrums, and are not mean to others
	Not on track	Children who often show most of the aggressive behaviours; they get into physical fights, kick or bite others, take other people's things, are disobedient or have temper tantrums
Hyperactivity and inattention	Ready for school	Children who never show most of the hyperactive behaviours; they are able to concentrate, settle to chosen activities, wait their turn, and most of the time think before doing something
	Not on track	Children who often show most of the hyperactive behaviours; they could be restless, distractible, impulsive; they fidget and have difficulty settling to activities

Figure 9.1C: Emotional Maturity Sub-domains by Children's Readiness for School

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Table 9.3D: Sub-domain Descriptions for Language and Cognitive Development

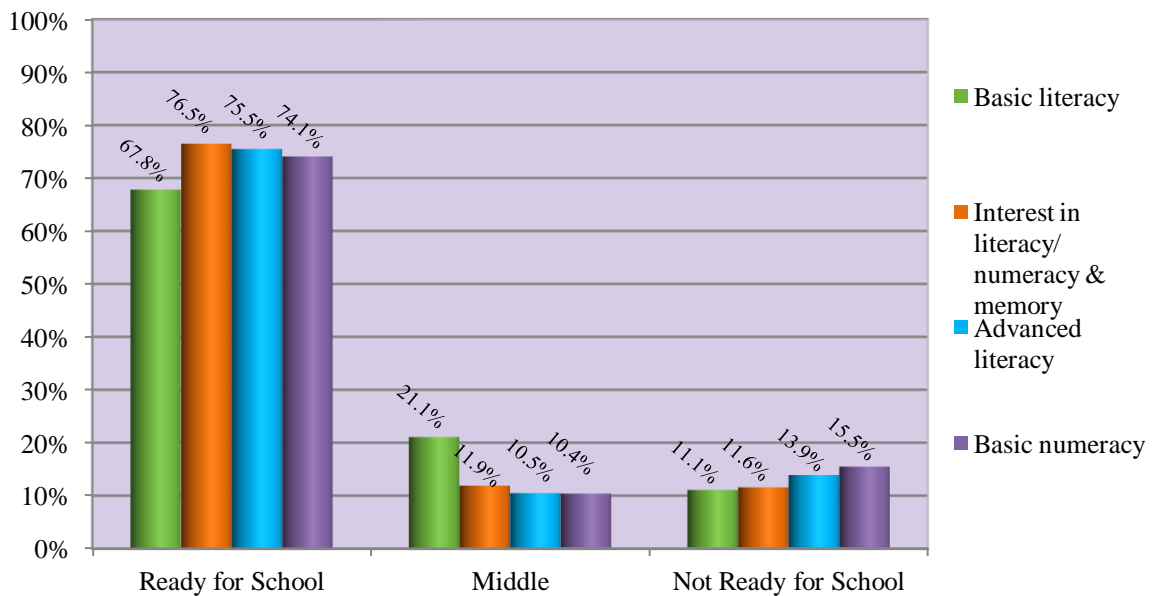| Sub-domain	Category	Language and Cognitive Development
Basic literacy	Ready for school	Children who have all the basic literacy skills: know how to handle a book, can identify some letters and attach sounds to some letters, show awareness of rhyming words, know the writing directions, and are able to write their own name
	Not on track	Children who do not have most of the basic literacy skills; they have problems with identifying letters or attaching sounds to them, rhyming, may not know the writing directions and even how to write own name
Interest in literacy/ numeracy and memory	Ready for school	Children who show interest in books and reading, maths and numbers, and have no difficulty with remembering things
	Not on track	Children who may not show interest in books and reading, or math and number games, or both, and may have difficulty remembering things
Advanced literacy	Ready for school	Children who have at least half of the advanced literacy skills: reading simple, complex words or sentences, writing voluntarily, writing simple words or sentences
	Not on track	Children who have only up to one of the advanced literacy skills; who cannot read or write simple words, or sentences and rarely write voluntarily
Basic numeracy	Ready for school	Children who have all the basic numeracy skills: can count to 20 and recognise shapes and numbers, compare numbers, sort and classify, use one-to-one correspondence, and understand simple time concepts
	Not on track	Children who have marked difficulty with numbers, cannot count, compare or recognise numbers, may not be able to name all the shapes and may have difficulty with time concepts

Figure 9.1D: Language and Cognitive Development Sub-domains by Children's Readiness for School

Table 9.3E: Sub-domain Description for Communication and General Knowledge

| Category	Communications Skills and General Knowledge
Ready for school	Children who have excellent or very good communication skills; can communicate easily and effectively, can participate in story-telling or imaginative play, articulates clearly, show adequate general knowledge, and are proficient in their native language
Not on track	Children who can range from being average to very poor in effective communication, may have difficulty in participating in games involving the use of language, may be difficult to understand and may have difficulty to understand others; may show little general knowledge and may have difficulty with the native language
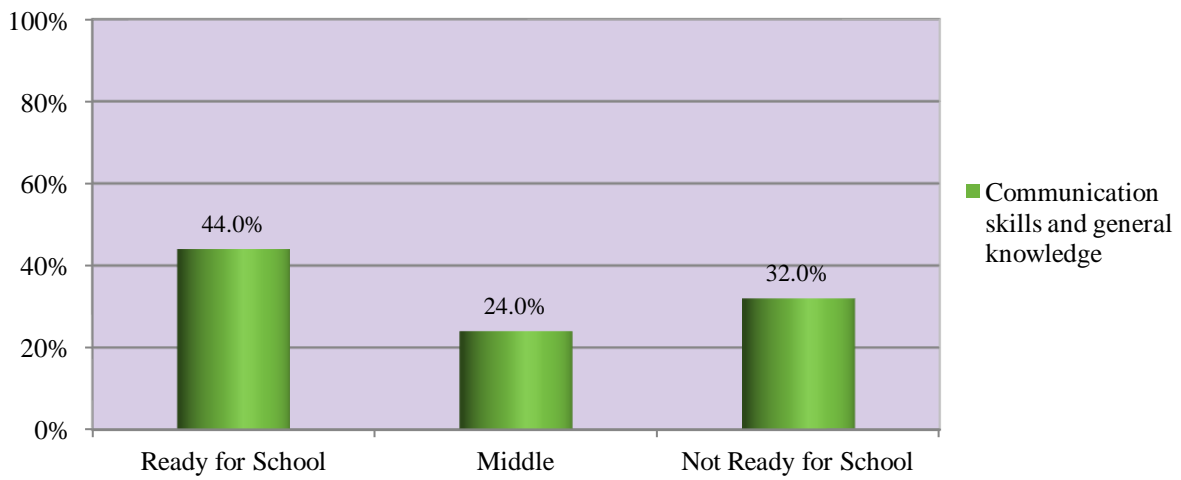
Figure 9.1E: Communication and GK Sub-domain by Children's
Readiness for School

9.3 The Multiple Challenge Index

As mentioned earlier, there are 16 sub-domains within the five primary areas of the EDI. Each of the sub-domains represents a relatively homogenous aspect of a child's development. A "challenge" ability range can be identified within each sub-domain, based on the range of scores, with 0 being the lowest. The sub-domain score of zero indicates that a child has no ability in any of the items included in the sub-domain. If a child scores low (below the cut-off) on nine or more of the 16 sub-domains, he/she is considered to have multiple challenges. For example, if a child's scores fall below the cut-offs in all four sub-domains of social competence, all four sub-domains of emotional maturity, and any one of the sub-domains of physical health and well-being, the child is said to have multiple challenges.

Given that three of the five primary areas have four sub-domains, one has three, and the last one has one, if a child is determined to experience difficulty in nine sub-domains, it means that he/she has difficulty in at least three of the five developmental areas. In short, the Multiple Challenge Index (MCI) scores are based on challenges in nine or more sub-domains,

and is expressed as "existence of multiple challenges" (=1) and "no multiple challenges" (=0).

The cut-offs for the sub-domains are not geographically determined and are not based on the normative sample as it is the case with the five primary domains. The sub-domain cut-offs are based on a teacher's endorsement of the items in the questionnaire (the actual responses of a teacher completing the questionnaire). For example, the physical independence sub-domain within physical health and well-being has four items (a6: independence in washroom habits, a7: established hand preference, a8: well coordinated, and c58: sucks thumb), each representing a specific developmental skill, generally mastered by children by the age of four. If a child has mastered a particular skill, the score of 10 is assigned on that item, otherwise, the score of zero is given (i.e., Yes= 10; No=0). Then, a "challenge" score for the physical independence is set at lower than 9.99, which would be given to a child whom the teacher gave the score of 0 on **all of the four items** included in the physical independence.

Figure 9.2 presents percentages of children in Alberta who were determined to be experiencing multiple challenges, compared to the Updated Normative II cohort of Canadian children. Although the differences are small, proportionately more children in Alberta were found to be experiencing multiple challenges than Canadian children as a whole.
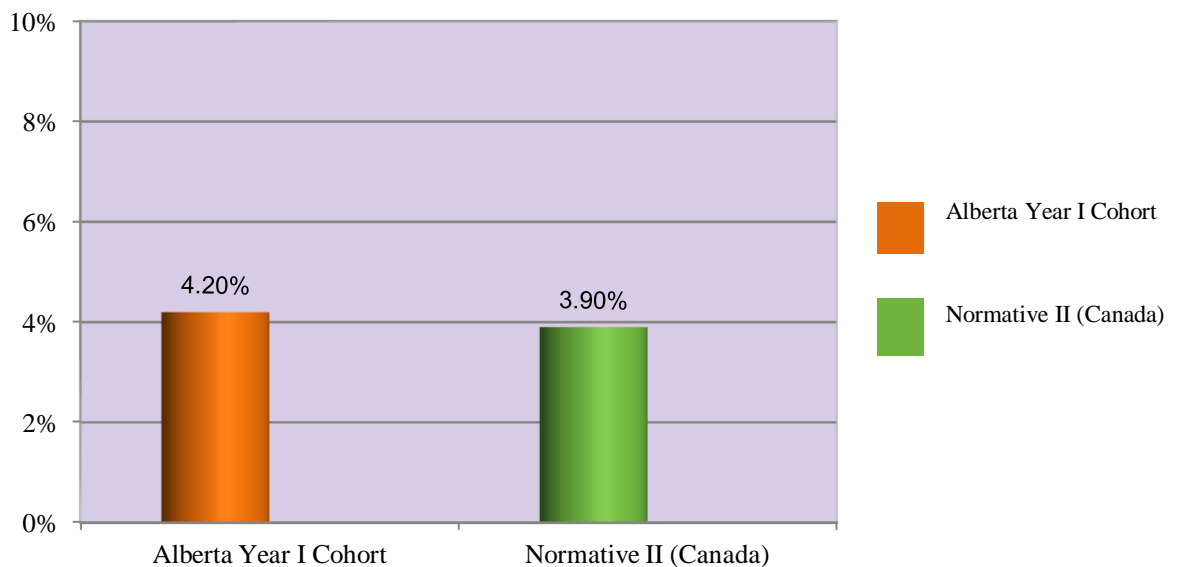
Figure 9.2: Percentages of Children Experiencing Multiple Challenges

CHAPTER 10

CONCLUSION

This report is intended to be a companion to the report, EDI Micro Database, 2009. The reader is advised to refer to the Database report for questions on variable structure, the EDI Guide for details on sections, and the EDI questionnaire for sections and variables within. The present report can be used to generate new knowledge that may be presented at different geo-political units or at the community level so that the findings can be more reflective of population-based domain scores.

Aboriginal: Whether or not a child belongs to a North American Indian, Métis, or Inuit as determined from a teacher's observation of the child.

Alberta cut-offs: It is the 2010 Alberta baseline 10th percentile cut-off values. The domain specific cut-off values are 6.92, 5.60, 6.17, 6.15, and 4.38 for physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication and general knowledge, respectively. If, for example, the 10th percentile value for the physical domain for a community is 6, it means that, on average, 10% of children in the community score lower than the 10th percentile Alberta cut-off, 6.92.

Arithmetic mean (also called 'mean'): It is the number we get when all scores are added together, and then divided by the number of children contributing data. The arithmetic mean of items with scores, say, 3, 4 and 8 is 5. The arithmetic mean is the most common type of average. However, it is a crude measure that is affected by outliers; it does not represent data with extreme values.

Communication and general knowledge: As a domain in the EDI, it consists of 8 items and has no sub-domains.

Domain missing: A domain is said to be missing for individual children if **more than 25% of questions** in the domain are either blank or with "Don't Know" responses. If, for example, the 13-item physical domain has no values entered in three or more items, the domain is considered invalid or missing.

Early Development Instrument (EDI): A teacher-completed survey of 103 questions to assess kindergarten children's development in five general domains: physical health and well-being, social competence, emotional maturity, language and cognitive development, and communication skills and general knowledge. In addition, some demographic information is collected as part of the EDI survey. As a population-based measure, it has been used across Canada and internationally.

Early intervention program: A program that either a child (e.g., speech/language therapy, Head Start) or a parent attended (e.g., parenting program).

Emotional maturity: As a domain in the EDI, it comprises 30 items and has four sub-domains: pro-social and helping behaviour, anxious and fearful behaviour, aggressive behaviour, and hyperactive and inattentive behaviour, each of which has 8, 8, 7, and 7 items, respectively.

English as a Second Language (ESL): A child, whose first language is a language other than English, has an ESL status.

French immersion: A program in which kindergarten students are introduced early to French language through immersion in an Anglophone school, that is, the main language of the school remains to be English.

Geometric mean: The arithmetic mean of items with scores of 3, 4 and 8 is 5. However, it is a crude measure that is affected by extreme values such as 8 in this example. Using the example, the geometric mean would yield a value of 4.579 ($= \sqrt[3]{3 \times 4 \times 8}$).

Harmonic mean: The harmonic mean, unlike the arithmetic mean, tends to lean toward the lowest score. The harmonic mean is useful in a situation of this sort: fewer children score high while most children score low; it gives a higher weight to those scoring low and lower weight to those scoring high. The harmonic mean of 3, 4, and 8 is, 4.26 ($= \frac{3}{\frac{1}{3}+\frac{1}{4}+\frac{1}{8}}$). In datasets containing at least one pair of unequal values, the harmonic mean gives the least value, arithmetic mean gives the greatest value, and geometric mean gives a value in between the other two.

Language and cognitive development: As a domain in the EDI, it comprises 26 items and has four sub-domains: basic literacy, interest and memory, complex literacy skills, and basic literacy and numeracy, each of which has 8, 5, 6, and 7 items, respectively.

Median: The numeric value separating the higher half of a sample from the lower half. The *median* of a finite list of numbers can be found by arranging all the observations from the lowest value to the highest value and picking the middle one. If there is an even number of observations, then there is no single middle value; the median is then usually defined to be the mean of the two middle values.

Mode: The mode of a set of data is the value in the set that occurs most often.

Multiple Challenge Index (MCI): The MCI scores are based on challenges in **nine or more sub-domains**. The MCI is expressed as "existence of multiple challenges" (=1) and "no multiple challenges" (=0). In contrast to the cut-offs for the domains, the cut-offs for the sub-domains are not based on the normative (provincial or national) sample. They are based on the teacher's actual responses on the questions/items. The physical independence sub-domain (within the physical health and well-being domain) has four items: independence in washroom habits, established hand preference, well coordinated, and sucks thumb, with each of the four items representing a skill generally mastered by 4-year-old children. Because the items are scored Yes = 10 and No = 0, a "challenge" score for the physical independence is set at lower than 9.99 and would be given to a child when the teacher responded 0 to **all of the four skills**.

Percentile: A score in and of itself is difficult to interpret. If a child scores 6 out of a possible 10 on an item that measures "shyness", 10 being very shy, how do we know how shy he is compared to his peers? If, on the other hand, we know that the 10th percentile value of his score is 6, and then we would say, on average, 10% of the children in his class score lower than him. The 10th percentile is the value below which 10% of the children score. Median (50th percentile) as well as 90th and 10th percentiles provide some idea about the shape and spread of the data.

Physical health and well-being: As a domain in the EDI, it comprises 13 items and has three sub-domains: physical readiness for school work, physical independence, and gross and fine motor skills, each of which has 4, 4, and 5 items, respectively.

Principal Components Analysis (PCA): PCA is the most common type of "factor analysis", used when the research purpose is data reduction or exploration. It analyzes a correlation matrix.

Special problem: A child who needs special assistance in the classroom due to chronic physical and/or mental disabling conditions (based on medical diagnosis, teacher observation or parent/guardian information), such as autism, foetal alcohol syndrome, or down-syndrome, as well as problems affecting a child's ability to do school work, such as problems at home, unaddressed dental needs, behavioural problem, and speech impairment.

Special need: A child who needs special assistance in the classroom due to chronic physical and/or mental disabling conditions (based on medical diagnosis, teacher observation or

parent/guardian information), such as autism, foetal alcohol syndrome, or down-syndrome following the Alberta Special Education Coding Criteria.

Special skills/talents: A child who demonstrates unique skills/talents that are not expected of children of his/her age in such areas as numeracy, literacy, music, and problem solving. A skill/talent should be reflective of the child's actual performance and not relative to his/her classroom peers.

Social competence: As a domain in the EDI, it comprises 26 items and has four sub-domains: overall social competence, respect and responsibility, independence and adjustment, and readiness to explore new things, each of which has 5, 8, 9, and 4 items, respectively.

Standard deviation: Standard deviation is a widely used measurement of variability or diversity. It shows how much variation or "dispersion" there is from the average (mean, or expected value). A low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data are spread out over a large range of values.

Standard error: The standard error or the standard error of the mean of multiple samples is the standard deviation of the sample means, and thus gives a measure of spread. It gives an indication of the likely accuracy of the sample mean, as compared to population mean. The smaller the standard error, the less the spread and the more likely that any sample mean is close to the population mean. The standard error is important to compute because it reflect, on average, how much sampling fluctuation a measure will show if used with another random sample drawn from the same population.

Updated Normative II cut-offs: It is the Canadian 10th percentile cut-off values, based on N = 174,799. The domain specific cut-off values are 7.0833, 5.5769, 6.0000, 5.7692, and 4.3750 for the physical health and wellbeing, social competence, emotional maturity, language and cognitive development, and communication and general knowledge, respectively. If, for example, the 10th percentile value for the physical domain for a community is 6, it means that, on average, 10% of children in the community score lower than the 10th percentile Canadian cut-off, 7.0833. Previously, it was referred to as Normative II cut-offs and was based on N = 176,201 previously. The domain specific cut-off values were 7.0833, 5.5769, 6.0000, 5.7692, and 4.2857 for the physical health and wellbeing, social competence, emotional maturity, language and cognitive development, and communication and general knowledge, respectively.

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APPENDIX A: THE STRUCTURE OF THE EDI BASED ON THE PRINCIPAL COMPONENTS ANALYSIS

As currently conceived, the Early Development Instrument (EDI) includes 103 questions that a teacher can use to rate a child's behaviour in five domains of development: physical health and well-being, emotional maturity, social competence, language and cognitive development, and communication and general knowledge. We analyzed the underlying structure of the EDI domains using the 2009 Alberta data, within a multivariate framework, the Principal Component Analysis (PCA) (Krishnan, 2011). The PCA reduces a complex set of variables into a set of fewer uncorrelated components to explore the nature of the component structure underlying the Alberta EDI data. Only children who were in class more than one month, had no special needs, and had scores missing in no more than one domain were included in the analysis (N = 7,938).

To begin with, all the 103 EDI items were used in the PCA yielding a 17-component structure that accounted for 62.3% of the total variance in the data. However, many of the items either loaded on more than one component (i.e., cross-loaded) or did not load on any of the components, which made it difficult to describe the component structure. Given the original number of domains (five) published by the Offord Centre and the Screeplot of the 17 components, a decision was made to retain the five components that accounted for the largest amount of the total variance. This resulted in the reduction of the variance accounted for from 62.3% to 44.44%. When the cross-loading items and items with no loadings were excluded from the PCA, a clean solution emerged with 71 items accounting for 47.88% of the total variance, which was almost 4% more than the variance accounted for by all the 103 items. The loadings of the retained 71 items on the five principal components are shown in Tables A1 to A5, alongside the 103-item domains of Offord. The tables provide a comparison of the components and the five domains in terms of their structures and the numbers of items in each domain. As seen in the tables, the pattern of the principal components differed from that of Offord's, in particular for the social and emotional domains. For example, whereas the social competence domain emerged with almost the same number of items, the items themselves varied (Table 1B). Given this, the assessment of social and emotional domains may be especially challenging in terms of their stability across populations.

To conclude, two major findings were obtained. First, the PCA results indicated that one-third of the EDI items might be theoretically but not necessarily empirically useful in understanding early child development. Second, the PCA of the Alberta 2009 EDI data showed meaningful, although different from the Offord's, patterns of domains. Therefore,

caution should be taken when interpreting the domains/components and in particular those that comprise social and emotional dimensions. These and other important issues need to be examined further.

Table A (1-5): A Comparison of Offord's Five Domains and the PCA's Five Components, Alberta 2009

Table A1: Physical Health & Well-being

Offord (13 items)	PCA (6 Items)	
Physical Health & Well-being	**Component #4**	**Loadings**
Well coordinated (Qa08)	Well coordinated (Qa08)	0.437
Proficient at holding pen (Qa09)	Proficient at holding pen (Qa09)	0.747
Manipulates objects (Qa10)	Manipulates objects (Qa10)	0.810
Climbs stairs (Qa11)	Climbs stairs (Qa11)	0.803
Level of energy (Qa12)	Level of energy (Qa12)	0.687
Overall physical (Qa13)	Overall physical (Qa13)	0.805
Dressed inappropriately (Qa02)		
Too tired (Qa03)		
Late (Qa04)		
Hungry (Qa05)		
Washroom (Qa06)		
Hand preference (Qa07)		
Sucks thumb (Qc58)		

Note: Rows shaded in purple color indicate items common to both Offord and PCA

Table A2: Social Competence

Offord (26 Items)	PCA (23 Items)	
Social Competence	**Component #1**	**Loadings**
Cooperative (Qc03)	Cooperative (Qc03)	0.580
Follows rules (Qc05)	Follows rules (Qc05)	0.707
Respects property (Qc06)	Respects property (Qc06)	0.723
Self-control (Qc07)	Self-control (Qc07)	0.754
Respect for adults (Qc09)	Respect for adults (Qc09)	0.692
Respect for children (Qc10)	Respect for children (Qc10)	0.729
Accepts responsibility (Qc11)	Accepts responsibility (Qc11)	0.692
Takes care of materials (Qc16)	Takes care of materials (Qc16)	0.598
Follow class routines (Qc24)	Follow class routines (Qc24)	0.577
Adjust to change (Qc25)	Adjust to change (Qc25)	0.470
Overall social/emotional (Qc01)	Gets into fights (Qc37)	0.655
Gets along with peers (Qc02)	Bullies or mean (Qc38)	0.681
Plays with various children (Qc04)	Kicks etc (Qc39)	0.635
Self-confidence (Qc08)	Takes things (Qc40)	0.602
Listens (Qc12)	Laughs at others (Qc41)	0.585
Follows directions (Qc13)	Restless (Qc42)	0.691
Completes work on time (Qc14)	Distractible (Qc43)	0.643
Independence (Qc15)	Fidgets (Qc44)	0.651

Works neatly (Qc17)	Disobedient (Qc45)	0.765
Curious (Qc18)	Impulsive (Qc47)	0.773
Eager new toy (Qc19)	Difficulty awaiting turns (Qc48)	0.740
Eager new game (Qc20)	Can't settle (Qc49)	0.661
Eager new book (Qc21)	Inattentive (Qc 50)	0.601
Independent solve problems (Qc22)		
Follow simple instructions (Qc23)		
Tolerance for mistakes (Qc27)		

Note: Rows shaded in purple color indicate items common to both Offord and PCA

Table A3: Emotional Maturity

Offord (30 Items)	PCA (10 Items)	
Emotional Maturity	**Component #3**	**Loadings**
Help hurt (Qc28)	Help hurt (Qc28)	0.784
Clean up mess (Qc29)	Clean up mess (Qc29)	0.771
Stop quarrel (Qc30)	Stop quarrel (Qc30)	0.776
Offers help (Qc31)	Offers help (Qc31)	0.793
Comforts upset (Qc32)	Comforts upset (Qc32)	0.855
Spontaneously helps (Qc33)	Spontaneously helps (Qc33)	0.795
Invite bystanders (Qc34)	Invite bystanders (Qc34)	0.784
Helps sick (Qc35)	Helps sick (Qc35)	0.839
Upset when left (Qc36)	Eager new toy (Qc19)	0.330
Gets into fights (Qc37)	Eager new game (Qc20)	0.335
Bullies or mean (Qc38)		
Kicks etc. (Qc39)		
Takes things (Qc40)		
Laughs at others (Qc41)		
Restless (Qc42)		
Distractible (Qc43)		
Fidgets (Qc44)		
Disobedient (Qc45)		
Temper tantrums (Qc46)		
Impulsive (Qc47)		
Difficulty awaiting turns (Qc48)		
Can't settle (Qc49)		
Inattentive (Qc50)		
Seems unhappy (Qc51)		
Fearful (Qc52)		
Worried (Qc53)		
Cries a lot (Qc54)		
Nervous (Qc55)		
Indecisive (Qc56)		
Shy (Qc57)		

Note: Rows shaded in purple color indicate items common to both Offord and PCA

Table A4: Language & Cognition

Offord (26 Items)	PCA (24 Items)	
Language & Cognition	**Component #2**	**Loadings**
Interested in books (Qb09)	Interested in books (Qb09)	0.369
Interested in reading (Qb10)	Interested in reading (Qb10)	0.550
Identifies letters (Qb11)	Identifies letters (Qb11)	0.673
Sounds to letters (Qb12)	Sounds to letters (Qb12)	0.697
Rhyming awareness (Qb13)	Rhyming awareness (Qb13)	0.645
Group reading (Qb14)	Group reading (Qb14)	0.585
Reads simple words (Qb15)	Reads simple words (Qb15)	0.667
Reads sentences (Qb17)	Reads sentences (Qb17)	0.505
Experiments writing (Qb18)	Experiments writing (Qb18)	0.346
Writing directions (Qb19)	Writing directions (Qb19)	0.501
Writing voluntarily (Qb20)	Writing voluntarily (Qb20)	0.429
Write own name (Qb21)	Write own name (Qb21)	0.426
Write simple words (Qb22)	Write simple words (Qb22)	0.511
Write simple sentences (Qb23)	Write simple sentences (Qb23)	0.410
Remembers things (Qb24)	Remembers things (Qb24)	0.589
Interested in Maths (Qb25)	Interested in Maths (Qb25)	0.582
Interested in number games Qb26)	Interested in number games (Qb26)	0.554
Sorts and classifies (Qb27)	Sorts and classifies (Qb27)	0.545
1 to 1 correspondence (Qb28)	1 to 1 correspondence (Qb28)	0.617
Counts to 20 (Qb29)	Counts to 20 (Qb29)	0.601
Recognizes 1-10 (Qb30)	Recognizes 1-10 (Qb30)	0.662
Compares numbers (Qb31)	Compares numbers (Qb31)	0.653
Recognizes shapes (Qb32)	Recognizes shapes (Qb32)	0.525
Time concepts (Qb33)	Time concepts (Qb33)	0.513
Handles a book (Qb08)		
Reads complex words (Qb16)		

Note: Rows shaded in purple color indicate items common to both Offord and PCA

Table A5: Communication and General Knowledge & Anxiety & Fearfulness

Offord (8 Items)	PCA (8 Items)	
Communication & General Knowledge	**Component #5 (Anxiety & Fearfulness)**	**Loadings**
Effective use English (Qb01)	Upset when left (Qc36)	0.490
Listens-English (Qb02)	Seems unhappy (Qc51)	0.648
Tells a story (Qb03)	Fearful (Qc52)	0.799
Imaginative play (Qb04)	Worried (Qc53)	0.801
Communicative needs (Qb05)	Cries a lot (Qc54)	0.574
Understands on first try what is being said to him/her (Qb06)	Nervous (Qc55)	0.650
Articulates clearly (Qb07)	Indecisive (Qc56)	0.507
Interested in number games (Qc26)	Shy (Qc57)	0.517

Note: No items are common to both Offord and PCA

In Section B (Language and Cognitive Skills), Section D (Special Concerns) and Section E (Additional Questions) of the 2009 EDI questionnaire, teachers are asked to comment on individual children in terms of special skills, special needs, type of religion/language class a child attended, etc. A qualitative analysis was undertaken in order to systematize teachers' comments by identifying themes emerging in them. It should be noted, however, that the identified themes are not based on any officially recognized system. Rather, the analysis is intended to (a) inform and/or explain the EDI results of the quantitative analyses; and (b) generate research questions and hypotheses for future research. Wherever needed, examples of teacher comments are provided to further clarify the meaning of a particular category. Finally, it must be acknowledged that there is no clear-cut border among the identified categories, and certain comments can be argued to fit better into a category other than the category it was placed initially. Many times teachers' commented on several aspects of a child's development, making it difficult to assign such comments to a single category/theme.

Special Skills and Talents

Questions #34-40 ask the teacher to identify ('yes', 'no', 'don't know') whether a child demonstrates special skills and talents in a certain area (i.e., numeracy, literacy, arts, music, dance, problem solving). The last question (#40) '*demonstrates special skills or talents in other areas*' asks the teacher to provide further specification of a child's skill/talent identified as 'other'. However, some teachers provided further explanation if they selected 'yes' for any of questions #34-39. Based on teachers' comments, the following themes were identified with respect to special skills and talents demonstrated by individual children (Q B):

- Numeracy & mathematics
- Science & nature:
    - *Science - learning new concepts and explaining them*
    - *General knowledge and science*
    - *Science-related topics*
- Technology & computers
- Literacy:
    - *Taught self to read at three*
    - *Reads chapter books*
    - *This child learned cursive writing in his country*
    - *Able to read anyone's name printed*
- Language skills & second language:
    - *Vocabulary exceeds typical kindergartener's vocabulary*
    - *Large and expressive vocabulary*

- *Able to manipulate sounds and words well*
- *Speaks several languages*
- Communication & leadership:
  - *Public speaking*
  - *Mature sense of humour*
  - *Negotiating with peers at playtime*
  - *Excellent role model*
- Memory:
  - *Rote memory*
  - *Photographic memory*
  - *Auditory memory*
- Problem solving & thinking:
  - *Thinks outside the box*
  - *Fluency in coming up with ideas*
  - *Exceptional in detail*
  - *Strategy games – chess, checkers*
  - *Good with complex puzzles; patterns*
  - *Fluency in coming up with ideas*
- Making things & creativity:
  - *Fine and gross motor skills*
  - *Creative builder in regards to object designs*
  - *Identifying and building complex 3-D objects*
  - *Building with Lego*
- Social skills & social-emotional maturity:
  - *Socially very well rounded child*
  - *Socially very kind and caring*
  - *Very socially mature*
  - *Very gentle and compassionate for age*
  - *Extremely positive and socially skilled child*
- Motivation to learn & inquisition
  - *Great curiosity*
  - *Very motivated to learn*
- Arts & music:
  - *Makes connections between visual art and the world*
- Athletics & dance:
  - *Tai Quan Do*
  - *Gymnastics*
  - *Hockey, etc.*
  - *Ryley is an exceptional downhill skier*

Special Problems

The following themes were identified with respect to problem(s) influencing child's abilities to do school as demonstrated by individual children (Q D2):

- Family-related (parents, siblings, home environment):
    - *Younger brother in critical condition many times*
    - *Siblings with social/emotional needs*
    - *Parental attention given to autistic brother*
    - *Several children, single parent, all special needs*
    - *Unstable home environment*
    - *Unemployed, emotionally unwell parent*
    - *Trouble getting to school, family violence*
    - *Single-parent working full-time*
    - *Single family home, abusive father*
    - *Poor male role model (father)*
    - *Recent separation/divorce/splitting up of parents*
    - *Parents fighting, older sibling bullying*
    - *Parents do not value education*
    - *Not much home support; mom severely depressed*
    - *Not provided for properly, family of 4 children*
    - *Mother was a meth addict. He is raised by grandma*
    - *Mother died two years ago*
    - *Mom is brain-damaged, dad sick with cancer*
    - *Mom often forgets to pick him up from school*
    - *Family violence*
    - *Lack of early learning experiences*
    - *Abandoned by mother as a small child and abused*

- Custody & living arrangement:
    - *Was in foster care and is having trouble adjusting*
    - *Under guardianship, biological parents have no access*
    - *Travels between parents*
    - *She has just been returned to mom from foster care*
    - *Lives with grandparents*
    - *Lives with mom 1 week, and dad the next*
    - *Lives in a group home*
    - *50/50 custody-weekly dramatic shift in home life*

- Physical condition:
    - *Wears a patch over one eye for farsightedness*
    - *Wears heavy glasses*
    - *Very poor sleeper, often tired*
    - *Walks with a leg brace*
    - *Diabetes*
    - *Club-footed*

- o *Surgery every 6 wks (throat)*
- o *Severe epilepsy*
- o *Sensory disorder*
- o *Allergies and asthma*
- o *Digestive difficulties*
- o *Heart condition*
- o *Hearing impairment*
- o *Rare lung condition*
- o *Occupational therapy*

- Cognitive:
  - o *Severe receptive-expressive delay*
  - o *Speech/language delay*
  - o *Stuttering*
  - o *Selective mutism*
  - o *Tourette syndrome*
  - o *Autism*
  - o *Asperger's syndrome*
  - o *ADHD, FAS, ADD*
  - o *Seems to be in another world most of the time*
  - o *Retention of concepts; transferring print to paper*
  - o *Language comprehension, information processing*
  - o *Fine and gross motor delays*
  - o *Cognitive delays*
  - o *Low IQ*
  - o *Down's syndrome*
  - o *Focus and attention*

- English as a second language:
  - o *Has been in India for 5 months, speaks no English*
  - o *ESL, vocabulary development*
  - o *ELL – Russian speaking*

- Behavioural:
  - o *Hyperactive (rocks in chair)*
  - o *Fairly severe tantrums*
  - o *Does not listen at home. Does what he wants*
  - o *Constantly on the move*
  - o *Behavioural difficulties at home and school*

- Emotional:
  - o *Very anxious when left by parents*
  - o *Will cling to any adult in the room*
  - o *Speaks only with encouragement, and seems stressed*
  - o *Homesick for Chile*
  - o *Emotionally unstable*
  - o *Displaying signs of depression and anxiety*

- Social:
  - *Very, very shy*
  - *Poor social skills, prefers adults*
  - *No sense of independence*
  - *Following rules, getting along*
  - *Difficulties getting along with younger sibling*
  - *Unusual social interaction with peers and adults*
  - *Possibly hyperactive/oppositional*
- Attendance:
  - *Misses a lot of school for no good reason*
  - *Often comes to school hungry, no socks, not clean*
  - *Inconsistent attendance*
  - *Absent over half school days, always leaves early*
- Age-related:
  - *Too young, no support at home*
  - *She is the youngest in the class*
  - *Premature birth*
  - *Not toilet trained yet*

Further Assessment of Child's Needs

In Question D3, teachers are asked '*Do you feel that this child needs further assessment? If yes, please specify'*. The teachers' comment either dealt with assessment either already received by individual children, going to receive, or expressing a need for an assessment. Based on teachers' comments, the following categories were identified with respect to the type of an assessment either being received by a child or needed for a child (Q D3):

- cognitive, learning disabilities, ADHD, autism, ADD, FASD
- neurodevelopmental, neurological
- hearing
- vision
- motor skills (fine and gross)
- speech & language, ESL, stuttering
- social behaviour
- occupational therapy (OT), physical therapy (PT)
- educational psychology
- psychological, emotional
- giftedness; academic assessment for placement purposes

Early Intervention Program

In Question E1, teachers were asked whether or not a child attended an early intervention program, and if yes, then teachers were asked to specify the name of the program, if known. The following types of early intervention programs were specified by teachers for individual children (Q E1):

- Headstart; ABC Headstart; aboriginal Headstart
- Hand-in-hand program
- GRIT (getting ready for inclusion today)
- U of A child study center
- A particular specialist (physiotherapist, psychologist, OT)
- Speech-language therapy; Speech clinic
- Heritage program
- Early education program
- Social/play therapy
- School-based program
- PUF
- Pre-school
- Playschool
- Homesteader
- Community options
- CASA
- Connect society (Sign Language)
- Capital Health; Glenrose
- Brighter Beginnings
- Bridge Program
- 100 Voices

Language / Religion Classes

In Question E3, teachers were asked whether or not a child attended other language or religion classes, and if yes, then teachers were asked to specify what class, if known. The following types of language and religion classes (or their location) were identified for individual children. Some pastime-related classes were included by teachers in this section too (Q E3):

- Religion classes:
    - Mosque; Temple; Pentecostal church; Sunday school; Spanish church; Wee college; Protestant church; Native religion; Muslim/Islamic studies; Mormon church; Buddhism; Family courses to become Catholic; Christian Sunday school; Catholic Sunday school.

- Language classes:
  - Urdu; Arabic; Ukrainian playschool; Chinese school; Spanish; Serbian; Russian; Punjabi; Portuguese; Polish; Mandarin; Cantonese; Korean; Japanese; Hindu; Italian; French immersion/preschool; Farsi; Greek; German bilingual playschool; English; Cree; Bengali.
- Pastime classes:
  - Soccer; swimming; skating; singing; Kung Fu; gymnastics; drumming; dance; drawing; cooking; ballet.