I AM, I'll Be

happy
educated
active
healthy

Demographic, socioeconomic, and neighbourhood characteristics of vulnerable children at school entry[1]

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The importance of school readiness for future academic success has been widely recognized. Indeed, a number of studies conducted in Canada and elsewhere in the world have shown that a child's developmental level at the end of the preschool period is strongly associated with health status as well as future social and academic adjustment.[2,3,4,5] In Canada it is estimated that between 20% and 35% of children are vulnerable at the time of school entry, whether this involves physical, cognitive or socioemotional aspects.[6,7,8,9] In certain disadvantaged neighbourhoods of Montreal, this proportion can be as high as 40%.[10]

Though it is now recognized that very early life experiences can be determinants of future adjustment and success, we still know very little about the factors associated with children's ability to learn upon entry into Québec's education system. In large part, this is because of the lack, until very recently, of population studies in the province providing data on both school readiness and various characteristics of children's lives prior to school entry.

To partially fill this gap, we are devoting two issues in this series to children's readiness for school. Based on an adapted version of the *Early Development Instrument* (EDI), administered as part of the *Québec Longitudinal Study of Child Development* (see the box entitled *About the survey* on page 11), the aim of this article is to paint a portrait of vulnerable children at school entry as a function of their demographic, socioeconomic and neighbourhood characteristics at the time they were attending kindergarten. Based on the data on pre-school trajectories collected in the QLSCD, another issue will cover various characteristics of early childhood associated with school readiness.[11]

This article has three goals: 1) estimate the proportion of QLSCD children who were vulnerable in at least one aspect of their development, based on their kindergarten teachers' responses to the EDI; 2) assess the predictive validity of this instrument related to the children's academic achievement in Grade 4 of elementary school; and 3) gain a better grasp of demographic, socioeconomic and neighbourhood characteristics associated with children's readiness for school.

1. Preliminary analyses used in the writing of this article were funded by the Fondation Lucie et André Chagnon.

2. P. KERSHAW, B. WALBURTON, L. ANDERSON, C. HERTZMAN, L. G. IRWIN and B. FORER (2010), "The Economic Costs of Early Vulnerability in Canada," *Canadian Journal of Public Health*, Nov.-Dec. 2010, Vol. 101, Supplement 3, p. S8-S13.

3. M. N. MCCAIN, J.-F. MUSTARD and S. SHANKER (2007), *Early Years Study 2: Putting Science into Action*, Toronto (ON), Council for early Child Development.

4. N. FORGET-DUBOIS, J.-P. LEMELIN, M. BOIVIN, G. DIONNE, J. R. SÉGUIN, F. VITARO and R. E. TREMBLAY (2007), "Predicting early school achievement with the EDI: A Longitudinal population-based study," *Early Education and Development*, Vol. 18, No. 3, p. 405-426.

5. J.-P. LEMELIN, M. BOIVIN, N. FORGET-DUBOIS, G. DIONNE, J. R. SÉGUIN, M. BRENDGEN, F. VITARO, R. E. TREMBLAY and D. PÉRUSSE (2007), "The genetic-environmental etiology of cognitive school readiness in early childhood," *Child Development*, Vol. 78, No. 6, p. 1855-1869.

6. AGENCE DE LA SANTÉ ET DES SERVICES SOCIAUX DE MONTRÉAL (2008), *En route pour l'école! Enquête sur la maturité scolaire des enfants montréalais. Rapport régional*, Montréal, Direction de santé publique, ASSSM, 133 p.

7. P. KERSHAW et al. (2010), *op. cit*.

8. M. JANUS and E. DUKU (2007), "The school entry gap: Socioeconomic, family, and health factors associated with children's school readiness to learn," *Early Education and Development*, Vol. 18, No. 3, p. 375–403.

9. D. J. WILLMS (Ed.) (2002), *Vulnerable Children. Findings from Canada's National Longitudinal Survey of Children and Youth*, Edmonton, The University of Alberta Press, 444 p.

10. AGENCE DE LA SANTÉ ET DES SERVICES SOCIAUX DE MONTRÉAL (2008), *op. cit*.

11. H. DESROSIERS et al. (forthcoming), "Characteristics of early childhood and school readiness: The importance of families' social support,"*Profiles and Pathways*. *Québec Longitudinal Study of Child Development Series - QLSCD*, Québec, Institut de la statistique du Québec.

Québec

Target population and sample used for the analysis

From the outset, it is important to note that the QLSCD is a longitudinal survey being conducted on a cohort of children born in Québec at the end of the 1990s. The data drawn from it therefore reflect the situation of children in Québec kindergartens excluding those who came to the province after their birth.[12]

The analyses that follow cover children born in Québec who were attending kindergarten in public and private schools in 2004. Excluded are certain children who were considered ineligible because of autism or mental incapacity, or who were in a special class according to data provided by the Ministère de l'Éducation, du Loisir et du Sport (MELS) (Ministry of Education, Leisure and Sport) (n = 41). In all, the analysis covers 925 children for whom their teacher filled out a questionnaire administered in the spring of 2004. The children were an average age of 6.3 years at the time they were assessed by their kindergarten teacher.

To fulfill the goals of this article, bivariate analyses and multivariate logistic regressions were conducted. All the data presented here have been weighted and were therefore adjusted to allow the results to be generalized to the target population of children in the QLSCD. In addition, the complex sample design of the survey was taken into account in the generation of estimates and conducting of statistical tests.

Early Development Instrument

The *Early Development Instrument* (EDI) is a questionnaire containing 104 items developed by Janus and Offord at the Offord Centre, McMaster University in Hamilton, Ontario.[13] It was designed to obtain a teacher's assessment of a child's readiness for school based on his/her knowledge and observations of the child during the school year. The EDI measures five general domains of readiness for school: physical health and well-being; social competences; emotional maturity; language and cognitive development; and general knowledge and communication skills. Each domain covers various aspects of child development (see Table 1). The EDI is widely used in Canada and elsewhere in the world. It constitutes a valid instrument for assessing the level of children's readiness for school in a variety of contexts.[14,15,16]

The French version of the EDI was derived using a back-translation procedure.[17] In the QLSCD, a shortened version containing 92 items was used.[18] Based on responses to these items, a score with a value between 0 and 10 was calculated for each of the five developmental domains. In spite of certain differences between the QLSCD version and the original EDI, internal consistency analyses for each domain of school readiness assessed in the QLSCD provided results similar to those of Janus, Walsh and Duku[19] based on the original version (see Table 1).

12. The ISQ estimates that approximately 7% of children 6 years of age in 2004, namely at the time of the seventh data collection of the QLSCD, came to Québec after their birth and were therefore not part of the target population.

13. M. JANUS and D. R. OFFORD (2000), "Reporting on readiness to learn in Canada," *ISUMA Canadian Journal of Policy Research*, Vol. 1, p. 71-75.

14. N. FORGET-DUBOIS et al. (2007), *op. cit*.

15. M. JANUS, S. A. BRINKMAN and E. K. DUKU (2011), "Validity and Psychometric Properties of the Early Development Instrument in Canada, Australia, United States, and Jamaica," *Social Indicators Research*, Vol. 103 No. 2, p. 283-297.

16. M. JANUS and D. R. OFFORD (2007), "Development and psychometric properties of the Early Development Instrument (EDI). A measure of children's school readiness," *Canadian Journal of Behavioral Science*, Vol. 39, No. 1, p. 1-22.

17. R. J. VALLERAND (1989), "Vers une méthodologie de validation transculturelle de questionnaires psychologiques. Implications pour la recherche en langue française," *Psychologie canadienne*, Vol. 30, No. 4, p. 662-680.

18. The French version used in the 2004 round of the QLSCD differed somewhat from the one used in the *Enquête sur la maturité scolaire des enfants montréalais* in 2006. In comparing the two versions, certain questions were formulated differently and the response choices differed in certain sections. Moreover, a dozen items in the original scale, mainly those assessing aggressive behaviours (four out of seven) and pro-social behaviours (five out of eight) were not included in the QLSCD version in 2004.

19. M. JANUS, C. WALSH and E. DUKU (2005), *Early Development Instrument: Factor structure, Sub-domains and Multiple Challenge Index, Ontario, Offord Centre for Child Studies*, [On-line]. www.offordcentre.com/readiness/files/RESULTS.Normative_Data_II.pdf (Accessed November 2, 2011).

Table 1
Description of the five domains of school readiness (EDI) assessed in the QLSCD, 2004[1]

Domain	Aspects assessed	Cronbach's alpha (α)[2]
Physical health and well-being	General physical development, motor skills, diet and clothing, cleanliness, punctuality, alertness	0.77
Social competences	Social skills, self-confidence, sense of responsibility; respect for peers, adults, rules and routines; work habits and autonomy; curiosity	0.93
Emotional maturity (short version)	Pro-social behaviour and helps others, fear and anxiety, aggressive behaviour, hyperactivity and inattention, expression of emotions	0.88
Language and cognitive development	Interest and skills in reading, writing and mathematics; competencies in language	0.88
General knowledge and communication skills	Ability to communicate and be understood, ability to understand others, clear articulation, general knowledge	0.91

1. For more details on the adapted version of the EDI used in the 2004 round of the QLSCD, please contact the authors.

2. Cronbach's alpha is a statistical indicator (coefficient) varying between 0 and 1 that evaluates the internal consistency of a psychometric instrument comprising a set of items, which should be measuring the same "underlying dimension" of a phenomenon. It indicates the degree of homogeneity or internal consistency; the closer the value is to 1, the higher the reliability of the instrument.

Definition of vulnerability

The EDI does not contain clinical criteria upon which a child's vulnerability can be determined in one or another developmental domains. Rather a threshold is used based on the distribution of a reference sample. In general, a child is considered to be vulnerable in a domain of development if his/her score in that domain is equal to or lower than the 10th percentile in the distribution of the reference sample. This threshold of vulnerability was chosen by the authors of the EDI to provide a means of identifying children experiencing difficulties rather than just those diagnosed with problems, who would form a smaller group in the population.

It should be emphasized that no uniform norms exist across Canada with regards to a reference sample. For example, some provinces use national norms, while others use provincial ones. Furthermore, certain norms are pre-adjusted to take into account age and sex, others are not. In this analysis, we opted for an indicator of vulnerability adjusted for age and sex in order to facilitate the presentation of descriptive statistics. Including the age group and sex of the children in assessing their readiness for school provides a means of taking into account a *priori* differences between boys and girls and younger and older children.

For each domain of school readiness, deciles were calculated for six different sub-groups by age:[20]

*   Girls between 68 and 70 months
*   Boys between 68 and 70 months
*   Girls between 71 and 73 months
*   Boys between 71 and 73 months
*   Girls between 74 and 82 months
*   Boys between 74 and 82 months

Although these six sub-groups correspond to those used by the authors of the EDI to establish national norms, in this analysis the thresholds of vulnerability were based on the QLSCD sample. Indeed, Canadian norms on vulnerability may be inappropriate in that they are based on a sample of children some of whom arrived in Canada after their birth, whereas children who arrived in Québec after their birth were excluded from the target population of the QLSCD.

20. M. JANUS and E. DUKU (2004), *Normative data for the Early Development Instrument*, Ontario, Offord Centre for Child Studies, [Online]. [www.offordcentre.com/readiness/files/ RESULTS.Normative_Data.pdf] (Accessed November 2, 2011).

For example, a vulnerable child in the *Physical health and well-being* domain is presumed to present deficits in fine motor skills, such as holding a pencil or crayon, overall motor skills such as climbing stairs, or general well-being, such as being tired or hungry, compared to children the same age and sex in the target group of the QLSCD. In the *Social competences* domain, a child is presumed vulnerable if he/she has few social skills, difficulty getting along with peers, following rules and regulations and class routines, listening, adapting to change, etc.[21]

In a larger context, a child was considered vulnerable at school entry if his/her score in one or another of the developmental domains was in the lowest decile. This method provided a unique indicator without having to calculate an average of the five domains of school readiness, which could have resulted in masking difficulties experienced by children in certain domains.[22]

Vulnerability at school entry and academic achievement in Grade 4

According to the criterion we set, one quarter (25%) of Québec children born at the end of the 1990s was vulnerable in at least one domain of his/her development at school entry. Around 11% of children were vulnerable in one domain, 8% in two, and 6% in three or more domains (data not shown).

Certainly not all vulnerable children in kindergarten are condemned to fail in school nor are other children assured of obtaining good marks. However, vulnerable children are more likely to face difficulties in benefiting from what is taught in school and in adjusting both socially and academically. In this regard, the QLSCD data indicated that nearly half (46%) of children considered vulnerable in at least one domain of their development at school entry presented below average academic achievement in Grade 4 as reported by their teacher, while this was the case for only 14% of non-vulnerable children. In the areas of language and cognitive development, these proportions were 62% and 16% respectively (Figure 1). These data support the results of other research on the predictive validity of the EDI, in particular the domain of language and cognitive development as it relates to academic achievement.[23,24,25]

Figure 1

Proportion of children[1] whose academic performance was below average in Grade 4 of elementary school by whether they were considered vulnerable in kindergarten,[2] for each domain and in at least one domain of child development in the EDI, Québec, 2004 and 2008[3]
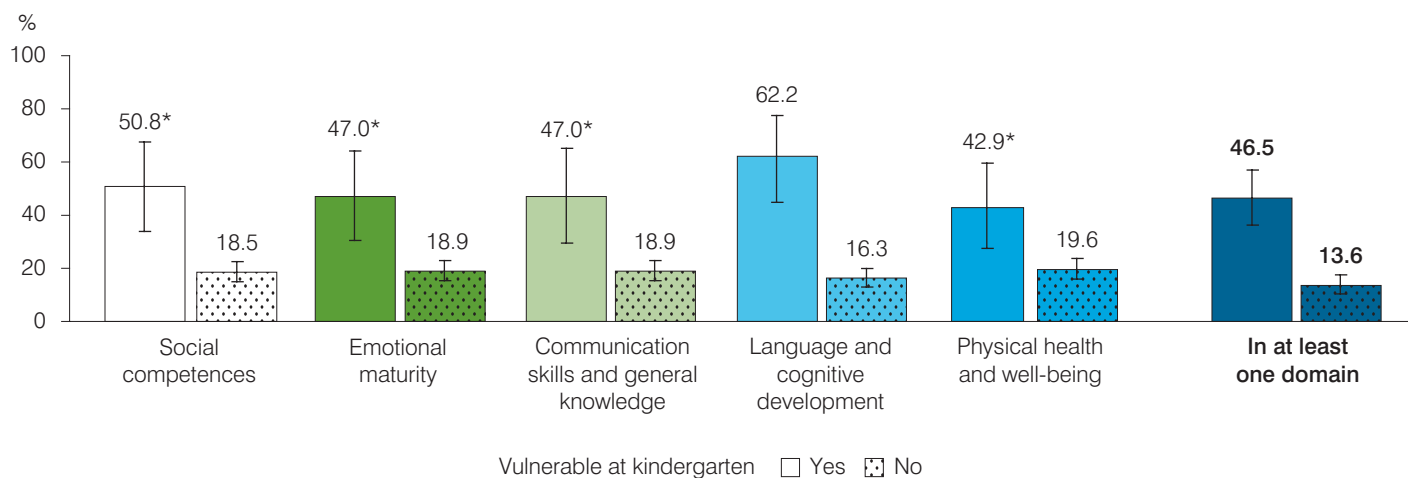
*   Coefficient of variation between 15% and 25%; interpret with caution.

1. Children born in Québec in 1997-1998.

2. For each developmental domain, a child was considered vulnerable if his/her score was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.

3. Chi-square test significant at the threshold of 0.05 in all developmental domains.

Source : Institut de la statistique du Québec, ÉLDEQ 1998-2010.

21. M. JANUS (2007)**,** *The Early Development Instrument: A Tool for Monitoring Children's Development and Readiness for Schoo*l, in: M. E. YOUNG and L. M. RICHARDSON (ed.) *Early Child Development - From Measurement to Action. A Priority for Growth and Equity,* Washington, D.C.: World Bank, p. 141-155.

22. M. JANUS and E. DUKU (2007), *op. cit*.

23. A. D'ANGIULLI, W. WARBURTON, S. DAHINTEN and C. HERTZMAN (2009), "Population-Level Associations between Preschool Vulnerability and Grade-Four Basic Skills," *PLoS ONE*, Vol. 4, No. 11: e769. (doi:10.1371/journal.pone.000762).

24. M. JANUS (2007), *op. cit*.

25. J.-P. LEMELIN and M. BOIVIN (2007). "Success starts in grade 1: The importance of school readiness," in *Québec Longitudinal Study of Child Development* (QLSCD 1998-2010), Québec, Institut de la statistique du Québec, Vol. 4, Fascicle 2, 12 p.

It is interesting to note that the children who were vulnerable in more than one developmental domain in kindergarten were not more likely to present below average academic performance in Grade 4 of elementary school compared to those who were vulnerable in only one domain (data not shown). This result confirms in a certain way the point of measuring overall school readiness based on vulnerability in one or another aspects of child development.

Demographic and socioeconomic characteristics of vulnerable children in kindergarten

Tables 2 and 3 show the proportion of vulnerable children in at least one domain of their development according to certain demographic and socioeconomic characteristics of the households in which they were living when they were in kindergarten.

These are characteristics that are often examined in terms of their associations with aspects of child development, such as the mother's age and educational level, household income, or type of household (single-parent, two-parent, blended).[26] Added to these are the child's exposure to a language other than that of instruction, which can be associated with receptive vocabulary at school entry.[27]

Noteworthy is that the socioeconomic characteristics assessed in kindergarten clearly reflect the context in which the majority of children were growing up. For example, the vast majority of children who were living in a low-income household while they were attending kindergarten had experienced at least one episode of low income before the age of 4 years (84%). (For a definition of low-income, see the box entitled *Some Definitions* on page 10). In nearly 80% of cases, the mother's educational level was the same when the child was attending kindergarten as when he/she was 5 months of age. Therefore, although certain parents had returned to school after the birth of their child or had seen their financial situation improve, such changes only involved a minority of households (data not shown).[28]

As indicated in Table 2, the proportion of vulnerable children in at least one domain of school readiness was higher among those living in disadvantaged households, irrespective of the indicator – parents' employment status, mother's educational level, or household income.[29] However, the level of income insufficiency was not associated with the risk of vulnerability at school entry. Children living in a *very* low-income household (below the 60% level of the low-income cutoff) showed no difference from those living in a low-income household (income between the low-income cutoff and the 60% level) in terms of their ability to cope with the exigencies of the education system (Table 2). However, the composite indicator of the

Table 2

Proportion of vulnerable children in kindergarten[1] by certain socioeconomic characteristics, Québec, 2004

	%	C.I.[2]
Parents' employment status (past 12 months)[3]		
Single parent or both parents had been working	22.8	19.1 ; 26.4
One parent in a two-parent family had been working	20.6 *	14.1 ; 28.3
Neither parent in a two-parent family nor the single parent had been working	61.1 *	40.3 ; 79.3
Mother's educational level[3]		
No high school diploma	38.9	28.6 ; 49.2
High school diploma	27.3	20.2 ; 35.4
Post-secondary diploma or certificate (non-university)	19.6	14.8 ; 25.2
University degree	19.8 *	13.7 ; 27.0
Low-income household[3]		
No	20.8	17.5 ; 24.1
Yes, low-income	35.3 *	23.2 ; 48.8
Yes, very low-income	47.8 *	30.3 ; 65.6

*   Coefficient of variation between 15% and 25%; interpret with caution.

1.   Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.

2.   Confidence interval: 95%

3.   Chi-square test significant at the threshold of 0.05.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

family's socioeconomic status presented a different picture. In taking into account not only income but also the parents' educational level and the prestige of their jobs, this indicator clearly revealed a gradient of vulnerability. Children from the most disadvantaged families were more at risk of not being sufficiently ready for school compared to those from middle-class households (39% vs. 24%), the latter being themselves less likely to be ready compared to those from the most advantaged families (24% vs. 10%) (Figure 2). Moreover, similar to what has been observed by Willms,[30] these findings clearly indicate that children from less advantaged households, although more likely to present difficulties at school entry, do not comprise the majority of vulnerable children (Figure 3).

26. See, among other articles: M. JANUS and E. DUKU (2007), and WAKE et al. (2008), *op. cit*.

27. H. DESROSIERS and A. DUCHARME (2006), "Starting school on the right foot: Factors associated with vocabulary acquisition at the end of kindergarten," in *Québec Longitudinal Study of Child Development* (QLSCD 1998-2010), Québec, Institut de la statistique du Québec, Vol. 4, Fascicle No. 1, 16 p.

28. See also H. DESROSIERS and M. SIMARD (2010), "Pauvreté monétaire, pauvreté subjective durant la petite enfance : l'éclairage des données longitudinales," in B. MASQUELIER and T. EGGERICKX (Ed.) (2010), *Dynamiques de pauvretés et vulnérabilités en démographie et en sciences sociales*, Actes de la Chaire Quetelet 2007, Louvain-La-Neuve, Les Presses Universitaires de Louvain, p. 35-58.

29. Previous research has shown that children from disadvantaged households are also more likely to accumulate problems, namely be vulnerable in two or more aspects of their development in kindergarten. See H. DESROSIERS, in collaboration with K. TÉTREAULT (2009), "L'ÉLDEQ : une mine d'information pour mieux comprendre les conditions de la petite enfance liées à la réussite éducative," Presentation at the 10th Symposium québécois de recherche sur la famille, Trois-Rivières (Canada), October 27, [Online]. http://www.jesuisjeserai.stat.gouv.qc.ca/colloques.htm (Accessed March 7, 2012).

30. D. J. WILLMS (Ed.) (2002), *op. cit*.

Figure 2

Proportion of vulnerable children in kindergarten[1] by socioeconomic status of the household,[2, 3] Québec, 2004
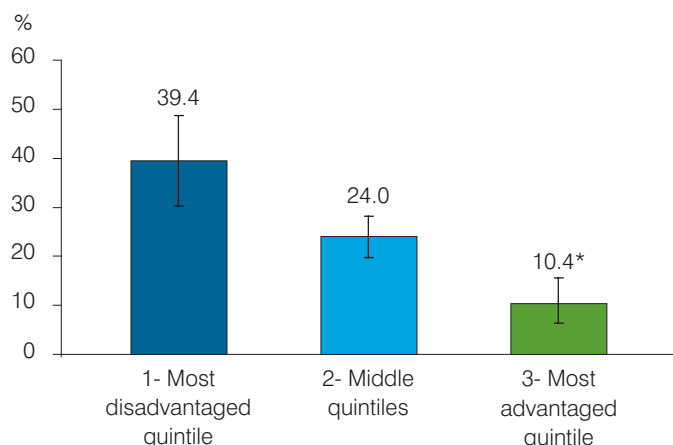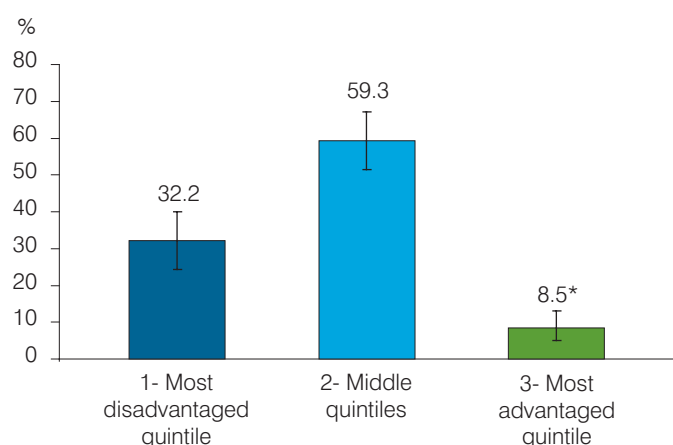

* Coefficient of variation between 15% and 25%; interpret with caution.
1. Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.
2. For more details, see box entitled *Some Definitions* on page 10.
3. Chi-square test significant at the threshold of 0.05.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

Figure 3

Distribution of vulnerable children in kindergarten[1] by socioeconomic status of the household,[2] Québec, 2004

* Coefficient of variation between 15% and 25%; interpret with caution.
1. Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.
2. See footnote 2 in Figure 2.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

With regards to family composition, the proportion of vulnerable children was higher among single-parent families compared to those living in an intact two-parent family (Table 3). In contrast, compared to the latter, children living with a step-parent did not seem more likely to face difficulties at school entry. The proportion of vulnerable children was relatively higher among those with at least three brothers or sisters compared to those with one or two. Having a relatively young mother was only marginally associated with the risk of vulnerability at school entry.

While the proportion of vulnerable children did not vary with the mother's immigrant status, children exposed to a language other than that of instruction were more likely to be vulnerable in at least one domain of their development in kindergarten ([p < 0.10]; Table 3).

Tableau 3

Proportion of vulnerable children in kindergarten[1] by certain demographic characteristics of the child, mother or household, Québec, 2004

	%	C.I.[2]
Type of household[3]		
Lives with both biological parents	21.7	17.8 ; 25.6
Lives with one biological parent and a step-parent	25.1*	16.6 ; 35.2
Lives with a single-parent	33.8	24.7 ; 42.9
Number of brothers and sisters in the household[3]		
None	28.5*	18.1 ; 40.9
1	21.8	17.6 ; 26.0
2	20.5	15.0 ; 26.0
3 or more	44.1*	29.8 ; 59.2
Mother's age group[4]		
Under 30 years	30.0	22.9 ; 37.8
30 years and over	22.9	19.1 ; 26.6
Mother's immigrant status		
Born in Canada	23.3	20.3 ; 26.4
Immigrant	28.3*	15.9 ; 43.6
Exposure to a language other than that of instruction[4]		
Yes	30.3	21.6 ; 39.0
No	22.5	19.3 ; 25.7
Region of residence		
Montréal-Centre	28.0*	19.1 ; 38.4
Other urban region with 10,000 inhabitants or more	24.7	20.4 ; 29.0
Rural region or small town	20.0	14.5 ; 25.6

* Coefficient of variation between 15% and 25%; interpret with caution.
1. Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.
2. Confidence interval: 95%
3. Chi-square test significant at the threshold of 0.05
4. Chi-square test significant at the threshold of 0.10.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

Is vulnerability at school entry associated with a child's neighbourhood characteristics?

In addition to household characteristics, it seemed pertinent to us to examine the children's readiness to learn at school entry by certain characteristics of their neighbourhood. For example, given that the management and provision of health and social services varies from rural to urban areas in Québec,[31] it seemed interesting to see whether child development in kindergarten differed by the type of region in which the children were living. Research has shown that the levels of affluence and cohesion of the neighbourhood in which families live are associated with child development in the early years.[32,33] The characteristics of the neighbourhood in which the children were living that we used in our analyses are described in the box on page 10.

Firstly, the data show that school readiness did not differ by region in which household was located – Montréal-Centre, other urban region with 10,000 or more inhabitants, small town or rural region (Table 3). The region's level of material disadvantage was associated with children's vulnerability, while the level of social disadvantage proved to be only a trend in terms of their vulnerability ($p < 0.10$) (Figure 4). More precisely, children living in the most advantaged neighbourhoods (5th quintile) were at a lower risk of lacking school readiness compared to those living in less advantaged neighbourhoods (2nd quintile). However, given that material deprivation in the neighbourhood was strongly correlated with household income, the association vanished when the latter was taken into account (data not shown). This means, for example, that a higher concentration of disadvantaged people in the child's neighbourhood did not constitute an additional risk factor for children in low-income households. Yet the social cohesion of the neighbourhood was strongly associated with school readiness, independent of household income. Therefore, children living in neighbourhoods perceived by the parents as being less cohesive and safe were less likely to be considered ready for school (data not shown). These results coincide with other research showing that the association between disadvantaged neighbourhoods and child development can reflect the influence of family characteristics such as income.[34] Other research has shown that school readiness is more strongly associated with the degree of social cohesion in a neighbourhood than its level of affluence.[35]

Figure 4

Proportion of children in kindergarten[1] vulnerable in at least one domain of the EDI, by score on their neighbourhood's material and social deprivation scales,[2] QLSCD, 2004
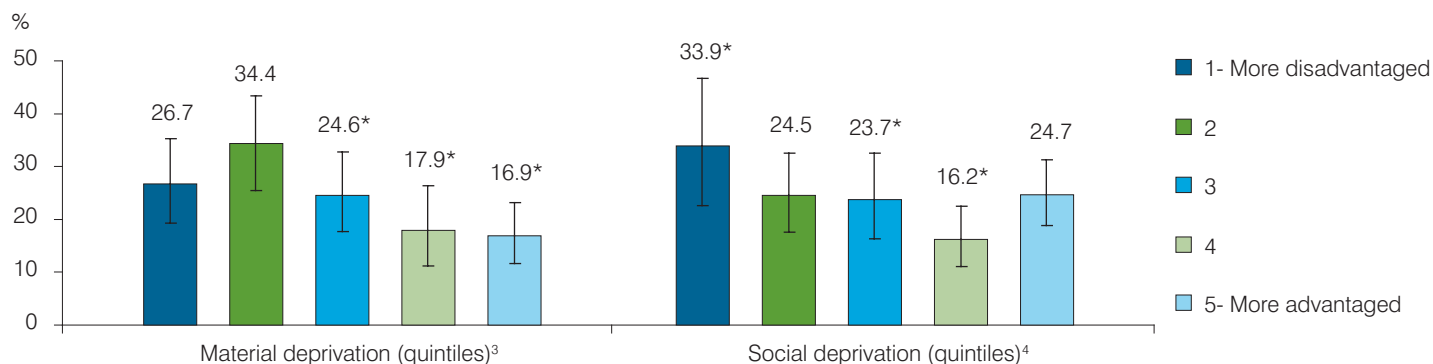
*   Coefficient of variation between 15% and 25%; interpret with caution.

1.   Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile of the distribution of the QLSCD sample, adjusted for age and sex.

2.   For a description of the these variables, see the box entitled *Some Definitions* on page 10.

3.   Chi-square test significant at the threshold of 0.05

4.   Chi-square test significant at the threshold of 0.10.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

31.   J. MARTINEZ, R. PAMPALON, D. HAMEL and G. RAYMOND (2004), *Does living in rural communities rather than cities really make a difference in people's health and wellness?*, Québec, Institut national de santé publique, Direction Planification, recherche et innovation, Report No. 269, 87 p.

32.   D. KOHEN, E. C. HERTZMAN and J. BROOKS-GUNN (1998), *Les influences du quartier sur la maturité scolaire de l'enfant*, Hull, Direction générale de la recherche appliquée, Développement des ressources humaines Canada, Catalogue No. W-98-15F, 80 p.

33.   D. K. RUNYAN, W. M. HUNTER, R. R. S. SOCOLAR, L. AMAYA-JACKSON, D. ENGLISH, J. LANDSVERK et al. (1998), "Children Who Prosper in Unfavorable Environments: The Relationship to Social Capital," *Pediatrics*, Vol. 101, No. 1, p. 12-18.

34.   M. WAKE, A. SANSON, D. BERTHELSEN, P. HARY, S. MISSON, K. SMITH and J. UNGERER and the LSAC Research Consortium (2008), "How well are Australian infants and children aged 4 to 5 years doing? Findings from the Longitudinal Study of Australian Children Wave 1," *Social Policy Research Paper series*, No. 36, Commonwealth of Australia, Australian Government Department of Families, Housing, Community Services and Indigenous Affairs, 111 p.

35.   D. KOHEN, E. C. HERTZMAN and J. BROOKS-GUNN (1998), *op. cit*.

An interesting finding is that nearly 80% of children living in less cohesive neighbourhoods were still living at the same address since when they were about 5 months of age (data not shown). This only applied to approximately half of children living in more cohesive neighbourhoods. In other words, the vast majority of children living in neighbourhoods with lower social cohesion were growing up there. This means the association observed between the neighbourhood in which they were living while in kindergarten and a higher risk of developmental vulnerability perhaps did not only reflect the situation at a specific time, but the cumulative experience of growing up in a disadvantaged environment.

Since neighbourhood characteristics were associated with household ones, how can we disentangle their respective contributions to school readiness? To answer this question, we needed to analyze the characteristics simultaneously. Table 4 shows the most important concomitant relationships emanating from a multivariate logistic regression. In this model, only sociodemographic characteristics associated with the risk of vulnerability at school entry in the bivariate analyses were retained (at a threshold of 0.10). Added to characteristics of the child's household was the degree of social cohesion in the neighbourhood in which he/she was living while attending kindergarten.[36] For purposes of parsimony, certain categories of variables with no differences among them were grouped together.

As indicated in Table 4, the mother's educational level, the child's exposure to a language other than that of instruction, having at least three brothers or sisters, and living in a neighbourhood perceived as less cohesive, were each associated with the child's risk of vulnerability, as assessed by the teacher. In contrast, neither low household income when the child was in kindergarten,[37] nor family structure, were significantly associated with this risk beyond the other characteristics examined.

When we examine the association between these four characteristics and vulnerability in each of the five domains of school readiness, we see that the mother's educational level was associated with vulnerability in all of them, with the exception of *Emotional maturity*. The child being exposed to a language other than that of instruction only contributed to vulnerability in the *Social competences* domain. Having three or more brothers or sisters contributed only marginally (p < 0.10) to predicting vulnerability in *Communication skills and general knowledge*, beyond the other three characteristics examined. Social cohesion in the neighbourhood was associated with vulnerability in terms of *Emotional maturity*, and it tended to also be associated with *Language and cognitive development* (p < 0.10; data not shown).

Table 4

Main demographic, socioeconomic and neighbourhood characteristics associated with the risk of vulnerability in kindergarten, logistic regression models, Québec, 2004[1]

	Odds ratio[2,3]
Low-income household	
No	*1.00*
Yes	1.59
Mother's educational level	
No high school diploma	1.98[†]
High school diploma	1.29
More than a high school diploma	*1.00*
Child exposed to a language other than that of instruction	
No	*1.00*
Yes	1.60[†]
Type of household	
Two-parent	*1.00*
Single-parent	1.33
Number of brothers and sisters living in the household	
None	1.44
One or two	*1.00*
Three or more	2.11[†]
Neighbourhood cohesion level	
Low	2.34[†]
Other	*1.00*
Missing data[4]	0.69

1. Children born in Québec in 1997-1998. A child was considered vulnerable if his/her score in at least one domain of child development was equal to or lower than the 10th percentile in the distribution of the QLSCD sample, adjusted for age and sex.

2. The reference category is in italics. It is recommended here to interpret the odds ratios as correlations, in other words, by only concluding that the probability is higher or lower by a given factor without specifying the magnitude of the "effect" observed. Therefore, an odds ratio higher than one (1) should be interpreted as indicating that the children presenting a given characteristic were more likely to be vulnerable in at least one domain of school readiness compared to the reference category, whereas an odds ratio lower than one (1) means they were less likely to be vulnerable in this regard.

3. Threshold: [†] p < 0.05.

4. The non-response rate for this variable was 9%. Analysis of the non-response rate and various tests conducted revealed that there was a low risk of bias. For these reasons, imputation was not judged to be required.

Source: Institut de la statistique du Québec, QLSCD 1998-2010.

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36. Although fulfilling the statistical criterion of inclusion (p < 0.10), the mother's age group and parents' employment activity in the previous 12 months were not included in the rest of the analyses because of small proportions in certain categories (e.g. no parent working: 4%) or because of their very strong association with other variables such as the number of children in the first case and income level in the second case (data not shown). For validation purposes, the mother's age group was tested while omitting the number of children in the model shown in Table 4 and this did not prove significant.

37. It should be emphasized that testing other income variables to gain a more in-depth understanding of the dynamics of low-income episodes did not change this result perhaps because the vast majority of children in the target population living in a low-income household when they were in kindergarten had experienced this at a very young age (see earlier in the article). Examples of the other variables tested were: 1) at least one episode of low income before the end of kindergarten vs. none, 2) transitory episodes of low income vs. persistent ones, 3) no episode of low income vs. at least one before 4 years of age vs. 2 recent episodes vs. always under the threshold of low-income.

The aforementioned results support those of other studies showing that the social cohesion of a neighbourhood is associated with children's behaviours independent of factors such as the type of family or its socioeconomic level.[38,39] Several hypotheses have been suggested to account for the association between neighbourhood cohesion and child development, such as variable access to quality services (daycare, health care, libraries, playgrounds, community centres, schools), positive role models, or a support network of friends and acquaintances.[40,41] In general, neighbourhoods with a low level of cohesion are those in which parents risk feeling isolated and alone, thereby receiving less support to alleviate the stress related to parenting.[42] Some research has revealed that mothers living in less safe and cohesive neighbourhoods have fewer positive interactions with their children and present parenting practices that are less consistent. In addition, since children often attend school in the same neighbourhood as where they attended kindergarten, neighbourhood characteristics can also reflect those of the school.[43,44] It would be therefore important to take into account other family or school characteristics in order to gain a better understanding of the nature and contribution of the child's neighbourhood to his/her level of development at school entry.

Conclusion

Data from the QLSCD indicate that approximately a quarter of children born in Québec in the late 1990s were vulnerable in at least one domain of their development at the time of their entry into the education system in 2004. These findings coincide with those of population studies conducted elsewhere in Canada. Similar to these, the QLSCD data clearly show that children in disadvantaged neighbourhoods are more likely to present developmental delays in terms of school readiness. Nevertheless, they do not comprise the majority of children at risk of experiencing difficulties in their school trajectory.[45,46] In addition to having a mother with no high school diploma, other sociodemographic and neighbourhood characteristics individually contributed to predicting the degree of school readiness as assessed by the teacher – exposure to a language other than that of instruction, having at least three brothers or sisters, and living in a less cohesive neighbourhood.

Compared to sources of cross-sectional data, the QLSCD contains considerable data on the pre-school trajectories of children. These data can be very productive in terms of identifying the early precursors of school readiness, and therefore in turn identifying targets for intervention whereby a greater number of children can begin school on the right foot. This will be the topic of another issue in this series devoted to children's readiness for school.[47]

38. C. HETZMAN and D. KOHEN (2003), "L'importance du quartier dans le développement de l'enfant," *Transition*, Vol. 33, No. 3, p. 3-5.

39. J. L. MOREN-CROSS, D. R. WRIGHT, M. LAGORY and R. GAINES LANZI (2006), "Perceived Neighborhood Characteristics and Problem Behavior Among Disadvantaged Children," *Child Psychiatry and Human Development*, Vol. 36, No. 3, p. 273-294.

40. T. LEVENTHAL and J. BROOKS-GUNN (2000), "The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes," *Psychological Bulletin*, Vol. 126, No. 2, p. 309-337.

41. J. L. MOREN-CROSS et al. (2006), *op. cit*.

42. N. E. HILL and M. A. HERMAN-STAHL (2002), "Neighborhood safety and social involvement: Associations with parenting behaviors and depressive symptoms among African American and Euro-American mothers," *Journal of Family Psychology,* 16, No. 2, p. 209–219.

43. C. HETZMAN and D. KOHEN (2003), *op. cit*.

44. D. KOHEN, L. OLIVER and P. FRITZ (2009), "Examining the effects of schools and neighbourhoods on the outcomes of Kindergarten children in Canada," *International Journal of Speech-Language Pathology*, Vol. 11, No. 5, p. 404-418.

45. M. JANUS and E. DUKU (2007), *op. cit*.

46. D. J. WILLMS (Ed) (2002), *op. cit*.

47. H. DESROSIERS et al. (forthcoming), *op. cit*.

Some Definitions

Low-income household

A household was considered to be low-income if its gross annual income from all sources was below the low-income cutoff set by Statistics Canada, based on its size and that of the region in which it was located, for the reference year 2003. Low-income is that which was between the low-income cutoff and 60% of this threshold, while very low-income was defined as under 60% of this threshold.

Socioeconomic status of the household

Socioeconomic status was a variable that was constructed by the Institut de la statistique du Québec (ISQ) using a method developed by J. Doug Willms at the University of New Brunswick. It is based on five sources: the educational level of the Person Most Knowledgeable of the child (PMK), the educational level of the spouse/partner, if applicable, the prestige of the job of the PMK and spouse/partner, if applicable, and household income. For more details on the construction of this indicator, see the technical documentation on the QLSCD website at: http://www.iamillbe.stat.gouv.qc.ca/doc_tech_an.htm.

Region of residence

This variable consisted of a combination of two variables defining the location of the household – one determining the Québec health region and the other a geographic one identifying four large regions.[48] Each child was assigned a value indicating the region in which he/she was living while attending kindergarten (Montréal-Centre = 20%; Other urban region of 10,000 inhabitants or more = 57%; Rural region or small town = 24%).

Materially-disadvantaged indicator

This geographic indicator was based on the proportion of people with no high school diploma, the employment / population ratio, and average individual income of people 15 years of age and over in the area in which the household was located.[49] Each child was assigned a value indicating the quintile of the materially-disadvantaged status of the neighbourhood in which he/she was living while attending kindergarten, namely in 2004.

Socially-disadvantaged indicator

This geographic indicator was based on three variables: the proportion of people separated, divorced or widowed; the proportion of single-parent families; and the proportion of people living alone in the area in which the child was living.[50] Each child was assigned a value indicating the quintile of the socially-disadvantaged status of the neighbourhood in which he/she was living while attending kindergarten, namely in 2004.

Level of neighbourhood cohesion

In the QLSCD, the level of neighbourhood cohesion when the child was attending kindergarten was derived from parents' responses to the following five questions taken from the National Longitudinal Survey of Children and Youth (NLSCY): 1) If there is a problem around here, the neighbours get together to deal with it; 2) There are adults in this neighbourhood that children can look up to; 3) People around here are willing to help their neighbours; 4) You can count on adults in this neighbourhood to watch out that children are safe and don't get in trouble; 5) When I'm away from home, I know that my neighbours will keep their eyes open for possible trouble. For each of these questions, the parent had to indicate whether he/she strongly agreed, agreed, disagreed or strongly disagreed. Based on responses to these statements, a scale with values from 0 to 10 was constructed (Cronbach's alpha = 0.88). In this analysis, children in the lowest decile of the scale were considered to be living in a neighbourhood with low social cohesion.

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48. J. MARTINEZ et al. (2004), *op. cit*.

49. P. GAMACHE, R. PAMPALON and D. HAMEL (2010), *Guide méthodologique: "L'indice de défavorisation matérielle et sociale : en bref,"* Québec, Institut national de santé publique, September, 8 p., [Online]. http://www.inspq.qc.ca/santescope/liens.asp?comp=9&nav=M (Accessed February 23, 2012).

50. *Ibid*.

About the survey

The *Québec Longitudinal Study of Child Development* (QLSCD 1998-2010) is being conducted by the Institut de la statistique du Québec (ISQ) (Québec Institute of Statistics) in collaboration with various partners. The main goal of this study is to gain a better understanding of the trajectories which, during early childhood, contribute to children's social adjustment and success in the education system.

The target population of the QLSCD comprises children (singleton births) born to mothers residing in Québec in 1997-1998, with the exception of those whose mother, at the time of the child's birth, was living in certain administrative regions of the province (Nord-du-Québec, Terres-Cries-de-la-Baie-James and Nunavik) or on Indian reserves. Certain children were also excluded because of constraints related to the sample frame or major health problems. The initial sample eligible for longitudinal monitoring comprised 2,120 children. The children were monitored annually from the age of about 5 months to 8 years, then bi-annually to the age of 12, when they finished elementary school. A round of data collection was conducted in 2011, when most of the children were in their first year of high school (Secondary 1).

The QLSCD employs a variety of data collection instruments to gather data on the child, the person most knowledgeable of the child (PMK), her or his spouse/partner (if applicable) and the biological parent(s) not residing in the household (if applicable). During each round of data collection, the child is asked to respond to a questionnaire or participate in a variety of activities designed to assess development. As of the 2004 round when the children were in kindergarten, the child's teacher is also being asked to respond to a questionnaire covering various aspects of the child's development and adjustment to school.

Since 2004, the QLSCD has been funded by the Ministère de la Santé et des Services sociaux du Québec, the Ministère de la Famille, the Fondation Lucie et André Chagnon, and the ISQ. The Ministère de l'Éducation, du Loisir et du Sport du Québec provides administrative data that can be matched with those of the QLSCD.

For more information on the survey, you can access the website of the QLSCD, also known as "I am, I'll be," at: www.iamillbe.stat.gouv.qc.ca.

To access the survey microdata, you can contact the *Centre d'accès aux données de recherche* at the ISQ (CADRISQ) through their web page (www.stat.gouv.qc.ca/cadrisq) or by telephone (514-343-2299).

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