

Starting school on the right foot: Factors associated with vocabulary acquisition at the end of kindergarten

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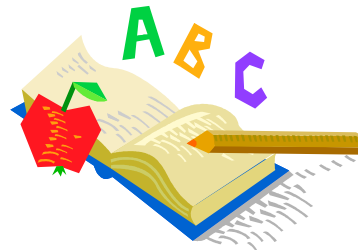
About the QLSCD (1998-2010)

This fascicle is based on data from the Qu  bec Longitudinal Study of Child Development (QLSCD 1998-2010), conducted by the Institut de la statistique du Qu  bec in collaboration with a host of partners (see the last page of this fascicle). The objective of this study is to identify factors occurring during early childhood which influence social adaptation and school achievement.

The population targeted initially by the QLSCD was made up of all children (singleton births only) born to mothers residing in Qu  bec in 1997-1998, excepting those with mothers then residing in the administrative regions (as defined by the Ministry of Health and Social Services) of Northern Qu  bec, the Cri territories, and the Inuit territories, as well as on Indian reserves. Some children were also excluded because of limiting factors related to the survey base or because of serious health problems. The initial sample suitable for longitudinal follow-up was made up of 2,120 children. These children have been followed annually from around age 5 months to about 8 years of age, after which they will be followed biannually until 12 years of age. At the time of the 2002 survey round, the timing of the data collection was modified so that all children are seen in the spring, which is the point at which they are also assessed by the school system. It should be emphasized here that this marks the first time that such a large sample of Qu  bec-born children has been followed so thoroughly through early childhood.

The QLSCD is structured around a number of data collection instruments used to gather information about individual children, about the person most knowledgeable about them (PMK), about her/his spouse/partner (if applicable), and about non-residential biological parents (if applicable). At each data collection, the target child is invited to participate in one or more activities that make it possible to assess the child's development. Beginning with the 2004 survey round, teachers were also asked to answer questionnaires discussing various aspects of the child's development and his/her academic adjustment.

Additional information about the survey methodology and data sources may be found on the QLSCD web site, also known as "I am, I'll be", at: www.iamillbe.stat.gouv.qc.ca.



It is now generally accepted that success in school—which is associated with professional and economic integration and, more broadly, with individual social adjustment—is to a large extent determined by early life experiences. Difficulties often take root in the first years of

life, which only emphasizes how important it is for children to be as well prepared as possible for learning when they start school. In fact, unfavourable family or socioeconomic circumstances during early childhood can keep children from starting off on the right foot at school. For children who are less prepared to take their first steps at school, early intervention remains the key ingredient for success (Ramey and Ramey, 1990).

This fascicle discusses a key aspect of preparing children for school: vocabulary development. To this end we rely on results from the Peabody Picture Vocabulary Test (PPVT) (Dunn, Th  riault-Whalen and Dunn, 1993), which can be used as an indicator of cognitive skill. According to the authors of the PPVT the level of vocabulary acquisition is usually an excellent predictor of success in school. More specifically, the results of the test administered to preschool children are considered a good predictor of reading and writing abilities at the age of 8-9 years (Hoddinott, Lethbridge and Phipps, 2002).

We will first present PPVT results for kindergarten children as evaluated in the Qu  bec Longitudinal Study of Child Development (QLSCD 1998-2010) (see sidebar on this page). Next we will try to understand to what extent the aptitude for vocabulary comprehension among children is linked to other aspects of their development, such as their general health status and certain social and affective skills that can influence learning ability. Then we will examine the relationship between the verbal ability of kindergarten children and various characteristics of the home and economic environment in which they are growing up. We will also be interested in finding out how these PPVT scores change between age 3½ and the end of kindergarten.

Evaluating children's vocabulary levels at the end of kindergarten?

The present analysis discusses Québec children that took the Peabody Picture Vocabulary Test (PPVT), in either English or French, while in kindergarten (see Box 1). The analysis takes as its object children for whom the main language understood, or of which the child has the better command in cases where French and English are spoken, is the one to which the children have had the most exposure during early childhood.

Given that one of the objectives of this analysis is to compare the level of vocabulary acquisition among children at age 3½ years and at the end of kindergarten, only children having taken the same version of the test at the two testing points have been included.³ These children represent more than 91 % of the children about 6 years old targeted by the QLSCD. When they took the test, the children were between 5.8 and 6.8 years of age (median age: 6.1 years). Of these, 93 % took the French test and 7 % the English.⁴

Before taking a closer look at the data, we should mention that the raw scores for each child have been standardized based on normative tables in the test-taking manual (Dunn and Dunn, 1981; Dunn, Thériault-Whalen and Dunn, 1993). These norms, which differ by test version, take into consideration the age of the child⁵ and arbitrarily set the mean for the reference sample at 100 and the standard deviation at 15. Yet the standardized mean among Québec children attending kindergarten happens to be over 100, at 114.3. This is partly due to the scores for children who took the test in French, since the mean for them is 115.7, whereas it is only 96.0 for those who took the English version (data not shown). These results lead us to believe that the established norms for the Canadian population as a whole, especially for francophones, might not be representative for Québec children of kindergarten age (Godard and Labelle, 1995). In point of fact, when one compares the actual ages of children with their age-equivalent scores, one finds that for children who took the test in French, the PPVT age⁶ is distinctly higher than the actual age (7.3 years as opposed to 6.2 years), whereas for children who took the test in English, the PPVT age is a little lower (5.9 years as opposed to 6.2 years) (data not shown). Here it should be noted that the norms for the French version of the PPVT were derived from a representative sample of francophone children in Canada. It may well be that the level of French among Québec children exceeds that for francophones outside Québec, which would explain the higher scores here. Similarly, it is possible that the level of English among Québec anglophones, who live in predominantly francophone settings, is lower than the mean level for anglophone children in Canada. This does not prevent us from comparing Québec children with each other: a child with a low PPVT score is a child who, relatively speaking, has more difficulty with vocabulary acquisition compared with other children of the same age who speak the same language.

From the standardized scores it is possible to know how well kindergarten children understand vocabulary *compared with other children of the same age who speak the same language*. For children as a whole who have taken either test version, three categories may be distinguished: children who lag behind the others, children who are average, and children considered more advanced. For the purposes of this study, we have established that children having a less extensive vocabulary are the ones whose standardized results on the French or English versions of the scale are one standard deviation below the mean; these children are likely to present lower levels of verbal skills than their peers do. By contrast, children whose test results are one standard deviation above the mean are considered relatively more advanced in this regard (Ross, Scott and Kelly, 1996).⁷ Because they are based on arbitrary thresholds, these results should not be used for diagnostic purposes; they are a relative measure useful for determining the characteristics of children whose language skills are somewhat above the average for children of their age.

Box 1

The Peabody Picture Vocabulary Test (PPVT)

To measure learning abilities, a vocabulary test was administered to the children individually, in French or English: the first time when they were around 3 years of age, and the second time when they were about 6 years of age.

The French version of the scale used in the QLSCD is an adaptation of the Peabody Picture Vocabulary Test – Revised (PPVT - R) developed by Dunn and Dunn (1981) and validated by Dunn, Thériault-Whalen and Dunn (1993). This 15-minute word comprehension test may be administered from age 3 on and measures a person's vocabulary comprehension ability. One of the attractive features of the PPVT is that it does not depend on oral or written responses; it thus appears especially appropriate for persons who might have difficulty expressing themselves verbally, such as children with language disorders (Dunn and Dunn, 1981). This test is administered individually using a manual with pictures to be identified by the child. During the test, the interviewer says a word and shows the child a page with four drawings on it. The child must then point to the picture corresponding to the word read by the interviewer. The full series includes a set of training pictures followed by 170 others arranged in increasing order of difficulty. The starting point is determined by the child's age.

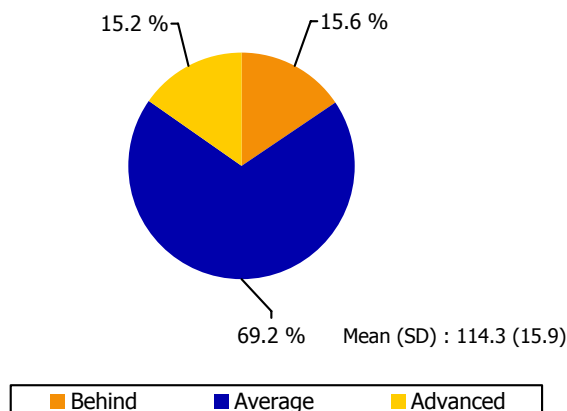
The PPVT has around a 70 % correlation with the intellectual quotient, using the Wechsler Intelligence Scale for Children (Dunn and Dunn, 1997). Even though it tests only one area of cognitive and linguistic ability, this test can provide a good idea of a child's future school performance (Williams and Wang, 1997).

As can be seen in Figure 1, based on the chosen criteria, around 16 % of kindergarten children lag behind other children of their age in vocabulary development. The proportion of children who might be considered more advanced than other children is 15 %. These children tend to have a richer vocabulary (they find it easier to identify the pictures associated with the pronounced words), which is a good indicator of the reading and learning aptitudes that will develop later (Government of Canada, 2002).

Earlier work has emphasized significant differences by sex for vocabulary comprehension among preschoolers (Government of Canada, 2002; Neill et al., 2005). According to the present analysis, however, boys and girls do not differ significantly in this regard at the end of kindergarten: about 15 % of boys and 16 % of girls lag behind the others according to our definition, with standardized means at 114.5 and 114.1 respectively (data not shown).

Boys and girls do not differ significantly in vocabulary development at the end of kindergarten.

Figure 1
Distribution of children by vocabulary comprehension aptitude level at the end of kindergarten,¹ Québec, 2004



1. Based on age-adjusted standardized scores.
 Source: Institut de la statistique du Québec, *QLSCD 1998-2010*.

The level of vocabulary comprehension in children is associated with certain social and emotional skills

The idea of educational maturity or school readiness refers to a set of cognitive, emotional, and social skills that a child has on starting school that makes him or her ready for school life (Janus and Offord, 2000; Rimm-Kaufman and Pianta, 2000; see Box 2). To what extent is vocabulary comprehension associated with other aspects of child development that influence learning ability?

Box 2

The five areas of school readiness measured by the Early Development Instrument (EDI)

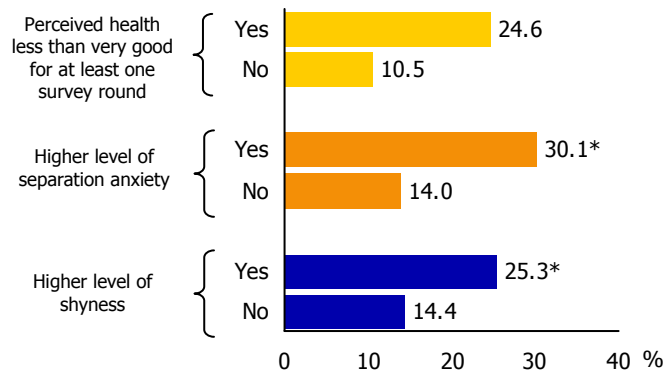
- Physical health and well-being
- Social competence
- Emotional maturity
- Language and cognitive development
- Communication skills and general knowledge

Sources : Janus et Offord, 2000;
www.dsc.gc.ca/fr/pip/ds/CPE2006/cpe_apercu.shtml

To answer this question, the level of vocabulary acquisition among kindergarten children was linked to certain aspects of their development as assessed by their parents, such as their general health status (for a description of the variables presented in this fascicle, see Table A.1 in the appendix). Data show that children's language abilities are not independent of their health status. Children whose health status is perceived as less than very good, rather than as excellent or very good, in at least one of the annual survey rounds, are proportionately more likely to lag behind in vocabulary development (25 % as opposed to 11 %). Shyer children or those having higher anxiety levels when separated from their parents or from people to whom they are attached have also been found to have more limited language development compared with other children of their age (Figure 2 and Table A.2). No simple relationship, however, can be established between these aspects of child development and language skills. Indeed, it is possible that a large part of the difficulty that shy or anxious children have when taking the test has little to do with language and may instead be because the PPVT is administered by a person that the child does not know well or at all. By contrast, the data do not allow drawing conclusions about significant links with other conditions, such as social withdrawal, ADHD, emotional distress, general anxiety, aggressive behaviours, oppositional disorders, or victimization. Nor does the level of language skills among kindergarten children appear to be linked to the eagerness to attend school, as declared by parents (data not shown).



Figure 2
Proportion of children lagging in vocabulary acquisition at the end of kindergarten¹ by perceived health status, separation anxiety level, and shyness level, Québec, 1998-2004



1. Based on age-adjusted standardized scores.

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

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

Children learning more than one language perform less well on the PPVT

To begin with, it is important to emphasize that 80 % of the kindergarten children figuring in the present analysis were living in households where the main language spoken by their parents was French; 11 % in households where the main languages spoken were English only or French and English only; and around 9 % in households where the parents spoke at least one language other than French or English at home (data not shown).

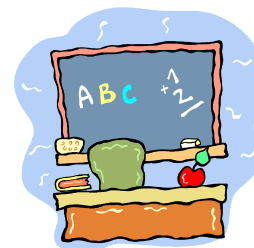
The QLSCD data reveal that children learning a language other than the one used to evaluate them, whether at home or at school (for example, participation in a French-language immersion program by those having taken the English version⁸), were distinctly more likely to lag behind others in vocabulary development: such was the case for 34 % of these children compared with 11 % of other children

(Figure 3 and Table A.3). More specifically, if we look at children having taken the test in French, we find that 59 % of those living in families where at least one language other than French or English is spoken at home turn out to be behind the others in French vocabulary comprehension, as we have defined it.

That is the case for only 21 % of children living in anglophone or bilingual (French and English) families. By comparison, this situation affects 11 % of children in families where only French is spoken (data not shown).⁹ Clearly, we must continue to follow the educational progress of multilingual children if we are to determine whether those found to be lagging at the end of

Children exposed to more than one language have somewhat less advanced vocabulary levels.

kindergarten continue to do so or whether their difficulties are only transient. Indeed, some studies of language development among children who are exposed to several languages suggest that evaluating vocabulary levels in only one of the languages could lead to underestimating the total lexicon of these children. The total lexicon is taken to include the cumulative vocabulary in all the languages to which children are exposed (Oller and Pearson, 2002). Thus, it is not easy to determine to what extent delays in vocabulary acquisition among children exposed to another language do or do not constitute indicators of general language-learning slowness. Still, since these children for the most part will be exposed to the dominant language in school, it is possible that having a more limited vocabulary in the language of instruction¹⁰ constitutes a threat to educational performance despite their multilingual abilities.



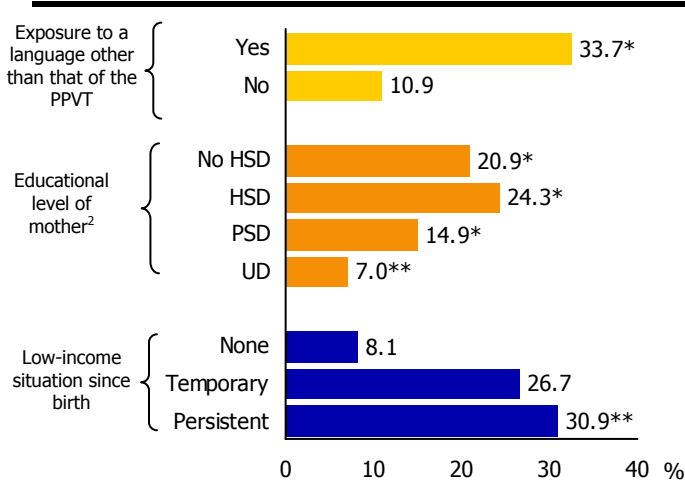
Children's vocabulary comprehension abilities vary by socioeconomic milieu

A number of studies conducted in Canada and elsewhere in the world show that children from underprivileged settings do not do as well as others on various developmental dimensions, particularly those relating to cognitive development and academic performance (Hoddinott, Lethbridge and Phipps, 2002; Ross and Roberts, 1999; for a review of American and British research, see Bruniaux and Galtier, 2003).

Concerning the educational level of mothers, the data in Figure 3 show that children whose mothers have not completed post-secondary studies are more likely to lag developmentally in vocabulary acquisition than are those whose mothers have non-university post-secondary degrees, and these children are less advantaged than those whose mothers completed university studies. Similarly, whereas only 8 % of the children who have never lived in a low-income household lag in language skills, this situation applies to about one child in four (27 %) or more who have lived in a low-income household at one time or other since birth.¹¹ Thus, in the area of language skills, children from disadvantaged socioeconomic settings tend to be relatively less well prepared for starting school.

Children from less privileged socioeconomic milieus are at a disadvantage when it comes to language skills.

Figure 3
Proportion of children lagging in vocabulary acquisition at the end of kindergarten,¹ by selected sociodemographic characteristics, Québec, 1998-2004



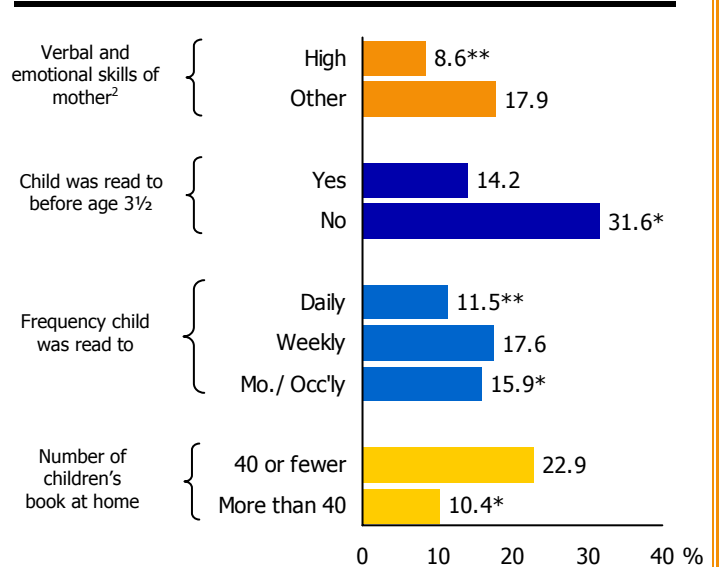
1. Based on age-adjusted standardized scores.
 2. HSD High school diploma
 PSD Post-secondary diploma (other than university)
 UD University degree
- * Coefficient of variation between 15 % and 25 %; interpret with caution.
 ** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.
- Source: Institut de la statistique du Québec, *QLSCD 1998-2010*.

Language skills at the end of kindergarten and preschool stimulation programs

The data in Figure 4 and Table A.4 show that language ability turns out to be closely associated with the level of stimulation the child receives in the family environment: children who receive more vocabulary-related stimulation from an early age are proportionally less likely to lag in vocabulary development at the end of kindergarten. This is the case, for example, with children living with mothers who had higher verbal and emotional skills¹² when their children were toddlers (1½ years old). Children to whom parents or an adult in the home have begun to read regularly around age 3½ years or before, as well as those who were read to¹³ weekly during the year before they started school, are also less likely to lag in vocabulary acquisition in kindergarten. The number of books at home—an indicator closely linked to household income level—is also positively associated with the ability of children to understand vocabulary.

Language ability among kindergarten children is closely linked to stimulation levels, especially stimulation through reading activities.

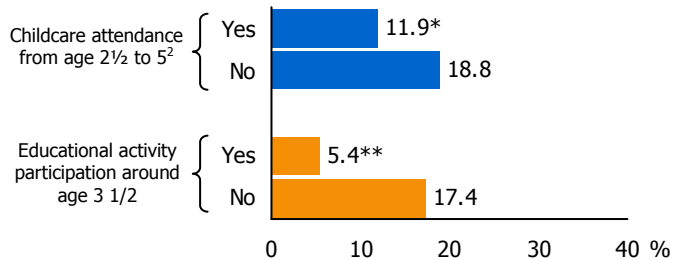
Figure 4
Proportion of children lagging in vocabulary acquisition at the end of kindergarten¹ by verbal and emotional skills of mother and pre-kindergarten reading habits, Québec, 1998-2004



1. Based on age-adjusted standardized scores.
 2. When child was around 1½ years old.
- * Coefficient of variation between 15 % and 25 %; interpret with caution.
 ** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.
- Source: Institut de la statistique du Québec, *QLSCD 1998-2010*.

Concerning childcare or preschool arrangements, it is evident from the analysis that children who were regularly attending childcare (including home care) at each survey round from age 2½ until the year before entering kindergarten were less likely than others to lag behind in kindergarten. This is also the case for children who participated regularly in educational activities around age 3½ such as nursery school or preschool (Figure 5 and Table A.5). By contrast, the data do not reveal significant differences by attendance or non-attendance at 4-year-old kindergarten or by main childcare arrangements in the year before entering kindergarten, whether that be care in child's home, home daycare or care in a daycare centre, private or otherwise (data not shown; see also Capuano et al., 2001).

Figure 5
Proportion of children lagging in vocabulary acquisition at the end of kindergarten,¹ by childcare attendance and educational activity participation, Québec, 2000-2004



1. Based on age-adjusted standardized scores.
 2. At each survey round from 2000 to 2003.
- * Coefficient of variation between 15 % and 25 %; interpret with caution.
 ** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.

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

Children's vocabulary development levels tend to remain steady across time

Since children's vocabulary comprehension was also evaluated around age 3½, it is possible to determine to what extent relative performance among children remained steady across time. To do this, a language measure like the one described for kindergarten children above was constructed based on PPVT results for 3½-year-old children. According to the previously established criterion, 16 % of 3½-year-old children lag behind in vocabulary comprehension (standard deviation below the mean) relative to other children of their age, whereas 18 % of 3½-year-old children are generally more advanced than their peers (data not shown). If we compare the profiles of children at age 3½ years and at 6 years, we find that around 17 % of them see an improvement in their relative situation and that a similar proportion fall into a lower level. In other words, about two children out of three (66 %) will hold the same position relative to the other children of their age (Table 1).¹⁴

Indeed, of children considered as lagging behind on the PPVT at age 3½, about 45 % were still found, three years later, to lag compared with other children of their age (that is, 7.7 %/[7.7 %+ 9.5 %]; see Table 1). These findings agree with those of Hodinott, Lethbridge and Phipps (2002), who found that 39 % of Canadian children with low PPVT scores at age 4 or 5 had reading scores four years later that put them in the lowest 20 %. In all, 8 % of all children were to show a persistent lag compared to other children (Table 1). The movement of children from one category to another between 3½ years of age and the end of kindergarten did not turn out to be associated in any significant way with the socioeconomic characteristics of their households (educational level of mothers and income level from birth on), nor was it associated with the languages spoken at home by their parents, the language of instruction of the

children, or the language in which vocabulary tests were taken (data not shown). Some trends can be seen, however. For example, although these results are not significant at the 0.05 level, girls, compared with boys, tended more often to see their position decline relative to other children between 3½ years of age and the end of kindergarten ($p = 0.09$; data not shown). This may be due to the fact that when they enter school, sex-specific differences that existed when the children were younger tend to disappear, with boys catching up to girls.¹⁵ Conversely, children to whom an adult at home read on a daily or weekly basis in the year preceding the start of kindergarten were more likely to see an improvement in their relative position between 3½ years of age and the end of kindergarten ($p = 0.06$; data not shown).

Among children with less developed language skills at around age 3½, about 45% were still lagging behind at the end of kindergarten compared with other children their age.

Table 1
Changes in vocabulary comprehension aptitude between age 3½ and the end of kindergarten,¹ Québec, 2001, 2004

	%
Improvement in relative position	17.3
Lagging → average or advanced	9.5
Average → advanced	7.8
Same relative position	66.1
Lagging → lagging	7.7*
Average → average	51.6
Advanced → advanced	6.8
Decline in relative position	16.6
Average → lagging	6.6*
Advanced → average or lagging	10.0

1. Based on age-adjusted standardized scores.
- * Coefficient of variation between 15 % and 25 %; interpret with caution.

Note: The non-response rate for this analysis was more than 5 %; the children for whom data were lacking were more often than not children living in households in which a language other than French or English was spoken. Since this characteristic is not significantly associated with changes in the relative position of the children, the risk of bias is low.

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



Encouraging the development of language ability before grade school: What's the best bet?

Several characteristics examined earlier have proven to be linked to vocabulary acquisition. Some of them, however, are interrelated such that it is difficult to disentangle their true effect. For one thing, one might ask oneself whether the relationship found between infant stimulation activities and children's vocabulary comprehension abilities at the end of kindergarten is a lasting one when children's socioeconomic background is taken into account, and vice versa.

In order to better identify the factors associated with vocabulary acquisition and comprehension, logistical regression analysis was used to take simultaneously into account various characteristics of children and their families.

Unlike previous analyses based on standardized scores, here raw PPVT scores are being used, and these do not take children's ages into account. This allows us to verify the effect of their ages on vocabulary comprehension abilities at the end of kindergarten. Indeed, children in school are not all the same age, and it could be worthwhile to determine whether academic performance varied by age within a single grade, once language characteristics and particularly social origin were taken into account (Brunner, 2003; Jeantheau and Murat, 1998).

In concrete terms, we are seeking to find out which of several characteristics are the most strongly associated with lagging vocabulary acquisition among children at the end of kindergarten. For the purposes of this analysis, we have defined as lagging those children who rank in the lowest quintile in the French or English versions of the PPVT scale. This threshold, also used in other studies (Hoddinott, Lethbridge and Phipps, 2002), is a little less restrictive than the one established for previous analyses.

Apart from children's ages, socioeconomic characteristics, and exposure to another language, a variety of variables pertaining to the children, their mothers, and their households were considered using bivariate analyses.¹⁶ Because of its importance, sex was kept in the analysis independent of its significance level, particularly to verify whether or not there was an interaction effect between the sex of the children and other characteristics that could affect vocabulary acquisition.

Table 2 shows the characteristics associated with vocabulary level, once all the variables are considered. As we can see, age influences language ability among kindergarten children, with older children having an advantage as demonstrated by their lower probability (odds ratio less than 1) of being in the bottom quintile of the vocabulary scale.¹⁷ Conversely, children who have been exposed to another language at home or at school are more likely to perform less well than the others; this is particularly true of children whose parents speak a language other than French or English at home. As far as income is concerned, we see that, all else being equal, children who have known temporary low-income periods during their preschool years are more likely to be in the bottom quintile of the PPVT scale at the end of kindergarten than are those whose families lived above the low-income threshold continuously after their birth. By

Older kindergarten children are at an advantage when it comes to language skills.

contrast, contrary to expectations, children who have known persistent rather than temporary low-income situations do not stand out from children from better-off families. The effect of temporary low income on vocabulary acquisition level may be the result of variables that were not measured, such stress level associated with major changes in economic status during the early years of a child's life.

As can be seen in Table 2, the situation at birth and the general health status of children also proved closely associated with children's vocabulary comprehension ability levels: compared with other children, those with low birth weights (under 2500 g), and those whose health was neither excellent nor very good during at least one of the annual survey rounds (1998-2004), were relatively less advanced than their peers on this dimension. Young children growing up in less functional families—in other words, in families that did not get along or communicate as well—also stood out as being at a disadvantage. It should be noted that, even when other factors related to vocabulary acquisition were taken into account, the educational level of mothers was clearly associated with children's language abilities: compared with children whose mothers held secondary-school diplomas, those whose mothers possessed university degrees were less likely to lag behind others in vocabulary. Children to whom parents had begun reading regularly before age 3½ also stood out for being less likely to be ranked with children with the poorest performance.

These last results are often interpreted as being due to greater language stimulation by more educated parents and by parents who read to their children (Hoff, 2003). Yet, since language-related problems are known to be in part genetic in origin, it is also possible that in some cases lower maternal educational levels, the lack of stimulation from not being read to at home, and lags in children's language skills may in part be attributable to the fact that parents and children share hereditary vulnerabilities that affect language development and academic ability (Dionne, 2005).

Finally, it should be emphasized that no interaction was found between children's sex and characteristics associated with their language skills (data not shown).

Table 2
Main characteristics associated with low PPVT scores (bottom quintile) among kindergarten children, logistical regression model (raw scores), Québec, 1998-2004¹

	Odds ratio	Confidence interval (95 %)
Sex of child		
<i>Boy</i>	1.00	...
Girl	1.18	(0.78 – 1.78)
Age of child (continuous)		
	0.32	(0.14 – 0.70) ^{††}
Exposure to other than PPVT language		
<i>No</i>	1.00	...
French or English	1.96	(1.07 – 3.59) [†]
At least one language other than French or English	8.01	(3.76 – 17.06) ^{†††}
Low-income situation after birth		
<i>None</i>	1.00	...
Temporary	2.18	(1.35 – 3.50) ^{††}
Persistent	1,36	(0.61 – 3.02)
Educational level of mother		
No high school diploma	1,06	(0.57 – 1.96)
<i>High school diploma</i>	1.00	...
Post-secondary diploma (other than university)	0.63	(0.37 – 1.08) [‡]
University degree	0.34	(0.17 – 0.68) ^{††}
Low birth weight (under 2500 g)		
Yes	3.58	(1.57 – 8.18) ^{††}
<i>No</i>	1.00	...
Health of child perceived as less than very good during at least one survey round		
Yes	1.87	(1.20 – 2.90) ^{††}
<i>No</i>	1.00	...
Child was read to before age 3½		
Yes	0.44	(0.25 – 0.77) ^{††}
<i>No</i>	1,00	...
Low family functioning during at least one survey round (1998, 1999, or 2004)		
Yes	1.59	(1.06 – 2.39) [†]
<i>Other</i>	1.00	...

1. The reference category is in italics. Odds ratios are significantly different from 1 at thresholds of: ‡: 0.10; †: 0.05; ††: 0.01; †††: 0.001.

Note: The non-response rate for this analysis was more than 5 %; the children for whom data were lacking were less likely to be living in an intact two-parent family. Since no significant interaction between family type and other model variables was found, it is likely that the risk of bias is low.

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

What are the key findings of the study?

The data presented in this fascicle imply that learning French or English vocabulary poses an additional challenge to kindergarten children who have been exposed to another language. Compared with monolingual children, those whose parents speak a language other than French or English at home and, to a lesser extent, children growing up in a bilingual setting (French and English) stand out as being more likely to rank with low-scoring children. It

would be worthwhile to follow multilingual children to see how their vocabulary learning progresses during their first years at school.

The socioeconomic milieu in which children have grown up also emerges as being closely associated with language skills; kindergarten children from more privileged socioeconomic milieus, as we have seen, enjoy an advantage in this regard, even after taking into account the other characteristics of the family milieu. Older children, too, are also generally more prepared to meet academic challenges; conversely, children with low birth weights or whose health is less good during their first years of life are less ready to do so.

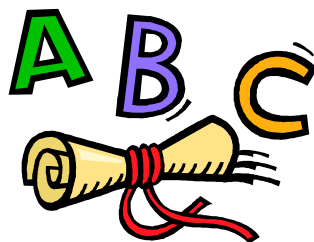
Beyond these characteristics, our analysis has allowed us to highlight the positive link between vocabulary comprehension skill levels and certain characteristics of family life, particularly the better performance by children to whom parents have begun to read well before they started kindergarten, that is, before age 3½. By contrast, our analysis has not allowed us to uncover any significant link between preschool activities and language development among children, beyond social origins and the other characteristics considered (see also Gagné, 2003; Lefebvre and Merrigan, 1998). This could have to do with the fact that the PPVT measures the scope of children's vocabulary, which is more readily acquired in an informal context where exchanges occur between children and between children and adults than in a formal context of preschool attendance (Capuano et al., 2001). Nevertheless, it should be said that the present analysis does not look at the quality of childcare, nor at the duration and intensity of preschool program attendance, which are known to be associated with the cognitive development of young children, particularly in underprivileged settings (Melhuish, 2001; Peisner-Feinberg et al., 2001).

It should be mentioned here that we chose to give prominence to certain factors associated with lagging vocabulary acquisition rather than those that disposed children to be more advanced in this area. Yet an exploratory analysis shows that even after controlling for household socioeconomic characteristics, children who participated in educational activities at an early age (3½ years) are found to be more likely than others to occupy the top quintile of the vocabulary development scale at the end of kindergarten. The number of children's books at home, along with the frequency of being read to by an adult in the household in the year before entering

kindergarten, also appear to have a distinct effect beyond that associated with age, with exposure to another language, and with household socioeconomic characteristics (data not shown). This suggests that even as we seek to improve the conditions prevailing at birth, early stimulation activities such as, for example, early exposure to reading in preschool settings, could constitute worthwhile ways to prepare children better for starting school.

Interventions carried out early with children who have more limited language skills are proving even more relevant now that, like other studies, the present analysis reveals that children's performance on the PPVT tends to remain steady over time. According to Hoddinott, Lethbridge and Phipps (2002), this steady performance across time persists even when characteristics particular to children, their parents, and their households are considered. What's more, their analysis shows that a number of variables characterizing mothers and households seem to have little impact on later PPVT performance by the children, beyond the effect they originally had on outcomes at a younger age, which our study did not look at.

The level of vocabulary acquisition represents only one component of school readiness. Children found to be lagging in vocabulary acquisition do not necessarily experience major problems in educational maturity, but they may be considered at potential risk. The QLSCD should make it feasible to follow these children, at least until the end of primary school, and in so doing identify the family, social, and educational characteristics that might help some of them develop in more advantageous ways. It will also be possible to link the QLSCD to other aspects of development and learning skills, as well as to pupil assessments made by teachers from kindergarten on.



Appendices

Table A. 1

Details concerning the characteristics of children, mothers, and households presented in this fascicle

Characteristic	Survey Round	Description
Languages learned by child at home or at school		
Exposure to a language other than that of the PPVT	2004	<p>Two variables constructed from main languages spoken at home by parents, language of instruction, and attendance of French-language immersion program</p> <p>2 categories:</p> <ul style="list-style-type: none"> ▪ Children not exposed to a language other than that of the PPVT; ▪ Children exposed to a language other than that of the PPVT. <p>3 categories:</p> <ul style="list-style-type: none"> ▪ Children not exposed to a language other than that of the PPVT; ▪ Children exposed to another language (French or English); ▪ Children exposed to a language other than French or English.
Development and social and emotional skills of child		
Weight at birth	1998	Low birth weight (< 2500 g).
Health status of child	1998 - 2004	Health of child perceived as less than very good (good or fair) by the PMK during at least one of the first 7 survey rounds.
Separation anxiety, shyness, physical aggressiveness, general anxiety, emotional disorders, social withdrawal, oppositional disorder, victimization, hyperactivity, or inattention	2004	Highest decile on standardized scale (from 0 to 10) measuring one or another aspect of child development based on declaration made by PMK. Higher scores indicate more symptoms.
Eagerness to attend school	2004	<p>Frequency of child's eagerness to attend school, according to PMK.</p> <p>4 categories:</p> <ul style="list-style-type: none"> ▪ Almost never; ▪ Sometimes; ▪ Often; ▪ Almost always.
Socioeconomic characteristics		
Educational attainment of mother or female partner	2004	<p>4 categories:</p> <ul style="list-style-type: none"> ▪ No high school diploma; ▪ High school diploma; ▪ Post-secondary diploma (other than university); ▪ University degree.
Low-income situation	1998 - 2001, 2003 and 2004	<p>3 categories:</p> <ul style="list-style-type: none"> ▪ The category "none" refers to children from households where they always lived above the low-income threshold¹ (missing value acceptable); ▪ The category "temporary" includes children from households where they experienced at least one episode below the low-income threshold and at least one above it; ▪ The category "persistent" includes children from households where they always lived below the low-income threshold (missing value acceptable).

PMK: person most knowledgeable about the child.

1. For definition, see note 11 at the end of this document.

Table A. 1 (continued)

Details concerning the characteristics of children, mothers, and households presented in this fascicle

Home-based stimulation activities		
Verbal and emotional skills of the mother	1999	Highest quartile on standardized scale (from 0 to 10) measuring verbal and emotional skills of the mother or female partner according to interviewer. Higher scores indicate better verbal and emotional skills.
Reading frequency	2003	Frequency with which an adult in the household read to child or listened to child read. 3 categories: <ul style="list-style-type: none"> ▪ Daily; ▪ Weekly; ▪ Monthly or occasionally.
Number of children's books	2003	Presence of more than 40 books for children in the home.
Beginning of reading to child	1998 - 2001	Reading to child done regularly by an adult member of household before the 2001 survey round (about 3½ years).
Family functioning	1998, 1999 and 2004	Highest quintile on standardized scale (from 0 to 10) measuring family functioning during at least one of the survey rounds indicated (missing values not acceptable). Higher scores indicate lower levels of family functioning.
Childcare or preschool arrangements		
Attendance at childcare	2000 - 2003	Regular attendance at a childcare setting at all survey rounds, without regard to care arrangement: private or public childcare centres, school-based childcare, childcare based in child's home or another's home (missing value acceptable).
Main childcare arrangement	2003	Primary childcare arrangement when child attends childcare in usual setting at survey round (whether childcare is private or public). 4 categories: <ul style="list-style-type: none"> ▪ Does not usually attend childcare; ▪ At the child's own home; ▪ Family-based childcare (whether related or not); ▪ Childcare centre or school-based childcare.
Educational activities	2001	Usually takes part in preschool program or in educational activities such as nursery school or preschool, play group, or mother-child program.
Kindergarten for 4-year-olds	2003	Attendance at kindergarten for 4-year-olds.

Table A.2
Distribution of children by vocabulary acquisition level at the end of kindergarten,¹ perceived health status, separation-anxiety level, and shyness level, Québec, 1998-2004

	Vocabulary acquisition level				p
	Lagging	Average	Advanced	Total	
	%				
Perceived health status less than very good during at least one survey round					
Yes	24.6	65.0	10.3*	36.3	< 0.0001
No	10.5	71.8	17.7	63.7	
Higher separation-anxiety level					
Yes	30.1*	64.5	5.4**	10.4	< 0.01
No	14.0	69.7	16.4	89.6	
Higher shyness level					
Yes	25.3*	58.4	16.4*	11.6	< 0.01
No	14.4	70.6	15.0	88.4	

1. Based on age-adjusted standardized scores. (see text for more information)

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

** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.

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

Table A.3
Distribution of children by vocabulary acquisition level at the end of kindergarten¹ and selected sociodemographic characteristics, Québec, 1998-2004

	Vocabulary acquisition level				p
	Lagging	Average	Advanced	Total	
	%				
Exposure to language other than that of PPVT					
Yes	33.7*	60.0	6.3**	20.8	< 0.0001
No	10.9	71.6	17.6	79.2	
Educational attainment of mother					
No high school diploma	20.9*	x	x	15.8	< 0.0001
High school diploma	24.3*	67.1	8.6*	21.8	
Post-secondary diploma (other than university)	14.9*	66.6	18.6	33.2	
University degree	7.0**	70.7	22.3	29.2	
Low-income situation since birth					
None	8.1	72.3	19.6	60.7	< 0.0001
Temporary	26.7	64.0	9.3*	31.1	
Persistent	30.9**	x	x	8.3*	

1. Based on age-adjusted standardized scores. (see text for more information)

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

** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.

x Data not published because of disclosure risk.

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

Table A.4
Distribution of children by vocabulary acquisition level at the end of kindergarten,¹ verbal and emotional skills of mother, and reading habits before starting kindergarten, Québec, 1998-2004

	Vocabulary acquisition level				p
	Lagging	Average	Advanced	Total	
	%				
Verbal and emotional skills of mother when child was aged 1½ years					
High	8.6 **	70.8	20.7	19.2	< 0.05
Other	17.9	68.0	14.1	71.7	
No answer	12.5 **	75.5	12.0 **	9.1	
Child was read to before age 3½ years					
Yes	14.2	69.7	16.1	91.9	< 0.001
No	31.6 *	x	x	8.2	
Frequency child was read to by adult household member (2003 survey round)					
Daily	11.5 **	64.9	23.6	29.2	< 0,001
Weekly	17.6	69.1	13.3	53.6	
Monthly or occasionally	15.9 *	77.3	6.8 **	17.2	
Number of children's books in home (2003 survey round)					
40 or fewer	22.9	66.8	10.3	40.9	< 0.0001
More than 40	10.4 *	71.0	18.6	59.1	

1. Based on age-adjusted standardized scores. (see text for more information)

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

** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.

x Data not published because of disclosure risk.

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

Table A.5
Distribution of children by vocabulary acquisition level at the end of kindergarten¹ and regular attendance at childcare and educational settings, Québec, 2000-2004

	Vocabulary acquisition level				p
	Lagging	Average	Advanced	Total	
	%				
Attendance at childcare at all survey rounds between ages 2½ years and 5 years					
Yes	11.9*	69.6	18.5	45.4	< 0.05
No	18.8	69.0	12.2	54.6	
Participation in educational activities around age 3½					
Yes	5.4**	71.8	22.7	14.0	< 0.001
No	17.4	68.8	13.8	86.0	

1. Based on age-adjusted standardized scores. (see text for more information)

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

** Coefficient of variation greater than 25 %; imprecise estimate for descriptive purposes only.

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

Notes

1. Hélène Desrosiers and Amélie Ducharme are Project Manager and Research Officer, respectively, at the Institut de la statistique du Québec.
2. All data presented in the fascicle have been weighted and, therefore, adjusted to make it possible to generalize from the results to the target population. Moreover, estimates were produced by taking into account the complex sample design of the survey. Unless explicitly stated otherwise, all differences presented in the text are statistically significant at the 0.05 level.
3. Beside the children who did not take the same version of the test at the two testing points or for whom information was not available ($n = 56$), also excluded from the purview of the study were a small percentage of children who were about to finish their first year or were not attending school or for whom information about academic level was not available ($n = 29$). Some children were also excluded because of the presence of chronic developmental problems (e.g., autism). The sample selected for analysis included 1,077 children.
4. For all or substantially all of them (97 %), this language was also the language of instruction in kindergarten.
5. The adjustment was made by 2-month age groups.
6. That is to say, the mean age of the children with such a score in the reference population used for standardization.
7. Since the PPVT norms differ according to the language in which the test was taken, calculation of the mean and the standard deviation made allowance for that; they were calculated separately for the PPVT version (French or English) taken by the child. One variable common to all children was then created in order to identify those children lagging behind, within the mean range of, or more advanced than their peers.
8. According to the QLSCD, 31 % of the children taking the English version of the PPVT were involved in a French-language immersion program.
9. Given that most of the children who took the English version of the test were living in anglophone households, it is not possible to conduct a separate analysis to distinguish between languages spoken at home for children who took this version of the test.
10. It should be recalled that 97 % of the target population children were assessed using the language of instruction.
11. For each survey round, household income level was established based on pre-tax low-income thresholds as defined by Statistics Canada. These thresholds correspond to the income level at which a household begins to devote, on average, for food, clothing, and shelter, a portion of its pre-tax income that is 20 % greater than the portion devoted by an average household with the same number of members in a similarly sized community.
12. The level of verbalization of the mother was evaluated by the interviewer based on wording in the Observations of Family Life, an abridged and adapted version of the Home Observation for Measurement of the Environment Inventory (HOME) (Caldwell and Bradley, 1984). This scale contains various questions that measure the quality of verbal exchanges between mothers and their children. The HOME is widely used to screen for environments at risk and is well-known because of its association with various tests of cognitive development (Baharudin and Luster, 1998; Guo and Mullan Harris, 2000).
13. More specifically, this indicator was derived from the following question: "Currently, how often do you or another adult of the household read aloud to your child or listen to your child read or try to read?"
14. The correlation coefficient between the standardized scores at the two testing points was 0.44.
15. The analysis does show that around age 3½ years, girls are more likely than boys to be ahead developmentally (20 % as opposed to 13 %; data not shown), whereas this is no longer the case toward the end of kindergarten.
16. The choice of variables is based on studies of vocabulary acquisition among young children while also taking advantage of prospective data gathered under the QLSCD for children from birth on. Most of the reviewed studies on this topic were conducted in the United States and Great Britain (for a literature review, see, for example, Bruniaux and Galtier, 2003; Demo and Cox, 2000); other work on the subject has also been done in Canada, based on data from the National Longitudinal Survey of Children and Youth (NLSCY) (Gagné, 2003; Lefebvre and Merrigan, 1998; Ryan and Adams, 1998) and the QLSCD (Neill et al., 2005). A variety of variables were first linked to raw scores obtained with the PPVT (bottom quintile). Variables found to be significant at the 0.10 level using bivariate analysis were then selected via multivariate analysis. Further details on the analytical approach used and the variables chosen may be had by contacting the authors of this fascicle.
17. It should be noted that, since the phenomenon under study is not rare, it is recommended that the odds ratios be interpreted using correlation, in other words, by considering only that the probability of receiving a low score on the PPVT is increased or decreased by a given factor, without specifying the scope of the "effect" observed. For example, a ratio of less than 1 must be interpreted as indicating that children are less likely to be found in the bottom quintile (20 %) of the PPVT scale relative to the reference category, whereas a value greater than 1 shows that they are more likely to be found there.



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