

# Effects of a Full-Day Preschool Program on 4-Year-Old Children

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## Abstract

This study explored the effects of a full-day preschool program on 4-year-old children. The study compared the development of a group of children ( $N = 403$ ) who attended the preschool program on a half-day basis during the 1999-2000 school year (the last year the half-day program was in place) with the development of a group of children ( $N = 418$ ) who attended the program on a full-day basis during the 2000-2001 school year (the inaugural year of the full-day program). The instruments used in this study assessed language, academic learning, prosocial behavior, conduct problems, and motor skills, as well as the degree to which parents were satisfied with their children's preschool programs. The results suggest that the full-day preschool program had a positive effect on children's language and academic learning as well as on parental satisfaction with the programming but that the full-day program did not affect prosocial behavior and conduct problems.

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## Introduction

This article discusses the evaluation of a full-day educational program offered to 4-year-old children by a French-language school board in Ontario. The study compared the development of a group of children who attended the full-day program with that of children who participated in the half-day program.

In North America, the field of education is becoming increasingly attuned to the importance of preschool programs. Educators believe that such programs facilitate children's academic and social adjustment while contributing to their acquisition of the skills and knowledge associated with academic success (Aos, Lieb, Mayfield, Miller, & Pennuci, 2004; Anderson, Shinn, Fullilove, Scrimshaw, Fielding, Normand, & Carande-Kulis, 2003; Capuano, Bigras, Gauthier, Normandeau, Letarte, & Parent, 2001). However, while most European countries offer such academic programs to children as young as 3 years old, few North American school systems offer full-day preschool programs for 4-year-old children. Indeed, children of that age are generally relegated to the care of child care providers. Several American states offer half- and full-day educational programs to young children from low-income communities, often in conjunction with the Head Start program (Garces, Thomas, & Currie, 2002).

In Canada, schools in Quebec and Ontario are unique in their provision of educational services to 4-year-old children, offering both general classroom programming and programs for specific populations. As such, children living in the province of Quebec who come from low-income families in Montreal and Quebec City can be enrolled in preschool programs for 4-year-olds or into the *Passe-Partout* program. These benefits are also extended to children with very special needs.

In Ontario, where French is less widely spoken, French-language school boards aim for early attendance as a means of preserving the integrity of the French population and of encouraging children to use the French language. This strategy is intended to promote a sense of belonging within the francophone community and to reduce the assimilation of Franco-Ontarians into the English majority culture (Masny, 1995; Th  berge, 1992). Consequently, the majority of French school boards in Ontario have, for several years, provided a half-day preschool program for 4-year-old children and a full-day kindergarten program for 5-year-old children. Since September 2000, the French Catholic School Board of Central and Eastern Ontario (CECLFCE), which serves one-quarter of Ontario's francophone children, has offered a full-day educational program to all 4-year-old children in its territory. This program was initiated in 2000 for educational, financial, and political reasons.

Educationally, this program was initiated because children in French schools obtained lower

grades than students in English schools on the provincial reading, writing, and mathematics exams taken by students in the third and sixth grades. Therefore, in order to ensure that their students were adequately prepared for future exams, the French school board began offering a full-day preschool program in its schools. Financially, because the Ontario Ministry of Education only funds half-day preschool programs, the school board was forced to invest more than one million dollars in the creation of a full-day preschool program. As such, the school board wanted to ensure that this program was a sound investment. Politically, prior to the creation of Ontario's 12 French-language school boards in 1998, French-language schools were integrated into and managed by English school boards. Therefore, Francophones wanted the opportunity to demonstrate their ability to self-manage and ensure the success of their students. Given the educational, financial, and political stakes of initiating a full-day preschool program, the school board opted to conduct an evaluation of this project in order to determine its effects on children's development. The current article presents the results of this evaluation.

## **Effects of Preschool Programs on Children's Development**

As previously mentioned, few school systems in Canada and the United States have integrated preschool programs for 4-year-olds into their mandates. As such, there is little research into the effect of such programs on children's development. We have therefore widened our literature search to include evaluations of preschool programs administered by child care centers for 4-year-old children. Finally, we have consulted several literature reviews that discuss the overall effects of preschool programs (Anderson et al., 2003; Aos et al., 2004; Currie, 2001; Gorey, 2001).

Government-funded preschool programs were initially created for children from low-income families. Their goal was to stimulate children's overall development and to promote their academic success. Studies suggest that the effect of these programs on children's development varies as a function of when the programs are evaluated (short, medium, or long term). While many studies have determined that these programs have short-term effects on children, researchers caution that these effects diminish as children progress through elementary school (Anderson et al., 2003; Leduc & Cadieux, 1993; White, Bush, & Casto, 1985). Nevertheless, midterm evaluations of such programs have demonstrated that children who attend such programs are more socially adjusted and do better academically than children who are not exposed to the programs (Currie, 2001; Klein, 2004; Royer, 1995). Finally, some studies have revealed long-term effects, such as higher rates of completing secondary and post-secondary education, and higher income as well as greater financial autonomy and life satisfaction (Schweinhart, 2004; Schweinhart & Weikart, 1993).

The results of these studies usually vary as a function of the time of evaluation (short, medium, or long term) and as a function of the developmental domain that is assessed (linguistic, cognitive, academic learning, social-emotional, and motor development). Few studies explore all of these domains. Indeed, most are primarily focused on one or a few of these domains.

### **Linguistic Development**

Preschool programs support children's linguistic development through the provision of high-quality learning experiences in the domains of reading and writing (Ministère de l'Éducation du Nouveau-Brunswick, 1991; Ministère de l'Éducation du Québec, 2001; Ministère de l'Éducation et de la Formation de l'Ontario, 1998). Palacio-Quentin and Coderre (1999) have identified several studies that confirm the relationship between attending preschool programs and language development in children (Dunn, Beach, & Kontos, 1994; Goelman & Pence, 1987; McCartney, 1984; McCartney & Scarr, 1984). However, they specify that attending a preschool program does not guarantee that children will develop better language skills, a claim supported by Ackerman-Ross and Khanna (1989) and Taylor (1978) who found no differences between the linguistic

development of children who attended a preschool program and that of children who stayed at home. These studies highlight that above and beyond attendance, the quality of a preschool program plays a fundamental role in children's linguistic development. Finally, some studies have failed to find short-term effects but have observed long-term impacts. For example, while researchers for the Swedish Göteborg project (Wessels, Lamb, & Hwang, 1996), a longitudinal study of children who attended preschool programs, did not observe an improvement in language at the age of 4 and 6 years old, they found significant differences at the age of 8 years old. The relevant literature supports the existence of a relationship between preschool programs and the development of language that may or may not be evident in the short term but could manifest itself later on.

## **Cognitive Development**

In terms of cognitive development, many researchers have reported that children who attend preschool programs demonstrate higher intelligence quotients than those who do not. However, these effects diminish throughout elementary school (Barnett & Escobar, 1990; Farran, 1990; Leduc & Cadieux, 1993; White et al., 1985). Nevertheless, longitudinal studies indicate that children's intellectual abilities increase on a medium-term basis when factors such as the quality of the preschool program, the duration of the children's attendance, and the socioeconomic level of the family are taken into consideration (Andersson, 1989; Berkman, 1996; Campbell & Ramey, 1994; Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Dunn, 1993).

## **Academic Learning**

As previously mentioned, the primary goal of preschool programs is to encourage children's overall development. Nevertheless, most of the programs initiated by communities exclusively target children's academic success. Many studies have explored the effects of preschool programs on academic learning. Their results vary as a function of several variables such as socioeconomic status and belonging to a visible or racial minority.

Jeantheau and Murat (1998) evaluated 10,000 French first-grade students who began school at 2 and 3 years of age. Their results suggest that children from lower-income families (blue-collar workers, unemployed, or inactive in the employment field) benefit the most from early schooling. These benefits are manifested in a variety of domains such as vocabulary, oral comprehension, numerical and logical problem solving, writing, and concepts related to time. The researchers also report positive effects among children of more wealthy families (executives and teachers) in domains such as familiarity with writing, writing skills, mathematical calculation, and oral comprehension.

Jarousse, Mingat, and Richard (1992) studied 1,900 French children who entered school at the ages of 2 and 4 up to the second grade and found that those children who were exposed to school at an early age obtained better grades in French and in mathematics, but these results only became apparent when they entered the second grade. Researchers did not find any significant differences during the first year of schooling.

Caughy, DiPietro, and Scrobino (1994) examined a group of 867 American children ages 5 and 6 who were part of the National Longitudinal Survey of Youth. They noted that children from low-income areas who attended child care centers performed better on reading tasks than children from low-income areas who did not attend child care centers. However, differences between middle-class children were less striking, and there were no differences between children from upper-class families.

Results from the Swedish longitudinal Göteborg project (Wessels et al., 1996; Broberg, Wessels, Lamb, & Hwang, 1997) highlight that 8-year-old children who attended child care earned higher grades in mathematics and reading than those who were cared for at home or at another type of

child care center. Thornburg, Pearl, Crompton, and Ispa (1990) evaluated the visual, auditory, and motor skills (linked to writing) of 835 5-year-old American children. While the results suggest that attending a preschool program had no effect on White children, African American children who attended child care centers scored significantly higher than those who stayed at home.

The outcomes of these studies suggest that preschool programs affect academic learning but that the scope and the nature of these effects is moderated by variables such as socioeconomic status and belonging to a visible or racial minority.

## **Social-Emotional Development**

While the developers of preschool programs are primarily concerned with children's cognitive development, parents, teachers, and educators are interested in children's social-emotional development (Maltais, Herry, & Levesque, 2001). According to relevant literature, attending a preschool program positively influences children's social-emotional development.

Schweinhart (2004) and Schweinhart and Weikart (1993) compared children who participated in the Perry Preschool Project to a control group and found that children who had attended the preschool program displayed better psychosocial adjustment than the control group. Clarke-Stewart (1981, 1986), who studied several aspects of social behavior among 150 American children ages 2 and 3 years old, concluded that children who were cared for outside of the home were more socially competent and better able to understand the feelings of others. Larsen, Hite, and Hart (1983) noted more social competence among children from higher-income families who attended a preschool program than among children who did not attend such a program.

Balleyguier and Melhuish (1996) evaluated 125 children between the ages of 3 and 4 years old and concluded that children who attended child care programs displayed better social skills (independence, sociability, low levels of aggressiveness) than children who did not attend child care program or who were cared for individually. Other studies have also concluded that attending a preschool program promotes children's psychosocial development (Letarte, Normandeau, Parent, Bigras, & Capuano, 1993; Vitaro, Dobkin, Gagnon, & LeBlanc, 1994; Capuano, Bigras, Gauthier, Normandeau, Letarte, & Parent, 2001). However, studies by Thornburg et al. (1990) and by Winett, Fuchs, Moffat, and Nerviano (1977) found that preschool programs do not have a significant effect on children's psychosocial development.

## **Motor Development**

Few studies have focused on the effects of preschool programs on children's motor development. Thornburg et al. (1990) compared the motor development of 835 American 5-year-olds (divided into four groups as a function of the type of child care service): children who had never had an outside caregiver, children who attended a child care program from the age of 2, children who had attended a part-time child care service, and children who attended a full-day child care program before the age of 2. The study found no significant differences among these groups in terms of motor development.

## **Summary of the Literature Review**

In light of the analysis of studies exploring the effects of preschool programs on children's development, it appears that results vary as a function of the developmental domain being evaluated and as a function of the number of years between children's attending the program and the time of evaluation (short-, medium-, or long-term evaluation). Thus, the results of studies targeting linguistic development are contradictory. Some studies have found positive short-term effects, while others have not. Moreover, some studies report finding effects only at midterm evaluations.

In terms of cognitive development, studies indicate that there are significant increases in children's intelligence quotients, but that these diminish and even disappear with time. The studies exploring the effects of preschool programs on academic learning and psychosocial development are more conclusive; they identify positive effects. In terms of academic learning, however, the results vary as a function of variables such as socioeconomic status and belonging to a racial or visible minority. Finally, few studies have explored the effects of preschool programs on children's motor development. Furthermore, no significant effects were found in the limited studies that exist.

## **Goal of the Study**

The study compared the development of a group of children who at the age of 4 years old attended a full-day preschool program with a group of children who, at the same age, attended a half-day preschool program. This study addressed the following question: Is a full-day preschool program more likely to enhance children's linguistic, academic, social-emotional, and psychomotor development than a half-day preschool program?

The research is important and original in a number of ways. First, the program that was evaluated is offered in an academic context and not in a child care setting, in contrast to most of the previous studies. Second, the study examined a universal mainstream program and not a specific program funded only for a limited time. This study also targeted a program that benefits a large number of children, namely all of the 4-year-old children living in the school board's catchment area. Finally, the evaluation of the program is important because the program is offered in areas where French is a minority. Such areas pose a special challenge in terms of maintaining a francophone community and countering assimilation and the loss of clientele to English school boards, while supporting the acquisition of the French language (some children enter preschool programs without knowing how to speak French).

## **Methods**

This study employed a quasi-experimental model to compare the development of children who attended the preschool program for 4-year-olds on a half-day basis during the 1999-2000 school year with that of students who benefited from the program on a full-day basis during the 2000-2001 school year. The quasi-experimental model was chosen because it would have been impossible to randomly create both an experimental and a control sample from students at the school board in 2000-2001 since all of the children were enrolled in the full-day preschool program. In addition, two factors prevented researchers from recruiting a control group from another Ontario school: first, the populations of other school boards are not comparable, and, second, many school boards had already inaugurated universal full-day preschool programs for their 4-year-old constituents. The methodology section introduces the participants and the assessment tools used to evaluate the various developmental domains.

## **Schools and Participants in the Study**

The sample for the half-day preschool program offered in 1999-2000 consisted of 403 students selected from 13 of the 39 schools in the district (Table 1). The chosen schools accurately represent the populations in the downtown and suburban areas, as well as the communities bordering the school board's district. This geographic survey ensures a proportional representation of the francophone population in each region of the district.

In addition to the direct evaluation of the students, 16 teachers and 353 parents (88% of parents) completed questionnaires. In 2000-2001, 418 students attending the full-day preschool program for 4-year-olds participated in the evaluation of the full-day program. In order to accurately compare the development of students attending the full-day and the half-day

programs, the schools targeted in 1999-2000 were also used in 2000-2001. In the 2000-2001 poll, 19 teachers and 354 parents (85% of parents) completed questionnaires. Table 1 presents demographic information about the children and the parents. There are no significant demographic differences between the two populations, although the percentage of children belonging to a racial minority is statistically higher in the 2000-2001 group.

**Table 1**  
Characteristics of and Information about the Participants

Demographic Information	Half-day Program 1999-2000	Full-day Program 2000-2001
Number of children	403	418
Number of parents	353	354
Number of teachers	16	19
Average age of the children (in months)	59.2	59.5
Percentage of children whose first language is English (according to the teacher)	54	61
Percentage of girls	50	51
Percentage of children belonging to a racial minority	18	24
Percentage of children living with both parents	85	87
Percentage of children with special needs	7	8
Percentage of mothers with a university degree	34	38
Percentage of fathers with a university degree	33	38

## Developmental Domains Evaluated and Instruments Used

This section presents the domains evaluated in this study and the instruments used in their assessment. The tools evaluated the linguistic, academic, social-emotional, and psychomotor development of the children; their adjustment to school; as well as their parent's perception of the preschool program. Table 2 presents the evaluation tools used as a function of the developmental domains and the respondents.

**Table 2**  
Assessment Tools Classified by the Developmental Domains and the Participants

Developmental Domains	Source of Information		
	Child	Teaching Staff	Parent
Linguistic	Peabody Picture Vocabulary Test and Test for Auditory Comprehension of Language (French-Canadian version)	8 items ( $\alpha = 0.94$ ) Early Development Instrument (EDI)	Use of French 6 items ( $\alpha = 0.85$ ) 1 item (EDI)
Academic			1 item (EDI)
Awareness of writing			
- Functional elements		6 items (EDI) ( $\alpha = 0.80$ )	
- Formal elements		9 items (EDI) ( $\alpha = 0.86$ )	
Mathematics		9 items (EDI) ( $\alpha = 0.86$ )	
Academic behavior		7 items (EDI) ( $\alpha = 0.90$ )	
Academic adjustment		5 items (EDI) ( $\alpha = 0.86$ )	
Social-emotional			
Prosocial behavior		10 items (NLSCY) ( $\alpha =$	10 items (NLSCY) ( $\alpha =$

		0.93)	0.72)
Hyperactivity and inattention		8 items (NLSCY) ( $\alpha = 0.93$ )	8 items (NLSCY) ( $\alpha = 0.83$ )
Anxiety		8 items (NLSCY) ( $\alpha = 0.85$ )	8 items (NLSCY) ( $\alpha = 0.72$ )
Conduct problems		6 items (NLSCY) ( $\alpha = 0.89$ )	6 items (NLSCY) ( $\alpha = 0.72$ )
Psychomotor		5 items (EDI) ( $\alpha = 0.80$ )	1 item (EDI)
Parent's perceptions about the program for 4-year-olds			7 items, one of which is a scale of 5 items ( $\alpha = 0.89$ )
Demographic information		Date of birth, gender, etc.	Level of education, age, gender, belonging to an ethnic minority, etc.

The evaluation of children's linguistic abilities was completed by polling both parents and teachers and by administering assessments to the children themselves. For each of their students, the teachers completed the language development subscale of the Early Development Instrument (EDI) (Centre canadien d'études sur les enfants à risque, 1999; [http://www.offordcentre.com/readiness/EDI\\_factsheet.html](http://www.offordcentre.com/readiness/EDI_factsheet.html)). This instrument is an outcome measure of children's early development. It measures children's readiness to develop in a school environment in the five general domains identified in the literature: (1) physical health and well-being, (2) social competence, (3) emotional maturity, (4) language and cognitive development, and (5) communication skills and general knowledge. The EDI can be administered at either the junior or senior kindergarten level, that is, to either 4- or 5-year-olds. The EDI was developed by Drs. Magdalena Janus and Dan Offord at the Offord Centre for Child Studies, McMaster University, with support of a national advisory committee. It is largely based on the National Longitudinal Survey of Children and Youth (NLSCY) and other existing developmental tests. Between 1998-1999 and 2004-2005, it has been administered to over 290,000 students from across the nation.

The items related to language addressed competencies such as the ability to tell a story, to understand what they are being told, and to clearly pronounce words. Parents were asked to complete a scale assessing their child's use of French at home. The assessment tools used with the children included the Peabody Picture Vocabulary Test (PPVT-R) (Dunn, Thériault-Whalen, & Dunn, 1993) and the French-Canadian version of the Test for Auditory Comprehension of Language (TACL) (Groupe coopératif en orthophonie, 1995).

The PPVT-R evaluates children's receptive language. It asks them to point, from among four images, to the one that illustrates a word spoken by the examiner. This test includes normative data for Francophones from across Canada. Each child's raw score is transformed into a percentile rank that varies between 1 and 99. The PPVT-R is often used in studies and primarily evaluates vocabulary comprehension.

The French version of the Test for Auditory Comprehension of Language (TACL) evaluates children's receptive language. It targets three elements of language (vocabulary, style, and syntax) and provides a global score combining the three elements of the test. This test asks children to point to one image, from among three options, that illustrates the word or the phrase said by the tester. An overall score (maximum 120) is calculated for this test, as are scores for each of the subscales (maximum 40 each) (types of words and relationships: e.g., bird; grammatical morphemes: e.g., The boy is beside the car; elaborate phrases and sentences: e.g., The girls are eating and watching television). The TACL evaluates several components of receptive language, including vocabulary, form, and syntax.

The evaluation of academic learning targeted developmental domains including awareness of writing, mathematics, academic behavior, and adjustment to academic life. Teachers were asked to complete the five subscales of the EDI that relate to these domains. Awareness of writing can be divided into two general components: functional aspects and formal aspects (Giasson, 1995). The functional aspects of writing include understanding the functions of writing (reading and writing) and its organization (e.g., the child understands the utility of reading and writing; he or she differentiates between the illustrations and the text). The formal aspects of writing relate primarily to the capacity to read and write letters, words, and sentences. In mathematics, the scale primarily evaluates competencies related to numeration and geometry. Finally, the teachers completed two subscales targeting academic behavior (e.g., follows rules or instructions; listens attentively; works independently) and adjustment to academic life (e.g., adjusts to changes in time management; follows classroom routines).

The evaluation of this program also focused on children's social development. A behavioral scale used by Statistique Canada (1997) in the National Longitudinal Survey of Children and Youth was used in this project. The objective of the behavior scale is to assess aspects of the behavior of children ages 2 years and over. It measures hyperactivity and inattention (8 items), anxiety (8 items), conduct problems (6 items), and prosocial behavior (10 items). A complete factor analysis was carried out for the scores on the behavior scale in order to assess the psychometric properties of this scale for the NLSCY population of 14,226 children. As part of this analysis, the items that loaded into each construct or factor were compared to the expected result, which led to the factors kept for this study. Both teachers and parents were asked to respond to these items.

Motor development was evaluated using five items from the EDI.

Finally, the questionnaire distributed to parents included questions assessing their level of satisfaction with the program for 4-year-olds, the role of the program in their child's development, and the amount of progress made by their child since the beginning of the year. For each scale used in this study, the results of the two subgroups as well as the results for the entire sample were submitted for factor analyses with orthogonal Varimax rotations. The coefficients of correlation for each of the items were greater than 0.30, and the factor structure was the same for each of the three groups.

## **Data Collection**

Data collection took place during the last two weeks of May of each year of evaluation in order to ensure that each population had an identical amount of time to develop. Four students in a Master of Speech Therapy program were responsible for evaluating children's linguistic abilities. A speech therapy consultant provided them with a two-day training session and supervised the test administration and the interpretation of the results. The parents and teachers completed their questionnaires during the same time period.

## **Results**

The goal of this program evaluation was to identify the effects of the full-day preschool program for 4-year-olds on the children's development. The means obtained from the respondents were submitted to univariate analyses of intersubject covariance (ANCOVA). The confidence level was set at  $p < .01$ . The independent variable was the format of the preschool program (half-day or full-day), and the dependent variables were the various developmental domains assessed in the children and the parents' perception of the preschool program.

In total, 821 children and 707 parents were evaluated. The children were divided into two groups—those who attended the half-day preschool program in 1999-2000 ( $N = 403$ ; parents:  $N = 353$ ) and those who attended the full-day program in 2000-2001 ( $N = 418$ ; parents:  $N = 354$ ). The



statistical analyses considered the following covariables: the number of students per class, the gender of the children, the age of the children, belonging to a racial minority, the language spoken at home, the family structure (single- or two-parent home), the parents' level of education, and the socioeconomic status of the family (based on the parents' occupation). Table 3 presents the covariables that significantly affected the domains that were evaluated in this study. The means garnered from the subjects were adjusted based on this analysis of covariance in order to limit the effect of the covariables on the dependent variables.

**Table 3**

Covariables Considered in Comparing the Two Groups that Significantly Affect the Evaluated Domains (ANCOVA)

	Number of Children per Class	Gender of the Child	Age of the Child	Belonging to a Racial Minority	Language Spoken at Home	Family Structure*	Occupation (mother)	Occupation (father)	Level of Education (mother)	Level of Education (father)
<b>Parents' perceptions about the program for 4-year-olds</b>										
Parents' satisfaction with the program	ns**	ns	ns	ns	$p < .01$	ns	ns	ns	ns	ns
Role of the program in the child's progress (based on parent evaluation)	ns	ns	ns	$p < .01$	$p < .01$	ns	ns	ns	ns	ns
Level of progress in the child since the beginning of the year (based on parent evaluation)	ns	$p < .01$	ns	ns	$p < .01$	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$
<b>Adjustment to academic life</b>										
Adjustment to academic life (based on teacher evaluation)	ns	ns	ns	ns	ns	$p < .01$	ns	$p < .01$	$p < .0001$	$p < .0001$
<b>Linguistic development</b>										
Types of words and their relationship	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .01$	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Grammatical morphemes	ns	ns	$p < .0001$	$p < .01$	$p < .0001$	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Complete	ns	ns	$p < .01$	$p < .01$	$p < .0001$	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$

sentences			<.0001							
Overall score on the TAFL	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Percentile score on the PPVT-R	ns	ns	ns	$p < .0001$	$p < .0001$	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Expressive and receptive language (based on teacher evaluation)	ns	ns	$p < .0001$	ns	$p < .0001$	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Use of French at home	ns	ns	ns	ns	$p < .0001$	ns	ns	ns	ns	ns

**Social-emotional development**

Social development (based on teacher evaluation)	ns	ns	ns	ns	ns	ns	$p < .01$	$p < .01$	ns	ns
Prosocial behavior (based on teacher evaluation)	$p < .0001$	$p < .0001$	$p < .01$	ns	ns	ns	ns	ns	ns	ns
Hyperactivity and inattention (based on teacher evaluation)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Anxiety (based on teacher evaluation)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Conduct problems (based on teacher evaluation)	ns	$p < .0001$	ns	ns	ns	ns	ns	ns	ns	ns
Prosocial behavior (based on parent evaluation)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Hyperactivity and inattention	ns	ns	ns	ns	ns	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$

(based on parent evaluation)										
Anxiety (based on parent evaluation)	ns	ns	ns	ns	ns	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$
Conduct problems (based on parent evaluation)	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
Self-concept	ns	ns	$p < .01$	ns	ns	ns	ns	ns	ns	ns
<b>Academic development</b>										
Awareness of writing: Functional elements	$p < .0001$	$p < .0001$	$p < .0001$	ns	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Awareness of writing: Formal elements	ns	$p < .0001$	$p < .0001$	ns	ns	ns	$p < .0001$	$p < .0001$	$p < .0001$	$p < .0001$
Mathematics	ns	ns	$p < .0001$	$p < .01$	ns	ns	$p < .01$	$p < .0001$	$p < .0001$	$p < .0001$
Academic behavior (based on teacher evaluation)	ns	$p < .0001$	$p < .01$	ns	ns	ns	ns	ns	$p < .0001$	ns
<b>Psychomotor development</b>										
Motor development (based on teacher evaluation)	$p < .0001$	$p < .0001$	$p < .0001$	ns	ns	ns	ns	ns	ns	$p < .01$

\*Two parents or single-parent household.

\*\*ns = The variable does not significantly affect the evaluated domain.

Table 4 presents the means obtained from the two groups of children for each of the developmental domains evaluated in the study. The table also includes the results from statistical analyses by presenting the  $F$  values and the degrees of freedom.

**Table 4**  
Means Obtained by the Two Groups of Children and the Results of the Statistical Analyses Utilized in This Study

Domains Evaluated	Half-day Program	Full-day Program	$F$ Values and Degrees of Freedom
<b>Parents' perceptions about the program for 4-year-olds</b>			
Parents' level of satisfaction with the preschool	3.04	3.31	$F(1,632) = 14.9, p < .0001$

program (max. 4)			
Role of the program for 4-year-olds in children's progress (according to parents) (max. 4)	3.48	3.54	$F(1,664) = 0.1, ns$
Children's level of progress since the beginning of the year (according to parents) (max. 4)	3.28	3.38	$F(1,662) = 13.4, p < .0001$
<b>Adjustment to academic life</b>			
Adjustment to academic life (according to teachers) (max. 2)	1.70	1.83	$F(1,791) = 20.4, p < .0001$
<b>Linguistic development</b>			
Types of words and relationships (max. 40)	27.34	29.22	$F(1,789) = 25.6, p < .0001$
Grammatical morphemes (max. 40)	17.80	19.59	$F(1,789) = 15.9, p < .0001$
Complex phrases and sentences (max. 40)	14.00	16.05	$F(1,789) = 15.1, p < .0001$
Overall score on the TAFL (max. 120)	58.75	64.79	$F(1,789) = 29.3, p < .0001$
Percentile ranking on the PPVT-R	27.94	34.78	$F(1,789) = 17.8, p < .0001$
Expressive and receptive language (according to teachers) (max. 5)	3.95	4.00	$F(1,783) = 0.6, ns$
Use of French at home (max. 4)	2.76	2.95	$F(1,562) = 302.4, p < .0001$
<b>Social-emotional development</b>			
Social development (according to teachers) (max. 5)	4.30	4.15	$F(1,796) = 7.2, p < .01$
Prosocial behaviors (according to teachers) (max. 2)	0.81	0.79	$F(1,761) = 0.2, ns$
Hyperactivity and inattention (according to teachers) (max. 2)	0.47	0.60	$F(1,795) = 10.4, p < .001$
Anxiety (according to teachers) (max. 2)	0.18	0.22	$F(1,782) = 2.6, ns$
Conduct problems (according to teachers) (max. 2)	0.17	0.20	$F(1,795) = 1.1, ns$
Prosocial behaviors (according to parents) (max. 2)	1.28	1.28	$F(1,625) = 0, ns$
Hyperactivity and inattention (according to parents) (max. 2)	0.60	0.59	$F(1,655) = 0.1, ns$
Anxiety (according to parents) (max. 2)	0.41	0.38	$F(1,664) = 1.6, ns$
Conduct problems (according to parents) (max. 2)	0.25	0.24	$F(1,687) = 0.4, ns$
<b>Academic development</b>			
Awareness of writing: formal aspects (max. 2)	0.79	1.00	$F(1,688) = 37.0, p < .0001$
Awareness of writing: functional aspects (max. 2)	1.37	1.49	$F(1,749) = 13.8, p < .0001$
Mathematics (max. 2)	1.33	1.62	$F(1,730) = 92.4, p < .0001$
Academic behavior (according to teachers) (max. 2)	1.72	1.64	$F(1,786) = 12.7, p < .0001$
<b>Psychomotor development</b>			
Motor development (according to teachers) (max. 2)	4.43	4.26	$F(1,788) = 18.1, p < .0001$

The results highlight that the full-day preschool program had a positive effect on the linguistic development of children. The two assessment tools used to evaluate language revealed that children who attended the full-day preschool program demonstrated a superior vocabulary

(PPVT-R:  $F(1,789) = 17.8, p < .0001$ ; TACL types of words and relationships:  $F(1,789) = 25.6, p < .0001$ ) than children in the half-day program. The average percentile rank on the PPVT-R rose from 28 to 35, a 25% improvement. In addition, the TACL demonstrated an overall improvement in children's comprehension of French. This improvement was apparent in children's vocabulary, form, and syntax scores (overall TACL scores:  $F(1,789) = 29.3, p < .0001$ ). The parents of children attending the full-day program also reported that their children spoke French more often at home ( $F(1,562) = 302.4, p < .0001$ ).

The full-day program also had positive effects on children's academic learning in terms of their awareness of writing (formal aspects:  $F(1,688) = 37.0, p < .0001$ ; functional aspects:  $F(1,749) = 13.8, p < .0001$ ), as well as mathematics ( $F(1,730) = 92.4, p < .0001$ ). Teachers also noted that children who attended the full-day preschool programs adjusted better and more quickly to academic life ( $F(1,791) = 20.4, p < .0001$ ). However, teachers also reported that children who went to preschool on a full-day basis tended to be less attentive and more hyperactive in class (academic behavior:  $F(1,786) = 12.7, p < .0001$ ; hyperactivity and inattention:  $F(1,795) = 10.4, p .001$ ). The teachers' evaluations did not reflect those made by the parents. The parents' evaluations suggest no differences between the behavior of the two groups of children.

The teachers did not observe any effect on children's prosocial behaviors stemming from the full-day preschool program. However, they reported that these students had weaker overall social development ( $F(1,796) = 7.2, p < .01$ ) as demonstrated by behaviors such as being less attentive to others and being less inclined to share.

Although teachers noted an improvement in academic learning among preschoolers attending the full-day program, they did not report a similar improvement in psychomotor development ( $F(1,788) = 18.1, p < .0001$ ).

Finally, parents generally had a positive view of the full-day preschool program for 4-year-olds. They reported more satisfaction with the program than the parents of children attending the half-day program ( $F(1,632) = 14.9, p < .0001$ ) as well as greater progress in their children as compared to the beginning of the school year ( $F(1,662) = 13.4, p < .0001$ ).

## Summary and Discussion

This article discusses a study of the effects of a universal full-day preschool program for 4-year-olds. The study compared the development of a group of children ( $N = 403$ ) who attended the program for 4-year-olds on a half-day basis during the 1999-2000 school year (the last year the half-day program was in place) with the development of a group of children ( $N = 418$ ) who attended the program for 4-year-olds on a full-day basis during the 2000-2001 school year (the inaugural year of the full-day program).

The tests administered to the children primarily targeted linguistic development, while the questionnaires intended for parents and teachers targeted the following domains: parents' level of satisfaction with the program for 4-year-olds, the role of the program in the children's progress (according to the parents), the level of progress made by the children since the beginning of the year (according to the parents), adjustment to academic life (according to the teachers), expressive and receptive language (according to teachers), the use of French at home, prosocial behavior (according to teachers and parents), conduct problems (according to teachers and parents), awareness of writing (reading and writing), mathematics, academic behavior (according to teachers), and motor development (according to teachers).

The results highlight several of the significant effects of the full-day program for 4-year-olds on children's development and on parents' level of satisfaction. Indeed, the parents of children enrolled in the full-day program reported being more satisfied with the organization of the program than parents whose children attended the half-day program for 4-year-olds. They also observed higher levels of progress in their children. Moreover, the teachers found that children who attended the full-day program more easily adjusted to academic life than children who

attended the half-day program.

The most significant progress was apparent in the domains of linguistic development and academic learning. An exploration of the results on evaluations of children's language development permits several observations. The overall results indicate that the full-day preschool program enabled a significant improvement in children's language in terms of the development of vocabulary (evaluated by the PPVT-R and the types of words and relationships subtest of the TACL), of grammatical morphemes (measured by the grammatical morphemes subtest of the TACL), and of elaborate phrases and sentences (evaluated by the phrases subtest of the TACL). These results are consistent with those obtained by Dunn, Beach, and Kontos (1994); Goelman and Pence (1987); McCartney (1984); and McCartney and Scarr (1984) who, with short-term evaluations, observed positive effects on the language skills of children who attended preschool programs, despite the fact that these studies did not discuss as many aspects of linguistic development. As for effects apparent at a medium-term evaluation, such as those observed by Wessels et al. (1996), it is necessary to wait for the second phase of the program evaluation that will reassess the children when they are in the second grade.

While significant progress has been observed, children who attended the preschool program for 4-year-olds still score below the pan-Canadian average for vocabulary development as measured by the PPVT-R. Indeed, children attending the program on a half-day basis obtained a percentile ranking of 28 compared to children who attended the program on a full-day basis who scored, on average, 35 on a percentile range. Both of these fall below the mean percentile score of 50. Therefore, while the full-day program has a positive effect on linguistic development, the quality of learning services in the preschool program for 4-year-olds as well as in the kindergarten program for 5-year-olds must be improved in order to meet the national average.

There is also disagreement between the results garnered by the tests administered to children and those stemming from the language scale completed by the teachers. This measure of language is the only assessment tool that is not significant. One possible explanation would be that the language scale completed by the teachers targeted different linguistic behaviors that are more complex than those evaluated by the tests given to the children (for example, the ability to tell a story versus the ability to understand sentences). It is also possible that the improvements made by children in the development of their linguistic skills, while significant, were not large enough to be measured by the tasks on the language scale completed by the teachers.

The results relating to language also demonstrated a significant increase in the use of French by children in the full-day program, as compared to children in the half-day program. In terms of the program evaluation, it is important to explore this significant increase in the use of French at home. Indeed, we must question whether this increase is truly the result of the preschool program or whether it is caused by an extraneous variable such as the fact that children in the full-day program are immersed into a more francophone environment than the children in the half-day program. We have thus examined, in detail, the items on the scale evaluating the use of French at home.

The results highlight that two of the six items produce a significant difference between the two groups: *L'enfant parle français à la maison* (The child speaks French at home) and *L'enfant parle français à ses amis* (The child speaks French to his friends). The other items (e.g., *La mère parle français à l'enfant*—The mother speaks French to the child) do not produce significant differences. Thus, it seems that the people surrounding the child in the full-day program do not use French more often than the people surrounding children in the half-day program. On the other hand, children in the full-day program used French at home more often than children who attended the preschool program on a half-day basis. It therefore seems that children in the full-day program speak French at home more often than children in the half-day program because they observe French being spoken more often. This effect was also noted in the comments made by the parents of children in the full-day program who were reminded by their children to speak

French to them, a comment that was never experienced by the parents of children in the half-day program.

The outcomes of this study also underlined a significant improvement in the academic gains made by children in the full-day program in the domains of reading, writing, and mathematics. These results support the consensus established by previous studies that claim that children who attend preschool programs demonstrate significant academic improvement (Jeantheau & Murat, 1998; Jarousse, Mingat, & Richard, 1992; Caughy, DiPietro, & Scrobino, 1994; Wessels et al., 1996; Broberg, Wessels, Lamb, & Hwang, 1997; Thornburg et al., 1990). However, these studies also note that the nature and scope of the academic gains vary as a function of variables such as belonging to a racial or ethnic minority and socioeconomic status (including occupation and level of education of the father and mother). The information in Table 3 also highlights that these variables influence academic gains. Our analyses attempted to control for these effects by including them as covariables in the statistical analyses.

Nevertheless, the full-day preschool program had little effect on children's behavior. The parents' reports suggest that there is no difference between the two groups of children in terms of prosocial behaviors and behavioral problems such as anxiety, conduct problems, hyperactivity, and inattention. Teachers even noted an increase in behaviors linked to hyperactivity and lack of attention as well as a decrease in academic behaviors such as "Being attentive in class" and "Listening carefully to instructions" (*Être attentif en classe; Bien écouter les consignes*).

These two results could be explained by a higher level of fatigue among children who attended the full-day program for 4-year-olds. The parents and program administrators noted that the children in the full-day program were tired at the end of their day in class, while this remark was rarely made with regard to children in the half-day program. These results are surprising as prior studies had unanimously claimed that preschool programs facilitated social adjustment (Schweinhart & Weikart, 1993; Clarke-Stewart, 1981 & 1986; Larsen, Hite, & Hart, 1983; Balleyguier & Melhuish, 1996; Letarte, Normandeau, Parent, Bigras, & Capuano, 1993; Vitaro, Dobkin, Gagnon, & LeBlanc, 1994; Capuano, Bigras, Gauthier, Normandeau, Letarte, & Parent, 2001). This difference in outcomes may be explained by the fact that the comparison group was composed of children who attended a half-day preschool program, whereas the majority of previous studies relied on comparison groups consisting of children who had never attended a preschool program. Therefore, our results may indicate that the adaptation of a half-day program to a full-day curriculum does not produce an improvement in the behavioral development of children.

The results of this study indicate that there was a diminishment in the motor development of children who attended the full-day program as compared to those in the half-day program. The only previous study identified in the literature review found preschool programs to have no effect on the motor development of children (Thornburg et al., 1990). An analysis of the items in the scale used in this study reveals that several items are related to the child's energy level. As such, this finding is congruent with observations made by parents and teachers that children in the full-day program display higher levels of fatigue.

While we lack sufficient data to explore this increased level of fatigue, it is possible that teachers in the full-day preschool program focus more attention than did teachers in the half-day program on providing pedagogical activities to prepare children for the academic learning of the first grade. Therefore, they may have relinquished a play-focused educational approach that targets children's overall development. As such, the paper-and-pencil activities completed by the children may have benefited their academic development at the expense of the anticipated positive effects on their socialization and behavior.

Despite the positive results observed in the development of children who attended the full-day preschool program, the current study is limited by its methodology. Indeed, the use of a quasi-experimental study comparing the development of children who attended a half-day preschool

program for 4-year-olds in the 1999-2000 school year with that of children who attended a similar full-day program in the 2000-2001 school year did not allow for the creation of a control group or the random assignment of children to the two research groups (experimental and control). This choice of model was necessitated by the fact that it was not possible in 2000-2001 to create randomized experimental and control groups within the school board because all students were enrolled in a full-day preschool program. Moreover, it was not possible to use a control group from a different school board because their populations were not comparable to the population being studied and because other school boards had already established full-day preschool programs. This limitation implies that the two groups may have had initially different developmental characteristics. Although we have attempted to control these variables by including them in the statistical analyses as covariables, we cannot guarantee that all biases were eliminated in the analysis of the results.

It would also have been interesting if the evaluation protocol of this project had included a component targeting the evaluation of the quality of the program being offered to children (Florin, 2000; Palacio-Quentin & Coderre, 1999; Paquette, 1998). This evaluation would have allowed the researchers to relate the results obtained in the different developmental domains to indicators of program quality. These data include parents' engagement in the program, the age at which children began attending preschool programs, the content of the daily activities at the preschool, the training given to program administrators, and the ratio of program administrator to child (Capuano et al., 2001). However, budgetary constraints forced certain decisions, and it was not possible to collect such data.

The results of this study highlight interesting effects of the full-day preschool program on language development and academic learning. Nevertheless, we invite teachers and the program administrators to find frameworks that promote children's socialization. Finally, it would be interesting to explore the long-term effects of this program, which is what we anticipate doing at the end of the second and fifth grades.

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