



Elementary School Students at Risk of Dropping Out of High School: Characteristics at 12 Years of Age and Predictors at 7 Years of Age

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QLSCD 1998-2010 in brief

This fascicle is based on data from the *Québec Longitudinal Study of Child Development* (QLSCD 1998-2010) which is being conducted by the Institut de la statistique du Québec (Québec Institute of Statistics) in collaboration with various partners (listed on the back cover). The goal of this study is to gain a better understanding of the trajectories which, during early childhood, lead to children's success or failure in the education system.

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

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

Further information on the methodology of the survey and the sources of data can be accessed on the website of the QLSCD (also known as "I Am, I'll Be"), at www.iesuisjeserai.stat.gouv.qc.ca/default_an.htm



In Québec, 26% of 20-year-olds have not yet graduated from or received some accreditation from high school (MELS, 2011). The problem is more marked among boys, with a non-graduation rate of 32%. Given the current social, political, and economic context of society, and the consequences of dropping out of school, this problem is of great concern. Youth who leave school are confronted with a demanding, competitive labour market for which the lack of a diploma is a major obstacle. It influences an individual's quality of life, especially in terms of the skills required to fully function in the knowledge society (Bernèche and Perron, 2006). Indeed, teenagers who drop out of school are more likely to face problems of integrating into the workplace, to have low-paying jobs that have little social prestige and are less stable, to be unemployed, and to live on welfare and remain so for longer periods of time (Bjerk, 2012; Canadian Education Statistics Council, 2012; Coelli, Green and Warburton, 2007; Ferrer and Riddell, 2002; Fortin, 2008; Gervais, 2005).

Given these social and financial difficulties and the insecurity they engender, it is not surprising that dropouts also present more physical and mental health problems (Aloise-Young, Cruickshank and Chavez, 2002; Cutler and Lleras-Muney, 2006; Furnée, Groot and van den Brink, 2008) and have a shorter life expectancy (Wong, Shapiro, Boscardin and Ettner, 2002). Furthermore, when they become parents, they are more likely to see their children do poorly in and drop out of school like they themselves did (Janosz et al., 1997; OCDE, 2006; Oreopoulos,

Page and Huff Stevens, 2003). Dropping out has also been associated with juvenile delinquency, adult criminality (Drapela, 2005; Harlow, 2003; Sweeten, Bushway and Paternoster, 2009) alcohol and drug abuse (Crum et al., 2006; Townsend, Flisher and King, 2007), although some of these associations can be explained by pre-existing characteristics of the dropouts (Drapela, 2005; Sweeten, Bushway and Paternoster, 2009). For governments, dropping out does not only imply a loss of tax revenue, but also engenders additional expenses in social services and deprives society of qualified labour. In Québec, dropping out results in a loss of \$1.9 billion per cohort (Groupe d'action sur la persévérance et la réussite scolaires, 2009).²

The consequences for individuals and the cost to society has motivated researchers, educators and public administrators to gain a better understanding of the causes of dropping out of school to find better solutions to prevent the problem. As part of this collective effort, the aim of this fascicle is to (1) describe the individual, family and social characteristics of Québec students who, at 12 years of age, present precursor signs of this problem, and (2) attempt to identify the factors which, at 7 years of age, are predictive of this problem. It has been well established that the earlier we intervene, the greater the odds that preventive action will be successful and the cost-benefit implications of investment will be positive. The findings presented in this fascicle are therefore designed to inform policymakers, administrators and front-line educators of the factors that merit more attention in terms of prevention efforts from elementary school on to deter students from dropping out of high school.

Dropping out of school – a multifactor problem

During the past 30 years, social, family and school factors predicting dropout have been widely documented in the literature, particularly in studies conducted on adolescents. There is a consensus among researchers that there are a multiplicity of risk factors based on individual, family, school and community characteristics (Janosz, Fallu and Deniger, 2003; Rumberger and Lim, 2008).

Poverty is one of the factors most often cited in predicting school dropout (Audas and Willms, 2001; Bushnik, Barr-Telford and Bussière, 2004; Conseil régional de prévention de l'abandon scolaire, 2001; Kaufman, Alt and Chapman, 2004; Moreau, 1995). It explains the sociogeographic differences observed in the rates of school dropout (Gruskin, Campbell and Paulu, 1987). Family structure and parental attitudes and practices are also factors brought to light in various prospective studies. Children from divided or blended families, those in which there is little communication and warmth, those in which the parents have little education or ascribe little value to schooling, are more likely to drop out of school (Astone and McLanahan, 1991; McNeal, 1999; Potvin and al., 1999; Suh, Suh and Houston, 2007). Early associations predicting school dropout have been observed for

a number of family factors (Garnier, Stein and Jacob, 1997; Jimerson, Egeland, Sroufe and Carlson, 2000). At the community level, poverty, racial inequality, ghettoization and the presence of street gangs are only a few examples of factors associated with school dropout (Crane, 1991; Foster and McLanahan, 1996; Harding, 2003; National Research Council, 1993). In Québec, comparing high school graduation rates as a function of the region of origin seems to indicate that students from an immigration background have a higher rate than other students, with the exception of those from Central and South America, the Caribbean, Sub-Saharan Africa and southeast Asia (McAndrew, Ledent, Murdoch and Ait-Said, 2010).

A number of longitudinal surveys have also documented the association between cigarette smoking, drug use, or delinquent behaviours and future school dropout (Bachman et al., 2008; Bray, Zarkin, Ringwalt and Qi, 2000; Hannon, 2003; Townsend, Flisher and King, 2007). In addition, adolescents presenting certain types of psychopathology, notably depression (Gagné, Marcotte and Fortin, 2011; Quiroga, Janosz and Marcotte, 2006) and attention deficit disorder (Gregg, 2009; Kent et al., 2011; Vitaro, Brendgen, Larose and Tremblay, 2005), are also at a higher risk of dropping out of school. Children who drop out before obtaining their diploma were more often victims of rejection on the part of their peers or socially isolated, in both elementary and high school (Parker and Asher, 1987; Zettergren, 2003). They often associate with peers whose academic aspirations are low or who themselves are current or potential school dropouts (Farmer et al., 2003; Staff and Kreager, 2008; Véronneau, Vitaro, Pedersen and Tremblay, 2008; Vitaro, Larocque, Janosz and Tremblay, 2001). Similarly, these children's relationships with their teachers are considered to lack warmth or be more conflicting (Croninger and Lee, 2001; Fagan and Pabon, 1990; Fallu and Janosz, 2003; Suh, Suh and Houston, 2007).

However, these sociodemographic, family and psychosocial predictors only partially explain school dropout. Given the very nature of the problem, it is not surprising that the quality of the school experience is one of the most powerful predictors of school dropout (Janosz et al., 1997; Rumberger, 2011). It follows that future school dropouts can often be characterized by having limited intellectual and verbal skills, repeated failing marks and repeat(s) of grade level, a lower sense of motivation and competence, a low level of school engagement, lower academic aspirations, discipline problems and absenteeism, and a low level of investment in academic and extracurricular activities (De Witte and Csillag, 2012; Henry, Knight and Thornberry, 2012; Janosz, Archambault, Morizo and Pagani, 2008; Jimerson, Anderson and Whipple, 2002; Kokko, Tremblay, Lacourse, Nagin and Vitaro, 2006; Mahoney and Cairns, 1997; Suh, Suh and Houston, 2007). Again, many of these characteristics are observed at the beginning of schooling (Simner and Barnes, 1991; Alexander, Entwisle and Horsey, 1997). Moreover, even though boys are at a higher risk of dropping out compared to girls, studies have tended to demonstrate that these differences subside when family and school risk factors are taken into account, such as academic failure, motivation and repeating one or more grade levels (Janosz et al., 1997; Rumberger, 1995).

We do not present an exhaustive review here of the risk factors of school dropout, but the summary above shows their diversity and the complexity of the phenomenon. Indeed, students who drop out present a variety of characteristics – some emerge early, and some are also predictors of other problems in adolescence such as delinquency or drug abuse (Dryfoos, 1991; Hawkins, Catalano and Miller, 1992; Valois, MacDonald, Bretous, Fisher and Drane, 2002).

The heterogeneity of student dropouts and screening

Québec research, similar to that elsewhere in the world, has shown that students who drop out of school have certain risk factors in common, all the while showing sufficient differences in certain characteristics to merit the adaptation of preventive actions based on particular circumstances (Cairns, Cairns and Neckerman, 1989; Fortin, Marcotte, Royer and Potvin, 2005; Janosz, LeBlanc, Boulerice and Tremblay, 2000). Indeed, students who drop out do not form a psychosocial or academic homogeneous group. It is essential to take this into account when implementing targeted and effective prevention programs. For example, in a longitudinal study of two different samples of Québec students (Janosz et al., 2000), a dropout typology was established based on their real student status (dropout or graduate) at 22 years of age and on three school-related characteristics at 13 years of age, namely academic performance, engagement and indiscipline. Four types of dropouts were identified using cluster analysis: the quiet dropouts, the disengaged dropouts, the low-achiever dropouts and the maladjusted dropouts. The quiet dropouts seemed to have characteristics similar to those of graduates. They did not present any apparent discipline problem and reported a high level of school engagement, sometimes even higher than that of graduates. However, their academic performance was low, namely just above a passing mark. Given that these students were not failing and did not present any type of behavioural problem, they were rarely recognized as youth at risk of dropping out of school. However, they did represent a high proportion of dropouts in the study, namely around 40%. Disengaged dropouts had average academic performance and presented few discipline problems. However, they were characterized by low school engagement. They comprised nearly 10% of dropouts. Similar to those lacking engagement, low-achiever dropouts presented few behavioural problems. Yet they performed very poorly academically, namely they tended to fail, and had very low levels of school engagement. They comprised around 10% of the dropout population. Finally, as their name implies, maladjusted dropouts presented a high degree of maladjustment and lack of discipline in school. They showed little engagement at school and obtained low marks. They had the most negative psychosocial profile of all the dropouts in the study, and represented about 40% of the dropout population (Janosz et al., 2000). Fortin et al. (2005) arrived at a similar classification, shedding light on a group of young people with strong depressive feelings. Whatever classification is used, it seems that students who drop out of school can be differentiated in terms of whether or not they experience behavioural problems, in addition to academic problems.

Knowledge of the predictors of dropping out of school has resulted in Québec researchers developing various tools to target students with the highest risk of becoming dropouts (Janosz, Archambault, Lacroix and Lévesque, 2007; Potvin, Fortin, Marcotte, Royer and Deslandes, 2004). However, longitudinal studies show that although risk factors for dropping out are numerous and have diverse origins, it is not necessary to measure them all to conduct reliable screening. Taking into account certain powerful dropout predictors will suffice; these are academic performance, repeating a grade, and school engagement (Archambault and Janosz, 2009; Janosz et al., 1997). Screening tools based on such factors will help support prevention efforts among students who have not yet dropped out, but who present several risk factors. Such tools for elementary school students have begun to be developed (e.g. *Premiers signes*, Potvin and Lapointe, 2010), but are not yet based on solid empirical evidence.

Dropping out of school, the final step in a process of disengagement

What are the processes through which the various risk factors lead to dropping out of school? Among the models attempting to explain this (see Rumberger, 2011), school engagement has occupied a prominent place (Christenson, Reschly and Wylie, 2012). Dropping out of school is the culmination of a process of disengagement from school (Rumberger, 1987). It is a dynamic process evolving over time based on interactions between the individual and his/her environment (Alexander, Entwisle and Horsey, 1997; Sameroff and Fiese, 1990). Deciding to drop out of school before graduating with a high school diploma appears to be the result of a trajectory punctuated with failure and personal problems and with peers, teachers and parents, engendering a decrease in motivation and the loss of the meaning of effort in applying oneself. Low engagement and academic failure tend to reinforce one another to the point where abandoning school seems to be a rational solution to ending the feeling of incompetence and experiencing negative emotions (frustration, anger, sadness, boredom) (Christenson, Reschly and Wylie, 2012).

However, how do we reconcile this theory of disengagement with Janosz's typology wherein 40% of students who drop out do not present a disengagement profile? Two complementary hypotheses have been advanced in this regard. First, the process of disengagement does not explain all cases of dropout, but a majority of them. Indeed, certain students abandon school because of non-school related events, such as illness or disease, pregnancy, and the need to fulfill financial and/or family needs (Rumberger, 2011). Others drop out of school because the chances are good that they can enter the labour market in a given community with no qualifications (Gilles, Potvin and Tièche Christinat, 2012). The quiet dropouts, who present good social skills, are particularly likely to travel this path. Next, since disengagement is a process over time, it is possible that a percentage of students known as quiet head towards greater disengagement and present a different profile. In fact, classification is not frozen in time – the percentage of quiet students tends to be higher at the beginning of

high school, while that of maladjusted students seems to increase with age, stabilizing when school-related difficulties such as performance and engagement crystallize (Elharrar, 1999).

According to certain American researchers (Ensminger, Lamkin and Jacobson, 1996; Ensminger and Slusarick, 1992), the disengagement process can begin very early, sometimes even at school entry. In Québec, little research has been devoted to the problems that feed this process of disengagement among elementary school students. However, some recent studies on Québec adolescents from disadvantaged backgrounds indicate that among those who begin high school with a low level of school engagement or one which very rapidly deteriorates, many end up dropping out (Archambault, Janosz, Pagani and Fallu, 2009; Janosz et al., 2008).

Which elementary students manifest predictors of later dropping out of school? Can we identify sub-groups of children at the end of elementary school at risk of dropping out, and what individual, family and social factors can allow us to do so? Furthermore, is it possible to detect precursors at the age of 7 years of the problems experienced by these students? Finally, what are the factors, which at 12 years of age, best identify these sub-groups of students at risk? Data from the *Québec Longitudinal Study of Child Development* (QLSCD; see box entitled *QLSCD 1998-2010 in brief*) provide a means of responding to certain elements of these questions. This is the purpose of this fascicle. The responses can contribute to guiding actions designed to prevent school dropout beginning in elementary school, and to identifying the indicators most likely to be used for potential screening of students at risk.

Goals

The goals of this fascicle are to:

- Determine the individual, family and social factors which best concomitantly differentiate students 12 years of age at risk of dropping out of high school from those not at risk, according to whether or not they present discipline problems.
- Determine the individual, family and social characteristics which, longitudinally, best predict at the age of 7 years the risk of dropping out of high school, according to whether or not the students manifest discipline problems at the age of 12 years.

The QLSCD has been following a cohort of children born in Québec at the end of the 1990s to the present time. Excluded therefore are children who came to Québec after their birth, namely 11% of children 12 years of age in 2010.³ In the 2005 round of the QLSCD, when the children were 7 years of age (Mean (M) = 7.14 years, standard deviation (s.d.) = 0.26 yrs.), 96% were in Grade 1 of elementary school;⁴ most of the remaining were in a higher grade. Five years later, namely when the children were 12 years of age (M = 12.12 years, s.d. = 0.26 yrs.), 90% of them were in Grade 6, while 8% were in a lower grade and a tiny proportion (about 2%) were in a higher grade.



Identifying 12-year-old students at risk of dropping out of high school

Identifying students at risk of dropping out was done in two stages. First, the students were classified as at-risk using the Dropout Prediction Index (DPI) (Archambault and Janosz, 2009; Janosz, LeBlanc, Boulerice and Tremblay, 1997) based on the data collected when the students were 12 years of age. This index is based on responses to seven questions asked of the student, two on academic performance, one on cumulative repeated grade levels, and four on school engagement. The DPI is a scale of probability, constructed from weighted scores of the aforementioned three indicators.⁵ Second, inspired by the typology of Janosz et al. (2000), we classified at-risk students into two groups based on whether, in the responses to five questions, they reported indiscipline at school⁶ (for more details, see Box 1).

The findings were that 15% of children in the target population were deemed to be at risk of dropping out of school, namely 8% without indiscipline and 7% with indiscipline. Table 1 shows the distribution of the students according to whether they were at risk or not, and by sex. As we can see, proportionally more boys than girls were in the group of students at risk with indiscipline, whereas among those at risk without indiscipline, there was no significant difference in the proportions of boys and girls.

According to the screening tool used in the QLSCD, about 15% of 12-year-old students were at risk of dropping out of school. Slightly more than half of them (8%) presented few or no discipline problems in class.

Table 1
Distribution of 12-year-old students¹ by whether they were at risk or not of dropping out of high school, by sex, Québec, 2010

	Boys		Girls		Total	
	%	C.I. ³	%	C.I.	%	C.I.
Students not at risk ²	46.7	[43.5 ; 49.9]	53.3	[50.1 ; 56.5]	85.2	[82.7 ; 87.7]
Students at risk with no discipline problems	45.9	[36.1 ; 55.7]	54.1	[44.3 ; 63.9]	7.7	[6.0 ; 9.7]
Students at risk with indiscipline ²	65.7	[56.0 ; 75.4]	34.3	[24.6 ; 44.0]	7.1	[5.2 ; 9.4]
Total	48.2	[45.3 ; 51.2]	51.8	[48.8 ; 54.7]	100	–

1. Students born in Québec in 1997-1998.

2. Difference by sex significant at the threshold of 0.05.

3. Confidence Interval at 95%.

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

Box 1

Building the typology of potential school dropouts in the QLSCD

Building the typology of potential dropouts presented in this fascicle was derived from the method described by Janosz et al. (1997), Janosz et al. (2000) and Archambault and Janosz (2009), based on three main predictors of school dropout – academic performance, repeating a grade level, and school engagement. More precisely the Dropout Prediction Index was first calculated from responses to 7 questions on the *Computerized Questionnaire for the Child* (CQC), administered as part of the QLSCD when the children were 12 years of age:

Academic Performance

During this school year, what is your average mark in English Language Arts?

During this school year, what is your average mark in mathematics?

Repeating a Grade:

Have you ever repeated an entire school year?

School Engagement:

Do you like school?

In terms of your school marks, how would you rate yourself compared with other students of your age at your school?

How important is it for you to get good marks?

Based on your own wishes, how far do you plan to go in school?

The threshold used to distinguish students at risk of dropping out from those not at risk was set to conform with that recommended in the *Trousse d'évaluation des décrocheurs potentiels* (TEDP) (Assessment Kit of Potential Dropouts), namely 0.35 (Janosz, Archambault, Lacroix and Lévesque, 2007). Then, among the children at risk, two profiles of potential dropouts, (lacking or with discipline) were defined based on 5 questions on lack of indiscipline in school.

During this school year, how many times have you...

disrupted the class on purpose?

been rude to your teacher?

used hidden notes or other means not allowed in order to cheat on a test?

missed school without a valid reason?

ever failed one or more of your subjects, as indicated on your report card (failure is a mark under 50%; or 60%; a D or an E)?

Students at risk of dropping out who presented three or more different behaviours of indiscipline comprised the group at risk with discipline problems, while students at risk who presented two or fewer behaviours of indiscipline comprised the group at risk with no discipline problems.

Methods of analysis

Characteristics and predictors studied

Data collected from the children, their parents⁷ and their teachers when the children were 7 years of age (2005 round – predictors of dropout risk) and 12 years of age (2010 round – characteristics of students at risk of dropping out), were analyzed. These data were grouped according to nine dimensions reflecting various aspects of

the lives of the children recognized in the literature as important factors in the process of school disengagement. Table 2 presents these dimensions and their indicators,⁸ which were used as independent variables. Approximately 120 variables were explored to study the concomitance of the characteristics of 12-year-old students, and 114 variables to detect possible predictors in the students at 7 years of age.⁹ As much as possible, the same indicators were analyzed at 7 and 12 years of age, although certain ones were added or deleted between the two rounds.

Table 2
Overview of indicators associated with the risk of dropping out of high school, by dimension

Dimension	Summary description/Examples of indicators
Sociodemographic characteristics of the parents and family	Parents' educational level, family structure, parents' employment status, household income, parents' immigration status.
Family environment and practices	Family environment: parents' health status, social support, parents' lifestyle habits in terms of alcohol consumption, parents' smoking and drug use, couple satisfaction, family functioning, anxiety and depression in the mother. Parenting attitudes and practices: positive, consistent, intrusive and coercive parental practices Practices related to schooling: conditions fostering learning reported by the teacher, the importance ascribed to marks, parent-school communication, parent involvement in the school and in monitoring school work, parent-child communication about school, parental stimulation of reading.
Academic performance and learning of the students	Academic performance, overall and by subject, language skills.
Motivation, quality of participation in class, and self-concept of students	Motivation in reading, writing and mathematics, self-concept in reading, writing and mathematics, attachment to school, investment in school, time devoted to homework, frequency of reading, quality of participation in class.
Behaviours of the children	Hyperactivity, inattention, emotional problems, anxiety, shyness, aggression, opposition, altruism.
Social relations of the children	Relationships with peers and teachers (positive and involving conflict), victimization, social withdrawal.
Lifestyle habits of the children	Participation in organized extracurricular activities, eating habits, sleep, computer use, time spent watching television and playing video games.
Physical and mental health of the children	General health status, prescription drugs, health problems, visits to physical and mental health specialists, physical condition.
School, social and neighbourhood environment	Quality of school environment, school atmosphere, general behaviour of the child's class, changing schools, number of hours a week in child care, neighbourhood characteristics.

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

Analytical strategies

To paint a portrait of students at risk of dropping out, with or lacking discipline in school, a comparison was made with students not at risk using multinomial regressions (see Box 2 for a description of this statistical method). First, by comparing them with the not-at-risk group, we wanted to identify indicators individually associated with being in one of two at-risk groups (with indiscipline or not) using bivariate multinomial regressions. As expected, the vast majority of the indicators under study were individually associated with the risk of dropping out of high school (data not shown). As a number of indicators of the same dimension tended to be correlated with each other, such as school motivation and time spent studying, it would be interesting to see which ones appeared to be the most discriminating. This is why, as a second step, we conducted a series of multivariate regressions. Based on preliminary analyses, we included all the significant indicators of a particular dimension. These regressions resulted in indicators which, for each dimension, (1) best characterized, at the age of 12 years, the risk of dropping out or not, or (2) best predicted this risk when the children were 7 years of age. Comparisons among the three groups of students (at risk with no discipline problems, at risk with indiscipline, and not-at-risk) were conducted to gain a better understanding of the specificities of each of these groups.

The third step involved a single multinomial regression, which in an iterative process, grouped together the indicators that at 12 years of age, seemed to be the most predictive in each dimension of differentiating students at risk from those not at risk of dropping out (namely the significant variables that emanated from the second step in the analysis). The idea was to determine which ones were the strongest in terms of differentiating students at risk, with indiscipline or not,¹⁰ all dimensions combined. We then repeated the operation with the data at 7 years of age to identify the best predictors. The sex of the students was entered into the final models as a variable to explain to what degree it would contribute to being in one of the two groups at risk of dropping out, beyond other factors under study. Interaction tests were also conducted to ascertain to what degree associations among the various indicators in the final models could vary by the sex of the students.

The analyses conducted in the last two steps were based on weighted data and were therefore adjusted so the results could be generalized to the target population of the QLSCD. In addition, the complex sample design of the survey was taken into account in calculating the precision of the estimates and the conducting of statistical tests. Unless otherwise indicated, the differences reported in this article are significant at the threshold of 0.05. In cases where the threshold is at 0.10, the result will be designated as a trend.

Results

Portrait of students at risk of dropping out of high school

This section presents a portrait of students at risk of dropping out for each of the dimensions analyzed. The results are shown in Table 3 (characteristics at 12 years of age) and Table 4 (predictors at 7 years of age).

Sociodemographic characteristics of the student's families

While preliminary bivariate analyses in the first step seemed to indicate that a number of sociodemographic indicators were associated with the risk of dropping out, particularly in terms of aspects found in the literature such as the parents' ages and level of education, family structure, etc. (data not shown), only family income resulted in being significant in the multivariate analyses, at both 7 and 12 years of age. We can conclude that, compared to students not at risk, students at risk of dropping out of high school, irrespective of whether they present discipline problems or not, were more likely to be from low-income families. This factor was also the most predictive in terms of the risk of dropping out compared to the other sociodemographic characteristics analyzed. Additional analyses would be needed to determine whether family income mediates the associations among other sociodemographic factors and dropout risk, for example the parents' education levels or family structure.

Box 2

Multinomial regressions

Multinomial regressions were used here to examine to what degree various characteristics of students were associated with being in one group rather than another of three groups (or types) of students – at risk with indiscipline, at risk with discipline, and not-at-risk. A multinomial regression, also known as a polytomous logistic regression, is used to predict the probabilities of various possible outcomes of a categorically-distributed dependent variable when there are more than two such discrete outcomes, in this case, three groups of students.

The results presented in this fascicle are derived from multinomial, multivariate regression models, namely ones that analyze different variables simultaneously. They provide a means of discovering the unique contribution of each variable to the probability of being in one or the other of the groups of at-risk students. To do this, first a reference group was chosen, with which the other groups would be compared. In the second step, the goal of which was primarily descriptive, the three groups were compared with each other. In other words, each group of at-risk students was compared with the group of not-at-risk students, then at-risk students with discipline were compared with at-risk students lacking discipline. In the third and final step of the modeling process, only the two at-risk groups of students were compared with those not at risk. The results are presented in the form of odds ratios. An odds ratio lower than 1 indicates that the students presenting a given characteristic were less likely to be in one of the at-risk groups than in the reference group, while an odds ratio higher than 1 indicates that they were more likely, once all the other factors were taken into account.

Table 3
**Main characteristics of 12-year-old students¹ associated with the risk of dropping out of high school,
 results of multinomial regression models, by dimension, Québec, 2010**

	Comparison of students at risk with NO discipline problems and students not at risk	Comparison of students at risk WITH indiscipline and students not at risk	Comparison of students at risk with NO discipline problems and students at risk WITH indiscipline	Interpretation ²
Odds ratios				
Sociodemographic characteristics of parents and family				
Household income (high score = high income)	0.81 ^{††}	0.79 ^{†††}	1.03	2 and 3 < 1
Family environment and practices				
Conditions favourable for learning reported by the teacher (high score = conditions met)	0.88	0.59 ^{†††}	1.49 ^{††}	3 < 1 and 2 > 3
Exposure to second-hand smoke reported by the PMK (0 = no; 1 = yes)	2.84 ^{†††}	1.13	2.51 [†]	2 > 1 and 3
Positive parenting practices reported by the child (high score = positive practices)	0.82	0.47 ^{†††}	1.73 [†]	3 < 1 and 2 > 3
Importance ascribed by the PMK to the child's academic performance (high score = not important)	2.24 ^{††}	1.57	1.42	2 > 1
Communication from the school regarding academic performance problems, reported by the PMK (high score = more frequent communication)	2.46 ^{†††}	1.68 [†]	1.46	2 and 3 > 1
Communication from the school regarding child's behavioural problems, reported by the PMK (high score = more frequent communication)	0.69	1.49 [†]	0.46 ^{††}	2 < 3
Frequency with which the PMK checks the child's school work / helping the child with homework (high score = high frequency)	1.37 [†]	1.42 ^{††}	0.96	2 and 3 > 1
PMK's level of satisfaction with having to help the child with school work (high score = very dissatisfied)	1.16	2.08 ^{††}	0.55 [†]	3 > 1
Academic performance and learning of the students				
Reading skills (high score = low level)	1.81 ^{††}	2.48 ^{†††}	0.73	2 and 3 > 1
Special needs help at the school reported by the teacher (0 = yes; 1 = no)	0.18 ^{†††}	1.29	0.14 ^{†††}	2 < 1 and 3
Overall level of academic performance reported by the PMK (high score = low level)	2.70 ^{†††}	2.95 ^{†††}	0.91	2 and 3 > 1
Repeating a grade level reported by the PMK (1 = yes; 2 = no)	0.13 ^{†††}	0.09 ^{†††}	1.51	2 and 3 < 1
Motivation, quality of participation in class, and self-concept as a student				
Motivation in reading reported by the child (high score = high motivation)	0.44 ^{†††}	0.13 ^{†††}	3.49 ^{†††}	2 and 3 < 1; 2 > 3
Quality of participation in class reported by the teacher (high score = high quality of participation)	1.05	0.64 [†]	1.65 [†]	3 < 1 and 2 > 3
Attraction of school reported by the child (high score = high level of attraction)	0.80	0.64 ^{†††}	1.24	3 < 1
Self-concept in reading reported by the child (high score = strong self-concept)	0.60 ^{†††}	0.72 ^{††}	0.82	2 and 3 < 1
Self-concept in mathematics reported by the child (high score = strong self-concept)	0.66 ^{†††}	0.65 ^{†††}	1.01	2 and 3 < 1

Table 3 (continued)
**Main characteristics of 12-year-old students¹ associated with the risk of dropping out of high school,
 results of multinomial regression models, by dimension, Québec, 2010**

	Comparison of students at risk with NO discipline problems and students not at risk	Comparison of students at risk WITH indiscipline and students not at risk	Comparison of students at risk with NO discipline problems and students at risk WITH indiscipline	Interpretation ²
Odds ratios				
Behaviours of the children				
Hyperactivity reported by the teacher (high score = high level of hyperactivity)	0.81 ^{††}	1.14 [†]	0.70 ^{†††}	2 < 1 and 3; 3 > 1
Inattention reported by the teacher (high score = high level of inattention)	1.23 ^{†††}	1.39 ^{†††}	0.89 [†]	2 and 3 > 1
Anxiety reported by the teacher (high score = high level of anxiety)	1.30 ^{†††}	1.12 [†]	1.15 [†]	2 > 1
Indirect aggression reported by the child (high score = high level of indirect aggression)	0.78 ^{††}	1.14 [†]	0.68 ^{†††}	2 < 1 and 3
Altruism reported by the child (high score = high level of altruism)	0.88 [†]	0.85 ^{††}	1.04	2 and 3 < 1
Social relations of the children				
Conflict in the relationship between the child and teacher reported by the teacher (high score = relationship marked by conflict)	1.12 [†]	1.42 ^{†††}	0.79 ^{†††}	3 > 1 and 2 < 3
Negative relationship with best friend reported by the child (high score = negative relationship)	1.19	1.32 ^{††}	0.90	3 > 1
Lifestyle habits of the children				
Has already tried smoking cigarettes, reported by the child (1 = yes; 2 = no)	0.78	0.26 ^{††}	2.97	3 < 1
Time spent reading for pleasure, reported by the child (duration)	0.67 ^{††}	0.67 ^{††}	1.00	2 and 3 < 1
Physical and mental health of the children				
Child takes prescription drug for ADHD, reported by the PMK (1 = yes; 2 = no)	0.33 ^{††}	0.16 ^{†††}	2.01 [†]	2 and 3 < 1
Physical condition perceived by the PMK (high score = poor physical condition)	1.40 [†]	1.66 ^{††}	0.84	3 > 1
School, social and neighbourhood environment				
General behaviour in the child's class reported by the teacher (high score = well-behaved)	1.01	0.83 ^{††}	1.22 [†]	3 < 1 and 2 > 3
Neighbourhood is dangerous and/or lacks social cohesion, reported by the PMK (high score = dangerous neighbourhood)	0.94	2.22 ^{†††}	0.42 ^{††}	3 > 1 and 2 < 3

1. Students born in Québec in 1997-1998.

2. 1 = Not at risk; 2 = At risk with no discipline problems; 3 = At risk with indiscipline.

Note: An odds ratio (OR) is significantly different from 1 at the threshold of: ‡: 0.10; †: 0.05; ††: 0.01; †††: 0.001. An odds ratio lower than 1 indicates a lower probability that a student would be classified into one group compared to another, whereas an odds ratio higher than 1 indicates an increase in the probability.

PMK: Person Most Knowledgeable of the child.

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

Table 4
At 7 years of age, main predictors of the risk of dropping out of high school among 12-year-old students,¹
results of multinomial regression models, by dimension, Québec, 2005 and 2010

	Comparison of students at risk with NO discipline problems and students not at risk	Comparison of students at risk WITH indiscipline and students not at risk	Comparison of students at risk with NO discipline problems and students at risk WITH indiscipline	Interpretation ²
Odds ratios				
Sociodemographic characteristics of parents and family				
Household income (high score = high income)	0.79 ⁺⁺⁺	0.75 ⁺⁺⁺	1.05	2 and 3 < 1
Family environment and practices				
Conditions favourable to learning reported by the teacher (high score = conditions met)	0.71 ⁺⁺	0.58 ⁺⁺⁺	1.23 ⁺	2 and 3 < 1
Communication from the school regarding academic performance problems, reported by the PMK (high score = more frequent communication)	2.17 ⁺⁺⁺	1.58 ⁺	1.38	2 and 3 > 1
Stimulation to read on the part of the PMK (high score = frequent stimulation)	1.31	0.37 ⁺⁺	3.56 ⁺⁺⁺	3 < 1 and 2 > 3
Restless legs syndrome in the mother (high score = constantly)	1.28 ⁺⁺⁺	1.04	1.23 ⁺	2 > 1 and 3
Academic performance and learning of the students				
Reading skill reported by the PMK (high score = low level)	1.75 ⁺⁺	1.56 ⁺	1.12	2 and 3 > 1
Reading skill reported by the teacher (high score = low level)	1.89 ⁺⁺⁺	1.96 ⁺⁺	0.96	2 and 3 > 1
Activity with numbers (high score = high level of success)	0.88 ⁺⁺	1.00	0.88 ⁺	2 < 1 and 3
Motivation, quality of participation in class, and self-concept as a student				
Quality of participation in class reported by the teacher (high score = high quality of participation)	0.69 ⁺⁺⁺	0.80 ⁺	0.86	2 and 3 < 1
Self-concept in reading reported by the child (high score = strong self-concept)	0.26 ⁺⁺⁺	0.25 ⁺⁺⁺	1.03	2 and 3 < 1
Behaviours of the children				
Inattention reported by the teacher (high score = high level of inattention)	1.35 ⁺⁺⁺	1.34 ⁺⁺⁺	1.01	2 and 3 > 1
Social relations of the children				
Positive relationship between the child and teacher, reported by the teacher (high score = positive relationship)	0.84 ⁺⁺	0.92	0.91	2 < 1
Conflict in the relationship between the child and teacher reported by the teacher (high score = relationship marked by conflict)	1.17 ⁺⁺	1.37 ⁺⁺⁺	0.85 ⁺⁺	2 and 3 > 1; 2 < 3
Lifestyle habits of the children				
Participation in organized educational or sports activities reported by the mother or acting mother (spouse/partner of the father)	0.71 ⁺	0.49 ⁺⁺⁺	1.43	2 and 3 < 1
Physical and mental health of the children				
Child takes prescription drug for ADHD, reported by the PMK (1 = yes; 2 = no)	0.20 ⁺⁺⁺	0.15 ⁺⁺	1.32	2 and 3 < 1
School, social and neighbourhood environment				
Teacher gives clear/sufficient instructions, reported by the PMK (high score = never)	1.91 ⁺⁺	1.77 ⁺	1.08	2 and 3 > 1

1. Students born in Québec in 1997-1998.

2. 1 = Not at risk; 2 = At risk with no discipline problems; 3 = At risk with indiscipline.

Note: An odds ratio (OR) is significantly different from 1 at the threshold of: †: 0.10; ‡: 0.05; ++: 0.01; +++: 0.001. An odds ratio lower than 1 indicates a lower probability that a student would be classified into one group compared to another, whereas an odds ratio higher than 1 indicates an increase in the probability.

PMK: Person Most Knowledgeable of the child.

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

Family practices and environment

Among the indicators studied were attitudes and practices related to schooling that most differentiated students at risk of dropping out of high school from those not at risk. When the students at risk were 12 years of age (Grade 6), their parents had more contact with the school with regards to low academic performance (students with indiscipline or not) and behavioural problems (trend only for students at risk with indiscipline), ascribed less importance to marks (only students at risk with indiscipline) and were less likely to meet conditions favourable to learning according to the teacher¹¹ (only students at risk with indiscipline). Already at 7 years of age (Grade 1), the parents of at-risk students, with indiscipline or not, were more likely to be called to the school to discuss problems of their child's academic performance, and had more difficulty in providing conditions favourable for their child's learning, compared to parents of children not at risk. In addition, at-risk students with indiscipline at 7 years of age received less stimulation from their parents with regards to reading.¹² Furthermore, parents of students at risk spent more time helping their child with school work at 12 years of age, the presumed impact of low academic performance. Parents of children at risk with indiscipline were also more likely to report dissatisfaction with having to do this.

Mothers of at-risk students with discipline seemed to be more likely to present symptoms associated with restless leg syndrome, dysexecutive syndrome (frontal lobe) and attention deficit disorder (ADD) (Chervin, Archbold, Dillon, Pituch, Panahi, Dahl and Guilleminault, 2002; Wagner, Walters and Fisher, 2004). The correlation between symptoms of ADD in the mother and inattention in her child when he/she was in Grade 1 (the latter as assessed by the teacher) was significant ($r > 0.10$; $p < 0.001$). In Grade 6, at 12 years of age, the students at risk with indiscipline were exposed to less favourable parenting practices compared to those not at risk. At the same age, students at risk with no discipline problems were more likely to be exposed to second-hand smoke at home compared to not-at-risk students.

Academic performance and learning

At 12 years of age, the students categorized in our analyses as at risk had more learning difficulties than other students, particularly with regards to reading, as reported by the teachers. This result is not surprising given that academic performance reported by the students was a component of the index used to select students at risk of dropping out. In addition, learning difficulties were already perceptible in many students at 7 years of age; they had low reading skills as reported by parents and teachers. Furthermore, students at 7 years of age with no discipline problems presented lower scores for the activity on knowledge of numbers than those not at risk. However, this was not the case for at-risk students with indiscipline. At 12 years of age, students with no discipline problems were more likely to receive special help, no doubt because of their particular difficulties in reading that were observed earlier.



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Motivation, quality of participation in class, and self-concept in reading and mathematics

At 12 years of age, the students at risk, with indiscipline or not, perceived themselves more negatively than others in terms of learning (self-concept in reading and mathematics). The teachers judged the students at risk as less engaged in learning (less participation in class), and this was even more pronounced in students at risk with indiscipline. Only students at risk with indiscipline reported lower motivation in reading and they liked school less than their not-at-risk peers. Therefore, the attraction of school and the quality of participation in class seemed to be lower in students at risk with indiscipline than any other group of students, and motivation in reading seemed to be lower in students at risk with indiscipline compared to those not at risk. It is interesting to note that certain problems in students at risk, with regards to self-concept and the quality of participation in class, appeared at the beginning of elementary school, namely at 7 years of age. The process of disengagement, therefore, seems to take root at the beginning of elementary school for some students and seems associated with the risk of dropping out in high school.

Children's behaviours

At 12 years of age, the behaviours that seemed most associated with the risk of dropping out were hyperactivity, inattention, anxiety, indirect aggression and a low level of altruism. Students at risk, with indiscipline or not, were more likely to present certain characteristics such as inattention, as reported by the teachers, anxiety, as reported by the teachers (trend among students at risk with indiscipline), and a low level of altruism (self-reported). However, students at risk with no discipline problems tended to manifest more signs of anxiety and fewer signs of inattention than students at risk with indiscipline, while the latter were more hyperactive according to the teachers and manifested more indirect aggression (self-reported) than students not at risk or at risk with no discipline problems.

This behavioural profile appears to have already formed at 7 years of age, but at that age inattention seemed to be the best predictor of problems in students at risk with discipline problems or not.

Children's social relations

At 12 years of age, students at risk with indiscipline reported a more negative relationship with their best friend compared to students not at risk. Their relationship with their teachers also involved more conflict compared to students not at risk. There was a trend in this same direction among students at risk with no discipline problems. The precursors of these problems appeared at the age of 7 years, notably with regards to the relationship with the teacher, which was less positive or involved more conflict among students at risk compared to those not at risk. There was more conflict with the teacher in students at risk with indiscipline compared to any other group of students.

Children's lifestyle habits

The students at risk of dropping out were less engaged in organized extracurricular activities, such as clubs, associations, and sports when they were 7 years of age. At 12 years of age, spending little time reading for pleasure (students at risk with indiscipline or not) and having already tried smoking cigarettes (students at risk with indiscipline) were also factors associated with being categorized in the groups at risk of dropping out.

Children's physical and mental health

Both at 12 and 7 years of age, no significant association was detected between the risk of dropping out of school and general physical health indicators such as visits to emergency, seeing a specialist for a physical health problem, temporary health problems, or body weight (data not shown). Indeed, only one association was significant at 12 years of age, namely students at risk presented less favourable physical health, according to their mother, than students not at risk, even though only a trend was observed for students at risk with no discipline problems.

Students at risk seemed differentiated from those not at risk in terms of mental health, particularly with regards to inattention and hyperactivity at 7 years of age. They were more likely at the beginning and at the end of elementary school to be taking medication to treat symptoms of Attention Deficit and Hyperactivity Disorder (ADHD). At 12 years of age, the students at risk with indiscipline were more likely to take medication for this than those with no discipline problems, which was not the case at 7 years of age. It should be noted that in spite of medication, these students still had a greater tendency to present more striking attention problems than any other group of students.

School, social and neighbourhood environment

We have few data that can describe the wider physical and social environment of the students. However, it should be emphasized that at 12 years of age, the students at risk with indiscipline were living in neighbourhoods their parents considered more dangerous than others and where there was less community cohesion, compared to students not at risk or at risk with no discipline problems (data on the neighbourhood were not collated in 2005 when the children were 7 years of age). Students at risk with indiscipline were in classes considered more difficult by their teachers compared to students not at risk or at risk with no discipline problems. These classes had more students with behaviours representing a challenge for the teachers. In addition, at 7 years of age, the parents of children at risk thought that the teacher was giving less clear or insufficient instructions regarding school work when compared with the parents of students not at risk.

Summary of the results

The results demonstrate that 12-year-old students at risk of dropping out of high school, identified by their learnings (lower marks in English and mathematics, repeating a grade), their disengagement and lack of discipline in school, were also differentiated from not-at-risk students by a number of developmental aspects and lifestyle characteristics. The results also indicate that a quite a few problems observed at 12 years of age in Grade 6 were already present or were emerging near the end of Grade 1 of elementary school, namely at 7 years of age. Although the factors shown in Tables 3 and 4 clearly differentiated students at risk from those who were not, some of these factors also differentiated the two types of students at risk.

Overall, students at risk were more likely to come from disadvantaged families whose attitudes and practices related to schooling were less than optimal. However, it seems that students at risk with indiscipline presented a greater number of risk factors associated with their home and school environments that were more pronounced than those of other students, namely less positive parenting practices, unfavourable conditions for learning, little parental stimulation of reading, more dangerous neighbourhood, being in a class with more discipline problems than other classes, etc. At-risk students' interpersonal relations seemed less positive, both with peers and teachers. Again, it was students at risk with indiscipline who had the most negative relationship with their teacher. More serious externalized behaviour problems among these students, such as hyperactivity and aggression, could explain this negative relationship. Students at risk with indiscipline were more likely to try smoking cigarettes earlier than those not at risk. At-risk students with no discipline problems had discernible attention problems in Grade 1 at 7 years of age, though they tended to be less pronounced than those of at-risk students with indiscipline, at 12 years of age. Their behavioural characteristics could have reflected internalized behaviours (absence of aggression, absence of hyperactivity, anxiety). It should be noted that even though students at risk with

indiscipline also tended to present more signs of anxiety than those not at risk, these signs were more pronounced among students at risk with no discipline problems. It is not surprising to observe that the two groups of students at risk experienced problems in school because this is how they were originally categorized. The results show that these problems were perceptible at 7 years of age and it seems that students at risk with no discipline problems presented additional vulnerability, since they obtained a lower score than all the other groups of students on a standardized test on numbers. Students at risk with indiscipline were differentiated from other groups by their low interest in school and their particularly low quality of participation in class at 12 years of age. They seem to have already been on a trajectory particularly at risk in that their signs of disengagement in school, already numerous, were similar to those observed in high school, such as low engagement in class, low marks, difficulties in relations with people, and serious behavioural problems (Archambault et al., 2009).

Many problems observed in 12-year-old students at risk of dropping out of high school, particularly a negative self-concept as a student, low class participation, attention and learning difficulties in reading, were already perceptible at the age of 7 years.

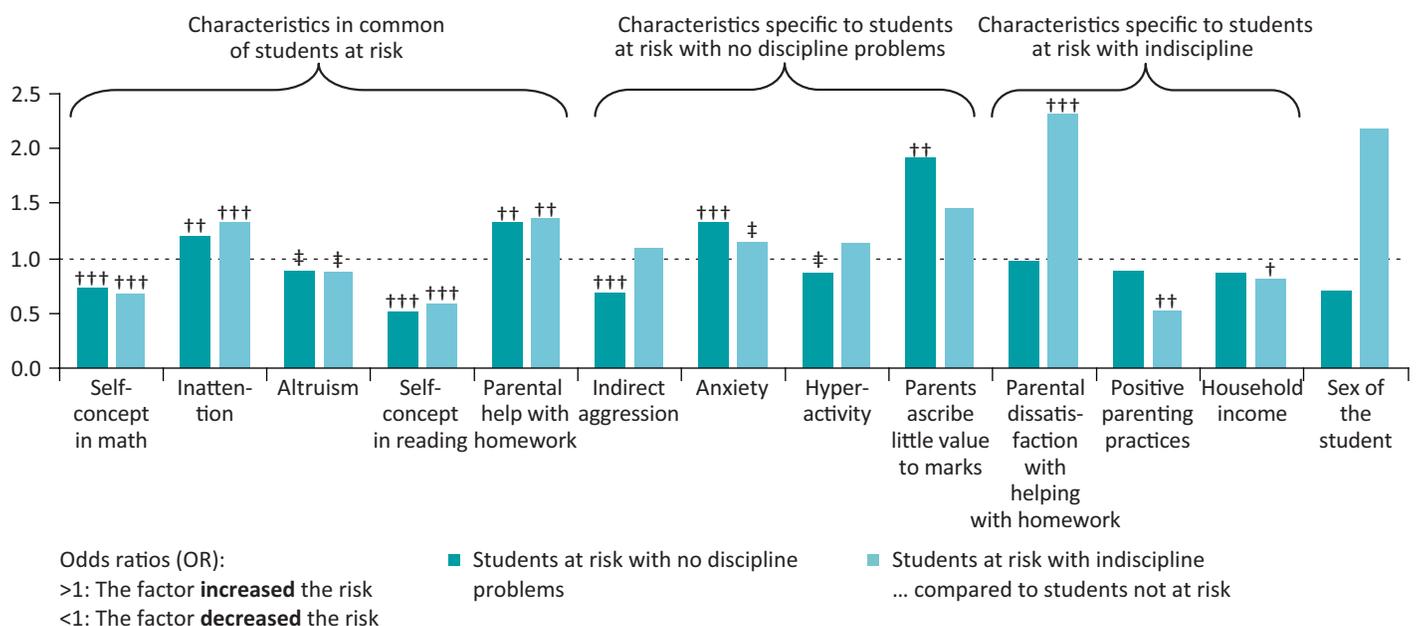
Do certain dimensions deserve greater attention in terms of guiding interventions with 12-year-old students at risk of dropping out of high school? Which characteristics remain associated with being an at-risk student with indiscipline or not, when other factors are taken into account? To address these questions, two final models were produced and the results are presented below.

What are the dominant characteristics of 12-year-old students at risk of dropping out of high school?

The results of multinomial regression analyses comparing the three categories of students (not at risk, at risk with indiscipline, at risk without indiscipline) indicated that 12-year-old students at risk of dropping out of high school were mainly differentiated by four of the nine dimensions under study, namely self-concept in reading and math, externalized and internalized behavioural problems, environment and parental practices, and sociodemographic characteristics (see Figure 1). With regards to self-concept, students at risk, with indiscipline or not, perceived themselves more negatively as learners in both mathematics and reading compared to students not at risk. They therefore assessed themselves as having lower competencies in these subjects. The strength of this factor can be explained by the fact that the self-image of a student, in other words the feeling of competence, is based in large part on academic performance, i.e. marks, which was used in constructing the dropout prediction index. Inattention problems reported by the teacher, and to a lesser degree, a lower level of altruism ($p < 0.10$), differentiated both students at risk with indiscipline and those with

no discipline problems from students not at risk. However, students at risk with no discipline problems were particularly distinguished by internalized behaviours. They presented less indirect aggression and more signs of anxiety than students not at risk. They also tended to present fewer signs of hyperactivity ($p < 0.10$). Students at risk with indiscipline did not appear significantly more hyperactive or aggressive than their fellow students not at risk when controlling for their other characteristics, for example self-concept, inattention, and parental help with school work. With regards to environment and parental practices, the frequency with which the mother helped her child with his/her school work differentiated the two categories of students at risk from those not at risk. This can easily be explained by the lower academic performance of these students. A number of other aspects of the family environment seemed to be particularly influential in characterizing students at risk with indiscipline, such as parental dissatisfaction with helping their child to do his/her homework and parental practices considered less positive by the child. However, less importance ascribed to academic performance (marks) by the parents seemed to be more characteristic of students at risk with no discipline problems. Low family income differentiated only students at risk with indiscipline. Though boys seemed to be more likely to be in the group at risk with indiscipline, this specificity disappeared when the effects of other indicators, such as aggression, self-concept and inattention, were simultaneously included in the model. Finally, the tests of interaction conducted between the different variables in the models and the sex of the student revealed no significant variation between boys and girls.

Figure 1
Main characteristics of 12-year-old students¹ associated with the risk of dropping out of high school, results of multinomial regression models, all dimensions combined, Québec, 2010



1. Students born in Québec in 1997-1998.

Note: The odds ratios (OR) significantly differ from 1 at the threshold of: ‡: 0.10; †: 0.05; **: 0.01; ***: 0.001.

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

In summary, the students at risk differed from those not at risk in terms of a more negative self-concept as a student, greater attention problems, and a greater need for parents to help with school work. Students at risk without indiscipline were differentiated from those not at risk by some form of internalized behaviours such as more anxiety and a tendency to present fewer signs of hyperactivity, and by their parents ascribing less importance to academic performance. Students at risk with indiscipline were distinguished by less positive parenting practices as reported by the child, lower family income, greater parental dissatisfaction with helping with homework, but not by externalized behaviours such as hyperactivity and aggression, once the other factors were taken in to account.

12-year-old students at risk of dropping out of high school were differentiated from students not at risk by a more negative self-concept as a student, had more attention problems, need more parental help with homework and tended to have a lower level of altruism.

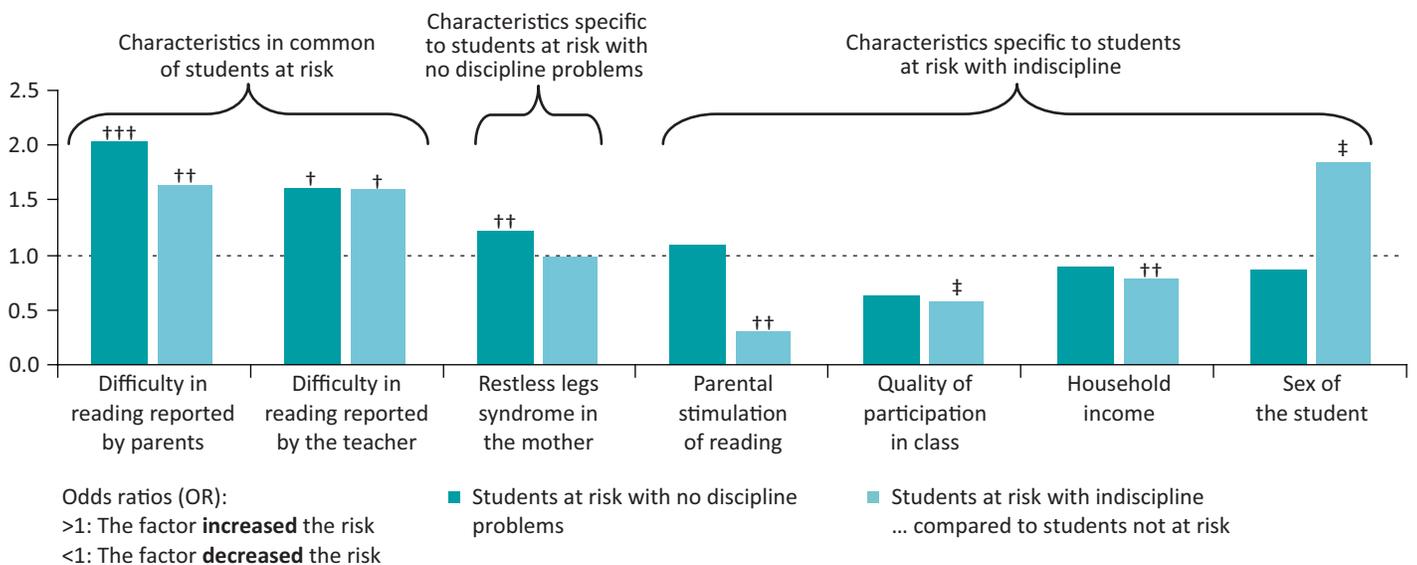
We conclude this article by examining the relative weight of the predictors at 7 years of age of dropping out of high school. Do all the predictors presented in the preceding analyses remain associated with the risk of dropping out, when entered in the model simultaneously? What are the most powerful predictors and could they give direction to prevention interventions?

What are the best predictors at 7 years of age of dropping out of high school?

In the end, seven variables from three dimensions appeared to predominate in predicting the risk at 12 years of age of dropping out of high school and being in one of the sub-groups at risk (see Figure 2). First, reading difficulty perceived by the parents and teachers were precursors of being, at 12 years of age, in one or the other of the two sub-groups at risk of dropping out of high school. Other variables predicted in more specific fashion being in different risk groups. Boys ($p < 0.10$), students with a low quality of participation in class ($p < 0.10$), students from low-income families and those who received less parental stimulation for reading¹³ were particularly likely to be in the at-risk group of students with discipline problems at 12 years of age. Students born to mothers showing neurological vulnerability associated with an attention deficit, namely restless legs syndrome, were more likely to be in the group at risk with no discipline problems. These predictors did not differ by sex.

Reading difficulties at 7 years of age (Grade 1) were precursors of the risk, at the end of elementary school (12 years of age - Grade 6), of dropping out of high school, whether the students had discipline problems or not.

Figure 2
At 7 years of age, main predictors of the risk of dropping out of high school among 12-year-olds,¹ results of multinomial regression models, all dimensions combined, Québec, 2005 and 2010



1. Students born in Québec in 1997-1998.

Note: The odds ratios (OR) significantly differ from 1 at the threshold of: ‡: 0.10; †: 0.05; ††: 0.01; †††: 0.001.

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

Conclusion

This study provides support for the idea that the experience of a fair number of elementary school students is negative and predisposes dropout at a later age. Based on three major predictors of dropout, namely academic performance, repeating a grade level and disengagement, this study estimates that about 15% of 12-year-old children born in Québec at the end of the 1990s (18% of boys, 12% of girls) already have a serious risk of dropping out when they are in high school. By demonstrating that a large number of individual, social and family factors measured at 7 years of age predicts this risk of dropping out, our study reinforces the notion that school dropout is a process that, for many children, has its beginnings at elementary school entry (Alexander, Entwisle and Horsey, 1997; Sameroff and Fiese, 1990). These observations confirm that measures to prevent school dropout should target elementary school students as early as possible. The results also indicate that, while likely to have certain problems in common, at-risk students in elementary school are not a homogeneous group and present individual and social vulnerability distinct enough to warrant actions adapted to their strengths and weaknesses. Our conclusion will focus on the impacts of the study considered useful for preventing school dropout.

However, in spite of the strengths of the QLSCD, namely a longitudinal sample representative of children born in Québec in the late 1990s with multiple sources of data, it does have certain limits in terms of an exhaustive analysis of the determinants of failure in school. For example, the QLSCD does not provide a means of precisely assessing the influence of the school, the class, sociogeographic or ethnic factors. Moreover, categorizing the students at risk was based on a dropout prediction index initially validated with high school students. The data collected from parents and teachers support the validity of convergence and discriminant validity of this index, but only further analyses integrating data on dropping out will provide a means of verifying the predictive validity. This could be accomplished using the data currently being collected on the longitudinal sample of the student who are now teenagers.

What are the implications of the results for students at risk? As other researchers have observed (see Rumberger, 2011), at-risk children are more likely to come from disadvantaged backgrounds and have parents who barely provide supervision and support for either schooling or learning. Disadvantaged children and their parents should therefore be a priority. Québec government programs such as the *Stratégie d'intervention Agir autrement* designed to target disadvantaged families and encourage greater school-family cooperation (Epstein, 2001) are particularly relevant. Furthermore, since schools are neither mandated nor organized to directly support parents, it is important to include the complementary role of community and health organizations in a comprehensive strategy to prevent school dropout (e.g. *Réunir Réussir*,¹⁴ Balfanz, Fox, Bridgeland and McNaught, 2009; Gilles, Potvin and Tièche Christinat, 2012). In addition, these students experience failure and learning difficulties that generate a feeling of incompetence, which in turn feeds school disengagement (Christenson, Reschly and Wylie, 2012). Interventions aimed at improving learning strategies (Fournier and Cartier, 2011; Cartier, Contant and Janosz, 2012) and a feeling of self-efficacy (Margolis and McCabe, 2006) could therefore be productive for all students at risk. We also observed that

students at risk seem to manifest more emotional problems such as more signs of anxiety. These students should therefore benefit from interventions designed to self-regulate emotions (Weinstein, Husman and Dierking, 2000; Cleary and Zimmerman, 2004). Our study also shed light on two other risk factors that our two sub-groups had in common, namely reading skills at 7 years of age and concentration problems at 12 years of age.

At the beginning of schooling, students learn to read, then must read to learn (Cartier and Tardif, 2000). Therefore an early deficit in reading skills will have serious consequences. A number of studies have shown the associations between reading ability and success in school (McGee, Prior, Williams, Smart and Sanson, 2002). A certain number of initiatives have been implemented in Québec in the past few years to promote the capacity of parents to simulate reading in their children (e.g. *Les Sacs d'histoires*),¹⁵ as well as the different reading projects of *Le florilège (Action Plan on Reading in School)*¹⁶ and that of teachers to do the same (e.g. *Coup de poing*,¹⁷ *Le florilège*). In addition, researchers are increasingly perfecting interventions and pedagogical tools with the goal of improving children's reading skills (*Abracadabra* [Abrami, 2011]; *Apprendre à lire à deux* [Dion, Borri-Anadon, Vanier, Potvin and Roux, 2005]) or reading strategies in learning contexts (Cartier, 2007). Our study has emphasized the importance of developing reading skills right at school entry.

Students in Grade 6 (12 years of age) at risk of dropping out of high school seem to have difficulty concentrating in class, and this is perceptible in Grade 1 (7 years of age). Since the real amount of time devoted to learning influences its quality, not concentrating in class can have a direct, negative impact on academic performance and school engagement (Gettinger and Walter, 2012). Using QLSCD data, other researchers have already demonstrated that attention and hyperactivity problems in kindergarten or during the preschool period predict learning difficulties in Grade 2 or Grade 4 of elementary school (Cardin et al., 2011; Pagani et al., 2011). Inattention can be treated by special needs interventions on the part of parents and teachers as well as ones designed to increase the child's capacity to concentrate (e.g. self-regulation, neurofeedback, medication) (*Programme Attentix* [Caron, 2006]; Dawson and Guare, 2012).

Finally, let us examine the impacts of this study in terms of a differential approach to prevention. Among 12-year-old students born in Québec at risk of dropping out of high school (15%), those with no discipline problems (8%) seem more likely to present anxiety problems, while those with indiscipline (7%), also presenting with anxiety, tend to be aggressive towards their peers, have a particularly negative relationship with their teacher and peers, and show little interest in school. Compared to the former, the latter group, who bear quite a resemblance to the *maladjusted* category of students (Janosz et al., 2000), present slightly more disadvantaged psychosocial, socioeconomic and family characteristics, such as being in a low-income household, having parents with few positive parenting practices, and experiencing conditions less favourable for learning. The quality of their participation in class would be lower than that of any other group. They not only appear to be at risk of dropping out of school as teenagers, but also at risk for other problems, such as delinquency and addiction (Dryfoos, 1991). Though these students need support in terms of learning in school, they also need help in developing social skills and the ability to self-regulate their emotions. Their parents are also likely to need support in their child-rearing practices. In addition, given the

magnitude and diversity of the problems these children have, the chances of interventions being successful are much higher if they are implemented at the very beginning of schooling. Children at risk with no discipline problems would benefit from the general measures described above. Though these children at 7 years of age present symptoms of inattention comparable to those of students at risk with indiscipline, their inattention at 12 years of age tends to be less accentuated than that of the latter group. We can surmise that the process of maturity or interventions targeting them can help reduce their vulnerability in this regard. Indeed, as our results show, these students are more likely to benefit from special needs help in the school at 12 years of age. School staff should be very vigilant in ensuring that all these

students at risk continue to receive the support they need to meet the challenges that await them in high school. Furthermore, the results of our study clearly suggest the value of constructing a screening tool for Grade 1, but more in-depth analyses will be required to develop such a tool. At this stage, the most powerful predictors at 7 years of age seem to be more productive in differentiating the students at risk from those not at risk than the characteristics of students at risk at 12 years of age. In addition, it would be important to verify whether predictors, if studied in kindergarten, would provide also a productive screening capacity, since appropriate support interventions could be implemented in Grade 1 of elementary school.



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Notes

1. Michel Janosz, Isabelle Archambault, Sophie Parent and Linda Pagani are professors in the École de psychoéducation (Université de Montréal) and researchers in the Groupe de recherche sur les environnements scolaires (GRES) (Research Group on School Environments) and the Institut de recherche en santé publique of the Université de Montréal (IRSPUM) (Research Institute on Public Health). Sophie Pascal is a researcher in GRES and IRSPUM. Luc Belleau is a statistician at the Institut de la statistique du Québec.
2. See also BELFIELD, and LEVIN (2007); CANADIAN COUNCIL ON LEARNING (2009); FORTIN (2008); GILMORE (2010); HANKIVSKY (2008) and RICHARDS (2009) for examples of the costs associated with school dropout.
3. The ISQ produced these data based on the *Fichier d'inscription des personnes assurées* (Register of Insured Persons) at the Régie de l'assurance maladie du Québec (Québec Health Insurance Board – i.e. Medicare) in 2010.
4. Most children in Québec enter Grade 1 of elementary school at 6 years of age. QLSCD rounds are conducted later in the school year (namely between February and May of the following calendar year), so this is why most of the children in Grade 1 in the 2005 round were 7 years of age, not 6. Similarly, most of the children in Grade 6 in 2010 were 12 years of age. Grade 6 is the final year of elementary school prior to the first year of high school in Québec, known as Secondary 1.
5. The risk score varied from 0 to 1. The most recent study validating the DPI showed it detected 76% of real dropouts (24% false negatives) and 68% of students not at risk (32% false positives) with a risk score of 0.35, namely that used in our analysis here. The DPI has been validated with 13-year-old students (Archambault and Janosz, 2009). The validation of the index with students in Grade 6 of elementary school is currently underway, but a series of preliminary analyses has demonstrated its consistency with 12-year-old students.
6. A first attempt to reproduce the typology of Janosz et al. (2000), comprising four groups of students at risk, proved inconclusive because of the small numbers of students at risk in the QLSCD. However, two groups at risk of dropping out were able to be established – the first group comprising quiet, disengaged and low-achiever students, and the second group comprising those with indiscipline (also called “maladjusted”) (see Box 1).
7. Data from the parents was collected from the Person Most Knowledgeable of the child (PMK) or from the mother. Data from the *Self-Administered Questionnaire for the Biological Father / Spouse/Partner Living in the Household* were therefore not used because this meant excluding children living in a single-parent household with a single mother.
8. The internal consistency of each measurement scale was validated (Cronbach's alpha > 0.60).
9. The complete list of indicators and details on how the scales and indexes were constructed is available from the authors upon request.
10. Indicators associated with academic performance and learning were excluded from this last step since they were already direct components of the index of the risk of dropping out.
11. This indicator comprises the Family Discipline sub-scale of the Early Development Instrument (EDI) developed by Janus and Offord (2007). This sub-scale was based on the following eight questions: “Since the beginning of this school year, how often has this child arrived: 1) without the materials needed to do his/her school work (e.g., notebooks, paper)? 2) inadequately clothed to participate in school-related activities (e.g., gym, sports, field trips, recess)? 3) inadequately dressed for the weather conditions? 4) too tired to do school work? 5) without a lunch/snacks? 6) without adequate nourishment/hungry? 7) without his/her homework completed? 8) late for school?”
12. Parental stimulation of reading is a composite index based on responses to nine questions asked of the parents. For example, “Currently, how often do you or another adult in the household read aloud to ...[child's name] or listen to ... read? Approximately how many books do you have in your home for ...'s use (excluding school books)? How often do you talk with ... about what you, or another family member, are reading? How often do you encourage ... to read a book?”
13. See Footnote 12.
14. <http://www.reunirreussir.org/>
15. http://www.mels.gouv.qc.ca/sections/viepedagogique/155/index.asp?page=dossierD_6
16. <http://www.mels.gouv.qc.ca/lecture/index.asp?page=florilege>
17. http://www.mels.gouv.qc.ca/sections/viepedagogique/155/index.asp?page=dossierD_4

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