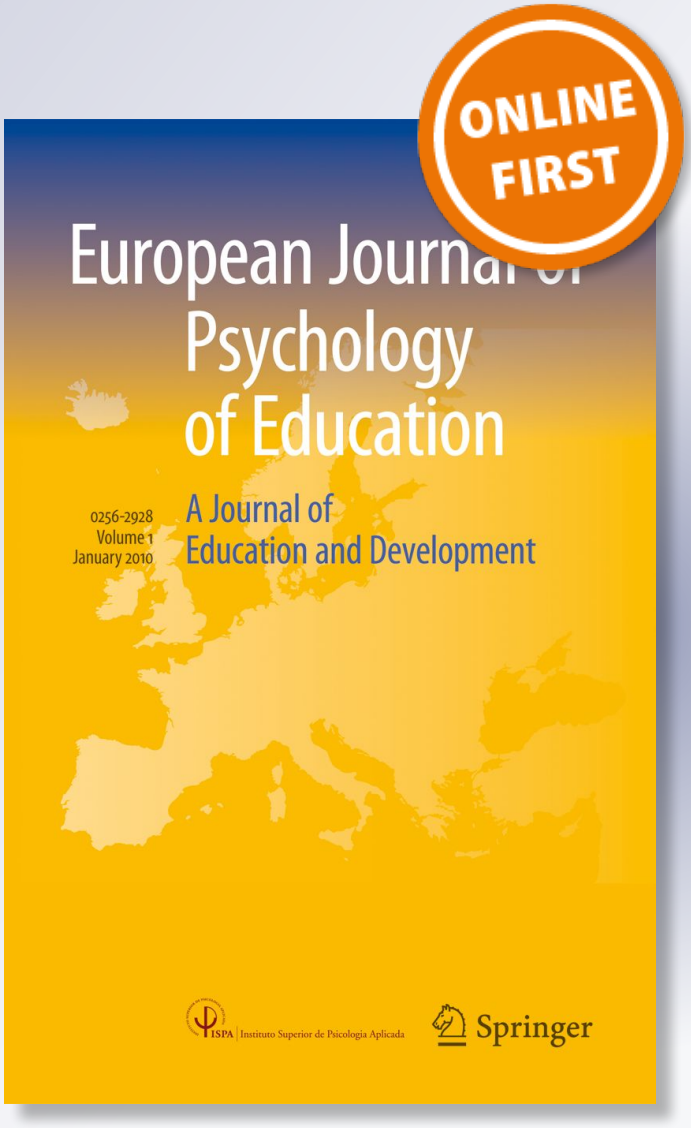
A multidimensional model of school dropout from an 8-year longitudinal study in a general high school population

Laurier Fortin, Diane Marcotte, Thierno Diallo, Pierre Potvin & Égide Royer

European Journal of Psychology of Education
A Journal of Education and Development

ISSN 0256-2928

Eur J Psychol Educ
DOI 10.1007/s10212-012-0129-2



Springer

Eur J Psychol Educ
DOI 10.1007/s10212-012-0129-2

A multidimensional model of school dropout from an 8-year longitudinal study in a general high school population

Laurier Fortin · Diane Marcotte · Thierno Diallo · Pierre Potvin · Égide Royer

Received: 11 February 2012 / Revised: 8 May 2012 / Accepted: 16 May 2012

Abstract This study tests an empirical multidimensional model of school dropout, using data collected in the first year of an 8-year longitudinal study, with first year high school students aged 12–13 years. Structural equation modeling analyses show that five personal, family, and school latent factors together contribute to school dropout identified at 19 years of age: poor parent–teenager relationships, youth depression and family difficulties, negative classroom climate, negative school interactions, and poor academic achievement. This model increases our understanding of the dropout process in the general population and has direct implications for the development of high school dropout prevention programs.

Keywords Theoretical model · School dropout · High school students · Risk factors

High school dropout is a major social problem in several industrialized countries because many young people leave school without a high school diploma. Incidences of school dropout for youth aged 20–24 years were at 10.2 % in Canada for the years 2004–2005 (Bowlby 2005). Dropping out of school can have important social and personal consequences. Students who drop out of school present social adjustment difficulties that may lead to problems such as delinquency or behavior problems (Battin-Pearson et al. 2000; Jimerson et al. 2002). Socially, they have a higher rate of unemployment and greater reliance on social assistance and employment insurance than graduates and their lack of technical training makes it difficult for them to enter the labor market (Garnier et al. 1997).

L. Fortin (✉) · T. Diallo
University of Sherbrooke, Sherbrooke, Québec, Canada
e-mail: Laurier.Fortin@USherbrooke.ca

D. Marcotte
University of Québec à Montréal, Montreal, QC, Canada

P. Potvin
University of Québec à Trois-Rivières, Trois-Rivières, QC, Canada

É. Royer
University Laval, Quebec City, QC, Canada

Published online: 29 June 2012

Many authors believe that prevention measures must be applied as early as possible, while students are still in school, as it is much easier to keep them in school than to persuade them to return (Franklin and Streeter 1995; Rumberger 1995). We believe that a comprehensive understanding of the predictors and processes involved in high school dropout can guide the identification of students at-risk and the implementation of effective prevention programs adapted to the needs of these high school students, so as to modify their developmental pathways and promote their academic and social adjustment. Although many studies have examined the social an economic factors associated with school dropout, few have examined how the different personal, social, and school risk factors for school dropout interact, which factors might predict this outcome, or if the processes involved are the same for girls and boys in the general school population. Thus, to address these gaps, the main objective of this study was to develop a multidimensional empirical model of school dropout. This predictive model was tested using data from an extensive longitudinal study, with a sample of high school students evaluated at 12–13 years of age and dropout status identified by 19 years of age.

Students at-risk of school dropout

Many studies over the past two decades have aimed to increase our understanding of students at-risk of school dropout. Essentially, these studies focus on risk factors in the personal, family, and school contexts. At the personal level, researchers have identified youth cognitive, affective, and behavioral characteristics that are consistently associated with high school dropout. Poor academic achievement is an important cognitive variable most often reported in dropout studies (Battin-Pearson et al. 2000; Dunn et al. 2004; Jimerson et al. 2002; O'Connel and Sheikh 2009). Students who drop out are also noted to show little motivation in school, as well as a lack of interest and engagement in their schooling (Dunn et al. 2004; Janosz et al. 2008; Hickman et al. 2008). At-risk students often do not value academic achievement nor do they adhere to school values (Alexander et al. 2001). They do not seem to understand how their schooling can contribute to their integration in society (Dunn et al. 2004). Some dropouts may exhibit problems with social isolation, a high level of anxiety and/or depressive symptoms (Marcotte et al. 2006). Above and beyond the variables already mentioned, behavioral problems appear to be one of the most important dropout risk factors for students (Fortin et al. 2006a, b). Some studies show that behavior problems are early predictors of school dropout (Garnier et al. 1997; Hickman et al. 2008) and, at the end of primary grades, a high level of behavior problems appears to be the best predictive factor of future school dropout (Jimerson et al. 2002).

The family environment also seems particularly influential as many family characteristics are significantly associated to school dropout, in particular parents' interest and involvement in their youth's schooling, parents' educational practices, interactions between parents and children, and family difficulties. Battin-Pearson et al. (2000) noted that low parental educational expectations for their child is predictive of poor academic achievement, and thus contributes to the probability that a youth will drop out of school. A lack of parental supervision and inadequate educational practices are also reported (McNeal 1999). In this respect, Fortin et al. (2006a, b) suggest that deficits in the parents' educational practices, such as little emotional support, little involvement in their child's school activities and poor supervision, which pertains to the knowledge of their child's social activities, are strongly associated with dropout risk. Likewise, Englund et al. (2008) showed that parents' involvement in schooling and a supportive relationship with their child increase the probability of

obtaining a high school diploma. Little family cohesiveness is also an important factor (Lagana 2004). Blondal and Adalbjarnardottir (2009) showed that adolescents who perceive their parents as being more authoritative at age 14 are more likely to have completed high school by age 22 than adolescents who perceive their parents as being more authoritarian or neglectful. Finally, low family socioeconomic status has been reported in many studies as a very important factor, as dropouts often tend to come from families living in poverty (Englund et al. 2008).

A number of studies have shown that the school context also contributes to explain school dropout. Most studies draw attention to the influence of the teacher–student relationship and the classroom climate on academic achievement and perseverance. Dropouts who attribute their decision to drop out to school factors describe particularly difficult educational trajectories linked to low academic achievement, boredom, a lack of motivation, numerous conflicts with teachers, and teachers' negative attitudes on their behalf (Lessard et al. 2006). The quality of the teacher–student relationship, in particular the ensuing attitudes and behaviors, has a strong impact on a student's academic achievement and perseverance (Englund et al. 2008; Fortin et al. 2006a, b). Furthermore, the teacher–student relationship plays a very important role in school bonding, academic achievement, and the students' emotional and social well-being (Fredriksen and Rhodes 2004). Regarding the classroom climate, Dorman et al. (1997) infer that both cooperation among students and an appropriate level of order and organization in class are associated with students' perceptions of substantial support and interest from their teachers. Likewise, relationships with peers as well as order and organization in class appear strongly associated to the student's engagement in academic activities and to academic achievement (Anderson et al. 2004). Lan and Lanthier (2003) conducted a longitudinal study with grades 8 through 12 students to examine changes over time in the students' personal characteristics associated with dropping out of school. Their results show that academic performance, relationships with teachers, perceptions of the school environment, motivation, and participation in school activities gradually deteriorated from grades 8 to 12.

In spite of the numerous studies of the past two decades, there is still little gender-specific information on dropout risk and processes. However, some differences have been noted between girls and boys pertaining to perceptions of the classroom climate and factors leading to the decision to quit school. Girls have more positive perceptions of the classroom climate than boys, particularly on aspects such as cooperation and student engagement in class, the teacher's empathy towards students and academic goal orientation in class (Sinclair and Fraser 2002). In their study on students' at-risk of school dropout, Lessard et al. (2007) noted that girls report stronger bonds to school than boys, especially concerning student engagement in class and affiliation with peers, perceiving clearer rules in class, and having more positive attitudes towards teachers and the school. In another study, the two strongest predictors of high school dropout risk for boys are negative family functioning and negative attitudes towards teachers, whereas the odds that girls will drop out increase as a function of increased behavior problems, lower academic achievement, and less commitment to school (Lessard et al. 2004).

Thus, researchers have identified many factors associated with the risk of dropping out of school, but less is known about how these personal, family, and school variables interact and what is the respective weight of each factor in the student's decision to drop out. This knowledge appears essential to both intervention strategies and prevention. What are the specific combinations of risk factors that lead to dropping out and are there gender differences? Over the last decade, a few researchers have elaborated theoretical models to explain the dropout process, using longitudinal studies that take into account multidimensional risk

factors. These models increase our understanding of the interactions between risk factors and processes leading to dropping out of school.

Empirical models of school dropout

Garnier et al. (1997) tested an empirical model using data from a longitudinal study focused on nonconventional family lifestyles. Since 1974–1975, 205 Euro-American families were followed. Structural equation analyses show that certain risk factors identified in childhood are associated to multiple problems at adolescence. Risk factors most predictive of school dropout are family factors evaluated during childhood (socioeconomic status and stress) combined with problematic youth behaviors at adolescence (academic failure and drug use). This model emphasizes the importance of family risk factors in the cumulative risk leading to dropout. However, youth raised by parents who adhered to nonconventional values in the 1970s may not have the same personal and family characteristics nor do they evolve in the same context as present-day youth.

Kaplan et al. (1997) tested another model in a 3-year longitudinal study, covering the seventh to the ninth grade. They examined the effects of negative school experiences on feelings of rejection as well as behaviors and attitudes that disparage school and lead to school dropout. Structural equation analyses show the direct effects of negative school experiences leading to the adoption of attitudes degrading values held by the school system and associating with peers involved in illegal or disruptive activities. Results show that students with poor academic results devaluate the importance of school. This model demonstrates the importance of social and school variables in the dropout process. However, dropout status in this study was identified by self-report and no family factors were considered in the model although it is well known that some family factors are very important to understand the dropout process.

Jimerson et al. (2000) evaluated family factors in early childhood as predictive of school dropout at the end of adolescence. Data were collected in a 19-year longitudinal study following children of mothers at-risk due to poverty and associated risk factors including single parenthood, age, and education. Results show that the family environment and care giving in early childhood are strong predictors of later school dropout. Socioeconomic variables, behavior problems, academic achievement, academic abilities, and parents' school involvement from primary grades until adolescence are also good predictors of dropout status at 19 years of age. This study focused on a specific population of at-risk mothers and their children. In terms of the model predicting the dropout status of these youths, 19 years later, there was no consideration for gender and thus no conclusions comparing how the model fit for boys and girls.

Battin-Pearson et al. (2000) tested a dropout model in a longitudinal study focusing on social adaptation problems and criminality considering youths' characteristics at 14 years of age and dropout status at age 16. Structural equation analyses show that poor academic achievement is the strongest predictor of dropout. Poor academic achievement mediates the relationship with dropout before the end of 10th grade for factors such as affiliation with deviant peers, low school bonding, low parental educational expectations, parent's lack of education, gender (male), and ethnicity (African American). The model also shows a direct pathway to dropout for general deviance, affiliation with antisocial peers and low family socioeconomic status. This model confirms that behavior problems and poor academic achievement are two very important factors in the dropout process. These authors suggest that school dropout is best explained using a combination of different factors emanating

from various sources. However, there are two limits associated with this study. First, the authors did not take into account certain important school characteristics such as the student–teacher relationship and the classroom climate. Second, the students who participated to this study were selected on the basis that they demonstrated antisocial behavior and their dropout status was self-reported, which may or may not represent the official status.

These empirical models suggest that the cumulative process leading to dropout can be triggered by many different types of factors. Furthermore, poor academic achievement is a central factor in all these models and thus appears to be very important in the dropout process. We believe these empirical models make an important contribution to the understanding of the cumulative nature of risk factors and the processes leading to school dropout. However, a main and quite important limit of these models is that they are often based on research projects studying school dropout as the result of psychosocial difficulties of high risk populations. These studies' experimental designs were conceived to understand and explain school dropout for these specific populations. Furthermore, many variables strongly associated to school dropout, mainly those linked to the classroom climate, student–teacher relationship, and teachers' attitudes towards students, are not taken into consideration. Choosing designated at-risk populations and risk factors associated with these populations results in increased understanding about how students from such high-risk populations drop out. However, do these models allow us to understand the dropout process in a general population? Although school variables such as academic achievement have been found to be good predictors of dropping out, these studies have mainly examined the students' behaviors, attitudes, and abilities while ignoring what is actually happening in the classroom. Moreover, some of these longitudinal studies cover a very brief period of time, identify dropout status in the middle of adolescence whereas many students may complete high school later in life and through other venues, and dropout status is often based on self-report which is not always reliable. Finally, recent studies have shown that for a subgroup of students, depression may contribute to poor academic achievement and school dropout. This factor has not been taken into consideration in these studies.

Purpose of the study

The ecosystemic model of Bronfenbrenner (1979, 1986) provides an interesting theoretical foundation for the study of school dropout. This model places the student, as a system, at the core of his own experiences, with his own assets, interacting with other systems such as the family and the classroom. Not only are the system's characteristics important, but special consideration is also given to the interactions between these various systems. In addition, the interactions between the systems occur in a developmental perspective over time. Bronfenbrenner also insists on the importance of child–adult relationships as a crucial element contributing to the positive development of the child who can then better adapt through difficult times. This ecosystemic model stems from the understanding that the child's development occurs in a multidimensional context. Therefore, if applied to the understanding of the dropout process, the various systems of this model must be included to fully understand the process.

The review of the literature also shows that in order to explain the dropout process, researchers must consider multiple sources of data, such as those provided from the personal, family, and school contexts. The main themes are: (1) on the personal level, gender (being a boy), school engagement and low achievement, externalized behavior problems, and, more recently, internalized behavior problems; (2) on the family level, socioeconomic status,

positive relationships versus family conflicts and parental educational practices; (3) on the school level, student–teacher relationships and school and classroom climates.

The main objective of this study is to test a multidimensional and empirical model of school dropout using structural equation modeling with a general student population. Our model takes into account the different personal, family, and school environments, as well as, their interactions in order to conceptually organize the associated factors and guide both preventive and curative interventions aimed at students at-risk of school dropout. We hypothesize that five latent factors will emerge in this analysis: poor parent–teenager relationships, youth depression and family difficulties, negative classroom climate, negative school interactions, and poor school achievement. We hypothesize that school achievement is a central factor and that it is directly associated with school dropout. Moreover, we recognize on the one hand that the family contributes to the dropout process and on the other that the school as significant a role. We hypothesize, furthermore, that a child who experiences poor parent–teenager relationships is more likely to show poor school achievement and for a subgroup who experience major family difficulties, depression may also contribute to the poor achievement. In essence, because of a problematic family environment, the student is not as available to engage in his student role and thus, does not develop the abilities and competences necessary to succeed in school. In addition, when the classroom climate and the school interactions are negative, the student does not benefit from the type of support needed to sustain school success. Finally, the accumulation of personal-, family-, and school-related difficulties over a long period of time contributes to poor school achievement which ultimately leads the student to drop out of school without a diploma.

Method

Participants

The participants came from the first year of an extensive 8-year longitudinal research project (1996–2007) designed for a general student population to answer specific questions concerning adolescents' educational achievement, social adaptation, and school dropout. Data were collected at time 1 while dropout was measured at time 8. The convenience sample for this study consisted of 672 French–Canadian students aged 12–13 years in the first year of the research project, when they were starting high school; 54 % were boys and 46 % were girls. The Sherbrooke and Quebec City cohorts attended schools in lower-middle class districts, whereas the Trois-Rivières cohorts were from middle-class districts. In the eighth year of the study, 111 participants were identified as school dropouts by the Ministry of Education of Quebec, when they were 19–20 years of age, while 561 students had obtained a high school diploma. The Quebec Ministry of Education defines a school dropout as someone who leaves school without obtaining a high school diploma and does not enroll the following year (Quebec Ministry of Education 2000).

Measures

The 18 selected personal, family, and school variables for these analyses were scale scores from the following measures, collected in the first year of the research project, and hypothesized to reflect latent constructs. Gender, socioeconomic status (SES) and dropout status identified at 19 years of age were used as measured variables. When required, variables were negatively recoded; thus, higher scores indicate increased levels of difficulty

in personal spheres, lowest socioeconomic status, most negative perceptions, or lowest grades. Gender was coded 0 for male and 1 for female.

Analyses of school records Grade point averages in French, Mathematics, and English, as well as school misconduct such as truancy were gathered from school records.

Social skills rating system (Gresham and Elliot 1990) This teacher-rated questionnaire provided a multivariate assessment of the social behaviors of students in school. The teacher's version consists of 51 statements divided into three subscales: social skills (cooperation, assertion, and self-control), problem behaviors (externalizing and internalizing problems) and academic competence. The social skills rating system (SSRS) shows adequate reliability (test–retest, 0.90; Cronbach's alpha, 0.90) and concurrent validity with various test scales. Principal axes factor analyses with Varimax rotation conducted on the scores of 672 high school students resulted in the same factorial structure as the original English version. The internal consistency coefficients ranged from 0.79 to 0.92.

Beck depression inventory (Beck 1978) This self-report measure completed by the student consists of 21 items assessing the intensity of emotional, behavioral, cognitive, and somatic symptoms characteristic of depression. Each item offers a choice of four answers ranging from 0 to 3. The psychometric qualities of the Beck depression inventory have been confirmed for Quebec adolescents, with internal consistency coefficients varying from 0.86 to 0.88 (Baron and Laplante 1984; Gosselin and Marcotte 1997). A cut-off score of 16 has been suggested to identify subjects manifesting characteristics of clinical depression (Strober et al. 1981).

Family environment scale (Moos and Moos 1981) This self-report questionnaire covers 45 statements measuring the students' perceptions of the social and environmental characteristics of their family. Each statement is answered true or false. Five subscales assess the following dimensions: cohesion, expression, conflicts, organization, and control. The reliability of this questionnaire has proven adequate (alphas varying between 0.68 and 0.78) and concurrent validation has been demonstrated with several tests.

Parental participation in school follow-up (Epstein et al. 1993) This self-report questionnaire answered by the student consists of 20 statements covering five subscales: parental emotional support (alpha=0.78), communication with teachers (alpha=0.68), parent–adolescent interactions pertaining to school (alpha=0.73), parent–school communication (alpha=0.56), and parent–adolescent communication (alpha=0.64).

Classroom environment scale (Moos and Trickett 1987) This student self-report questionnaire assessed the classroom social climate. The condensed version includes nine scales of five statements each (a total of 45 statements) with a choice of true or false answers. The scales are: engagement, affiliation, teacher support, task orientation, competition, order and organization, clarity of rules, teacher control, and innovation; a total score of the classroom environment is also provided. The questionnaire has been shown to have adequate reliability (Cronbach's alpha between 0.52 and 0.75) and concurrent validity with other instruments (between 0.16 and 0.40).

Teacher's attitudes towards the student scale (Potvin and Rousseau 1991) This questionnaire is answered by the teachers, assessing their attitudes towards the student. It consists of

18 bipolar adjectives; each pair of adjectives has a value of −3 to +3, providing a minimum total score of −54 and a maximum total of +54. The instrument's reliability is adequate (Cronbach's alpha between 0.50 and 0.86).

Socioeconomic status SES was measured using family yearly income and both father and mother income and educational levels, as reported by the parents.

Procedures

In September 1996, all first year high school students at each of the selected schools were invited to participate in the study. The only students to be excluded were those exhibiting intellectual disabilities, as these students rarely obtain a high school diploma. All student participants were contacted through their teachers. Each teacher was informed of the purpose of the study by the school principal, and was subsequently met by one of the researchers, who explained the main research objectives and invited the teacher to participate. The parents or legal guardians were also contacted for their consent and assured that all collected information would remain confidential. The percentage of students who accepted to participate, with parental consent, was 78.1 %. The English questionnaires were translated into French and administered to the participants in the same order in each class. Two research assistants, trained in administering the tests, were assigned to each school. While the students answered their questionnaires, the teacher completed the teacher questionnaires for each participating student in his/her class.

Analyses

Missing data analysis strategy Missing data was handled by the maximum likelihood procedure implemented in Mplus (version 5.2) software. Maximum likelihood estimation with missing data is based on all available data. Under the missing at random condition, maximum likelihood parameter estimates and standard errors are consistent and estimates are efficient (Collins et al. 2001).

To validate the factor analysis and the structural equation model (SEM), we chose to use random split-half subsamples of different subjects. The entire sample of 672 students was divided in two random subsamples of 337 and 335 students. There were no significant differences between the two subsamples on gender or SES variables, or on the proportion of dropouts identified in each sample. The first subsample of 337 students was further randomly divided in two equivalent subsamples of 169 and 168 students. In pilot study 1, an exploratory factor analysis was conducted on the subsample of 169 students. In pilot study 2, a tentative Confirmatory Factor Analysis (CFA) and SEM were formulated using the subsample of 168 subjects. Finally, the CFA and SEM models from pilot study 2 were tested on the remaining subsample of 335 subjects. The details of the final CFA and SEM results on this sample of 335 subjects are reported below.

Assessing model fit Assessing the fit of a model to empirical data by using chi-square poses some difficulty as this test tends to reject the hypothesized model when applied to large samples, even though it may be a well-fitting model. Therefore, other approaches were considered to assess model fit. Overall model fit was assessed by examining the Comparative Fit Index (CFI, Bentler 1990) and the Tucker Lewis Index (TLI, 1973), for which values of 0.95 or greater are considered adequate (Yu and Muthén 2002; Hu and Bentler 1999; Marsh et al. 2004). The residual mean squared error approximation index (RMSEA)

and the standardized root mean square residual (SRMR), for which values of 0.05 or less for the former and 0.07 or less for the latter, indicating adequate model fit, were also considered. Models were compared by calculating the chi-square value and corresponding degrees of freedom between the models. The statistical significance of the difference was then evaluated. Zero-order correlations among the 15 selected variables are presented in Table 1, as well as their means and standard deviations from Mplus.

Results

Confirmatory factor analysis

A CFA procedure was carried out to evaluate the relationships between the indicators and the five hypothesized latent factors. All factor loadings were freely estimated and the factor variances were fixed to 1 for identification purposes; the five latent factors were allowed to intercorrelate freely. Standardized path coefficients and *Z* scores for the indicators of the five latent constructs are shown in Table 2.

As shown in Table 2, a first latent construct identified as poor parent–teenager relationships was defined by poor parent–teenager interactions around daily school activities, such as completing homework, discussing grades and the importance of school, poor parent–teenager communication about subjects such as the youth's future projects and current events, as well as little parental emotional support comprised of behaviors such as encouragements, congratulations for the youth's accomplishments, and parents' involvement in the youth's activities. Three indicators reflected a latent factor identified as youth depression and family difficulties: the student's intensity of depressive symptoms including, for example, despair, sadness, self-depreciation, and social isolation; frequent family conflicts as expressed by high levels of anger, aggressiveness, and discord among family members, and low family cohesiveness demonstrated by little assistance and support among family members. Two latent factors reflected school influences. A negative classroom climate was revealed by the student's perception of a lack of order and organization in the classroom, limited student engagement in class activities and a global negative perception of the classroom social environment. Three other indicators comprised the negative school interactions factor: poor student cooperative behaviors in class including inadequate responses to the teacher's instructions and not listening when another student talks; the teacher's negative attitudes towards students consisted of negative descriptions of the students and students' externalized behavior problems such as fights, arguments and fits of anger. Externalized behavior problems are identified by the teacher. Finally, the last identified latent construct was poor academic achievement, construed by low grades in mathematics, French (the student's mother tongue) and English (second language).

As prior studies have shown that there are differences in dropout rates and academic achievement between boys and girls, we hypothesized that gender was a particular background variable that might differentially influence the solution. Therefore, gender had a special status in the measurement invariance across subpopulations and CFA was carried out for each gender separately as well as for the total subsample of 335 students. Results from each of the three separate analyses demonstrated that the model from pilot study 2 fit the data well. Goodness-of-fit indices of the total sample were deemed very good (χ^2 (80)=109.346, p=0.0163, CFI=0.986, TLI=0.981, RMSEA=0.033 CI [0.015, 0.048], SRMR=0.037). The chi-square test rejected the model but when we considered indices like the descriptive fit value (Muthén 1989), which takes into account the sample size and the degrees of freedom,

Table 1 Correlation matrix and means and standard deviations

	Variables														
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Order/org.[a]	–														
2. Eng. in class[a]	0.469	–													
3. Class. envir.[a]	0.681	0.670	–												
4. Parent comm.	0.181	0.048	0.232	–											
5. Affect. sup.	0.244	0.058	0.246	0.600	–										
6. Parent inter.	0.087	0.041	0.175	0.497	0.492	–									
7. Maths.[a]	0.097	0.113	0.101	0.133	0.242	−0.002	–								
8. French[a]	0.081	0.053	0.082	0.150	0.306	0.039	0.753	–							
9. English[a]	0.153	−0.006	0.033	0.212	0.320	0.065	0.650	0.604	–						
10. Teach. att.[a]	0.169	0.090	0.191	0.096	0.288	−0.007	0.498	0.501	0.365	–					
11. Behav. probl.	0.247	0.126	0.221	−0.046	0.121	−0.019	0.179	0.207	0.188	0.661	–				
12. Coop. behav.	0.153	0.109	0.171	−0.009	0.198	−0.027	0.398	0.455	0.262	0.757	0.633	–			
13. Fam. cohesion	0.178	0.064	0.169	0.286	0.407	0.216	0.097	0.086	0.162	0.230	0.229	0.172	–		
14. Dep. sympt.	0.237	0.082	0.189	0.087	0.303	0.101	0.166	0.163	0.178	0.024	0.077	0.081	0.291	–	
15. Fam. conflicts	0.229	0.117	0.238	0.171	0.349	0.122	0.059	0.059	0.123	0.238	0.248	0.266	0.670	0.179	–
M	2.006	1.924	14.895	2.703	2.057	1.752	22.933	25.694	22.976	31.688	1.195	3.225	1.595	6.718	2.248
SD	1.364	1.354	4.682	0.688	0.609	0.614	12.114	10.282	11.579	19.775	2.121	3.816	1.881	6.329	2.110

Reported correlations were rounded to three decimal places

1 Little class order/organization, *2* little engagement in class, *3* poor classroom environment, *4* poor parents–teenager communication, *5* little affective support, *6* poor parent–teenager interactions, *7* low mathematics grades, *8* low French grades, *9* low English grades, *10* negative teacher attitudes, *11* student externalized behavior problems, *12* poor student cooperative behavior in class, *13* low family cohesion, *14* youth depressive symptoms, *15* frequent family conflicts

[a] These variables were recoded negatively and absolute values were used

Table 2 Confirmatory factor analysis: standardized path coefficients and test statistic (*Z*)

Latent factor and indicators	Standardized path coefficient	*Z* statistic
Poor parent–teenager relationships		
Poor interactions	0.605	13.671
Poor communication	0.667	16.221
Little affective support	0.878	24.862
Youth depression and family difficulties		
Frequent family conflicts	0.719	19.664
Low family cohesion	0.825	25.016
Youth depression	0.614	14.275
Negative classroom climate		
Lack of order and organization	0.772	27.614
Little engagement	0.817	32.230
Poor classroom environment	0.885	39.601
Negative school interactions		
Student behavior problems	0.707	22.430
Negative teacher attitudes	0.892	41.456
Poor student cooperation	0.858	37.541
Poor academic achievement		
Low mathematic grades	0768	24.260
Low French grades	0.823	28.660
Low English grades	0.756	24.077

N=335

the resulting value was much less than the cutoff point of 1.5, suggesting that the model would not be rejected if the sample size was taken into account. The CFI and the TLI indicated a good reproduction of the estimated sample covariance matrix from the model-predicted covariance matrix. The RMSEA and the SRMR were also adequate. The factor indicator loadings were high and all statistically significant, ranging from 0.605 to 0.892. Table 2 reports that each indicator had a factor loading with a statistically associated *Z* value greater than 1.96, indicating that each of these indicators had a significant relationship with the relevant latent variable. Factor determinacy for complete data, the correlation between the estimated factor score and the factor ranged from 0.903 to 0.943. Thus, the indicator variables were good reflectors of latent constructs and we had strong evidence that the latent factors were well measured.

Measurement invariance test analyses across gender were then carried out. We first tested equality of factor loadings across gender and, in a second step, equality of measurement intercepts was considered. Table 3 shows the results of model testing from simultaneous multiple group analyses. Comparing the result of the model with equality constraints on factor loadings against the baseline model where no equality constraints were imposed showed that the chi-square difference between the two models was not statistically significant. This was evidence of gender invariance of factor loadings. However, comparing the results from the model with equality constraints on the factor loadings against the model with equality constraints on both the factor loadings and intercepts showed a statistically significant chi-square difference. This lead to the conclusion that there was some evidence of measurement intercepts non invariance for male and female.

Table 3 Summary of multiple group analysis results

Variables	χ^2	*df*	χ^2 diff	*df*
1. Baseline model: no measurement invariance	196.592	160		
2. Model with equality constraints on factor loadings	211.202	170		
Difference between models 2 and 1			14.61	10
3. Model with equality constraints on factor loadings and measurement intercepts	246.217	180		
Difference between models 3 and 2			35.015	10

N=332

SEM analysis

A structural equation model (SEM) framework was used to study relationships among the latent variables. This was done in several steps. We first established relationships among latent variables in pilot study 2 and tested this model on the second subsample of 335 students. Finally, gender and SES background variables were added to the final model shown in Fig. 1, to verify effects of these measured variables on latent variables.

The overall fit of the model was very good. The chi-square value was significant, χ^2=54,092, p<0.000, but the goodness-of-fit indices (CFI=0.96, TLI=0.96 and RMSEA=0.011) indicated adequate model fit. Altogether, the five latent factors in the model explained 58.71 % of the variance in dropout.

This representation of the final structural model (Fig. 1), shown without the latent variable indicators for clarity, includes only significant path coefficients for relationships among the five latent factors and the three observed variables (gender, SES, and dropout).

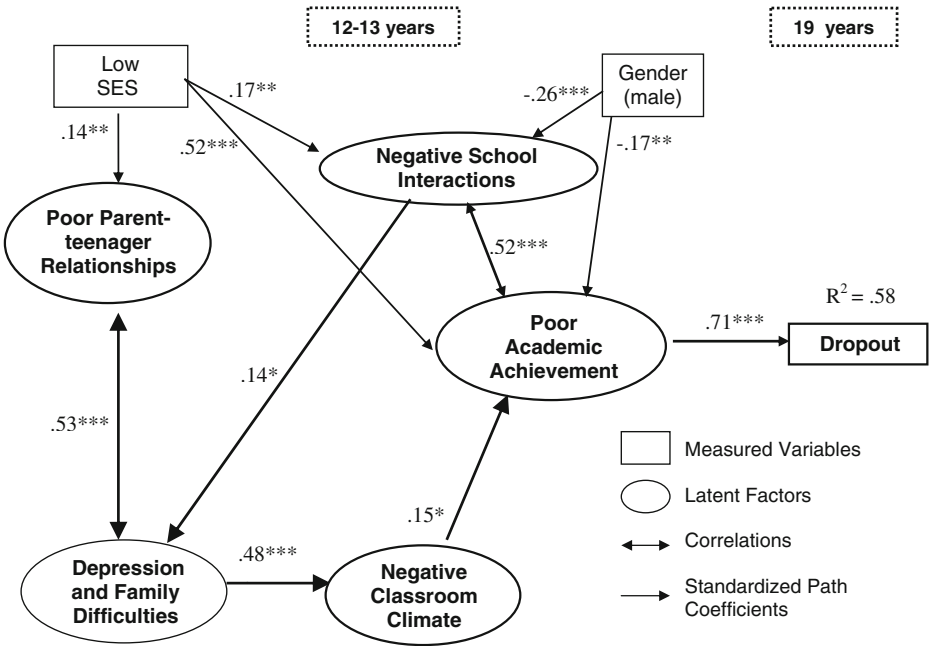


Fig. 1 Final multidimensional confirmatory model of school dropout

As seen in Fig. 1, the five latent factors identified from personal, family and school indicator variables measured at ages 12–13 explained a significant portion of the variance in dropout at age 19. Poor academic achievement was the only latent factor to directly and significantly predict dropout (0.71, $p<0.000$), thus mediating the effects of negative classroom climate.

The latent factor of poor parent–teenager relationships was intercorrelated with youth depression and family difficulties (0.53, $p<0.000$), but had no direct effect on negative classroom climate or poor academic achievement. However, youth depression and family difficulties significantly predicted students' negative perceptions of classroom climate (0.48, $p<0.000$). Negative school interactions, as reflected by student behavioral problems and teachers' negative attitudes towards students, was significantly intercorrelated with poor academic achievement (0.52, $p<0.000$) and also predicted youth depression and family difficulties (0.14, $p<0.05$), but did not directly predict dropout. Negative classroom climate was the only latent factor directly predicting poor academic achievement (0.15, $p<0.05$).

Two observed background variables were included in the analysis, and results show they contributed indirectly to school dropout by their impact on latent factors of the model, but had no direct paths to dropout status. Both low SES and gender (male) predicted negative school interactions and poor academic achievement. Low SES predicted poor parent–teenager relationships (0.14, $p<0.01$), negative school interactions (0.17, $p<0.01$), and poor academic achievement (0.052, $p<0.000$), but had no significant effect on the two other latent factors. There was no significant difference between boys and girls on the two latent family factors or perceptions of classroom climate, but boys had more negative interactions at school (−0.26, $p<0.000$) as well as poorer academic achievement (−0.17, $p<0.01$) than girls according to their teacher's evaluation.

Discussion

This study tested an empirical-based predictive model of school dropout in a general high school population evaluated at 12–13 years of age, to identify the main factors associated with dropout and determine how the relationships between these factors predict school dropout at 19 years of age. Our use of longitudinal data circumvents the ambiguities of causal inference inherent in cross-sectional designs. Factor analysis identified five latent factors, and structural equation modeling with these factors showed they significantly contribute to high school dropout. Two factors were from personal and family contexts: poor parent–teenager relationships and youth depression and family difficulties. Three other factors covered personal and school contexts: negative classroom climate, negative school interactions, and poor academic achievement. Furthermore, two observed background variables contributed indirectly to school dropout by their effects on latent factors of the model: gender and socioeconomic status.

Poor parent–teenager relationships, reflected by the teenager's perceptions of few conversations with parents about school, poor parent–teenager communication and little parental affective support, is strongly associated with the youth's depressive symptoms and family difficulties such as frequent conflicts and lack of cohesiveness among family members. As this factor of youth depression and family difficulties directly predicts the youth's perceptions of a negative classroom climate, these results suggest that exposure to adverse family environments may increase the vulnerability to depression for some students, which along with difficulties of daily life in a conflict-torn and disunited family predicts that these students will have difficulty engaging in classroom activities and achieving academic success. It is not surprising that youth-depressive symptoms and family difficulties are

indicators of this latent factor, as prior studies have shown that high levels of depressive symptoms are not uncommon in families where there are frequent conflicts and little cohesiveness within the family unit (Fortin et al. 2004). We had expected that depressive symptoms would be closely associated with externalized behavior problems, as both these risk factors were shown to be correlated with dropout risk in previous studies (Fortin et al. 2005). However, as measures of depressive symptoms and family functioning are drawn from student self-reports in this study, and exteriorized behavior problems were identified by the teachers, it is not surprising that youth depressive symptoms and family indicators were associated in this latent factor. Furthermore, the model shows that negative school interactions, including the student's behavioral problems, also predicts youth depression and family difficulties. This suggests that the student's behavioral problems at school may contribute to intensify family conflicts and youth depressive symptoms. However, even if the student has few depressive symptoms, poor parent–teenager relationships, interacting with family difficulties could provide sufficient explanations for the student's negative perceptions of the classroom climate, especially poor engagement in school.

Numerous studies suggest family factors play a role in the dropout process, including poor parent–youth communication, lack of parental support (Potvin et al. 1999), a lack of parental involvement in their child's school activities (Rumberger 1995), and little cohesiveness between family members (Lagana 2004). Englund et al. (2008) report that students whose parents are involved with their children and provide support tend to persevere in school more than youth whose parents do not provide these quality relationships. Other theoretical models explaining the dropout process also show the influence of parents on dropout (Garnier et al. 1997; Jimerson et al. 2000; Battin-Pearson et al. 2000). Our results suggest that students who come from high-conflict family environments generally tend to have more negative perceptions of the classroom climate than students who come from more adequate family environments. In this respect, Fortin et al. (2006a, b) noted that students identified at-risk of school dropout tend to report more conflicts and dysfunction in their families as well as more negative perceptions of classroom climate, especially a lack of order and organization in the class. It is most likely that students coming from poor family environments start high school without some of the required abilities that would allow them to fully commit to their schooling.

Our results suggest that the school context plays a very important role in the dropout process. The school context in itself has not been extensively studied in relation to high school dropout in previous studies completed with high-risk populations, although most researchers agree about the direct relationship between the student's poor academic achievement and dropout. Perhaps general deviance, antisocial peers, and low socioeconomic status have a more direct impact on academic achievement and dropout in these populations, but our results indicate that this is not the case in a general high school population. Our theoretical model underlines the importance of two other school factors within this population: negative perceptions of the classroom climate and negative social interactions at school between teachers and students. Numerous studies report a very strong link between the classroom environment and academic achievement (Anderson et al. 2004; Lessard et al. 2006; Englund et al. 2008). Students who have negative perceptions of the classroom climate tend to find there is little order and organization in the classroom, and thus believe that the students are agitated, too excited and waste much time in class. Furthermore, another important dimension of the classroom climate for these students is their perception of little engagement in class activities, which leads mainly to decreased motivation and a marked lack of interest in school. Bennacer (2000) demonstrates that academic achievement is associated with classroom organization and a class centered on academic goals. Anderson

et al. (2004) show that the classroom climate influences motivational behaviors and academic achievement. Janosz and Leblanc (1996) suggest that dropout risk increases when the school does not provide a clear, coherent, and well-structured environment for the students. Overall, these negative perceptions of the classroom or school climate add to the difficulties encountered by many students at-risk of school dropout, impeding their thorough engagement in academic activities and hindering their academic performance.

The results of the present study show that students who exhibit many oppositional, aggressive, or delinquent behaviors in the classroom, as identified by the teacher, also tend to exhibit poor academic performance. As a result of inadequate behaviors in the classroom, students are often suspended; being suspended from school often leads to falling behind in class and thus, to lower academic performance. Teachers tend to describe these students as unstable, agitated, disobedient, immature, and uncooperative and, in response to the students' behaviors and lack of academic success, will often exhibit negative attitudes towards these students. These results also converge with studies that emphasize that the combination of social and academic difficulties is a very important risk factor for dropout (Battin-Pearson et al. 2000; Dunn et al. 2004; Jimerson et al. 2002). Many studies emphasize that exteriorized behavioral problems cumulated with learning problems are strong predictors of school dropout (Battin-Pearson et al. 2000; Dunn et al. 2004; Jimerson et al. 2002). Dropout risk is high for these students, and their inappropriate behaviors and academic problems are also more likely to disturb both the classroom and the school environment.

Both behavioral and academic problems are influenced by the family's SES and student's gender. Gender (male) and low SES predict negative school interactions and poor academic achievement; low SES also predicts poor parent–teenager relationships. Our results show that low SES has a significant effect on academic achievement, whereas gender has a strong effect on negative school interactions, suggesting that boys exhibit more behavior problems, less cooperative behaviors in class and elicit more negative attitudes from teachers than girls. Many studies also have reported the close association between low SES of the family and school dropout (Englund et al. 2008; Jimerson et al. 2000) as well as lower academic achievement for boys mediating high school failure and dropout (Battin-Pearson et al. 2000; Newcomb et al. 2002). Thus, converging with the results of other studies, this model suggests that boys as well as students coming from a family in poverty are at higher risk for poor academic achievement and more behavioral problems and negative interactions with teachers and that these are the factors, and not gender or low SES per se, that may prevent them from completing high school.

Most studies concerning school dropout have suggested that poor academic achievement is the most robust predictor of school dropout and, cumulated with adolescent behavioral problems, both variables together strongly contribute to increase dropout rates (Battin-Pearson et al. 2000; Newcomb et al. 2002). Results of this study indicate that poor academic achievement is indeed a strong predictor of dropping out of school, and clearly the most important predictor of high school dropout. Furthermore, poor academic achievement is a mediating variable for negative classroom climate, SES and gender and is strongly associated with negative student–teacher interactions in class. This corroborates the vital importance of teacher–student relationships as well as classroom and learning experiences in promoting high school success and preventing dropout. Previous studies with at-risk populations often identify other factors contributing directly to school dropout, such as bonding to antisocial peers, engaging in deviant behaviors and coming from a family with low SES (Battin-Pearson et al. 2000) but in this study in a general population, all identified factors contribute together to predict dropout. Our results suggest that the direct contributions of general deviance and low SES to increasing the likelihood of dropping out of school,

regardless of academic achievement, is perhaps characteristic of high-risk populations, whereas more proximal school and classroom risk factors are more influential in explaining the dropout process in a general population.

To conclude, the influences of relationships with parents, family difficulties, and youth depression on poor academic achievement are mediated by the students' negative perceptions of the classroom climate in the first year of high school. However, negative student and teacher interactions are intercorrelated with school achievement, indicating that low academic achievement tends to increase student problem behaviors at school as well as teachers' negative attitudes and, in turn, these behaviors tend to decrease the students' academic success. Furthermore, the direct effects of low SES and male gender on both negative school interactions and school achievement underscores the often-noted increased levels of behavioral problems and lower academic achievement of lower-income youth, and boys in comparison with girls. Our results suggest that poor academic achievement is the strongest predictor of dropout, but our model also underlines that one must consider influences from multiple personal, family and school factors to better explain academic achievement and predict school dropout in order to have a more complete understanding of this complex social problem affecting many youths of diverse backgrounds.

Measured variables can bias any theoretical model that covers longitudinal data by the choices made early on in the research design. The principal limit of the present study is that measured variables were collected on self-report or teacher reported questionnaires. Parent and teacher interviews would provide complementary information that would further understanding of the role of family and school variables in the process of dropout risk. Also, theoretical models need to be validated on different populations. We used split samples to validate the identified factors and final model.

When we started our longitudinal study, our primary objective was to develop a theoretical and explanatory model of high school dropout, to increase our understanding of the problem as well as to use the predictive model to implement effective prevention programs. This model demonstrates that multidimensional factors interact to explain the dropout process and schools must not only consider the students' characteristics and personal risk factors, but also evaluate characteristics related to the youth's family and school environments. This model suggests that schools must put in place multidimensional intervention programs that simultaneously consider and tailor dropout out prevention programs to act upon these different personal, family, and school contexts to prevent high school dropout and failure.

For the student, programs should aim at increasing academic success and social abilities, ameliorating study habits and school engagement as well as decreasing behavioral problems and depressive symptoms. As a good classroom environment is of utmost importance for academic achievement, improving teachers' abilities in classroom management, as well as their abilities to motivate students and support adequate classroom and social behaviors should become a priority in schools. Teachers must develop positive attitudes and significant relationships with their students, and must be able to provide educational support and promote school achievement on a regular basis, for students at-risk of school dropout. When required, using school and community resources, programs should address parents' educational and relational abilities, supervision and interest in their adolescent's school activities, increasing understanding of the youth's difficulties, emphasizing the importance of academic achievement to their child, and, in certain cases, the parents' own personal difficulties. Finally, school administrators must ensure the school is optimally organized to answer at-

risk students' needs and thus, prevent school dropout. This organization must be planned considering the multidimensional risk factors associated with dropout risk, to act upon and decrease the impact of these risk factors and promote academic success. Furthermore, as organizational constraints vary across schools, program implementation must remain flexible and take these constraints into consideration, to best answer the students' need. Our continued work in the field demonstrates that this mission is possible.

References

Alexander, K. L., Entwisle, D. R., & Kabbani, N. S. (2001). The dropout process in life course prespective: early risk factors at home and school. *Teachers College Record, 103*, 760–822.

Anderson, A., Hamilton, R., & Hattie, J. (2004). Classroom climate and motivated behaviour in secondary schools. *Learning Environments Research, 7*, 211–225.

Baron, P., & Laplante, L. S. (1984). L'inventaire de dépression de Beck: son utilisation auprès d'un échantillon d'adolescents francophones. *Revue de Modification du Comportement, 14*, 161–166.

Battin-Pearson, S., Newcomb, M. D., Abbott, R. D., Hill, K. G., Catalano, R. F., & Hawkins, J. D. (2000). Predictors of early high school dropout: a test of five theories. *Journal of Educational Psychology, 92*, 568–582.

Beck, A. T. (1978). *Depression inventory*. Philadelphia: Center for Cognitive Therapy.

Bennacer, H. (2000). How the socioecological characteristics of the classroom affect academic achievement. *European Journal of Psychology of Education, 15*, 173–189.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238–246.

Blondal, K. S., & Adalbjarnardottir, S. (2009). Parenting practices and school dropout: a longitudinal study. *Family Therapy, 36*(3), 125–145.

Bowlby, G. (2005). *Taux de décrochage provinciaux-tendances et consequences. Questions d'éducation*. www.stat.can. Accessed: 12 Sept 2009.

Bronfenbrenner, U. (1979). *The ecology of human development : experiments by nature and design* (p. 330). Cambridge MA: Harvard University Press.

Bronfenbrenner, U. (1986). The Ecology of Human development as a Context of Human Development : Research Perspectives. *Developmental Psychology, 2*(6), 723–742.

Collins, L. M., Schaffer, J. L., & Kam, C. M. (2001). A comparison of inclusive and restrictive strategies in modern missing-data procedures. *Psychological Methods, 6*, 330–351.

Dorman, J. P., Fraser, B. J., & McRobbie, C. J. (1997). Relationship between school-level and classroom-level environment in secondary schools. *Journal of Educational Administration, 35*, 74–91.

Ministère de l'Éducation du Québec (2000). Bulletin Statistique, Gouvernement du Québec, Québec, no 14, mars.

Dunn, C., Chambers, D., & Rabren, K. (2004). Do students with disabilities' perceptions of high school predict dropping out of school? *Remedial and Special Education, 25*, 314–324.

Englund, M. M., Egeland, B., & Collins, A. (2008). Exceptions to high school predictions in a low-income sample: do adults make a difference? *Journal of Social Issues, 64*, 77–93.

Epstein, J. L., Connors, L. J., & Salinas, K. C. (1993). *High school and family partnerships: questionnaires for teachers, parents, and students*. Baltimore: Johns Hopkins University, Center of Families, Communities, Schools, and Children's learning.

Fortin, L., Royer, É., Potvin, P., Marcotte, D., & Yergeau, É. (2004). La prédiction du risque de décrochage scolaire au secondaire: facteurs personnels, familiaux et scolaires. *Revue canadienne des sciences du comportement, 36*, 219–231.

Fortin, L., Marcotte, D., Royer, É., & Potvin, P. (2005). Facteurs personnels, scolaires et familiaux différenciant les garçons en problèmes de comportement du secondaire qui ont décroché ou non de l'école. *Nouveaux cahiers de la recherche en éducation, 8*(2), 79–88.

Fortin, L., Marcotte, D., Potvin, P., Royer, É., & Joly, J. (2006a). Typology of students at risk of dropping out of school: description by personal, family and school factors. *European Journal of Psychology of Education, 21*, 63–383.

Fortin, L., Marcotte, D., Potvin, P., Royer, E., & Joly, J. (2006b). Typology of students at risk of dropping out of school: description by personal, family and school factors. *European Journal of Psychology of Education, XXI*(4), 363–383.

Franklin, C., & Streeter, C. L. (1995). Assessment of middle class youth at-risk to dropout: school, psychologist and family correlates. *Children and Youth Services Review, 17*, 433–448.

Fredriksen, K., & Rhodes, J. (2004). The role of teacher relationships in the lives of children and adolescents. *New Directions in Youth Development, 103*, 45–54.

Garnier, H. E., Stein, J. A., & Jacobs, J. K. (1997). The process of dropping out of high school: a 19-year perspective. *American Educational Research Journal, 34*, 395–419.

Gosselin, M.-J., & Marcotte, D. (1997). Le rôle de l'appréciation subjective de l'habileté de résolution de problème dans la dépression chez les adolescents. *Science et comportement, 25*, 299–314.

Gresham, F. M., & Elliot, S. N. (1990). *Social skills rating system*. Toronto: American Guidance Service.

Hickman, G. P., Bartholomew, M., Mathwig, J., & Heinrich, R. S. (2008). Differential developmental pathways of high school dropouts and graduates. *The Journal of Educational Sciences, 102*(1), 3–14.

Hu, L., & Bentler, P. M. (1999). Cut-off criteria for fit indexes in covariance structure analyses: conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

Janosz, M., & LeBlanc, M. (1996). Pour une vision intégrative des facteurs reliés à l'abandon scolaire. *Revue Canadienne de Psychoéducation, 25*, 61–68.

Janosz, M., Archambault, I., Morizot, J., & Pagani, L. S. (2008). School engagment trajectories and their differential predictive relations to dropout. *Journal of Social Issues, 64*(1), 21–40.

Jimerson, S., Egeland, B., Sroufe, L. A., & Carlson, B. (2000). A prospective longitudinal study of high school dropouts examining multiple predictors across development. *Journal of School Psychology, 38*, 525–549.

Jimerson, S. R., Anderson, G., & Whipple, A. W. (2002). Winning the battle and losing the war: examining the relation between grade retention and dropping out of high school. *Psychology in the Schools, 39*, 441–457.

Kaplan, D. S., Peck, B. M., & Kaplan, H. B. (1997). Decomposing the academic failure–dropout relationship: a longitudinal analysis. *The Journal of Educational Research, 90*, 331–343.

Lagana, T. M. (2004). Protective factors for inner-city adolescents at-risk of school dropout: family factors and social support. *Children and Schools, 26*, 211–220.

Lan, W., & Lanthier, R. (2003). Changes in students' academic performance and perception of school and self before dropping out of school. *Journal of Education for Students Placed at Risk, 8*, 309–332.

Lessard, A., Fortin, L., Joly, J., Royer, É., & Blaya, C. (2004). Students at-risk for dropping out of school: are there gender differences among personal, family and school factors? *The Journal of At-Risk Issues, 10*, 19–127.

Lessard, A., Fortin, L., Joly, J., Royer, E., Potvin, P., & Marcotte, D. (2006). Les raisons de l'abandon scolaire: différences selon le genre. *Revue québécoise de psychologie, 27*, 135–152.

Lessard, A., Fortin, L., Yergeau, É., & Poirier, M. (2007). School bonding or school dropout: tipping the scale for at-risk youth. *Learning Landscapes, 1*, 185–196.

Marcotte, D., Lévesque, N., & Fortin, L. (2006). Variations of cognitive distortions and school performance in depressed and non-depressed high school adolescents: a two-year longitudinal study. *Cognitive Therapy and Research, 30*, 211–225.

Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Banter's (1999) findings. *Structural Equation Modeling, 11*, 320–341.

McNeal, R. B., Jr. (1999). Parental involvement as social capital: differential effectiveness on science achievement, truancy, and dropping out. *Social Force, 78*, 117–144.

Moos, R. H., & Moos, B. S. (1981). *Family environment scale manual*. Palo Alto: Consulting Psyhologists Press.

Moos, R. H., & Trickett, E. J. (1987). *Classroom environment scale manual* (2nd ed.). Palo Alto: Consulting Psychologists Press.

Muthén, B. (1989). Latent variable modeling in heterogeneous populations. *Psychometrika, 54*, 557–585.

Newcomb, M. D., Abbott, R. D., Catalano, R. F., Hawkins, J. D., Battin-Pearson, S., & Hill, K. G. (2002). Mediational and deviance theories of late high school failure: process roles of structural strains, academic competence, and general versus specific problem behaviors. *Journal of Counseling Psychology, 49*, 172–186.

O'Connel, M., & Sheikh, H. (2009). Non-cognitive abilities and early school dropout: longitudinal evidence from NELS. *Educational Studies, 35*(4), 475–479.

Potvin, P., & Rousseau, R. (1991). *Les attitudes réciproques des enseignants et des élèves en difficultés scolaires*. Trois-Rivières: Université du Québec à Trois-Rivières, Faculté d'Éducation.

Potvin, P., Deslandes, R., Beaulieu, P., Marcotte, D., Fortin, L., Royer, É., et al. (1999). Risque d'abandon scolaire, style parental et participation parentale au suivi scolaire. *Revue canadienne de l'éducation, 24*, 441–453.

Rumberger, R. (1995). Dropping out of middle school: a multilevel analysis of students and schools. *American Educational Research Journal, 32*, 83–625.

Sinclair, B. B., & Fraser, B. J. (2002). Changing classroom environments in urban middle schools. *Learning Environments Research, 5*, 301–328.
Strober, M., Green, J., & Carlson, G. (1981). Utility for the Beck depression inventory with psychiatrically hospitalized adolescent. *Journal of Abnormal Child Psychology, 16*, 263–273.
Yu, C. Y., & Muthén, B. (2002). *Evaluation of model fit indices for latent variable models with categorical and continuous outcomes (technical report)*. Los Angeles: University of California at Los Angeles, Graduate School of Education & Information Studies.

Laurier Fortin. Psychoeducation Department, Sherbrooke University, 2500, Blv. Université, Sherbrooke, Québec, Canada. J1K 2R1. E-mail: Laurier.Fortin@USherbrooke.ca; Web site: http://www.usherbrooke.ca/psychoed/

Current themes of research:

School drop out. Personal, family and school risks factors. Behavior problems.

Most relevant publications in the field of Psychology of Education:

Fortin L. (2012). Trait d'Union: Programme de prévention du décrochage scolaire, www.ctreq.qc.ca, Québec, Canada. 250 pages.
Fortin, L., Potvin, P. Marcotte, D., Royer, É. (2012). Comparaison des facteurs personnels, familiaux et scolaires entre les garçons et les filles décrocheurs en problèmes de comportement au secondaire In: Les alliances éducatives pour lutter contre le décrochage scolaire" Les éditions Peter Lang, Genève, Suisse.
Fortin, L., & Potvin, P. (2007). Logiciel d'évaluation des types d'élèves à risque de décrochage scolaire. Québec, CTREQ éditeur.
Fortin, L., Marcotte, D., Potvin, P., Royer, É., & Joly, J. (2006). Typology of students at risk of dropping out of school: description by personal, family and school factors. *European Journal of Psychology of Education, XXI*(4), 363–383.
Fortin, L. Royer, É., Potvin, P., Marcotte, D., & Yergeau, É. (2004). La prédiction du risque de décrochage scolaire au secondaire: facteurs personnels, familiaux et scolaires. *Revue canadienne des sciences du comportement, 36*(3), 219–231.

Diane Marcotte. Psychology Department, University of Quebec in Montreal, C.P. 8888, Succursale Centre-Ville, Montreal, Quebec, Canada. H3C 3P8. Phone: (514) 987-3000, Ext. 2619. E-mail: marcotte.diane@uqam.ca; Web site: http://www.psycho.uqam.ca

Current themes of research:

Depression and internalized disorders in primary and high school students. School drop-out. Comorbidity of depression and conduct disorder. Prevention programs.

Most relevant publications in the field of Psychology of Education:

Bélanger, M., & Marcotte, D. (2011). Étude longitudinale du lien entre les changements vécus durant la transition primaire-secondaire et les symptômes dépressifs des adolescents. Revue canadienne des sciences du comportement.
Gagné, M-È., Marcotte, D., & Fortin, L. (2011). L'impact de la dépression et de l'expérience scolaire.
Lanson, A., & Marcotte, D. (2011). Relations entre les symptômes dépressifs, la perception de soutien social et les distorsions cognitives des adolescents dans le contexte de la transition primaire-secondaire Revue canadienne des sciences du comportement, déc 12.
Marcotte, D. (sous presse). Dépister, comprendre et intervenir auprès des étudiants qui vivent des difficultés psychologiques intériorisés lors de la transition secondaire-collégiale. Dans: Ménard, L. et St-Pierre. Enseigner pour faire apprendre au collégial et à l'université. Édition Chenelière.

Marcotte, D., & Poirier, M. (sous presse). La prévention et l'intervention d'orientation cognitivo-comportementale auprès des adolescents dépressifs. Dans: Turgeon, L. (Eds.). La thérapie cognitivo-comportementale chez les enfants et les adolescents. Québec, PUQ, 49 pages.

Thierno Diallo. Postdoc at Sherbrooke university, 2500, Blv. Université, Sherbrooke, Québec, Canada. J1K 2R1. E-mail: Thierno.diallo@usherbrooke.ca

Current themes of research:

Latent growth curve models. Growth mixture models. Simulations studies.

Most relevant publications in the field of Psychology of Education:

Diallo, T. M. O., Morin, A. J. S. (2012). Statistical power of latent growth curve models to detect piecewise linear trajectories. Manuscript submitted to Organizational Research Methods.
Diallo, T. M. O., Morin, A. J. S. (2012). The impact of total and partial inclusion or exclusion of active and inactive time invariant covariates in growth mixture models. Manuscript submitted to Psychological Methods.
Diallo, T. M. O., Morin, A. J. S., & Lu, H. (2012). The relative efficacy of different functional forms for detecting linear and nonlinear growth processes. Manuscript submitted to Structural Equation Modeling.
Diallo, T. M. O., Morin, A. J. S., & Parker, P.D. (2012). Statistical power of latent growth curve models to detect quadratic growth processes. Manuscript submitted to Psychological Methods.

Pierre Potvin. Psychoeducation Department, University of Quebec in Trois-Rivières, Canada. C.P. 500 Trois-Rivière, Québec, Canada. E-mail: Pierre.Potvin@uqtr.ca; Web site: http://www.pierrepotvin.com

Current themes of research:

School drop out. Teacher-student relationship. Behavioral disorders. Action research. Program evaluation.

Most relevant publications in the field of Psychology of Education:

Gilles, J-L., Potvin, P., Tièche Christinat (Éds.) (2012). Les alliances éducatives pour lutter contre le décrochage scolaire. Peter Lang. Berne.
Potvin, P. (2012). Prévenir le décrochage scolaire. Pour mieux comprendre la réussite ou l'échec scolaire de nos enfants et adolescents. Collection Psychoéducation: fondements et pratiques. Béliveau éditeur (à paraître en septembre).
Potvin, P., Deslandes, R., Beaulieu, P., Marcotte, D., Fortin, L., Royer, E., & Leclerc, D. (1999). Risque d'abandon scolaire, style parental et participation parentale au suivi scolaire. *Revue canadienne de l'Education, 24*(4), 441–453. (1,2,3,4,5)
Potvin, P., Fortin, L., & Lessard, A. (2005). Le décrochage scolaire. Dans L. Massé, N. Desbiens, & C. Lanaris (Éds.), Troubles du comportement à l'école: prévention, évaluation et intervention (67–78). Montréal: Gaëtan Morin Éditeur.
Potvin, P., Fortin, L., & Rousseau, M. (2009). Qualités psychométriques du questionnaire de dépistage des élèves à risque de décrochage scolaire. *Revue de psychoéducation, 38*(2), 263–278.

Egide Royer. Faculté des sciences de l'éducation, Université Laval, Québec (Qué.) Canada G1K 7P4. E-mail: Egide.Royer@fse.ulaval.ca; Web site: http://www.fse.ulaval.ca/cv/Egide.Royer

Current themes of research:

Behavior disorders. Social skills. Special education. Teachers' training and emotional and behavioral disorders.

Most relevant publications in the field of Psychology of Education:

Gaudreau, N., Royer, É., Beaumont, C., & Frenette, E. (2012). Le sentiment d'efficacité personnelle des enseignants et leurs pratiques de la gestion de la classe et des comportements difficiles des élèves. *REVUE CANADIENNE DE L'ÉDUCATION 35*(1): 82–101.

Royer, É. (2010). Leçons d'éléphant: pour la réussite des garçons à l'école. Québec: École et Comportement.

Royer, É. (2006). SEBD students and teachers'training: A knowledge base is in search of practitioners. Dans M. Hunter Carsch, Y. Tiknaz, R. Sage et P. Cooper (Eds.), *The handbook of social, emotional and behavioural difficulties* (pp. 30–35). London: Continuum.

Royer, É. (2004). The gap between research and practice: Achieving effective in-service training for teachers working with EBD students. Dans P. Clough, P. Garner, J. T. Pardeck and F. Yuen (Eds.), *Handbook of emotional and behavioural difficulties in education* (pp. 373–384). London: Sage.

Royer, É. (2003). What Galileo Knew: School violence, research, effective practices and teacher training. In Royer, É. et Debarbieux, É. (Eds.), *Journal of Educational Administration, 41*(6), 640–649.