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EMPIRICAL RESEARCH

Trajectories of Anxiety During Elementary-school Years and the Prediction of High School Noncompletion

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Abstract Previous research has provided mixed results regarding the effect of anxiety on academic achievement. Building on this body of research, the present longitudinal study pursued two goals. The first goal was to describe trajectories of anxiety during elementary-school years. The second goal was to determine the predictive value of these trajectories on high school noncompletion after controlling for personal (i.e., gender, classroom behaviors, and academic achievement) and familial (i.e., sociofamilial adversity) characteristics. A community sample of 1,817 children (887 boys, 930 girls) participated in this study. Results showed that anxiety tended to fluctuate from kindergarten to Grade 6 for different groups of children. Furthermore, the result of a logistic regression analysis indicated that group membership for anxiety predicted high school noncompletion by age 20. As a whole, these findings suggest that considering heterogeneous developmental patterns of anxiety during elementary-school years appears quite useful for predicting an important outcome such as high school noncompletion.

Keywords Anxiety · Trajectories · Family · Classroom behaviors · High school noncompletion

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The problem of dropping out of high school is a major concern (Statistics Canada 2002; U.S. Department of Education 2000). The current situation is quite worrisome and for good reason. In 1999 in the United States, high school drop-outs represented slightly more than 11% of 34 million young people aged 16–24 (U.S. Department of Education 2000). During the same period, the situation for Canadian youth was equally dim since 24% of 18–20 year-olds had left school without a high school diploma (Statistics Canada 2002). In the province of Quebec, success indicators are even more alarming. According to a recent report from the Quebec Ministry of Education (Ministère de l'Éducation, du Loisir et du Sport 2005), the proportion of 17-year-old adolescents who no longer attended school and had not obtained a high school diploma was around 34%. Among these young people, approximately seven out of ten drop-outs were boys.

The consequences of high school drop-out are costly to the young people themselves and to society as a whole (Alexander et al. 2001). Several studies have shown that high school drop-outs are more likely to suffer from physical or psychological health problems (Rumberger 1987) and to have serious adjustment problems such as criminality (see Walker et al. 2004; Thornberry et al. 1985) and abuse of alcohol and psychotropic substances (Fagan and Pabon 1990; see also Dowrick et al. 2004). The social and employment integration of these young people also appears to be more difficult (Garnier et al. 1997). Numerous drop-outs experience difficulty entering the labor market and keeping a stable job (Hartnagel and Krahn 1989). Moreover, their unemployment rate is twice as high as that of individuals whose highest level of schooling is high school (Statistics Canada 2005).

Given the detrimental effects of dropping out, it is reasonable to ask why some young people decide to abandon

their studies early. An overview of studies that have hitherto sought to answer this question yields two major findings. The first relates to the fact that dropping out seems to result from a combination of personal and sociofamilial risk factors, including poor academic achievement (Janosz et al. 2000), a history of disruptive behaviors (Vitaro et al. 2005; Walker et al. 1998), low attachment to school (Janosz et al. 2000), association with deviant peers (Battin-Pearson et al. 2000; Fagan and Pabon 1990), academic demotivation, low socio-economic status, parents' low education level, and the fact of living in a single-parent family or a blended family (Alexander et al. 2001; Janosz et al. 1997; Jimerson et al. 2000). The second finding relates to the fact that these risk factors are generally present among some young people before their entry into high school and gradually contribute to undermining their academic progression, to the point of jeopardizing their high school graduation.

Although these factors constitute reliable predictors for dropping out of school, it should be noted that they do not entirely explain the issue (Janosz et al. 1997; Rumberger 1995). Other risk factors have probably been overlooked, including anxiety that could play a significant role in explaining academic problems experienced by young people (Albano et al. 2003; Tomb and Hunter 2004; Wood 2006; Woodward and Fergusson 2001). Theory and research suggest that a high level of anxiety tends not only to co-occur with a myriad of personal and sociofamilial risk factors, but also to impair concentration and gradually lead to lower academic achievement (American Psychiatric Association 2000; Ma 1999; Tannock 2000). In the current study, we explored the developmental trajectories of anxiety during elementary school and examined how these trajectories affect high school noncompletion¸ while controlling for sociofamily adversity, children's behavioral characteristics and academic achievement.

The Nature and Developmental Course of Anxiety

The *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association 2000) lists different subtypes of childhood anxiety disorder (e.g., separation anxiety disorder, generalized anxiety disorder, social phobia). These disorders are mainly characterized by fearfulness or excessive worries associated with emotional distress (e.g., crying) or avoidance behavior (e.g., not wanting to go to school) and can be accompanied by physiological symptoms (e.g., perspiration, diffuse abdominal pain, trembling) (Barrios and Hartmann 1997; Kendall et al. 2006; Pennington 2002). Although anxiety is an expected response to some stressful events, it can be felt as a painful and crippling pressure that interferes with daily functioning at home and at school (American Psychiatric Association 2000). In the present study, the examination of anxiety focuses on children's cognitive (fearfulness, worries) and emotional (crying) states as assessed by their mothers.

Anxiety can appear very early on in the child's development (Pennington 2002; Zahn-Waxler et al. 2000). Over time, its content tends to reflect changes in the child's capacity to represent reality (Campbell 1986). Although fear of being separated from the attachment figure and fear of strangers represent the main sources of worry between the ages of 6 months and 24 months, worries linked to failure, criticism, physical well-being, disease and death mainly predominate at the beginning of schooling and later in adolescence (see Gullone 2000 for a review). Thus, as intellectual capacities develop, anxiety seems to evolve from a global, imaginary and uncontrollable content to another content that is more salient and more rooted in reality (Pennington 2002; Vasey 1993).

Research on anxiety has indicated that the prevalence rates for any anxiety disorders in children and adolescents range from 2.4% to 17.7% (Costello et al. 2003; Costello and Angold 1995). The majority of epidemiological studies include assessment of functional impairment criteria, which tends to decrease the prevalence (Zahn-Waxler et al. 2000). Many children exhibit considerable anxiety symptoms without these being systematically accompanied by significant impairments in daily functioning (Garber 2004). Anxiety among adolescents is also more common in females than in males (see Kendall et al. 2006). The gap observed at puberty could have taken root in predispositions that already existed very early on in the girls' development. During childhood, girls are more inclined to be inhibited and to develop fears or worries (Lewinsohn et al. 1998; Zahn-Waxler et al. 2000). Lastly, anxiety symptoms have been shown to be highly stable over time (Bernstein and Borchardt 1991; Cantwell and Baker 1989; Cohen et al. 1993; Ialongo et al. 1995; Keller et al. 1992; Pine et al. 1998; Woodward and Fergusson 2001). For instance, anxiety symptoms among Grade 1 children have been shown to have significant prognostic value for anxiety symptoms 4 years later (Ialongo et al. 1995). Furthermore, anxiety symptoms in middle adolescence have been shown to predict an increased risk for adulthood anxiety symptoms (Pine et al. 1998; Woodward and Fergusson 2001). On the whole, these studies suggest that anxiety in children appears to be common and to predict later anxiety.

Despite some evidence for the developmental continuity of anxiety, little is known about how anxiety emerges over time and varies in terms of severity across children (Zahn-Waxler et al. 2000). Moreover, previous studies have focused on the more extreme forms of anxiety (i.e., clinical symptoms) even though many children may exhibit a less

severe form of anxiety (i.e., sub-clinical symptoms) that nevertheless puts them at risk for anxiety disorder (Garber 2004). Finally, very few studies have sought to describe the relation between anxiety symptoms in children and subsequent impairment, particularly in a school setting (Kendall et al. 2006; Tomb and Hunter 2004; Wood 2006).

A Group-based Approach to Examining Trajectories of Anxiety

A mixed modeling procedure for longitudinal data has been developed in order to empirically examines the presence of distinct and potentially opposite developmental trajectories. This semiparametric analytical procedure, referred to as TRAJ procedure, considers the normal heterogeneity of a population by grouping individuals according to the similarity of their trajectory, describing the form of these trajectories, and estimating the proportion of individuals belonging to each group (Nagin 1999; for more details, see the Method section). Recent longitudinal studies using this procedure have shown that subclinical levels of internalizing disorders (i.e., fearfulness and depressed mood) tend to fluctuate over time for different groups of children and young adolescents (Brendgen et al. 2005; Côté et al. 2002). Thus, these studies suggest that it may be possible to identify and describe different developmental trajectories of anxious children. However, none of these studies have considered the mother as a source of information for assessing the child's anxious behaviors or examined the long-term consequences of these trajectories on academic achievement. A better understanding of the trajectories of anxious children is important in order to identify those who represent high risk for future academic difficulties.

Anxiety and Academic Achievement

Several studies have suggested that anxiety has a deleterious effect on academic achievement (Duchesne et al. 2005; Ialongo et al. 1995; Ma 1999; Normandeau and Guay 1998; Pomerantz et al. 2002; Seipp 1991; Wood 2006; Woodward and Fergusson 2001). For instance, Duchesne et al. (2005) found that children who exhibit signs of anxiety in kindergarten are more likely to have academic problems at the end of their first year of high school. Similarly, Ialongo et al. (1995) have also shown that Grade 1 children who ranked in the top third when anxious behaviors were measured were more likely to be in the bottom third when academic achievement was measured at the end of Grade 5. Consistent with this finding, Woodward and Fergusson (2001) reported that anxious adolescents are at increased risk for subsequent educational underachievement as young adults. Finally, Seipp (1991) concluded in her meta-analysis that highly anxious children scored about one-half a standard deviation point below children with low anxiety levels on measures of academic achievement.

On the other hand, other studies have suggested that anxiety does not have any effect on academic achievement in adolescence (Eady 1999; Strahan 2003; Vitaro et al. 2005) and could even be beneficial (DiLalla et al. 2004; Sharma 1970). In their longitudinal study, Vitaro et al. (2005) found that anxiety in kindergarten did not predict high school graduation by late adolescence above and beyond early risk factors (gender, sociofamily adversity, and disruptiveness). Similarly, in her 2-year longitudinal study, Strahan (2003) reported that anxiety did not emerge as a significant predictor of college persistence and grade point average. However, these results contradict those of DiLalla et al. (2004) who have shown that children who were more prone to anxiety as preschoolers tended to have the highest grades as young adolescents. In addition, Sharma (1970) has also found that the relationship between anxiety among adolescents and academic achievement assessed 4 months later was curvilinear. Thus, adolescents who exhibit a moderate level of anxiety appear to succeed better at school than those exhibiting a low level or high level of anxiety.

In sum, these studies suggest that the contribution of the effect of anxiety on academic achievement is still not completely understood. Two important limitations can be raised to explain these mixed results. First, in the few longitudinal studies that have lasted for over 1 year (Duchesne et al. 2005; DiLalla et al. 2004; Ialongo et al. 1995; Strahan 2003; Vitaro et al. 2005; Woodward and Fergusson 2001), anxiety at one point in time was used to predict academic achievement at a subsequent point in time. This variable-centred approach can mask wide variations between individuals (Cicchetti and Rogosch 2002), while overestimating the linearity (or the absence of linearity) of the relation between anxiety and academic achievement. Because anxiety can vary over time, and such change might occur differently across children (Zahn-Waxler et al. 2000), an examination of continuity or change in patterns of anxiety over time may provide an important key to better understanding later outcomes such as the achievement of a high school diploma (Graber 2004).

A second limitation that can be raised to explain the fluctuation of the results in previous studies is the source of information chosen to assess anxiety. These studies have variously involved, as the source of information, either parents (e.g., DiLalla et al. 2004), teachers (e.g., Duchesne et al. 2005; Vitaro et al. 2005) or young people (e.g., Ialongo et al. 1995). Although there is no evidence regarding which source of information should be favored (Grills and

Ollendick 2003), at least two factors should be taken into account. On the one hand, it may not be easy for a teacher to detect anxiety symptoms in children, particularly in a structured environment such as that prevailing in their classroom (Gagnon et al. 1992; Tomb and Hunter 2004). On the other hand, a significant proportion of pre-adolescent children do not have the necessary cognitive and verbal skills to understand and describe their own subjective experience accurately (Edelbrock et al. 1985; Kendall et al. 2006; Ollendick et al. 2001). This could, in particular, account for the particularly low degree of agreement between children and other informants (Achenbach et al. 1987) and the fact that the degree of agreement is even lower between children and clinicians than between parents and clinicians (Grills and Ollendick 2003). Thus, mothers could prove to be a valid choice for assessing the development and evolution of their pre-adolescent child's anxious states. However, this hypothesis requires further empirical support.

Familial and Personal Characteristics as Potential Confounding Variables

It is possible that variability in the control of potentially confounding variables could also be partly responsible for the contradictory results reported in previous studies. Anxious children are often found to have a number of other problems besides anxiety. These children are more likely to exhibit hyperactivity (Tannock 2000) and aggressiveness (Zoccolillo 1992). They also have more difficulty establishing harmonious relations with their peers (Bruch 2001; Rubin et al. 1990) and are deemed by the latter to have few social skills (Rubin et al. 1993; see Seligman and Ollendick 1998, for a review). Lastly, anxiety has been associated with low socio-economic status, single parenthood, the mother's young age at the birth of the child and her low education level (Last et al. 1992; Woodward and Fergusson 2001). Furthermore, several studies indicate that these same characteristics predict academic drop-out (Alexander et al. 2001; Ensminger and Slusarcick 1992; Garnier et al. 1997; Rumberger 1995; Vitaro et al. 2005). In general, compared to high school graduates, students who abandon their studies are more likely to have exhibited disruptive behaviors right from the beginning of their schooling, to have fewer social skills, to have had low academic achievement, and to come from a high-risk family environment (e.g., single parent and low SES households). Based on these studies, the child's familial characteristics (structure, mother's education level and age at birth of first child) and personal characteristics (gender, hyperactivity, aggressiveness, prosociality and academic achievement) were used as covariates in our study.

The Present Study

Building on previous research, the current 15-year longitudinal study had two goals. The first goal was to describe different trajectories of anxiety using a group-based, multinomial approach. We expected that the proportion of children exhibiting a high level of anxiety from kindergarten to Grade 6 would be higher than those reported in epidemiological studies on anxiety in children and adolescents (Zahn-Waxler et al. 2000). Also, particular attention was paid to the gender of the children. Many studies have reported that anxiety is more prevalent among adolescent females than males (see Kendall et al. 2006). It seems that this difference may already exist during the first years of schooling (Lewinsohn et al. 1998).

The second goal was to determine the predictive value of these trajectories for high school noncompletion after controlling for the children's familial and personal characteristics during elementary school. Two hypotheses can be put forward. First, the relation between anxiety and high school noncompletion may be curvilinear (Sharma 1970). Moderate anxiety could have an adaptive function in the academic sphere by pushing the student to mobilize his personal resources (i.e., cognitive and behavioral) in order to be able to give his best, which, ultimately, reduces the probability of not completing his high school studies. On the other hand, an excessively high anxiety level could interfere with the student's capacity to perform well academically, whereas a very low anxiety level could lead to unmotivated performances. Second, the probability of high school noncompletion could vary according to levels of anxiety. This hypothesis is based on studies that have shown that highly anxious children are at increased risk for low academic achievement (e.g., Ialongo et al. 1995). Thus, the higher the child's anxiety level, the more at risk he will be of not completing his high school studies.

Methods

Participants and Procedure

Participants in the present study included 2,000 children (1,001 boys, 999 girls) who took part in a longitudinal study conducted across the province of Quebec from 1986 to 2000. The sample was selected randomly based on a list provided by the Quebec Ministry of Education. This strategy aimed to make up a sample of children that was representative of the population of children in Quebec enrolled in kindergarten in fall 1986. Every spring, a questionnaire was mailed to the parents of these children and their teacher. More details about the sampling strategy can be found in Zoccolillo et al. (1999). The majority of

children were French-speaking Caucasians (more than 94%) and the mean age at the starting point of the study (i.e., when they were in kindergarten) was 5 years (*SD* = .30). Eighty six percent (86%) of the participants were living with both biological parents at age 5. The mothers had received, on average, 11.93 years of schooling (*SD* = 2.62) and the mean age at the birth of their first child was 24.59 (*SD* = 3.87).

From the initial sample of 2,000 children, complete data were obtained for 1,817 of them (longitudinal sample; 887 boys and 930 girls), representing a 91% response rate. Attrition tests were performed on gender, family status, the mother's education level, and the children's behavioral characteristics in kindergarten (anxiety, hyperactivity, aggressiveness, and prosociality). Results indicated that participants in the longitudinal sample were not different from participants for whom data were not available for all assessment periods.

Measures

Mother's Report

Sociofamilial Adversity Index—Kindergarten: A Sociofamilial Adversity Index was created on the basis of information collected from mothers regarding family structure (i.e., two-parent, single, blended), their age at the birth of their first child and their education level. The association between these indicators and psychosocial functioning during the child's development as well as high school noncompletion has been well documented (e.g., Demo and Acock 1996; Janosz et al. 1997; Loeber and Farrington 2000; Rumberger 1995; Velez et al. 1989). To construct the index, each of these indicators was given a score of 0 or 1 depending on the degree of adversity that it represented for the child. Other studies have used a similar procedure (e.g., Brendgen et al. 2005; Vitaro et al. 2005). In the case of family structure, a child living with both biological parents obtained a score of 0 (low risk) while a child living within a single-parent unit or a blended family was assigned a score of 1 (higher risk). The other indicators (mother's education level and age at birth of first child) were given a score of 1 when the respective scores were in the bottom quartile and a score of 0 for higher values. These indicators were then grouped together to make up a global score (Sociofamilial Adversity Index). At least two out of three indicators were required to create the index. A higher score indicates greater risk or adversity. In the present study, 56.9% of the children obtained adversity index scores of 0. About one third (30.6%) of the sample obtained an average adversity index score between .33 and .50. Finally, 12.5% of the children obtained an average adversity index score between .67 and 1. The overall average sociofamilial index was .22 (*SD* = .29).

Anxious Symptoms—Kindergarten to Grade 6: The Anxiety scale in the parents' version of the Preschool Behavior Questionnaire (PBQ; Tremblay et al. 1992) was completed by the mothers to assess generalized anxious symptoms exhibited by their child annually from kindergarten to Grade 6. This scale included three items ('he/she tends to be afraid or to fear new situations'; 'he/she cries easily'; 'he/she is worried by many things') and used a 3-point scale ranging from 0 (does not apply at all) to 2 (applies very strongly). Each anxiety score ranged from 0 to 6 with the means varying between 2.11 (Grade 6) and 2.54 (Grade 1). Cronbach's alphas for this scale ranged from .60 to .67, indicating moderate internal consistency.

Teacher's Report

Children's Behavioral Characteristics in the Classroom—Kindergarten to Grade 6: Behavioral characteristics in the classroom were assessed yearly by the child's teacher using three subscales in the teachers' version of the Preschool Behavior Questionnaire (PBQ; Tremblay et al. 1992): Hyperactivity (2 items: 'Restless. Runs about or jumps up and down. Doesn't keep still'; 'Squirmy, fidgety child'), Aggressiveness (3 items: 'threatens or bullies others in order to obtain what he/she wants'; 'he/she fights with other children'; 'he/she hits and kicks others'), and Prosociality (10 items: e.g., 'he/she comforts a child who is crying or upset'; 'he/she takes the opportunity to praise the work of less able children'; 'he/she shows sympathy to someone who has made a mistake'). These behaviors were also scored on a 3-point scale (0 = not applicable; 1 = occasional behavior; 2 = frequent behavior). The decision to use teachers was guided by studies that suggest that teachers constitute a valid source of information for assessing the frequency and intensity of a child's problem behaviors, particularly because they can compare them to a reference group (e.g., Achenbach et al. 1987; Gagnon et al. 1992; Verhulst et al. 1994). Reliability coefficients as well as the validity of the PBQ construct have been well established (Tremblay et al. 1992). Indices of internal consistency for these dimensions were adequate, ranging from .87 (Aggressiveness in Kindergarten) to .91 (Prosociality at Grade 1).

The children's hyperactive, aggressive and prosocial behaviors were used as control variables in the analyses that examined the link between the trajectories of anxiety and high school graduation. Bivariate correlations for each of the behavioral characteristics were found across assessment periods at $p < .0001$: Hyperactivity = .25–.47; Aggressiveness = .33–.51; Prosociality = .16–.29. A global score for each behavior was computed from the seven

yearly PBQ scores (i.e., teacher ratings between kindergarten and Grade 6) and used in subsequent analyses. All children had at least three assessments on each behavioral dimension. Summary statistics for these scores are presented in Table 2.

Children's Academic Achievement—Grade 1 to Grade 6: The teachers assessed the children's academic achievement annually based on three indicators: academic achievement in reading, writing and math. These indicators were scored on a 5-point scale (1 = markedly below group average to 5 = markedly above group average). Bivariate correlations between these scores ranged from .49 to .88 ($p < .0001$). Achievement scores were subsequently grouped together to make up a global score of academic achievement. All the children were assessed on at least three occasions from Grade 1 to Grade 6. This global score was also used as a control variable. Means, standard deviations and ranges are presented in Table 2.

Government Report

Educational Status by Late Adolescence: When the participants were 20 years old, their educational status was collected through the Quebec Ministry of Education. The information obtained by this government organization allowed us to group these young people into two categories: those who had obtained a high school diploma and those who were still without a diploma. In the Quebec education system, approximately 34% of students do not complete high school by age 17 (Ministère de l'Éducation, du Loisir et du Sport 2005). In the present study, 31% of participants (39% of boys and 22% of girls) had still not obtained a diploma by age 20. However, 70.6% of them were still attending school, either being enrolled in night courses or taking an adult professional training course.

Statistical Analyses for Group-based Trajectories of Anxiety

Trajectories of anxiety were modeled using the kindergarten to Grade 6 scores for this measure. Semiparametric mixture models for anxiety were estimated using the SAS "TRAJ" procedure (Jones et al. 2001). This method helps to identify subgroups of children displaying distinct anxiety trajectories, describe the shape of these trajectories for each subgroup (i.e., whether there are variations or if the pattern is stable), and estimate the prevalence of children belonging to each of the trajectories. The identification of the model that depicts the number of optimal trajectories and their shapes (i.e., constant, linear or quadratic) is based on the Bayesian Information Criterion (BIC), calculated as:

$$\mathrm{BIC} = -2\log(\mathrm{L}) + \log(n) * k$$

where L is the model's maximized likelihood, n is the sample size, and k is the number of parameters in the model (Nagin 1999). Although there are no clear guidelines for interpreting the magnitude of the BIC, the optimal model should be the one with the maximum BIC value. Since BIC values are always negative, the maximum value is the least negative one.

For every child, the procedure calculates the probability of belonging to each trajectory group, based on the observed longitudinal pattern. It also determines the assigned trajectory group membership using the highest classification probability across groups (or maximum probability rule). Thus, children belonging to a particular trajectory group should have a high mean probability (maximum of 1) of assignment to the group to which they belong, on the basis of the maximum probability rule, and a low mean probability (minimum 0) of being assigned to other groups. A good fit would be reflected by probabilities of around .70/.80 or higher. It is important to note that this statistical procedure accommodates for missing data and it was possible to use data of children for which 3 of the 7 assessments were completed (see Nagin 1999).

Results

The results are presented in two steps. First, trajectory analyses were conducted using a semiparametric, group-based approach that assumes the heterogeneous development of anxiety during elementary school. Second, hierarchical logistic regression was performed to determine the predictive value of these trajectories for high school noncompletion after controlling for personal (gender, hyperactivity, aggressiveness, and prosocial behavior, and academic achievement in elementary school) and family (adversity) characteristics.

Trajectories of Anxiety During Elementary School

Group-based analyses were performed on models from 2 to 5 groups. A four-group model was identified as best fitting the data (Fig. 1). Black lines represent the observed trajectories of anxiety. They were calculated using the mean score of children in each of the trajectories identified by the procedure. The dotted lines illustrate the predicted trajectories of anxiety. These were calculated using the model's estimation coefficients. Table 1 presents mean assignment probabilities that were conditional on assignment by the maximum probability rule. Probabilities varied from .83 to .88, suggesting satisfactory model fits.

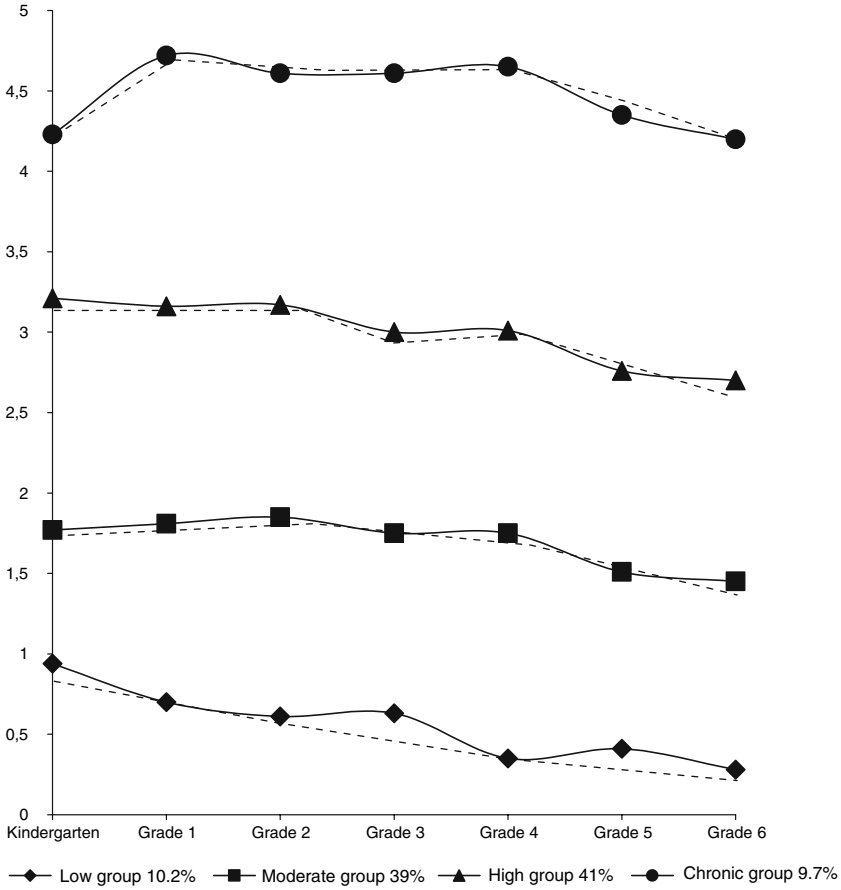

Fig. 1 Anxiety trajectories during the elementary-school years. Dotted lines represent predicted trajectories

A first group (10.2% of the sample) called the "Low group," comprised children who showed a low level of anxiety between kindergarten and Grade 6. The linear parameter of the trajectory was significant ($p < .001$), indicating that the level of anxiety decreased in time at a constant rate. A second group, comprising 39% of the sample, was labelled the "Moderate group." The level of anxiety of this group appears to have increased from kindergarten to Grade 2 and to have slowly declined until Grade 6. The quadratic shape was statistically significant ($p < .001$). A third group (41%) was identified as the "High group." Its level of anxiety started off at a relatively high level, but then declined steadily until Grade 6. However, even though anxiety declined over the years, it still remained at a high level. The quadratic trajectory was statistically significant ($p < .001$). The fourth group, which constituted 9.7% of the sample, was called the "Chronic group," because their anxiety started off at a high level and remained at a higher level than that of the other groups across the elementary-school years, despite a slight decline over time. The quadratic parameter was significant ($p < .001$).

Table 1 Mean assignment probabilities to group trajectories for anxiety (conditional on assignment by maximum probability rule)

	M	*SD*	Order
Anxiety			
Low (n = 186)	.88	.14	1
Moderate (n = 709)	.83	.14	2
High (n = 745)	.84	.14	2
Chronic (n = 177)	.87	.15	2

Note: The order indicates whether the trajectory was fit with a constant (0), linear (1), or quadratic (2) function

A contingency analysis was conducted to determine whether the gender representation was similar across trajectory groups. Results of this analysis revealed that the distribution of boys and girls was similar in each trajectory group ($\chi^2(3) = 4.99$, $p > .10$). Thus, the probability of belonging to one trajectory of anxiety or another seems to be independent of the child's gender.

Prediction of High School Noncompletion

Preliminary analyses were conducted in order to determine (1) the bivariate correlations between the different control variables in the study and (2) the proportion of young people who had not obtained a high school diploma across trajectory groups. As shown by Table 2, all the control

Table 2 Means, standard deviations, range, and bivariate correlations of control variables

	1	2	3	4	5	Mean (*SD*)	Range
1. Family adversity	–					.22 (.29)	0–1
2. Aggressiveness	.15***	–				.45 (.77)	0–5.43
3. Hyperactivity	.13***	.62***	–			.63 (.77)	0–4
4. Prosociality	–.06**	–.29***	–.20***	–		7.23 (2.69)	.20–16.05
5. Academic achievement	–.25***	–.26***	–.29***	.34***	–	3.31 (.91)	1–5

**$p < .01$; ***$p < .001$

variables are significantly linked with each other. Except for the link between aggressiveness and hyperactivity, the relations observed range from low to moderate. Moreover, a contingency analysis revealed that the proportion of young people who had not yet obtained a diploma at age 20 was different between trajectory groups ($\chi^2(3) = 24.71$, $p < .001$). More specifically, Fig. 2 shows that the proportion of young people without a high school diploma is higher in the Chronic and High groups (41% and 35%, respectively) than the proportion in the Moderate and Low groups (25% and 26%). Thus, the trajectories of anxiety during elementary school appear to be related to high school noncompletion.

A logistic regression analysis was performed to determine the contribution of trajectory group membership for anxiety to predicting high school noncompletion by age 20 after controlling for personal and familial characteristics. An analysis was performed according to the order of input of the following variables: sociofamilial adversity in kindergarten, child's gender, behavioral characteristics (aggressiveness, hyperactivity, prosociality) and academic characteristics (academic achievement) during elementary school. These were included in the first step as control variables. The trajectories of anxiety were inserted in the second step. Contrasts were defined such that each of the groups was compared with a reference group, in this particular case, the Moderate group. Choosing this group allowed for comparisons with more extreme and much less populated groups (i.e., Low and Chronic groups). Table 3 presents the results of this analysis.

Results of the first stage of the logistic regression analysis indicate that, except for prosociality, the child's familial and personal characteristics are significantly associated with high school noncompletion. More specifically, the probability of belonging to the noncompletion group, as compared with the completion group, is higher for young people who were exposed to sociofamilial adversity in kindergarten ($B = 1.18$, odds ratio = 3.27, $p < .001$) and for boys than for girls ($B = .42$, odds ratio = 1.53, $p < .01$). In addition, the presence of aggressiveness ($B = .23$, odds ratio = 1.26, $p < .05$) and hyperactivity ($B = .29$, odds ratio = 1.33, $p < .01$)

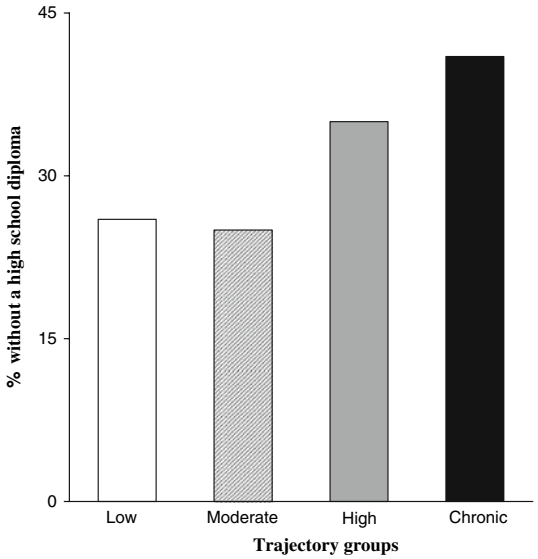

Fig. 2 Percentage of high school noncompletion depending on anxiety trajectory group

Table 3 Summary of logistic regression analysis predicting high school noncompletion from trajectory groups

Variables	*B*	*SE*	Wald	Odds ratio
Step 1 (Control variables)				
Sociofamily adversity	1.18	.21	31.05	3.27***
Sex[a]	.42	.14	9.52	1.53**
Aggressiveness	.23	.10	5.32	1.26*
Hyperactivity	.29	.10	8.52	1.33**
Prosociality	–.01	.03	.01	1.00
Academic achievement	–1.45	.09	253.91	.24***
Step 2 (Trajectory groups)				
Group[b]			12.37**	
Low	–.01	.23	.00	1.00
High	.41	.14	8.32	1.50**
Chronic	.55	.22	6.28	1.74**

Note: Final model = –2 log likelihood = 1586.36; $\chi^2(9) = 641.83$, $p < .001$; Nagelkerke $R^2 = .42$

[a] Girls serve as the reference group

[b] Moderate group serves as the reference group

*$p < .05$; **$p < .01$; ***$p < .001$

increases this same probability. In contrast, good academic achievement during elementary school decreases the likelihood of high school noncompletion ($B = -1.45$, odds ratio = .24, $p < .001$).

As regards the second stage of the analysis, results showed that group membership in terms of levels of anxiety predicted high school noncompletion. Specifically, being in the High trajectory group as compared to the Moderate group, based on the measure of anxiety, was a positive predictor of high school noncompletion ($B = .41$, odds ratio = 1.50, $p < .01$) even after controlling for confounding variables. Moreover, the results indicated that the probability of high school noncompletion in late adolescence was higher for children who belonged to the Chronic group as compared to the Moderate group ($B = .55$, odds ratio = 1.74, $p < .01$). No additional information was provided by membership in the Low trajectory group.

Discussion

The current study sought to better understand the relation between the trajectories of anxiety during elementary-school years and high school noncompletion, while considering the potential contribution of certain personal and familial characteristics. The results show that numerous children exhibit anxiety symptoms throughout their elementary-school years and that these children are particularly at risk of not completing their high school studies. These results will be discussed in light of studies that examine the development of anxiety among young people and the mechanisms that may explain the link between anxiety and academic problems.

Developmental Trajectories of Anxiety

The first goal of this study was to explore longitudinal trajectories of anxiety during elementary school in a community sample of children. The semiparametric, group-based approach to developmental trajectories allowed for the identification of four groups of children displaying distinct trajectories of anxiety. The identification of these heterogeneous patterns of anxiety underscores at least two important points. The first point is that half of the children seemed to experience apparent anxiety symptoms during the first years of schooling. Moreover, differences between these children and their less anxious peers could already be seen in kindergarten. Although anxiety symptoms tended to decline slightly over time, regardless of which group the child belonged to, the gap which existed between anxious and less anxious children at the beginning of schooling was maintained until the end of Grade 6. These findings are in line with existing literature suggesting that a significant proportion of school-aged children exhibit considerable anxiety symptoms that appear to remain relatively stable during childhood (e.g., Albano et al. 2003; Garber 2004; Ialongo et al. 1995; Zahn-Waxler et al. 2000). The presence of groups of children with distinct longitudinal trajectories also converges with previous research and theories that have suggested that anxiety may fluctuate in terms of severity across children (Côté et al. 2002; Garber 2004; Zahn-Waxler et al. 2000). Given that anxiety markedly increases during puberty (American Psychiatric Association 2000; Kendall et al. 2006), these results point to the need to introduce measures to prevent the development of anxiety disorders and severe impairment in functioning. Thus, schools could be a favorable context in which to introduce these measures (Greenberg et al. 2001; Tomb and Hunter 2004). Through schools, it would be possible to reach teachers and parents in order to inform them about the signs and symptoms of anxiety in children, provide preventive interventions in the classroom, detect high risk children and, if necessary, provide them with more sustained interventions (Tomb and Hunter 2004). By decreasing the proportion of children with high or chronic levels of anxiety at elementary school, it will be possible to better concentrate efforts on selective or indicated measures that target anxious adolescents at the beginning of high school.

The second point raised by this study is that children's trajectories of anxiety do not vary according to gender. Research on anxiety has indicated that the prevalence rates for anxiety disorders among children are more or less the same for boys and girls (see Zahn-Waxler et al. 2000). It is at puberty and even in mid-adolescence that a gap can be observed since 2–3 times more girls than boys suffer from anxiety at this time in their lives (Garber 2004). However, it should be noted that in our study, anxiety was assessed by the mothers, which does not exclude the possibility that girls are more anxious than boys outside the family environment. Further research is needed with the inclusion of others informants.

Prediction of High School Noncompletion

The second goal of this study was to determine the contribution of these trajectories to high school noncompletion after controlling for the children's familial and personal characteristics. The results indicate that, as compared to the Moderate group, group membership in the Chronic and High groups but not the Low group predicted high school noncompletion. Specifically, children whose trajectory of anxiety was high or chronic during elementary school had a higher probability of not completing high school than

children whose trajectory of anxiety was moderate. These results seem to support the hypothesis that the relation between anxiety and high school noncompletion is curvilinear and suggest that more than 50% of children exhibit high enough levels of anxiety during elementary school to contribute to undermining their academic progression during high school. Other studies have also shown that a high level of anxiety is detrimental to young people's academic achievement (e.g., Duchesne et al. 2005; Ialongo et al. 1995; Seipp 1991; Woodward and Fergusson 2001). For these anxious children, it can be speculated that part of their problems in high school can be explained by a number of cognitive schemes associated with their anxious state (Vasey 1993). It is well known that as they advance through school, children accumulate feedback on the quality of their academic learning and performance. More anxious children (e.g., High and Chronic groups) might develop excessive worries about academic failure, which make them highly sensitive to these messages, particularly when their achievement is not up to their expectations or is poor. These children may be more likely to anticipate failure, to perceive themselves negatively as learners, and to believe that they have little control over everything related to their learning. Such thoughts might be particularly present in potentially anxiogenous situations (e.g., new complex task; examination), lead to the adoption of avoidance behaviors (e.g., avoiding the requested task) and generate emotional distress. Over time, these thoughts might take hold and fuel anxiety, thus limiting the children's possibilities of making meaningful progress in their learning, while increasing the risk of high school noncompletion.

Moreover, it is also possible that the relation between anxiety and high school noncompletion can be partly explained by poor relations with peers. Anxious children are more likely to have negative relational experiences and to eventually be rejected by their peer group (Bruch 2001; Rubin et al. 1990). These negative and exclusionary experiences with peers not only deprive young people of a crucial source of socialization for their social and emotional development (LaGreca 2001), but also could also contribute to the emergence of negative attitudes towards school and increase their risk of dropping out (Birch and Ladd 1996; Hymel et al. 1996; Parker and Asher 1987).

Once again, these hypotheses point to the need to invest in preventive measures implemented during elementary school (Greenberg et al. 2001). Current efforts by professionals in schools are mainly concentrated on restricting disruptive behaviors in the classroom while measures targeting internalized problems, such as anxiety, are often neglected (Tomb and Hunter 2004). However, it appears essential that such measures be implemented right from the beginning of kindergarten, before anxiety sets in over a long period of time and becomes chronic. Through these measures, young people should be provided with tools to develop social skills and strategies for self-control (e.g., positive self-talk) and problem-solving in order to help them overcome potential problems that might put pressure on them (Meichenbaum 1985).

Limitations

The present study has potential limitations that should be taken into account when interpreting the findings. First, the results can only be generalized on the basis of the mother's report of her child's anxious behavior. Second, the mother's assessment may have been biased by her own subjective experience. A large body of literature supports the notion that family antecedents, in terms of emotional disorders, play a significant role in the etiology of childhood anxiety (see Kendall et al. 2006 for a review). Thus, if the mother herself suffers from anxiety or depression, she may not be the best source of information in terms of objectively assessing her child's behaviors, emotions, and feelings. Third, as the assessment of the child's anxious behaviors was limited to the family environment, it cannot be determined to what extent these behaviors may or may not vary across situations (e.g., school-setting, peer relationships, sporting and cultural activities). For all these reasons, other studies using multimethod, multi-informant assessment (e.g., psychologist, teachers, peers, coach) are necessary to provide a more differentiated view of anxious behaviors during childhood. Finally, numerous studies have shown that anxiety is often associated with depression (e.g., Bird et al. 1993; Brady and Kendall 1992; Pine et al. 1998). Some studies have also linked depression with the degree of academic achievement (e.g., Lewinsohn et al. 1995). It is therefore worthwhile to isolate the symptoms of depression as a potentially confounding variable in examining the predictive link between anxiety during elementary school and high school completion.

Conclusion

This study identified multiple trajectories of anxiety during elementary school and the important contribution of these trajectories to the prediction of high school noncompletion. Thus, compared to the moderately anxious group, young people belonging to the High or Chronic groups have a higher risk of not completing high school, above and beyond familial (sociofamilial adversity) and personal (gender, classroom behaviors, and academic achievement) characteristics. These results help to better understand the role of anxiety in the etiology of dropping out of high

school. Moreover, they raise the importance of early and effective intervention to prevent anxiety among young people. Thus, given the high comorbidity between anxiety, problem behaviors (e.g., hyperactivity, aggressiveness, opposition) and learning difficulties, a component centred on anxiety prevention could be integrated into programs targeting young people with these problems.

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