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Adjustment trajectories during the college transition: Types, personal and family antecedents,
and academic outcomes

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Abstract

This longitudinal study was aimed to describe and understand student adjustment trajectories during the college transition. Participants came from a large random sample of Quebec high school students. They completed a multidimensional measure of adjustment at two times before entering college and at two other times after college admission. Group-based trajectory analysis showed decreased adjustment for 6% (social adjustment) to 66.1% (academic adjustment) of students over this period, versus improved adjustment for 4.5% (social adjustment) to 11.6% (emotional and academic adjustment). All changes were linear, suggesting progressive changes from Secondary 4 to the second year of college. Multivariate and contingency analyses showed that personal anxiety, academic success, and attention problems in high school were significant determinants for adjustment trajectories, and that these trajectories were subsequently related to perseverance and college graduation.

Keywords: High school to college transition; youth; academic adjustment; social adjustment; group-based trajectories.

Adjustment trajectories during the college transition: Types, personal and family antecedents, and academic outcomes

The transition from high school to college is considered by the post-secondary education community as a determinant step in the academic pathway of youth (Dunn, 2016). At this time, students experience major developmental changes in several life spheres, including school, social life, and family life. Academically, they must adjust to a new school, a new program and schedule, new teaching practices, and new institutional expectations and norms (Hill, 2012). In terms of social networking, they must build new interpersonal relationships and cope with a diminution of available support in their social environment (Mattanah et al., 2010). With respect to family ties, some students will leave the nest and assume personal responsibility for the first time (Hiester, Nordstrom, & Swenson, 2009; Larose & Boivin, 1998). Researchers have posited that this academic transition places many students in a vulnerable position that can hinder their academic, social, and emotional adjustment (Lee, Dickson, Conley, & Holmbeck, 2014; Conley, Kirsch, Dickson, & Bryant, 2014). Some add that adjustment problems during this period can increase the risk for students to switch their college program, unduly prolong their admission to college, or simply drop out of college (Tinto, 2013).

Changes in adjustment during the college transition

In the present study, adjustment is conceived as a situational state that results from the interaction between three dimensions: the student's individual characteristics (e.g., previous academic success), the student's experience of the school and social environment (e.g., the quality of support by teachers and peers), and transitions (e.g., changes at school and in networks of friends) (O'Donnell, Shirley et al., 2018; Baker & Siryk, 1989). In the past two decades,

longitudinal studies of situational adjustment during the college transition have yielded nuanced portraits of the process. For instance, some authors have found that adjustment declines between the end of high school and the first year of college (Duchesne, Ratelle, Larose, & Guay, 2007; Fromme, Corbin, & Kruse, 2008; Pritchard, Wilson, & Yamnitz, 2007). Others have found improved situational adjustment over the same period (Hechanova-Alampay, Beehr, Christiansen, & Van Horne, 2002; Ratelle et al., 2004) or after the first college term (Rice, 1992), concluding that this transition can also be favorable for students' social and academic functioning. Still others have found very few significant changes during the transition (Luyckx, Soenens, Goosens, & Vansteenkiste, 2007; Nightingale et al., 2013). Notably, the direction and magnitude of changes in students' situational adjustment during the transition vary with the type of adjustment being assessed (emotional vs. academic) (Duchesne et al., 2007), the geographic region of the high school (rural vs. urban) (Fromme, Corbin, & Kruse, 2008), student's positive or negative expectations about the transition (Jackson, Pancer, Pratt, & Hunsberger, 2000), student's sex (Conley, Kirsch, Dickson, & Bryant, 2014), coping strategies, self-esteem, and degree of optimism prior to college entry (Pritchard, Wilson, & Yamnitz, 2007), and residential status at college (Larose & Boivin, 1998; Fromme, Corbin, & Kruse, 2008).

The portrait of changes in student's situational adjustment during the college transition is further complicated when we consider the methodological limitations of these longitudinal studies. First, most studies have assessed adjustment at only two times, typically at the end of high school and during the first college term (see, e.g., Pritchard, Wilson, & Yamnitz, 2007; Larose & Boivin, 1998). The lack of repeated measures in high school and college makes it difficult to situate the origin of adjustment changes or to determine their continuity or discontinuity across the transition. Second, all the reviewed longitudinal studies were conducted

in one or a few colleges or universities, so that the changes are heavily dependent on contextual variables such as the institution's geographic region and socioeconomic status, its student client profile, and its program offer profile. To our knowledge, no study to date has attempted to describe changes in adjustment in a large sample that is representative of a given student population. Third, although many of these longitudinal studies have attempted to identify antecedents of adjustment changes, very few, to our knowledge, have investigated relationships between these changes and indicators of subsequent academic pathways (i.e., perseverance and graduation) (for an exception, see Ratelle et al., 2004). To date, the long-term risks for adjustment problems during the college transition have been understudied. Are they normative or indicative of problematic academic pathways? Furthermore, studies have rarely considered the possibility that changes in adjustment during the transition could be naturally heterogeneous (for exceptions, see Duchesne et al., 2007; Ratelle et al., 2004). A group-based analysis of changes in trajectories would enable identifying population subgroups that experience greater difficulties during the transition, are at greater risk of dropping out of courses and programs, and should be targeted for preventive interventions.

The overall objectives of this study were therefore to obtain a more detailed portrait of adjustment trajectories during the college transition in a national random sample of students in the Québec education system, and to identify antecedents (personal and family) of and influences on subsequent academic outcomes. In the next sections, we briefly present the theoretical framework for our approach, review the literature on personal and family antecedents of situational adjustment in college, and identify the potential impact of these adjustment challenges on subsequent academic pathways. The specific research objectives and hypotheses are then presented.

Tinto's interactionist model

Tinto's theory of academic persistence (Tinto, 2010) provided part of the inspiration for our analysis of the nature, determinants, and effects of adjustment trajectories during the transition to college. According to the theory, while student persistence is influenced by certain pre-entry attributes, or antecedents (e.g., family background, skills and abilities, and prior schooling), it is also strongly influenced by the college experience, including interactions with faculty and staff as well as peers. Accordingly, student motivations at entry (i.e., intentions, goals, and institutional commitments) are originally shaped by antecedents, but subsequently undergo changes during the transition to college. These changes affect the degree of academic and social integration at college. Hence, the more satisfactory the institutional experiences at college (e.g., academic performance, quality of faculty and peer interactions, and quality of extra-curricular activities), the stronger their influence on academic and social integration, and consequently the greater the motivation to persist at college. Tinto's (2010) theory therefore suggests that academic and social adjustment trajectories during the transition would be highly variable across students according to their pre-entry attributes and according to what they experience at college, and that positive social and academic trajectories during the transition to college could predict better academic outcomes at the end of the college program.

Personal and family antecedents of situational adjustment during the college transition

Following Tinto's (2010) model, several studies have demonstrated that academic success in high school strongly predicts adjustment quality during the college transition, and more particularly, academic adjustment. For example, we know that the high school grade point average (GPA) is the best predictor of success and retention rates in the first term of college (*Ministère de l'enseignement supérieur et de la science / Ministry of higher education and*

science – MESS, 2014; Westrick, Le, Robbins, Radunzel, Schmidt, 2015). Moreover, youth who reported lower grades in high school perceived themselves as less academically competent (Chemers, Hu, & Garcia, 2001), used less effective study strategies (Vrugt & Oort, 2008), and were at greater risk not to graduate from college (Larose, Duchesne, Boivin, Vitaro, & Tremblay, 2015). Academic success in high school could therefore constitute a reliable predictor for membership in a given academic adjustment trajectory during the college transition (e.g., increasing, decreasing, or stable).

Besides academic grades, the research on personal antecedents for college success suggests that externalized behavior problems (e.g., aggression and inattention) during development tend to be associated with adjustment problems in college. For instance, a longitudinal study showed that beyond the contribution of low academic performance in the first college term, aggressive behavior at age 6 years predicted failure to graduate from college in 23-year-olds (Larose et al., 2015). Other studies have demonstrated that fewer youth who present attention and/or impulsivity problems in adolescence enter post-secondary school compared to peers without such problems, and when they do go to college, they exhibit more social problems, have lower self-esteem, and graduate in fewer numbers (see the review by DuPaul et al., 2009). In addition to influencing academic trajectories, the presence of externalized problems during development could therefore determine membership in specific types of social and emotional adjustment trajectories during the college transition.

Students' adjustment trajectories during the college transition could also be influenced by various internalized problems. The research on the college transition has highlighted the fact that youth who show high personal anxiety are at greater risk of having social problems at college, reporting more somatic problems in the first college term, and feeling less attached to their

college (Nordstrom, Swenson Goguen, & Hiester, 2014). Personal anxiety is also thought to be a significant determinant of functioning and academic success for college youth, notably due to its indirect effects on self-esteem and perceived academic competence (Strahan, 2003).

Accordingly, like externalized problems, internalized problems during development could be related to adjustment trajectories during the college transition in academic, social, and emotional terms.

Although previous studies have clearly demonstrated the prevalence of effects of pre-existing personal factors on adjustment during the college transition (Credé & Niehorster, 2012; Brooks & DuBois, 1995), some authors have looked beyond these factors to consider the experience of leaving home and family during the college transition, and more particularly, the quality of parental support during this separation. In fact, constructs such as parental attachment, academic involvement, reciprocity, and autonomy support were found to be significant predictors of college adjustment, especially for social adjustment, institutional attachment, and motivation (Lapoint & Soysa, 2014; Credé & Niehorster, 2012; Ratelle et al., 2004). In addition, research has shown that students who leave home to attend college feel greater solitude and social anxiety during the transition, and they perceive lower support by their social network (Larose & Boivin, 1998). Leaving home was also associated with homesickness, characterized by a combination of depression and anxiety, withdrawn behavior, and problems focusing on topics that are unrelated to home (Thurber & Walton, 2012). Thus, the experience of leaving home during the college transition and, more importantly, the quality of parental academic support throughout the process, might influence how students will adjust to the transition. This view is consistent with Tinto's (2010) model of persistence, which situates the family background as an important determinant for early integration into college.

Situational adjustment during the college transition and perseverance and graduation

Previous studies have conceived adjustment during the college transition mainly as outcomes. To our knowledge, no study to date has examined predictive relationships between adjustment trajectories during the transition and the quality of youth's subsequent academic pathways. Yet Tinto's (2010) proposes that student trajectories would be shaped by the interaction between what they were in high school and what they experience in social and academic systems at college, and that these trajectories would explain a large part of their academic persistence. The meta-analysis by Credé and Niehorster (2012) proposes some hypothetical directions for such an inquiry using cross-sectional results. Accordingly, academic, social, and emotional adjustment would make unique contributions to predict academic success in college students, but academic adjustment would provide by far the greatest explanatory power. The meta-analysis results also suggest that institutional attachment is a strong predictor of academic perseverance. This "meta-conclusion" is fully consistent with the many cross-sectional studies of the sense of belonging demonstrating that a caring, supportive, and welcoming environment in a higher education institution interacts with the student's personal characteristics to predict well-being and academic perseverance (e.g., Ostrove & Long, 2007; O'Keeffe, 2013). In accordance with Tinto's (2010) model, these preliminary findings suggest that adjustment trajectories during the transition could predict different indicators of youth's subsequent academic pathways.

Specificity of the Quebec educational system and potential moderators and controls

The present article examines the adjustment trajectories of students during the college transition in the province of Québec, Canada. For purposes of results generalization, it is

important to understand here the education system in the province of Québec. First, students begin high school typically at age 13, after having completed one year of kindergarten (called preschool) and six years of elementary school. Next, they complete five years of high school (secondary 1 to 5) within a single system (i.e., there is no middle school transition). At the end of the fifth year, they receive a secondary school diploma, which makes them eligible to enter college. All students who wish to go on to university must attend college first. High school graduates who enter college must then choose between two college streams: pre-university and technical. The pre-university stream is a two-year, full-time diploma program that prepares students to enter a three- or four-year university bachelor program. The main pre-university programs are the humanities, natural sciences, computer science, and the arts. The technical stream is a three-year diploma program that prepares students for direct entry into the workforce. Students who graduate from the technical stream can also go on to university. Examples of technical programs are nursing care, social work, and engineering technology.

In this particular setting, taking one or another of these streams could have a substantial moderating influence on adjustment trajectories and the relationships between personal and family antecedents and academic outcomes. A recent survey of a large sample of Québec college students revealed that college admission profiles varied greatly according to the two streams (*Fédération des cégeps*, 2012). Fewer youth in the technical stream came from well-off, well-educated backgrounds, lived with their parents during their college studies, and received financial help from their families compared to youth in the pre-university stream. Moreover, they received more government loans and scholarships, and they generally studied in conditions where professors had more personalized contacts with students but heavier workloads compared to professors in the pre-university stream (*Fédération des cégeps*, 2012). Given these distinct

admission profiles as well as the different experiences of youth between the two streams, we consider the college stream as a potential moderator variable.

In light of the wide gaps in academic success between boys and girls in Québec (MESS, 2014), we also consider student's sex as an influential moderator variable in the relationships between our main variables. This decision is also justified by previous longitudinal findings that girls are more likely than boys to have increased emotional adjustment problems during the college transition that persist up to the end of college (Conley, Kirsch, Dickson, & Bryant, 2014). In addition, they are less likely than boys to experience decreased academic adjustment during the transition (Duchesne et al., 2007), whereas at college entry, boys are already at greater risk for vulnerabilities such as lower relationship satisfaction and feelings of support from others (Conley, Kirsch, Dickson, & Bryant, 2014). Other studies have shown that the effects of the college transition on the parent-child relationship (e.g., communication) were more likely to influence the emotional adjustment of girls than boys (Moreira & Telzer, 2015). Student's sex could therefore moderate some of the associations explored in the present study.

Still other studies on the college transition suggest that parents' education and income levels as well as the high school's socioeconomic status can also influence students' adjustment trajectories during the college transition (Hertel, 2002; Strage, 2000; Toews & Yazedjian, 2007). Notably, some longitudinal studies by the National Center for Education Statistics (NCES) (e.g., Education 2002 and Beginning Postsecondary Students Longitudinal Studies) have shown that more students whose parents did not complete postsecondary studies came from lower earning households, did not go to college, and if they went, did not graduate (Cataldi, Bennett, & Chen, 2018; Redford & Mulvaney Hoyer, 2017). Other NCES studies have shown that, compared to peers from low-poverty schools, considerably fewer high school graduates from high-poverty

schools attended a 4-year institution after graduation (52% vs. 28%, respectively) (Aud, Hussar, Planty, et al., 2010). A frequently proposed hypothesis to explain these relationships is that less well-off, less educated families would have fewer means to support their children during the transition, and at the same time, these children would receive less support from high school peers and staff. However, this hypothesis was called into question by a recent meta-analysis by Credé and Niehorster (2012), who found few significant relationships between these particular sociodemographic variables and self-reported college adjustment. In light of the mixed results in the literature, we opted to use socio-family adversity as a control variable instead of a moderator variable.

The present study

The aim of the present study was to obtain a deeper understanding of the types, antecedents, and outcomes of students' adjustment trajectories during the transition to college. We had three specific objectives. First, we wanted to identify and describe natural adjustment trajectories in a random sample of Québec students, as assessed in their fourth and fifth year of high school and again in the middle of their first and fourth terms at college. In addition to measuring adjustment at repeated time points, we took into account the multidimensional nature (i.e., social, academic, and emotional) of adjustment. Second, with Tinto's (2010) model in mind, we wanted to explore relationships between adjustment trajectories and six personal and family antecedents: academic success in high school, externalized behavior problems (i.e., aggression and inattention), personal anxiety, leaving home to attend college, and parents' engagement in their child's school life in high school. All the antecedents (except for leaving home) were assessed prior to determining the trajectories (i.e., in fourth year high school). Relationships between antecedents and adjustment trajectories were then examined after

controlling for the level of socio-family adversity that the youth experienced in high school, and while considering college stream and student's sex as potential moderators. The third objective, also consistent with Tinto's (2010) model, was to determine relationships between adjustment trajectories during the transition and two significant indicators of student's academic pathways: perseverance in a college program for four terms after admission (perseverance), and graduation with a diploma four years after admission (graduation). In this analysis, we also accounted for the above-mentioned control and moderator variables. In line with these objectives, we propose three hypotheses: 1) the transition to college will be associated with decreasing social, academic, and emotional adjustment trajectories for a majority of students; 2) students with more positive adjustment trajectories during the transition will show, as measured in high school, higher academic success, lower externalized behavior problems (i.e., aggression and inattention), lower personal anxiety, and higher parents' engagement in high school; and fewer of them will leave home to attend college; and 3) more students with more positive trajectories during the transition will persevere in their college program and earn a college diploma.

Method

Participants and procedure

The study sample was drawn from the participants in the ERES project (*Évaluation du Renouveau à l'Enseignement Secondaire* / evaluation of the high school education reform) (Cyrenne et al., 2014; Larose et al., 2016). This longitudinal project was initiated in 2004 and the last data collection was in 2017. Three random samples of high school students were created from the population of all students attending a public or private high school in Québec. The participants were sampled by the *Ministère de l'Éducation et de l'Enseignement Supérieur*

(Ministry of education and higher education – MESS) and had to have begun high school in 2004, 2006, or 2007. The total number of schools included for sampling was 327, and the targeted number of student participants was 1,500 per cohort. The students were invited to complete school adjustment measures at various times, including twice during high school and twice during college: in fourth year (T1: March) and fifth year (T2: March) of high school and in the middle of their first term (T3: October) and fourth term (T4: March) of college. They were also invited to complete a measure of personal anxiety at T1. In addition, one parent per student had to complete a sociodemographic measure, a measure of engagement in their child's school life, and assessments of aggression and inattention problems, all at T1. Indicators provided by the MESS were also compiled for the entire sample at T4 to determine program perseverance four terms after college admission. Graduation with a college diploma was measured four years after admission (Time 5: T5), according to MESS data.

The total sample for the present study was drawn from students in the ERES project who made the transition to college without repeating a high school year (i.e., in the fall of 2009, 2011, and 2012), and who had completed at least three of the four measuring times. This subsample comprised 1405 students (60% girls; 40% boys), which accounts for 42% of the initial sample at T1 ($n = 3345$) and 62% of the sample of students who attended college ($n = 2266$). At Time 1, all students were in their fourth year of high school (mean age = 15.6 years; $SD = 0.41$). Of these, 73% were attending a public school and 27% a private school. The poverty index for the schools that the students attended (i.e., *indice de milieu socio-économique* / socio-economic milieu index: IMSE) was normally distributed, with a high score for 24% of schools (>7) and a low score for 22% (<4). The IMSE accounts for the percentages of families with children whose mother did not graduate from a post-secondary institution and households with unemployed

parents. This score varies from 1 (very advantaged) to 10 (very disadvantaged). The majority of the students in the sample (85%) came from two-parent families, and most of their parents had completed post-secondary education (68% of fathers; 77% of mothers). The median income for mothers was \$30,000 to \$39,999 (CAD), with \$50,000 and over for fathers. Of the total youth sample, 75% enrolled in a pre-university college stream and 25% in a technical stream. Of the total sample, 15% left home to attend college.

Measures and indicators

Situational adjustment during the college transition. Situational adjustment during the college transition was measured at four time points (T1 to T4) with three subscales of the French version of the Student Adaptation to College Questionnaire (SACQ: Baker & Siryk, 1989, translated into French and validated by Larose, Soucy, Bernier, & Roy, 1996). We retained the following subscales: Personal-Emotional Adjustment, Social Adjustment, and Academic Adjustment. The Personal-Emotional Adjustment subscale (7 items) assesses feelings associated with stress, such as loss of appetite, loss of emotional control, feelings of anger, and poor sleep quality. The Social Adjustment subscale (7 items) assesses how students are coping with interpersonal and societal demands at school, their relationships with groups and peers, and social isolation. The Academic Adjustment subscale (7 items) measures students' ability to cope with the diverse demands of the school experience such as exams, study habits, class attendance, and time management. Participants responded to all items on a five-point Likert scale ranging from 1 (*Doesn't apply to me at all*) to 5 (*Applies very closely to me*). The SACQ has high test-retest reliability and internal consistency as well as adequate construct and predictive validity (Baker & Siryk, 1989), as does the French version (Larose, Soucy, Bernier, & Roy, 1996). In the present study, internal consistency coefficients for the Personal-Emotional Adjustment, Social

Adjustment, and Academic Adjustment subscales varied from .73 and .85 across the four measurement times (T1 to T4).

Personal antecedents. The first personal antecedent that we measured was academic success in high school, estimated at T1 (fourth year high school) by student self-assessment of academic grades in three core subjects (language, math, and history). Students responded to the question: “In this school year, and referring to the marks in your reports, how would you rate yourself (out of 100) in the following subjects (French, math, and history)?” We averaged the scores for the three subjects to obtain an “average GPA” as an indicator of academic success.

The second and third personal antecedents were students’ externalized problems (i.e., aggression and inattention). They were assessed by the parents at T1 with two subscales of the French version of the Social Behavior Questionnaire – Parent Version (SBQ; Tremblay, Vitaro, Gagnon, Piché, & Royer, 1992). The Aggression-disruptiveness subscale contains 13 items (e.g., *My child is disobedient at home; My child gets very angry, has crises, or loses his or temper*). The Inattention subscale contains 4 items (e.g., *My child can’t concentrate or pay attention for long; My child daydreams or gets lost in thought*). All items were answered on a three-point Likert-type scale ranging from 1 (*Never applies*) to 3 (*Frequently applies*). Concurrent and predictive validity of the SBQ have been supported in previous studies (e.g., Pagani, Tremblay, Vitaro, Boulerice, & McDuff, 2001; Tremblay et al., 1992). As expected, the bivariate correlation between Aggression-disruptiveness and Inattention scores was moderate in our study ($r = 0.47, p < .001$). The alpha coefficients were .80 for Aggression-disruptiveness and .81 for Inattention.

Personal anxiety was the fourth antecedent considered. This was assessed by the students at T1 with the Worry-Oversensitivity subscale of the French version of the Revised Children’s

Manifest Anxiety Scale (CMAS: Reynolds & Paget, 1983; translated and validated by Turgeon & Chartrand, 2003). It contains 12 items with either a “Yes” or “No” response (e.g., *I have trouble making up my mind; I get nervous when things do not go the right way*). As reported by Turgeon and Chartrand (2003), the internal consistency of this subscale was excellent and the test-retest reliability after a 6-month period was similar to that for the original version. In addition, the concurrent validity, assessed by correlation with the State-Trait Anxiety Inventory for Children, was found to be good. In our study, the alpha coefficient for the Worry-Oversensitivity subscale was .80.

Family antecedents. Two family antecedents were also assessed. The first was leaving home (or not) to attend college. We assigned a score of 1 for students who were still at home at T3 and T4 and a score of 2 for those who left home to attend college between T2 and T3. The second family antecedent was the family’s engagement with the child’s school life (in high school). This variable was assessed at T1 by the parent using an instrument developed by Epstein, Connors, and Salinas (1993) and translated into French and validated in a Québec setting by Deslandes et al. (1995). Parents responded to 20 items on a Likert scale from 1 (*Never*) to 4 (*Very often*) to assess their participation in school-related activities at home and at school (e.g., *I ask my child how school is going; I ask my child if he or she has done their homework; I stay in contact with the teachers; I attend school meetings*). This instrument has shown excellent construct validity (factorial structure) and predictive validity as well as strong internal consistency (Deslandes et al., 1995). In the present study, internal consistency (Cronbach’s alpha) for total scores was .77.

Academic outcomes. We assessed two outcomes in this study. The first was perseverance in a college program since admission, according to compiled MESS data. Students who had

changed their program at least once between the first and fourth college term were assigned to a nonperseverant group (scored as 1), and those who remained in the same program from first to fourth term were assigned to a perseverant group (scored as 2). Students who dropped out of college were not taken into account for this variable.

The second outcome was graduation from college four years after admission, also according to MESS data. Students who had earned a college diploma four years after entering a pre-university or technical program were assigned to a graduate group (scored as 2). Youth who had not obtained a diploma four years after admission, whether or not they were still attending a college in Québec, were assigned to a nongraduate group (scored as 1). Recall that Québec's college programs last for a theoretical two or three years (pre-university and technical, respectively), and that students must graduate from one of these programs in order to enter university.

Moderator variables. Two moderator variables were included in the analysis. The first was the college stream. Students were assigned a score of 1 if they enrolled in a pre-university program and 2 for a technical program. Students who entered a Springboard program (i.e., preparation for college admission) were excluded from the analysis due to insufficient numbers. For the second moderator variable, sex, we assigned a score of 1 for boys and 2 for girls.

Control variables. Relationships between personal and family antecedents, adjustment trajectories, and indicators of student's academic pathways were examined while controlling for three sociodemographic factors: father's and mother's education level, father's and mother's income, and the poverty index of the youth's high school. Parents' education and income were assessed at T1 by the responding parent in the ERES project. On a five-point Likert scale, parents rated their education level (1= Post-university; 2 = University; 3 = College; 4 = High

school; 5 = Elementary) and income (1 = \$50,000 and over; 2 = \$40,000 to \$49,000; 3 = \$30,000 to \$39,000; 4 = \$20,000 to \$29,000; 5 = \$20,000 or less) as well as their spouse's levels (if applicable). The high school poverty index (*indice de milieu socio-économique* / socio-economic milieu index: IMSE) was provided by the MESS. This index varies from 1 (very advantaged) to 10 (very disadvantaged), which we converted to a poverty index ranging from 1 to 5. It expresses the school's degree of poverty in terms of the proportion of families with children in which the mother does not have a high school diploma and the proportion of households in which the parents are unemployed. We used the five indicators (mother's education, father's education, mother's income, father's income, IMSE ranking) to create a socio-family adversity index. First, we summed the mother's and father's incomes to obtain a total score out of 5. We then calculated the average scores for mother's education, father's education, parents' income (mother + father on a scale from 1 to 5), and IMSE ranking. The obtained socio-family adversity indicator theoretically varies from 1 (low adversity) to 5 (high adversity). In our sample, the average adversity score was 2.46 ($SD = .98$) with normally distributed scores.

Missing data

Attrition is a common problem in longitudinal research (Graham, 2009; Ployhart & Vandenberg, 2010). In our study, some students did not participate at all measurement times. The quantity of missing data varied from 2.4% (T1 vs. T2) to 22.5% (T1 vs. T4) for the adjustment assessments across the four measurement times, for an average of 10.4%. Little's (1988) MCAR test showed that the data were missing completely at random for the personal-emotional adjustment scores ($\chi^2 [24] = 31.06$, n.s.) but not for the academic ($\chi^2 [24] = 79.24$, $p < .001$) or social ($\chi^2 [24] = 52.97$, $p < .001$) adjustment scores. To overcome this problem, we elected to exclude from further analysis all youth who had participated at only one or two measurement

times, and to analyze trajectories for youth who had provided data at least at three of the four first measurement times. The quantity of missing data then dropped by 5.7% between T1 and T2, and the total analyzed sample dropped to 1325 students

Data Analysis

Our first research objective was to describe trajectories of student adjustment during the college transition. In order to meet this objective, we used a semiparametric approach to identify the trajectories (Nagin, 1999). Semiparametric mixture models were estimated using the SAS TRAJ procedure (Jones, Nagin, & Roeder, 2001), allowing us to identify how many groups of students belonged to distinct trajectories, describe the shape of the trajectory for each subgroup, and estimate the proportion of students in each trajectory subgroup. Three distinct separate trajectory analyses were performed to depict personal-emotional, academic, and social changes. Adjustment trajectories were modeled using the four adjustment scores (T1 to T4). The optimal number of groups was determined by estimating models with two, three, four, and five groups. Trajectory shapes were determined by estimating models with linear and quadratic trajectory shapes (or parameters). Models that best fit the data were determined according to the Bayesian Information Criterion (BIC), calculated as follows:

$$\text{BIC} = -2 \log (L) + \log (n) \times k$$

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 BIC magnitude, it has been proposed that the optimal model has the maximum BIC value. Because BIC is always negative, the maximum BIC is the least negative value. The procedure calculates the probability for each candidate of belonging to each group, based on observed longitudinal patterns (Nagin, 1999). It also determines the assigned trajectory group membership

based on the highest classification probability across groups (or the maximum probability rule). Taken together, these two estimates (i.e., BIC and probabilities) provide information on model fit. Hence, youths belonging to a particular trajectory group should have a high mean probability (maximum of 1) of being assigned to that group on the basis of the maximum probability rule and a low mean probability (minimum 0) of being assigned to another group. A good fit would be reflected by probabilities of around .70/.80 or higher.

The second and third research objectives were addressed using multivariate analyses of covariance (MANCOVAs: one per trajectory type) followed by ANCOVAs and post-hoc tests at $p < .01$ (Student-Newman-Keuls test). For each analysis, the variable trajectory group, as created in the first step, was entered as a factor, with the personal and family antecedents as dependent variables and the socio-family adversity index as a covariable. The analyses were initially run without the moderator variables, and subsequently while separately considering the contribution of the two moderator variables (college stream and sex) in a two-factor design (Trajectories X Moderator). The relationships between the indicators perseverance and graduation were determined using contingency analysis (X^2) with the inclusion of the control variable (socio-family adversity) and the moderator variables (college stream and sex) in the different analysis designs. Descriptive statistics (means, standard deviations, percent, and partial eta squared) were also reported.

Results

Student adjustment trajectories during the college transition

Models from two to five groups were estimated using the TRAJ procedure. Based on the BIC values and the probabilities of belonging to each group, the models that included five trajectory groups provided the best fit to the data for the four adjustment types. In the case of

personal-emotional adjustment, the BIC for the five-group model was -4994.08 compared to -5161.19, -5038.08, and -5009.93 for the two-, three-, and four-group models, respectively. For academic adjustment, the BIC for the five-group model was -4785.87 compared to -4891.76, -4809.29, and -4793.42, for the two-, three-, and four-group models, respectively. For social adjustment, the BIC for the five-group model was -4992.83 compared to -5080.48, -5026.45, and -5000.84 for the two-, three-, and four-group models, respectively. Table 1 presents the mean assignment probabilities for the five-group models according to the maximum probability assignment rule. The probability of belonging to a given group varied from .70 to .83, suggesting appropriate model fit.

Descriptions of the trajectory groups are presented in Figures 1a, 1b, and 1c. Figure 1a shows the emotional adjustment trajectories. A large proportion of students (73.9%) reported no changes in emotional adjustment during the transition (45% moderate stable; 24.6% high stable; 4.3% low stable); 14.5% reported decreased emotional adjustment and 11.6% improved. Interestingly, the trajectories that changed did so linearly, and beginning in fifth year high school, suggesting that these youth anticipated either problems or new opportunities at the time of transition. The analysis of the moderator and control variables showed that membership in an emotional adjustment trajectory did not vary according to either college stream or socio-family adversity index. However, it did vary according to sex, $X^2(4) = 59.79, p < .0001$. Girls were proportionately more numerous in the low stable (86.4%), low increasing (74.2%), and moderate decreasing (71.4%) trajectories compared to the moderate stable (63.2%) and high stable (48.4%) trajectories.

Figure 1b shows the academic adjustment trajectories. The majority of students (66.1%) reported decreased academic adjustment during the transition (43.5% high decreasing; 22.6%

moderate decreasing), with 11.6% improved adjustment and 22.3% no significant changes in academic adjustment (6.3% very high stable; 16% low stable). Like those for emotional adjustment, these trajectory changes were linear and began in fifth year high school. Analysis of the moderator and control variables showed that only college stream was associated with academic trajectory membership, $X^2(4) = 16.66, p < .005$. Proportionately more youth in the technical stream belonged to the low increasing (32%) trajectory compared to other trajectories (21% on average).

Figure 1c shows the social adjustment trajectories. The great majority of students (89.4%) reported no changes in social adjustment during the transition (4.3% very high stable; 60% high stable; 25.1% moderate stable), with 6% decreased and 4.6% improved social adjustment. The changes in social adjustment were once again linear and began in fifth year high school. The analysis of moderator and control variables showed that membership in a social adjustment trajectory varied according to college stream, $X^2(4) = 14.42, p < .01$. Proportionately more youth in the technical sector were in the low increasing (34.6%) trajectory compared to the moderate stable (18.2%) and very high stable (20.7%) trajectories.

Personal and family antecedents of trajectory groups

In the second analysis step we explored differences between trajectory groups with respect to all the personal and family antecedents while controlling for the socio-family adversity index. Tables 2a, 2b, and 2c present the adjusted means and standard errors for the variables according to the emotional, academic, and social adjustment trajectory groups. The effect size for trajectory group is given by the partial eta squared (η_p^2) statistic.

An initial multivariate analysis of covariance (MANCOVA) revealed that all antecedents varied according to the emotional adjustment trajectory groups, $F(24, 5256) = 57.28, p < .0001$. Univariate analyses of covariance (ANCOVAs) followed by post-hoc tests (see Table 2a) highlighted the following differences: the low stable group reported lower average GPA in high school than the other groups, $F(4, 1314) = 3.98, p < .005$; the low increasing group showed more aggressive behavior in high school than the high stable group, $F(4, 1314) = 3.67, p < .01$; the low stable and low increasing groups had more attention problems in high school than the high stable group, $F(4, 1314) = 3.54, p < .01$; and all groups had statistically differing anxiety levels, with more anxiety in high school for the low stable, low increasing, and moderate decreasing groups and less anxiety for the moderate stable and high stable groups, $F(4, 1314) = 79.45, p < .0001$. Family antecedents showed no associations with emotional adjustment trajectory groups. As presented in Table 2a, the η_p^2 statistic indicates that personal anxiety explains most of the variance among trajectory groups (28.2%), with small effect sizes for the other factors.

The multivariate analysis (MANCOVA) conducted with academic trajectory groups also revealed significant differences, $F(24, 5256) = 48.76, p < .0001$, which cannot be explained by socio-family adversity. Univariate analysis of covariance (ANCOVA) followed by post-hoc tests (see Table 2b) revealed the following differences: the low stable and low increasing groups had lower average GPA than all other groups and the very high stable group had higher average GPA than the high decreasing group, which in turn had higher average GPA than the moderate decreasing group, $F(4, 1364) = 38.54, p < .0001$; the low stable group showed more aggressive behavior in high school than the very high stable group, $F(4, 1314) = 3.58, p < .01$; the low stable and moderate decreasing groups showed the most attention problems in high school,

followed in descending order by the low increasing and high decreasing groups and finally by the very high stable group, which showed the fewest attention problems in high school, $F(4, 1314) = 16.76, p < .0001$; and the low stable group showed more anxiety in high school than all other groups, while the low increasing and moderate decreasing groups showed higher anxiety than the high decreasing and very high stable groups, $F(4, 1314) = 24.28, p < .0001$. Family antecedents showed no associations with academic adjustment trajectory groups. Table 2b presents the η_p^2 statistics, indicating that, taken together, average GPA (16%), attention problems (7.6%), and anxiety (10.7%) explained 34.3% of the variance in academic adjustment trajectories, with small effect sizes for other factors.

Multivariate analyses (MANCOVAs) according to social adjustment trajectory groups also revealed significant differences that were not explained by socio-family adversity, $F(24, 5256) = 22.15, p < .0001$. Univariate analyses of covariance (ANCOVAs) and post-hoc tests (Table 2c) highlighted the following differences: the low increasing group showed more personal anxiety in high school than the moderate decreasing and moderate stable groups, which in turn showed higher anxiety than the high stable and very high stable groups (with statistically different levels between the high stable and very high stable groups), $F(4, 1314) = 29.81, p < .0001$; proportionately more youth who left home to attend college belonged to the low increasing (19%) and moderate decreasing (22%) groups than the very high stable group (5%), $F(4, 1314) = 3.27, p < .05$ et $X^2(4) = 9.80, p < .05$; and parents of youth in the moderate stable group were less engaged in their child's school life than parents of youth in the very high stable group, $F(4, 1314) = 3.42, p < .05$. Table 2c presents the η_p^2 statistics, indicating that personal anxiety explains the largest portion of the variance between these trajectory groups (12.8%), with relatively smaller secondary effect sizes for family factors.

To determine the effects of our two moderators (college stream and sex) on the relationships between personal and family antecedents and adjustment trajectories, we ran a second set of multivariate and univariate analyses with each moderator included separately. Results showed no significant moderator effect.

Trajectory groups and academic outcomes

In the final analysis step, we explored relationships between adjustment trajectory groups and two indicators of youth's academic pathways: perseverance after four terms in the original college program (T4), and graduation with a diploma four years after admission (T5). Table 3 present the descriptive statistics.

Membership in a given emotional adjustment trajectory is about equally associated with perseverance, $X^2(4) = 21.69, p < .0001$, and graduation, $X^2(4) = 20.96, p < .0001$. The upper part of Table 3 presents the percentages, showing that the high stable group contained the highest number (83.6%) of youth who persevered in their program, with the lowest number (65%) for the low stable group. The three other groups are situated in the middle, with the low increasing group showing higher program perseverance than the low stable group. In addition, proportionately more students in the low increasing (77%), moderate stable (80.8%), and high stable (83.8%) groups obtained a college diploma than in the moderate decreasing (70.9%) and low stable (65%) groups. None of the relationships between emotional adjustment trajectories and pathway indicators were moderated by sex or college stream. However, socio-family adversity showed a moderator effect on the relationships between emotional adjustment trajectories and graduation, with a significant association for youth from disadvantaged backgrounds, $X^2(4) = 17.25, p < .001, \eta^2 = .04$, but not for youth from advantaged backgrounds,

$X^2(4) = 4.85, p = .303, \eta^2 = .007$. Thus, the emotional adjustment trajectories were associated with graduation, but only for youth from disadvantaged backgrounds.

Table 3, central part, presents the results on relationships between academic adjustment trajectories and pathway indicators, indicating that membership in a given academic adjustment trajectory is also associated with perseverance, $X^2(4) = 21.69, p < .0001$, and graduation, $X^2(4) = 64.49, p < .0001$. More students in the very high stable (94.2%) and high decreasing (86.2%) groups persevered in their program than in the low increasing (77.3%) group, followed by the low stable (66.5%) and moderate decreasing (70.4%) groups. In addition, more students in the high decreasing (81.6%) and very high stable (86.7%) groups obtained a diploma compared to students in the low stable (62%) and moderate decreasing (63.4%) groups. The low increasing group was situated in the middle (71.1%). No significant moderator effects of sex, college program, or socio-family adversity were found.

The lower part of Table 3 presents the results on relationships between social adjustment trajectories and pathway indicators. Membership in a given social adjustment trajectory is associated with perseverance, $X^2(4) = 23.17, p < .0001$, and graduation, $X^2(4) = 14.41, p < .01$. Proportionately more students in the high stable (81.4%) and very high stable (88.5%) groups persevered in their program compared to the low increasing (74.1%), moderate decreasing (73.8%), and moderate stable (73.5%) groups. Proportionately, the low increasing (66.1%) and moderate decreasing (56.3%) groups contained the fewest students to obtain a diploma, with the most in the high stable (77.2%) and very high stable (83.6%) groups. The moderate stable group was situated in the middle (71.5%). The analysis of the effects of moderator and control variables showed that sex and socio-family adversity influenced the relationships between social adjustment trajectories and graduation, with a significant effect for girls, $X^2(4) = 18.56, p <$

.001, $\eta^2 = .05$, but not for boys, $X^2(4) = 1.25, p = .870, \eta^2 = .002$. In addition, the effect was significant for youth from disadvantaged backgrounds, $X^2(4) = 13.82, p < .01, \eta^2 = .07$, but not for students from advantaged backgrounds, $X^2(4) = 2.86, p = .582, \eta^2 = .003$. Thus, the social adjustment trajectories were associated with graduation, but only for girls and for youth who had been exposed to higher-adversity family environments.

Discussion

Although several studies have explored changes in youth adjustment during the transition to college (see, e.g., Conley et al., 2014; Duchesne, et al., 2007; Fromme, Corbin, & Kruse, 2008; Pritchard, Wilson, & Yamnitz, 2007), none to our knowledge have examined adjustment trajectories from the fourth year of high school to the completion of a college program, and only a handful have attempted to identify determinants of these trajectories or measured their consequences for subsequent academic pathways. Drawing on certain premises of Tinto's (2010) interactionist model, we predicted that adjustment trajectories, while presenting wide variability across students, would be decreasing for the majority of students, would be predicted by academic and family antecedents, and would in turn predict academic perseverance in college and graduation with a college diploma.

Student adjustment trajectories during the college transition

Contrary to our first hypothesis, our results showed that the great majority of students who experienced social and emotional adjustment problems in college had experienced comparable levels of problems in high school, while the great majority of students who reported good social and emotional functioning in college had few adjustment problems in high school. Overall, these results suggest much greater continuity than discontinuity in student's ability to adapt to the college transition, at least in terms of social and emotional adjustment (Schulenberg,

Maggs, & O'Malley, 2003). Moreover, they also suggest that social and emotional adjustment during the college transition is more influenced by stable individual processes (e.g., traits) than by social processes related to specific aspects of the environmental transition (e.g., changing schools or groups of friends). These findings are consistent with some previous research showing that personality traits such as neuroticism, extraversion, agreeableness, and perfectionism are strongly associated with college student adjustment (Pritchard, Wilson, & Yamnitz, 2007). They are also consistent with other research indicating that these traits generally explain more of the variance in adjustment and academic success in college compared to contextual variables like parental support (Schnuck & Handal, 2011) or teacher support (Duchesne et al, 2007). The hypothesis of continuity is also supported by a significant finding of our study: personal anxiety explains the largest part of the variance in emotional and social adjustment, whereas leaving home to attend college and parental support throughout the academic pathway explain very little. We revisit this point further below.

The results were very different for academic adjustment (or student's ability to cope with the diverse demands of the school experience, such as exams, study habits, class attendance, and time management), and were more in line with our first hypothesis. A large majority of students who showed either high or moderate adjustment in fourth year high school reported decreased academic adjustment between fourth year high school and the second year of college. Academic adjustment therefore shows considerably more discontinuity compared to social and emotional adjustment. One intriguing finding that emerged however from the trajectory analysis is that academic adjustment began to decline in fifth year high school (and not in the first year of college), as was the case for the decreasing and increasing social and emotional adjustment trajectories, although these included fewer numbers of students. Interestingly, no quadratic effect

was found on the trajectories, indicating that the changes in adjustment were not steeper during the first months of college than before. How can this linear decrease in academic adjustment, which begins in fifth year high school, be explained? We propose two hypotheses.

The first hypothesis is based on the possibility of interaction effects between the greater demands of academic life and social comparisons among peers. Speaking generally, the further that students advance within a given education system, the greater the cognitive challenges. For example, high school students in Québec must pass many more ministerial exams in order to graduate from fifth year compared to fourth year. In addition, if they want to take scientific or technological programs in college, they have to pass advanced math courses, and these classes tend to be more homogenous and competitive. Students who opt for arts and communication programs must pass enriched foreign language courses. These new demands and situations imply greater cognitive challenges, suggesting that academic adjustment problems could become more acute as students advance through the academic pathway, even before they get to college.

The second hypothesis is that students might anticipate the academic challenges that they will have to deal with in order to pass their first college term. It is possible that, at the end of fourth year high school, they would worry about what college will be like. Will they manage to handle the demands of their courses and teachers? Will they be able to adapt to the faster pace of the college term (four months per term compared to 10 months in high school)? Will they survive and thrive in the competitive atmosphere? Such worries and anticipations could explain why academic adjustment trajectories begin to decline in fifth year high school. Accordingly, students would be cognitively involved in the transition prior to cope with real academic requirements. In line with this hypothesis, one study has shown that at the end of high school, many youth experience higher stress that is comparable to what they feel during the first months

of postsecondary studies (Pancer, Hunsberger, Pratt, & Alisat, 2000). Taken together, these results suggest that students experience the college transition primarily in academic terms, and that this process begins “in their mind” before they set foot in the college itself.

Different patterns of moderation emerged from our analyses. Compared to boys, girls were at greater risk for emotional adjustment problems during the transition. This result partly concurs with Conley et al.’s (2014) finding that girls were more likely than boys to have greater emotional adjustment problems that persist up to the end of college. However, our results show that more girls than boys belonged to the increasing trajectory (i.e., with fewer emotional problems) and the low stable trajectory (i.e., with previous emotional adjustment problems in high school). These results, which were obtained from group-based analysis, provide a more nuanced picture compared to previous studies, and call for more in-depth examinations of how the college transition affects emotional adjustment in girls.

Another finding that emerged from the moderator analysis is that more students in the technical college stream, even though they were less numerous in high stable trajectories, reported better academic and social adjustment during the transition compared to students in the pre-university stream. These positive changes could be explained by a number of factors. Compared to students in the pre-university stream, students in the technical stream might expect less peer competition (because students in the technical stream generally get lower grades than students in the pre-university stream). They might also anticipate taking a training program that meets their needs and is suited to their talents. Moreover, they might look forward to leaving high school, which can be difficult socially, and entering a college program where they would enjoy good relationships with the teachers and students, as described in previous research (*Fédération des cégeps*, 2012). Nevertheless, it is unclear whether these improvements were

already apparent in fifth year high school. Like the case of the academic adjustment trajectory, it is possible that an expectation process (positive, for some students in the technical stream) would operate here as well.

Personal and family antecedents of trajectory groups

The results of the analysis of the personal antecedents support our second hypothesis, which led us to qualify the roles of the different antecedents. It clearly showed that anxiety plays a prominent role in explaining the adjustment trajectories. The higher the anxiety in high school, the more that students belonged to at-risk trajectories for emotional, social, and academic adjustment problems, regardless of whether the trajectories were low stable or decreasing. Anxiety was therefore the determinant that explained the greatest part of the variation in the emotional and social trajectories, and it also contributed to explain a large part of the variation in the academic adjustment trajectories. These results concur with those of other studies (Nordstrom, Swenson Goguen, & Hiester, 2014; Strahan, 2003) showing that anxiety predicts interpersonal and somatic problems during the college transition and negatively affects academic success. As measured in our study, anxiety represents a state of mind that considerably hinders student functioning. In that regard, previous studies have shown that this type of anxiety interferes with student attention, self-regulation, interpersonal relationship, and self-esteem processes (Semple, Lee, Rosa, & Miller, 2010; Teubert & Pinquart, 2011), which could make the college transition more challenging.

Besides anxiety, the results of the present study show that academic success and attention problems in high school constitute significant determinants of adjustment trajectories. Unlike anxiety, however, academic success and attention problems in high school were limited to the academic sphere. These results confirm the findings of other cross-sectional studies that found

positive associations between these determinants and the student level of college adjustment (MEES, 2014; Westrick, Le, Robbins, Radunzel, Schmidt, 2015; DuPaul et al., 2009). Like anxiety, academic success and attention problems as of fourth year high school appear to determine trajectory membership during the transition. These findings call for proactive interventions to help students with emotional regulation and attention management well before they enter college.

Surprisingly, and contrary to the findings of some studies (e.g., Lapoint & Soysa, 2014; Ratelle et al., 2004; Larose & Boivin, 1998) and to part of our second hypothesis, we found very few significant relationships between family determinants (parental engagement in school life and leaving home to attend college) and student adjustment trajectories. The only significant relationships were with social adjustment, but with quite small effect size. It is therefore possible that these determinants, although transversally associated with the quality of college adjustment, had very limited power to predict future trajectory membership. It is also possible that the use of parent-reported engagement in school life as a measure may have limited or qualified the strength of the relationships with student's adjustment trajectories. The vast majority of previous studies that found associations between parental support and student's college adjustment used student-reported measures of parental support (Credé & Niehorster, 2012). Their measures could have artificially amplified the effect of the associations between what the parents actually did and the quality of their child's adjustment. Moreover, it is arguable that parental engagement would diminish toward the end of high school, thereby limiting the effects on the adjustment trajectories (Skaliotis, 2009). Further studies are needed to gain a deeper understanding of how parental engagement and leaving home can predict adjustment trajectories during the college transition.

Trajectory groups and academic outcomes

Consistent with our third hypothesis, adjustment trajectories during the college transition were strongly associated with perseverance in a college program and obtaining a college diploma. More students who belonged to at-risk adjustment trajectories during the transition ended up changing their college program or did not obtain a college diploma four years after admission (theoretically, it takes three years to earn a technical diploma and two years for a pre-university diploma). Of note, the analyses also showed that these relationships were present for all trajectory types (emotional, academic, and social), despite the fact that some trajectory types were much more stable than others for most youth, as reported above. These results confirm previous finding that student's history of adjustment problems since fourth year high school affected their academic pathway and lowered their odds of graduating from college (Larose et al., 2015). They are also consistent with the premise of Tinto's (2010) interactionist model, which posits that student adjustment to academic and social systems at college would be determinant in predicting perseverance and graduation. One interesting observation that arose from the analysis is that significantly more students who reported improved adjustment between fourth year high school and the end of college, including those who had substantial adjustment problems at baseline (i.e., low increasing trajectories), ended up persisting in their college program (for emotional and academic trajectories) and earning a diploma (for all three trajectory types) compared to students in low stable and moderate decreasing trajectories. This significant finding clearly suggests that improving the social, emotional, and academic experience of at-risk youth during the transition (or starting in fourth year high school) could help reduce college failure and dropout rates (Tinto, 2010).

The examination of the moderators showed that the emotional and social adjustment trajectories wielded more influence on college graduation when the students had experienced socio-familial adversity. Given the more limited support and resources available in at-risk families, it is understandable that the college transition would be more determinant for these students. Perhaps better emotional and social experiences during the transition would help compensate for problems related to their disadvantaged background. The good news here is that by improving these experiences during the transition, even students with fewer external resources could be encouraged to persevere in their college studies and graduate.

The examination of the moderators also showed that membership in a given social adjustment trajectory predicted graduation more strongly for girls than boys. Notably, better social experiences during the transition enabled more girls than boys to obtain a college diploma. This result is reminiscent of how the identity exploration process differs between boys and girls (Arnett, 2013). For girls, identity is generally associated with maintaining relationships with romantic partners, friends, and family. This process would become particularly salient in pursuing academic and vocational goals. From this perspective, it is possible that in order to graduate from college, girls have greater need of a successful social experience during the transition so that they can pursue their explorations of identity.

Strengths and limitations

This study has several strengths. First, it is the first longitudinal study to describe student's adjustment trajectories during the transition from a multidimensional perspective and considering four assessment times (two in high school and two in college). These methodological advantages enabled drawing a more detailed and nuanced portrait of the developmental process surrounding the college transition. According to our results, this process is first and foremost

academic, and it appears to operate well before the first college term. Second, this study addressed a sample that was representative of all youth attending college across the province of Québec. The adjustment trajectories are therefore independent of the individual college settings, and hence more normative than those described in previous studies. Third, our study includes an examination of the association between the trajectories and subsequent academic outcomes, which enabled demonstrating that the social, emotional, and academic experiences of students during the transition are determinant for predicting perseverance in a college program and graduation with a diploma.

Despite these strengths, this study also includes certain limitations. First, the exploration of the antecedents of the adjustment trajectories focused mainly on personal and family variables. It would be useful in future studies to examine the role of college environment variables as well. How do teaching practices, school climate, and peer relationships contribute to explain adjustment trajectories? To what extent can preventive measures in high school and accommodation policies in college improve adjustment trajectories for at-risk students? Second, this study was conducted in a specific setting (the province of Québec), where students enter college at a younger age (17 vs 18 years), student mobility is lower (15% of our sample), and program length is shorter (2 or 3 years) than what is generally the case for 4-year colleges and American universities. This could explain the strong stability of the social and emotional trajectories observed in our study. Third, we focused exclusively on academic outcomes (program perseverance and graduation). In future studies, it would be instructive to explore the effects of adjustment trajectories on vocational outcomes as well, such as career indecision. Fourth, it is important to mention that the group of students in our study who did not graduate could have included students who dropped out as well as students who remained enrolled in a

program but who took more time to complete their diploma. Our measure is therefore limited in terms of distinguishing between students who did and did not graduate, and it does not account for college dropout. Finally, we did not assess students' intentions, goals, or commitments during the transition, which limits the ability of the results to validate Tinto's theoretical model. The model predicts that students' motivational characteristics will be initially influenced by antecedents, and that academic and social experiences at college will then have significant bearing. The ultimate motivations that result from this process will determine the decision to withdraw from college or persist. Although our original intention was not to validate Tinto's model in its entirety (but instead to use it as a basis for predicting the effects of antecedents on adjustment trajectories, college perseverance, and graduation), future studies should include assessments of students' intentions, goals, and commitments during the transition from high school to college.

Implications for future research and theory

The results of this study have significant implications for the research on the transition to college, and for certain theories that attempt to delineate the effects of this transition on student adjustment. First, the results call for researchers to better document the effects of the transition by ensuring that student adjustment is measured at several times, both before and after college. The results of the present longitudinal study clearly show that, for some students, changes in adjustment during the transition have already begun in fourth year high school, before college entry. Longitudinal studies of the transition are therefore strongly recommended. Second, our results point to the need to pay closer attention to the contribution of students' personal antecedents to explain adjustment trajectories during the transition. Academic success, externalized problems, and anxiety, as measured in secondary four, all appear to be significant

predictors of student trajectories during the transition. Hence, it would be important for explanatory models of adjustment during the college transition to account for these personal antecedents. For this purpose, the strength of Tinto's (2010) interactionist model is the emphasis on the social and academic experiences at college and their congruence with the student's personal antecedents and goals. Nevertheless, this model includes a limitation for explaining adjustment trajectories, inasmuch as it does not clearly delineate the student's personal antecedents. While acknowledging the key role of support provided by college staff, it is important to explore how this support interacts with the student's personal antecedents to explain college adjustment. Finally, the results obtained with the methods used in the present study (group-based trajectory) clearly indicate the presence of wide variation in students' adjustment trajectories. Future studies should consider this variability, without presuming that the transition would affect all students equally.

Implications for practice

Our results underscore the importance of the college transition experience for the subsequent academic pathway. They also support the need for colleges to invest in annual, universal preventive measures designed to make the transition experience more comfortable and constructive for students. However, our results also suggest that high schools and colleges would gain by harmonizing their universal preventive efforts. Because the transition process appears to begin in the minds of students well before they set foot in college, there is a need to intervene as early as fourth year high school, when youth may already be thinking about what they want to study at college. This recommendation aligns with the conclusion of a recent meta-analysis showing that preventive programs that are limited to college generate widely varying and often insignificant effect sizes on academic perseverance and success (Valentine, Hirschy, Bremer,

Novillo, Castellano, & Banister, 2011). We must intervene earlier in the transition process: according to our results, this process begins in the fourth year of high school.

Our results also invite high school and college educators to design preventive interventions more thoughtfully. In light of our findings on the antecedents of adjustment trajectories, interventions should address youth's erroneous worries and beliefs about college and aim to dispel their anxieties or equip students to handle them better. Interventions should also help students improve their decision-making and attentional skills and prevent the negative effects of academic failure in high school from eroding their feelings of competence. To this effect, some high schools have implemented preventive programs in which students develop a "growth mindset" and learn strategies for emotional regulation, self-control, and problem solving (Dweck, Walton, & Cohen, 2014). We believe that if these types of intervention are applied during the high school–college transition, upcoming generations of students will reap the benefits.

In conclusion, our results demonstrate that adjustment problems during the transition are determinant for youth's academic pathways down the road. However, they suggest that the transition effect is confined to the academic experience (more than the social and emotional experience), and that it begins to operate in fourth year high school. Colleges and high schools are recommended to intervene early in high school and to tailor interventions to reduce anxiety, deal with worries, and dispel false beliefs, while strengthening attentional and decision-making strategies.

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Table 1

Mean assignment probabilities to group trajectories for personal-emotional, academic, and social adjustment (conditional on assignment by maximum probability rule).

	<i>M</i>	<i>SD</i>	<i>Order</i>
Personal-emotional adjustment			
Low and Stable (LS) (n = 61)	0.83	.03	0
Low Increasing (LI) (n=160)	0.71	.01	1
Moderate Decreasing (MD) (n=206)	0.70	.01	1
Moderate and Stable (MS) (n=618)	0.76	.01	0
High and Stable (HS) (n=330)	0.83	.01	0
Academic adjustment			
Low and Stable (MS) (n=220)	0.79	.02	0
Moderate Increasing (MI) (n=160)	0.70	.02	1
Moderate Decreasing (MD) (n=310)	0.74	.01	1
High Decreasing (HS) (n=598)	0.80	.05	1
Very High and Stable (VHS) (n=87)	0.79	.01	0
Social adjustment			
Low Increasing (LI) (n=64)	0.80	.03	1
Moderate Decreasing (MD) (n=82)	0.75	.02	1
Moderate and Stable (MS) (n=345)	0.77	.01	0
High and Stable (HS) (n=825)	0.72	.01	0
Very High and Stable (VHS) (n=59)	0.75	.01	0

Note: The order indicates whether the trajectory was flat (0), linear (1) or quadratic (2).

Table 2a

Adjusted means, standard errors, and effect sizes for all personal and family characteristics as a function of emotional trajectory groups (n = 1325)

	Low stable	Low increasing	Moderate decreasing	Moderate stable	High stable	
	<i>Mean</i> (SE)	<i>Mean</i> (SE)	<i>Mean</i> (SE)	<i>Mean</i> (SE)	<i>Mean</i> (SE)	η_p^2
Personal precursors						
High school average	3.44 ^a (0.12)	3.67 ^b (0.08)	3.73 ^b (0.07)	3.77 ^b (0.04)	3.91 ^b (0.05)	.019
Aggressive Behaviors	1.40 ^{ab} (0.05)	1.42 ^b (0.03)	1.38 ^{ab} (0.03)	1.39 ^{ab} (0.01)	1.31 ^a (0.02)	.018
Inattention	1.39 ^a (0.06)	1.35 ^a (0.04)	1.33 ^{ab} (0.03)	1.27 ^{ab} (0.02)	1.23 ^b (0.02)	.017
Anxiety	7.87 ^a (0.46)	6.31 ^b (0.28)	5.78 ^b (0.25)	3.49 ^c (0.13)	2.05 ^d (0.18)	.282
Family precursors						
Leaving family	1.23 (0.06)	1.16 (0.04)	1.16 (0.03)	1.13 (0.02)	1.15 (0.02)	.004
Parent academic Involvement	2.94 (0.07)	2.93 (0.05)	2.96 (0.04)	2.98 (0.02)	3.04 (0.03)	.008

Note. Different letters indicate a statistical difference at $p < .01$ using the Student-Newman Keuls.

Table 2b

Adjusted means, standard errors, and effect sizes for all personal and family characteristics as a function of academic trajectory groups (n = 1325)

	Low stable	Low increasing	Moderate decreasing	High decreasing	Very high and stable	
	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	Mean (SE)	η_p^2
Personal precursors						
High school average	3.28 ^a (0.06)	3.47 ^a (0.07)	3.73 ^b (0.05)	3.96 ^c (0.03)	4.31 ^d (0.09)	.160
Aggressive Behaviors	1.43 ^a (0.03)	1.37 ^{ab} (0.03)	1.41 ^{ab} (0.02)	1.36 ^{ab} (0.02)	1.29 ^b (0.04)	.017
Inattention	1.44 ^a (0.03)	1.29 ^{bc} (0.03)	1.35 ^{ab} (0.02)	1.22 ^c (0.02)	1.13 ^d (0.04)	.076
Anxiety	5.66 ^a (0.26)	4.31 ^b (0.31)	4.53 ^b (0.22)	3.01 ^c (0.15)	2.57 ^c (0.41)	.107
Family precursors						
Leaving family	1.13 (0.03)	1.16 (0.04)	1.18 (0.03)	1.13 (0.02)	1.22 (0.05)	.003
Parent academic Involvement	2.96 (0.04)	2.97 (0.05)	2.98 (0.03)	2.99 (0.02)	3.09 (0.06)	.004

Note. Different letters indicate a statistical difference at $p < .01$ using the Student-Newman Keuls.

Table 2c

Adjusted means, standard errors, and effect sizes for all personal and family characteristics as a function of social trajectory groups (n = 1325)

	Low Increasing	Moderate decreasing	Moderate and stable	High and stable	Very high and stable	η_p^2
	<i>Mean (SE)</i>	<i>Mean (SE)</i>	<i>Mean (SE)</i>	<i>Mean (SE)</i>	<i>Mean (SE)</i>	
Personal precursors						
High school average	3.77 (0.12)	3.52 (0.11)	3.78 (0.05)	3.78 (0.03)	3.97 (0.11)	.011
Aggressive Behaviors	1.32 (0.04)	1.45 (0.04)	1.39 (0.02)	1.37 (0.01)	1.33 (0.04)	.007
Inattention	1.30 (0.05)	1.38 (0.05)	1.30 (0.02)	1.27 (0.01)	1.26 (0.05)	.008
Anxiety	7.13 ^a (0.47)	5.45 ^b (0.43)	4.78 ^b (0.21)	3.31 ^c (0.13)	1.90 ^d (0.45)	.128
Family precursors						
Leaving family	1.24 ^a (0.05)	1.26 ^a (0.05)	1.14 ^{ab} (0.02)	1.13 ^{ab} (0.02)	1.07 ^b (0.05)	.012
Parent academic Involvement	3.05 ^{ab} (0.07)	2.97 ^{ab} (0.06)	2.91 ^a (0.03)	3.00 ^{ab} (0.02)	3.08 ^b (0.06)	.011

Note. Different letters indicate a statistical difference at $p < .01$ using the Student-Newman Keuls.

Table 3

Proportion within trajectory groups of students who persevere in their program after 4 sessions in college and got their diploma after 4 years in college (n = 1325)

	Emotional Trajectories					η^2
	Low stable %	Low increasing %	Moderate decreasing %	Moderate stable %	High stable %	
Program persistence	65.0	73.1	69.4	72.0	83.6	.02
College diploma	65.0	77.0	70.9	80.8	83.8	.02
	Academic Trajectories					η^2
	Low stable %	Low increasing %	Moderate decreasing %	High decreasing %	Very high and stable %	
Program persistence	66.5	77.3	70.4	86.2	94.2	.04
College diploma	62.0	71.1	63.4	81.6	86.7	.05
	Social Trajectories					η^2
	Low Increasing %	Moderate decreasing %	Moderate and stable %	High and stable %	Very high and stable %	
Program persistence	74.1	73.8	73.5	81.4	88.5	.02
College diploma	66.1	56.3	71.5	77.2	83.6	.01

