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School Life and Adolescents' Self-Esteem Trajectories

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This study investigates heterogeneity in adolescents' trajectories of global self-esteem (GSE) and the relations between these trajectories and facets of the interpersonal, organizational, and instructional components of students' school life. Methodologically, this study illustrates the use of growth mixture analyses, and how to obtain proper student-level effects when there are multiple schools, but not enough to support multilevel analyses. This study is based on a 4-year, six-measurement-point, follow-up of 1,008 adolescents (M_{age} = 12.6 years, SD = 0.6 at Time 1.) The results show four latent classes presenting elevated, moderate, increasing, and low trajectories defined based on GSE levels and fluctuations. The results show that GSE becomes trait-like as it increases and that school life effects, moderated by gender, played an important role in predicting membership in these trajectories.

Complex substantive issues require sophisticated methodologies—this is the essence of substantive-methodological synergies (Marsh & Hau, 2007). This study addresses two substantively important issues, and related methodological challenges. The first substantive objective of this study investigates heterogeneity in the level, shape, and stability of the developmental trajectories of adolescents' self-esteem. Methodologically, we illustrate the usefulness and flexibility of growth mixture analysis (GMA) as an alternative to more traditional variable-centered analyses in addressing these issues. The second substantive objective of this study is to evaluate whether these trajectories can be predicted from the instructional, organizational, and relational components of adolescents' school experiences and perceptions of school climate. Methodologically, we illustrate a simple alternative to multilevel modeling that can be used to accurately estimate the effects of unique student-level school experiences and perceptions of school climate properly disaggregated from school-level effects when the number of schools available is not sufficient to justify traditional multilevel analyses.

Substantive Issue 1—Shape and Stability of Self-Esteem Trajectories in Adolescence

Secondary schools play a crucial role in the development of adolescents' self-esteem. During this period, youths evolve in a context where they implicitly and explicitly learn about themselves, while experiencing the major physical, cognitive, emotional, and social changes of adolescence (Eccles et al., 1993; Steinberg & Morris, 2001). Youths' lives at school may comprise stress-generating experiences (e.g., conflict with teachers, failures, rejection) as well as positive self-enhancing experiences (e.g., teachers' warmth and support, school success,

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peaceful learning environment). Theories attempting to explain the relations between school life and psychosocial development invoke the fact that youths' experiences at school play a determining role in the fulfillment of their basic developmental needs (e.g., Eccles et al., 1993; Moos, 1979). For example, Eccles et al. (1993) argued that whereas adolescents' basic developmental needs include autonomy, intimacy, identity formation, sexuality, and abstract thinking, secondary school environments are often characterized by changes (e.g., increased control) opposing these needs. Thus, there is evidence that transition into the secondary school years is characterized by multiple changes that can drastically influence the way adolescents see themselves (Roeser, Eccles, & Sameroff, 2000; Steinberg & Morris, 2001). Indeed, adolescents experiencing a mismatch between developmental needs and socialization experiences at school may internalize the idea that their needs are unworthy of attention and develop chronic feelings of low self-esteem. Self-esteem, also called global self-esteem (GSE), refers to the positive or negative way people feel about themselves as a whole (Brown, Dutton, & Cook, 2001) and represents a key indicator of successful coping with the developmental tasks of adolescence (Craven & Marsh, 2008).

Studies investigating the secondary school transition noted that it is accompanied by a decrease in GSE (e.g., Eccles et al., 1993; Twenge & Campbell, 2001). However, longitudinal studies starting after this transition are more equivocal. Some found significant average increases in students' GSE (e.g., Greene & Way, 2005; Moneta, Schneider, & Csikszentmihalyi, 2001; Twenge & Campbell, 2001), while others found significant decreases (e.g., Reddy, Rhodes, & Mulhall, 2003; Rhodes, Roffman, Reddy, & Fredriksen, 2004; Way, Reddy, & Rhodes, 2007) or identified nonlinear (e.g., Baldwin & Hoffmann, 2002; Marsh, 1989) or stable (e.g., Morin, Maïano, Marsh, Janosz, & Nagengast, 2011; Young & Mroczeck, 2003) trajectories. The main limitation of these studies is that they focused on average trajectories, potentially ignoring interindividual variations in the shape of these trajectories. Indeed, all of these analyses relied on the assumption that all students were drawn from a single population following a similar growth trajectory, sometimes allowing interindividual heterogeneity to be specified around this average intraindividual trajectory (Bollen & Curran, 2006; Raudenbush & Bryk, 2002). Most previous studies of interindividual heterogeneity around the estimated average trajectory found it to be important (e.g., Reddy et al., 2003; Rhodes et al., 2004) and sometimes incorporated predictors of this heterogeneity (e.g., Greene & Way, 2005; Moneta et al., 2001). However, these studies were not designed to test whether this heterogeneity was related to the presence of unobserved subgroups of youths following qualitatively distinct trajectories (Muthén, 2002).

Another issue of importance is the study of youths' GSE trajectories is related to the repeated observation that GSE state-like fluctuations are a more important predictor of adaptation than average levels of GSE (e.g., Kernis, 2003, 2005; Kim & Cicchetti, 2009; Roberts & Monroe, 1992, 1999; Zeigler-Hill & Showers, 2007). However, most of these studies relied on intensive designs including multiple repeated measures taken over a relatively short period (e.g., 1–2 weeks), making it hard to generalize their results to longer time spans (e.g., Marsh, 1993; Ployhart & Vandenberg, 2010). Also, these studies have generally estimated trait-like levels of GSE as the mean of the repeated measures and state-like fluctuations as the standard deviation of the repeated measures, thus confounding two sources of fluctuations in GSE levels: (a) time-structured evolutions in trait GSE and (b) residual state-like variations in GSE, net of the time-structured variation (Marsh, 1993; Morin, Maïano, Marsh, et al., 2011; Ram & Gerstorf, 2009). To achieve a proper disaggregation of these two sources of variability, growth curve models (Bollen & Curran, 2006; Raudenbush & Bryk, 2002) in which individual-specific intercepts (representing the mean initial level of GSE), slopes (representing linear or nonlinear evolution in GSE levels), and time-specific residuals (representing state-like deviations in GSE levels) are needed. The few studies relying on these methods confirmed these state-trait interpretations in showing that time-specific levels of GSE measured over a short follow-up period (DeHart & Pelham, 2007; Zeigler-Hill & Showers, 2007) or properly disaggregated time-specific residuals estimated on longer developmental periods (Baldwin & Hoffmann, 2002; Kim & Cicchetti, 2009; Molloy, Ram, & Gest, 2011; Morin, Maïano, Marsh, et al., 2011) tended to fluctuate as a function of internal or external events occurring consecutively. Finally, implicit in these studies is the relative independence of GSE mean levels and indicators of instability (e.g., Kernis, 2003, 2005). However, these two indices have been found to be moderately correlated (rs = −.26 to −.29; e.g., Molloy et al., 2011; Roberts & Monroe, 1992; Zeigler-Hill & Showers, 2007). Similarly, using a different methodology, Marsh (1993) showed that responses to the

Rosenberg's GSE and stability of self-esteem scales were consistently positively correlated within and between four data waves taken 1 year apart. Furthermore, Marsh (1993) showed that higher levels of GSE were associated with later increases in self-esteem stability. These observations suggest that over longer time spans than usually considered in classical stability studies, there is a significant association between GSE levels and their stability, calling into question the relative independence of these facets of GSE. Thus, we propose the self-equilibrium hypothesis, according to which, over the long term, higher levels of GSE should show greater stability, reflecting a strong core self (e.g., Oyserman, Elmore, & Smith, 2012; Showers & Zeigler-Hill, 2012). Conversely, low levels of GSE should be more unstable and less efficiently portrayed by trait-like trajectories.

Most of the contradictory findings presented thus far could be related to the merging of subgroups characterized by stable, unstable, increasing and decreasing trajectories in the overall sample. On the basis of this observation, Morin, Maïano, Marsh, et al. (2011, p. 187) noted that although their results showed that GSE remained high and stable in general, "it would be logical to assume that a subgroup of students probably present very low self-concepts" and deserves special attention given that this subgroup is not apparent in studies based on classical variable-centered analyses. On the basis of the self-equilibrium hypothesis, we also expect this group to present a high level of GSE instability.

Methodological Issue 1—A Refined Person-Centered Approach to Self-Esteem Trajectories

Person-centered analyses, such as GMAs (e.g., Muthén, 2002), are specifically designed to explain developmental heterogeneity by separating a general population into latent classes of individuals presenting qualitatively and quantitatively distinct profiles of change over time (Muthén, 2002). We were able to locate only three person-centered studies of GSE trajectories in adolescence (Deihl, Vicary, & Deike, 1997; Hirsch & DuBois, 1991; Zimmerman, Copeland, Shope, & Dielmnn, 1997). Hirsch and DuBois (1991), in a cluster-analysis study of 128 adolescents (Grades 6–8), identified four different GSE trajectories: (a) consistently high (35% of the sample), (b) small increases (31%), (c) chronically low (13%), and (d) steep decline (21%). Zimmerman et al. (1997) replicated this study in a larger sample of adolescents (n = 1160; Grades 6–10) and identified four similar trajectories: (a) consistently high (48% of the sample), (b) moderate and rising (19%), (c) steadily decreasing (20%), and (d) consistently low (13%). Finally, Deihl et al.'s (1997) cluster-analysis study of a small sample of Grade 7–10 rural adolescents (n = 142) also identified three similar trajectories: (a) consistently high (47%), (b) small increase (37%), and (c) chronically low (16%). Interestingly, these studies confirmed that the trajectory classes differed from one another on a wide array of covariates, ranging from psychosocial adaptation problems (e.g., alcohol use, deviance) to school experiences (e.g., achievement, school satisfaction). This is important, since the only way to support a substantive interpretation of trajectory classes is through a process of construct validation showing that they present meaningful patterns of associations with theoretically significant covariates (Marsh, Lüdtke, Trautwein, & Morin, 2009; Morin, Morizot, Boudrias, & Madore, 2011).

The main limitation of these studies is their reliance on cluster analyses. Indeed, cluster analyses tend to rely on rigid assumptions (i.e., conditional independence, class-invariant variances, etc.) that often prove unrealistic with real-life longitudinal data (Magidson & Vermunt, 2004; Morin, Morizot, Boudrias, et al., 2011). Cluster analyses also fail to take into account the longitudinal dependencies in the repeated measures and thus cannot achieve proper disaggregation of state versus trait fluctuations in GSE levels (Morin, Maïano, Marsh, et al., 2011; Ram & Gerstorf, 2009). In contrast, GMA (Muthén, 2002) allows the direct specification and comparison of alternative models based on relaxed assumptions, and directly analyzes longitudinal dependencies. In particular, the ability to model class-specific growth curve models and time-specific residuals provides greater flexibility by taking into account the state and trait components of GSE, variations in these components, and their interrelations across subgroups of students (Morin, Maïano, Marsh, et al., 2011; Roberts & Monroe, 1999). GMA thus provides a natural framework for investigating the self-equilibrium hypothesis, which suggests that latent classes of students should differ from one another not only on the basis of their GSE levels, but also based on the size of their time-specific fluctuations, an information not available from cluster analyses.

Substantive Issue 2—School Life Components and GSE Trajectories

As previously noted, theories of adolescent development ascribe a central role to secondary

schools in shaping youths' GSE (Eccles et al., 1993; Hunt, 1975; Moos, 1979). Based on the observation that secondary schools often present a higher level of misfit to youths' developmental needs relative to primary schools, stage-environment fit theory specifically underscores the preeminent role of secondary schools' transitional characteristics in shaping adolescents' GSE trajectories (Eccles et al., 1993; Hunt, 1975; Roeser et al., 2000). This proposal received strong support from the evaluation of preventive programs aimed at improving the transitional school environment, which were found to result in lasting improvements in youths' levels of GSE (Felner & Adan, 1988; Felner et al., 1993). However, there remain surprisingly few comprehensive studies centered on the potential impact on youths' GSE trajectories of the multiple facets of secondary school life at play during this transition. Schools are complex social systems where multiple sources of influence combine to influence youths' development. Accordingly, the quality of students' transitional school life depends on a combination of factors related to their personal experiences at school, as well as by their school's characteristics, such as school climate (Bronfenbrenner, 1977; Eccles et al., 1993; Morin, Janosz, & Larivée, 2009). Stage-environment fit theory (Connell & Wellborn, 1991; Eccles & Roeser, 2009; Roeser et al., 1998, 2000) underscore the importance of three components of school life, each of which can be considered either a school characteristic or a part of students' school experiences.

The interpersonal component. The interpersonal component relates to schools' role in fulfilling students' relational and belongingness needs. Stage-environment fit theory proposes that GSE emerges in part from positive social interactions with meaningful others who provide external positive regards and generate feelings of belongingness on which to anchor GSE (e.g., Reddy et al., 2003; Roeser et al., 1998, 2000). Indeed, research shows that students who share positive interpersonal relationships with their teachers and peers, and experience low levels of conflict or social isolation, tend to present higher levels of GSE (Deihl et al., 1997; Hirsch & DuBois, 1991; Hoge, Smit, & Hanson, 1990; Roeser & Eccles, 1998). Similarly, studies have shown that positive perceptions of a school's climate related to between-student relationships, teachers–students relationships, and school bonding are associated with GSE (Greene & Way, 2005; Hirsch & DuBois, 1991; Hoge et al., 1990; Reddy et al., 2003; Roeser & Eccles, 1998; Way et al., 2007). Although this hypothesis was, to our knowledge, never formally tested, Janosz (Janosz & Bouthillier, 2007; Janosz, Georges, & Parent, 1998) proposed that schools' bonding climate (i.e., a general atmosphere of school belongingness and shared feelings of community) represents the core of this interpersonal component of school life.

The organizational component. The organizational component relates to schools' role in fulfilling students' needs for autonomy and security. Schools occupy a key position in helping students learn to express themselves in a context where such expressions will be recognized and valued, rather than discouraged (e.g., Hoge et al., 1990). Supporting students' autonomy is particularly important for GSE development (e.g., Roeser et al., 1998, 2000; Way et al., 2007). However, for this autonomy to influence GSE, students need to learn to function autonomously in a context where they feel free to be themselves without fearing for their security, while learning to do so in a manner that is respectful of others (Deci & Ryan, 2004; Eccles & Roeser, 2009). Optimal school organization should thus balance autonomy with order and security. Pushed to the extreme, school order and control leave no space for the development of autonomy, whereas extreme freedom results in systemic chaos. One indicator that balance has been achieved is linked to students perceiving a school climate of fairness and justice. Such a climate reflects students' perception that consequences are determined based on actions rather than personal characteristics such as appearance or nationality (Hoge et al., 1990; Janosz et al., 1998). Indeed, previous studies found that schools' efforts to support and reinforce students' autonomy and participation, to maximize security and fairness, as well as to lower levels of exposure to violence at school were all beneficial for students' GSE (e.g., Greene & Way, 2005; Hoge et al., 1990; Janosz et al., 2008; Roeser & Eccles, 1998; Way et al., 2007).

The instructional component. The instructional component relates to the fulfillment of students' needs for competence and achievement. Classical theories note that these needs lie at the core of GSE development (Marsh & Craven, 2006; Marsh & Shavelson, 1985). Not surprisingly, previous studies showed that students' academic achievement or competence, as well as perceptions that their school's educative climate encourages mastery and achievement, were related to levels of GSE (Hirsch & DuBois, 1991; Hoge et al., 1990; Roeser & Eccles, 1998; Zimmerman et al., 1997).

Limitations of previous research. To date, research on the relations between school life and GSE

seldom considered these three components of school life simultaneously or distinguished students' personal school experiences from their general perceptions of school climate. Moreover, most studies investigating the effects of school life simply used global measures of school satisfaction or climate formed from the aggregation of disparate constructs. Some studies (for counterexamples see Roeser & Eccles, 1998; Way et al., 2007) even aggregated, in a single measure, items referring to students' personal experiences (e.g., "I share warm and friendly relationships with my teachers") with items referring to school or classroom characteristics (e.g., "In this school, teachers treat students with respect"). This confusion makes it hard to disentangle the effects of students' experiences from the effects of schools' characteristics or climate. These two facets of school life are interrelated, with students' experiences influencing their perceptions of schools' characteristics and schools' environments shaping students' experiences. However, they still reflect different constructs that should be disentangled for greater precision (Marsh, Lüdtke, Nagengast, Trautwein, & Morin, 2012; Morin et al., 2009). For example, whereas a student may have been personally victimized at school (personal school experience), victimization may not be frequent in his or her school (school-level contextual characteristic). The student may thus describe this school as secure (perception of school climate) and end up feeling alone in being victimized, conveying a sense of rejection or unworthiness.

Moderators are likely at play in shaping the effects of school life on GSE. Among those, it is particularly surprising that none of the previous studies verified whether gender could moderate these effects. Indeed, it is very well documented that girls tend to present lower GSE levels than boys (e.g., Greene & Way, 2005; Reddy et al., 2003; Rhodes et al., 2004; Way et al., 2007). This difference suggests that the fit between youths' developmental needs and the characteristics of their social contexts may be greater for boys than for girls, making it important to understand the role of school life in explaining these differences. It is also well documented that girls attribute more importance to social relationships and intimacy than boys, who tend to place more value on personal achievement and status than girls (Cross & Madson, 1997; Helgeson, 1994). Paradoxically, girls also tend to outperform boys (e.g., Morin, Rodriguez, Fallu, Maïano, & Janosz, 2012) and are more likely to view evaluative feedback (such as school grades) as diagnostic of their ability, with resulting effects on GSE (e.g., Pomerantz, Altermatt, & Saxon, 2002). Finally, social relationships, including intimacy and social status, tend to be particularly affected by the secondary school transition (Eccles et al., 1993). It is thus highly probable that social facets of students' school lives play greater role in determining girls' (vs. boys') GSE trajectories. Even in the academic area, gender-based differences are to be expected since boys tend to value academic structures and goals centered on personal achievement and competition to a greater degree than girls, who tend to place more value on mastery, competence, and cooperative academic objectives and structures than boys (e.g., Grant & Dweck, 2003; Wigfield & Wagner, 2005). Thus, we expect that girls' GSE trajectories will show a greater level of reactivity to the school life components related to social relationships (i.e., the relational component) whereas boys' levels should be more sensitive to components related to achievement goals (i.e., the instructional component). In research on depression, of which low GSE is a core symptom, Morin et al. (2009) found support for this proposal.

Methodological Issue 2—Studying School Experiences and Climate: A Multilevel Question?

An important issue to consider in relation to the previous studies is that they relied mostly on student-level responses to study the effects of school life on GSE. However, schools are social systems with their own characteristics, which are to some extent distinct from the experiences of individual students (Bronfenbrenner, 1977; Moos, 1979). When the construct is a student-level variable, such as achievement, or school experiences, this is less likely to be a serious problem. Still, school-level proportions of students with specific characteristics (e.g., the proportion of female students) or experiences (e.g., being in conflict with teachers) are characteristics of the school context that may exert a differentiated impact on students' GSE trajectories. Analyses based on a single level (i.e., student level) thus confound the effects of individual students and schools. A clear example comes from the "Big-Fish-Little-Pond" effect (Marsh, 2007), showing that while the relation between students' achievement and self-esteem was strong and *positive*, the relation between average school levels of achievement and students' self-esteem was smaller and *negative*. Single-level studies in which these two sources of influence are not properly disentangled thus lead to the false impression that the relation between achievement and self-esteem is moderate

and positive (due to the conflation of strong positive student-level effects with smaller negative school-level effects) and completely ignore the negative school-level effect. Although aggregate school levels of achievement is a clear example of what Marsh et al. (2012) refer to as contextual variables (i.e., school aggregations of meaningful student-level variables), it is even more important to use appropriate levels of analysis with "climate" constructs based on students' ratings of characteristics common to all students (e.g., school's security climate). Climate constructs are generally rated using items directly referring to the school-level. In this case, single-level analyses yield conclusions that are located at the improper level of analysis.

Indeed, since students rate their schools directly, the meaning of residual student-level differences in ratings of a school is clearly different from the meaning of aggregated school-level ratings used to infer school climate. Consequently, conflated individual- and school-level effects are even harder to interpret. Marsh et al. (2012) even report results in which residual student-level ratings of schools' climate from appropriate multilevel analyses had no meaningful remaining associations with students' level outcomes once the effects of school-level climate was considered. This leaves open the question of the real meaning of these residual ratings, which, in multilevel analyses, are the difference between individual students' ratings and average school ratings (i.e., each student's unique perspective of the school). The question thus becomes whether it would be meaningful to evaluate if these residual scores (i.e., deviations between individual student's perceptions and the average perceptions of all students within a school) relate to other student-level constructs, such as GSE.

Because individuals choose and modify their environments, it is unlikely that all students will be exposed to similar school experiences or share similar perceptions of their schools (Mortimore, 1995; Rutter, 1999). Studying their unique perspectives is therefore worthwhile. Many authors used similar arguments to justify relying on single-level analyses of school-life characteristics, arguing that perceptions or unique experiences were a more powerful determinant of human development than macroscopic characteristics (e.g., Ciani, Middleton, Summers, & Sheldon, 2010). This approach is referred to the evaluation of schools' *psychological environments* (e.g., Roeser & Eccles, 1998; Way et al., 2007). The main criticisms of this approach are that results from single-level analyses erroneously conflate individual- and school-level effects and that individuals' unique perspectives may have no remaining effects on psychological outcomes once school- or classroom-level effects are considered (e.g., Marsh, 2007; Marsh et al., 2012). More importantly, to argue that individual perceptions or experiences are *more important* than aggregate school characteristics, one must demonstrate that they do indeed meaningfully predict the outcome of interest *over and above* the effects of aggregated school characteristics. Single-level analyses do not allow this to be verified. To our knowledge, this verification has yet to be conducted systematically with regard to GSE.

However, a more pragmatic issue is often at play. Indeed, many published single-level analyses are based on a small number of second-level units (e.g., schools). This either severely limits the power to detect school-level effects or, more likely, precludes multilevel analyses altogether. However, even with few second-level units, the conflation of individual- and school-level effects remains—unless there is a single school. This is an issue for this study, as the small number of schools (n = 5) made it inappropriate to use multilevel analyses, while the large number of students within each school made it realistic to study residual student-level effects. Although it makes no sense to study school-level effects with so few schools, it remains important to properly disaggregate student-level effects from school-level effects to verify whether there are indeed substantial variations in GSE that can be accounted for by schools' *psychological environments*. Interestingly, multilevel analyses are not needed to achieve properly disaggregated estimates of student-level effects. In fact, relying on group-mean-centered variables (subtracting the school means from individual ratings), even in single-level analyses, can achieve the same result (Enders & Tofighi, 2007; Kreft, De Leeuw, & Aiken, 1995). Group-mean centered ratings directly reflect individual deviations from average school values.

The Present Study

This study will attempt to address three substantive research questions. First, to test the self-equilibrium hypothesis, we will test for the presence of multiple latent trajectory classes of adolescents based on longitudinal ratings of GSE levels across Grades 7–10. Second, we will verify whether membership in these trajectory classes can be predicted by students' school experiences and school climate perceptions, encompassing the interpersonal, organizational, and instructional components of school life, as assessed during their 1st year after

transitioning to secondary schools. We will also verify whether these same factors have direct effects on initial levels, rates of change, and instability levels in GSE. Third, we will explore whether these effects are moderated by gender.

Method

Participants and Procedure

The Montreal Adolescent Depression Development Project (MADDP; Morin et al., 2009) is a 4-year prospective longitudinal study of over 1,000 adolescents measured six times over this period. The project was initially designed as a 1-year intensive follow-up study, with three measurement points. All seventh-grade students from five Montreal-area high schools were asked to participate in the project in September 2000, immediately following their transition to high school. Parents of the 1,553 eligible participants were informed of the project through a letter and had the option to call the research team to withdraw their child from the study (only 10 parents did so). The letter was accompanied by a consent form that described the initial three measurement points (across one school year): September or October 2000 (Time 1), February 2001 (Time 2), and May or June 2001 (Time 3). It should be noted that GSE was not measured at Time 3. The remaining 1,543 students were asked to sign a consent form similar to the parental one. A total of 1,370 agreed to participate and completed Time 1 measures and at least one of the two remaining measurement points.

These 1,370 participants were then contacted, during their 2nd year of high school (eighth grade: 2001–2002), to participate in a longer term follow-up study comprising 3 additional years, with one measurement period per year (Times 4, 5, and 6, with Time 4 being close to 1 year after Time 2). Of those participants, 1,034 were included in the longer term follow-up study: (a) 58 refused to sign the consent form in Year 2, (b) 142 were absent or had changed schools and could not be located during Year 2, and (c) 136 were excluded due to parental refusal. Of those, 1,008 were included in this study. The remaining 26 failed to complete at least three (of five) valid GSE measurements and answered in an inconsistent or extreme manner (e.g., choosing a high number of the first or last answering point notwithstanding reversed score items) or skipping multiple answers on most of the questionnaires. This led us to question the trustworthiness of their answers. The sample was predominantly of a French-speaking Canadian descent (79.1%) and almost equally split across genders (54.0% male students). At Time 1, the mean age of the participants was 12.6 years ($SD = 0.6$). Of these students, (a) 48.8% attended public schools, 30.4% attended private schools, and 20.8% attended a public school for gifted students and (b) 20.7% were in a regular program, 29.6% were in an enriched program, 30.4% were in a program for gifted students, and 19.3% were in a special education program.

The research ethics certificate precluded the inclusion in longitudinal analyses of participants who did not consent (or had no signed parental consent) to the longer term follow–up study. Attrition analyses were thus conducted to compare the present sample with the 1,370 subjects who were part of the initial Year 1 follow-up. These analyses revealed that compared to the participants, the lost students were a little older ($p \leq .05$) and slightly more likely to attend public schools ($p \leq .01$), to belong to a minority group ($p \leq .01$), and to have repeated a year in elementary school ($p \leq .01$). They also presented slightly lower levels of GSE at Time 1 ($p \leq .01$), but not at other times ($p \geq .05$), and had slightly more negative perceptions of their schools' security ($p \leq .05$) and between-students relational ($p \leq .05$) climates. However, they did not differ ($p \geq .05$) on other variables (gender, victimization, loneliness, relationships with teachers, and perceptions of teachers–students relational, educational, bonding and justice climates). Full information maximum likelihood estimator (MLR) was used to account for missing values on GSE indicators (Little & Rubin, 2002). However, as Mplus does not allow for missing data on exogenous predictors, they were imputed with the EM algorithm from SPSS 15.0 missing values (Little & Rubin, 2002), conditional on all predictors used in the study. Given the low levels of missing data (0% to 5.9%, $M = 3.0\%$, $SD = 2.2\%$), multiple imputation was not deemed necessary.

Measures

Background controls. Sociodemographic variables available in the MADDP and known to predict GSE were included as controls in the predictive analyses (e.g., Baldwin & Hoffmann, 2002; Greene & Way, 2005 Moneta et al., 2001; Morin, Maïano, Marsh, et al., 2011; Rhodes et al., 2004; Twenge & Crocker, 2002; Way et al., 2007; Young & Mroczeck, 2003). Gender (0 = *male*, 1 = *female*) and nationality were obtained from school records. Nationality was used

as a proxy for ethnicity and coded 0 for students of North American descent (NAD: Canada or United States) and whose maternal language was either French or English (n = 897; 88.99%) and 1 for minority students (non-NAD: n = 111; 11.01%). Minority students were almost equally from African or Arabic descent, Asian descent, and South-American descent but there were insufficient numbers to consider each group separately. Parental education was used as a proxy for socioeconomic status and assessed through a parental questionnaire, averaging maternal and paternal education into a global measure. Missing data from the parental questionnaire were imputed from adolescents' reports. We also assessed, via self-reports, whether students had repeated a year in elementary school (0 = *never*, 1 = *yes*).

Global self-esteem. The French adaptation (Vallières & Vallerand, 1990) of the Rosenberg Self-Esteem Inventory (Rosenberg, 1965) was used to assess adolescents' GSE at Times 1, 2, 4, 5, and 6. The 10 items (e.g., "I feel that I have a number of good qualities") from this instrument are rated on a 4-point Likert scale ranging from *strongly disagree* to *strongly agree*. This inventory presents adequate psychometric properties (Byrne, 1996; Vallières & Vallerand, 1990) and satisfactory scale score reliability estimates in this study (αs = .77–.89). The intraclass correlation coefficient (ICC) of these repeated measures, which can be interpreted as the proportion of the repeated measures variability that can be attributed to individual students versus time-specific fluctuations, is .469. This suggests some level of temporal stability in intraindividual trajectories, as well as significant time-specific fluctuations. In other words, this ICC confirms the presence of both state and trait components in GSE ratings.

Students' school experiences. All school experience variables were assessed during the 1st year to ensure temporal ordering of the predictors and trajectories' intercepts. Participants' 1st-year grade point averages (GPA), on a scale of 1–100, were obtained from school records. Students' *victimization* at school was assessed at Time 2 with a 14-item index (α = .82) from Janosz and Bouthillier's (2007) School Socioeducational Environment Questionnaire (SEQ). These items are rated on a 5-point (ranging from *never* to *four times or more*) frequency scale (e.g., "Since the beginning of the school year," "Students physically attacked you," "Students insulted or humiliated you"). Students' *loneliness* at school was assessed at Time 2 using five items (α = .85) from the French adaptation (Vitaro, Pelletier, Gagnon, & Baron, 1995) of Asher, Hymel, and Renshaw's (1984) questionnaire. The selected items (e.g., "I feel lonely at school," "I don't have any friends at school") were those with the highest loadings in Asher et al.'s study and are rated on a 4-point scale ranging from *not true* to *very true*. The quality of students' relationships with teachers was assessed at Time 2 with the two subscales from the short French version (Larose, Bernier, Soucy, & Duchesne, 1999; Morin et al., 2009) of Pianta and Steinberg's (1992) questionnaire. These subscales evaluate whether students share warm and supportive relationships with teachers (six items, such as "I share warm and friendly relationships with my teachers"; α = .76) or whether students experience conflicts with their teachers (seven items, such as "Sometimes, I feel that I am unfairly treated by my teachers"; α = .84). These items are all rated on a 5-point Likert scale ranging from *not at all* to *very much*.

Students' school climate perceptions. Students' school climate perceptions were assessed at Time 2 using Janosz and Bouthillier's (2007) SEQ, an instrument validated on over 70,000 students from 159 Quebec secondary schools. The SEQ covers: (a) between-students relational climate, or the degree to which interactions between students are characterized by warmth, trust, and respect (six items, such as "In this school, students can count on each other"; α = .77); (b) teachers–students relational climate, or students' respect for their teachers, and teachers' respect, warmth, and support toward students (seven items, such as "In this school, teachers treat students with respect"; α = .81); (c) bonding climate, or the general atmosphere of school belongingness (five items, such as "Students feel at home in this school"; α = .78); (d) justice climate, or the degree to which students perceive their school environment as equitable and respectful of individual differences (four items, such as "The rules of this school are fair"; α = .75); (e) educative climate, or students' perceptions of the extent to which education is emphasized and valued within their school (five items, such as "Students' success is at the heart of this school's priorities"; α = .76); and (f) security climate, or students' perceptions of the security in their school (five items, such as "There is a risk of being assaulted in this school"; α = .80). Items are rated on a 4-point scale ranging from *totally disagree* to *totally agree*.

Analytical Strategy

Descriptive statistics, correlations, scale score reliabilities, and intraclass correlations for the variables used in this study are all reported in online supporting information Appendix S1. Analyses were

performed using Mplus 6.1 robust MLR (Muthén & Muthén, 2010). A challenge in GMAs is to avoid converging on a local maximum likelihood, a problem that may stem from inadequate start values. To avoid this, 1,000 random sets of start values were requested in this study, and the 100 best were retained for final optimization values (Hipp & Bauer, 2006). All models converged on a replicated solution and can be assumed to reflect a "real" maximum likelihood.

Growth mixture analysis models with one to six latent GSE trajectories were estimated and compared, allowing all model parameters (time codes, intercepts and slope means, variances and covariances, and time-specific residuals) to be freely estimated in all classes (for details, see online supporting information Appendices S2–S6; Morin, Maïano, Nagengast, et al., 2011). Although time codes are usually fixed and constrained to equality across groups in latent curve models or GMAs (Bollen & Curran, 2006), only two of them need to be fixed to 0 and 1, respectively. The remaining ones can be freely estimated in all classes to better model nonlinearity (Ram & Grimm, 2007, 2009). In this case, the slope mean reflects the total change occurring during the study (between Times 0 and 1) and the freely estimated time codes represent the proportion of change occurring between each time point. In this study, the time codes of 0 and 1 were fixed at the second and last measurement points to reflect the fact that Time 1 was conceptualized as the MADDP baseline control measurement point and that predictors were assessed at Time 2 (thus allowing the temporal ordering of predictors and intercepts).

Once the final unconditional model was chosen, predictors were incorporated into this model (Clark & Muthén, 2011; Morin, Maïano, Nagengast, et al., 2011). A baseline conditional model was first estimated in which predictors were allowed to predict class membership through a multinomial logistic regression. Tests were then conducted on additional models in which predictors were also allowed to directly influence within-class variation in the intercepts and slopes of the trajectories, in the time-specific residuals, and in which these effects were allowed to vary from one class to another.

To obtain all of the statistical indicators used to select the model with the optimal number of classes, class enumeration was done without considering the clustering of students within schools. Indeed, recent results show that although ignoring nesting in GMA does affect standard error estimates and classification accuracy, it does not affect class enumeration (Chen, Kwok, Luo, & Willson, 2010). However, the final unconditional model and all conditional models were estimated while taking into account students' nesting within schools with the Mplus design-based correction of standard errors (Asparouhov, 2005; Muthén & Muthén, 2010). This method has proven as effective as multilevel models in obtaining proper standard errors (Marsh & O'Mara, 2010; Marsh et al., 2010). Finally, to obtain disaggregated, student-level effects net of school-level effects, school-related variables were group-mean centered prior to the analyses. For comparison purposes, all models were reestimated using classical variable-centered analyses. These results are reported in online supporting information Appendix S7.

Results

Unconditional Models

The results converged on a four-class solution that is illustrated in Figures 1 and 2. (Details of the class-enumeration process leading to the final model selection and detailed parameter estimates are reported in online supporting information Appendices S2–S5.) These four latent GSE trajectory classes are: (a) moderate levels of GSE and GSE stability (56.2%), (b) low levels of GSE and GSE stability (19.3%), (c) increasing levels of GSE and GSE stability (11.0%), and (d) elevated levels of GSE and GSE stability (13.5%). The results show clear qualitative differences between classes and clear associations between trait levels of GSE and GSE stability, thus supporting the self-equilibrium hypothesis.

The largest class (Figure 2c) includes students presenting moderate levels of GSE (intercept = 31.78, corresponding to the mean level of the full sample) that remain stable over the course of the study (i.e., the slope factor is nonsignificant and shows no significant between-students variability). In fact, most members of this latent class do appear to follow reasonably stable trajectories, as illustrated by the low

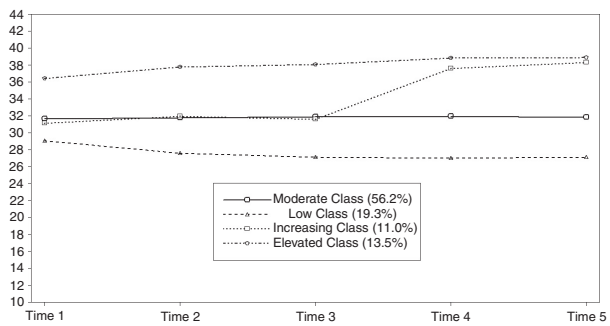

Figure 1. Estimated latent trajectory classes.

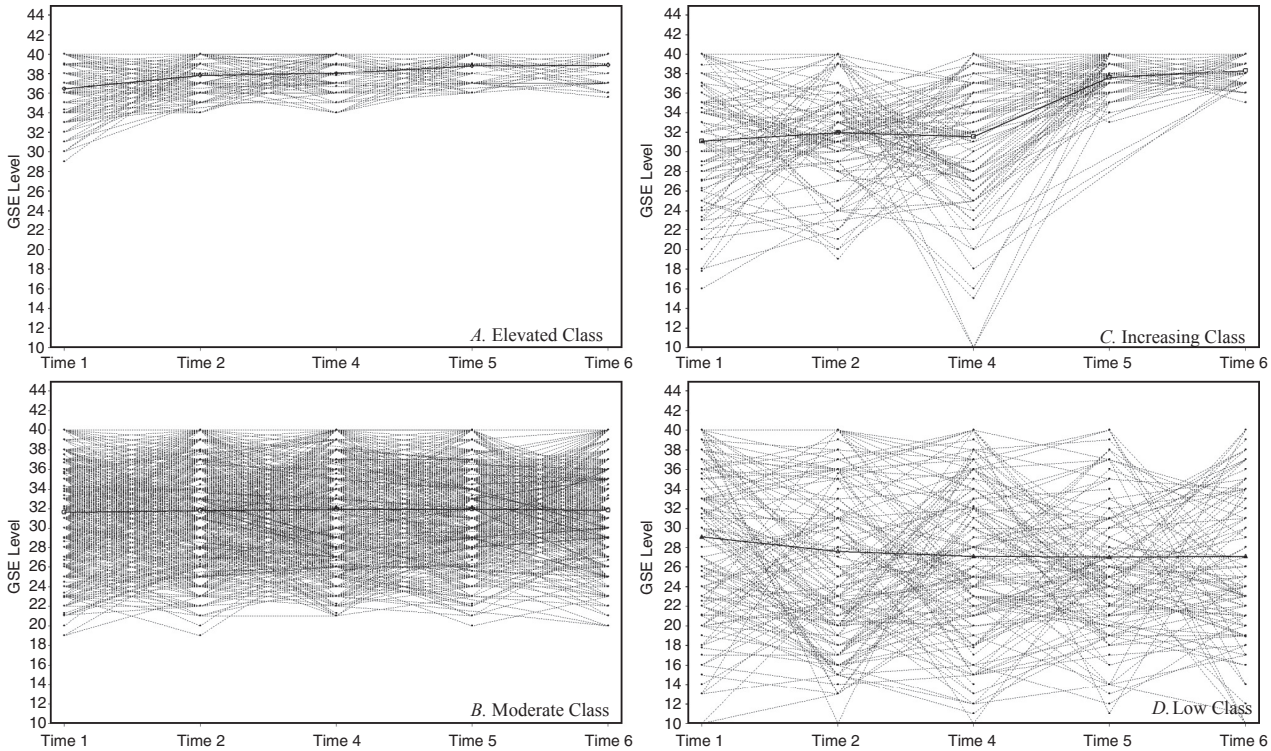

Figure 2. Estimated trajectories and observed individual values in the various latent classes.

time-specific residuals, $SD(\varepsilon_t)$ = 2.02–3.79, corresponding to a .3–.5 of a standard deviation.

The elevated class includes students presenting high GSE (intercept = 37.77, near the maximum of the GSE measurement scale) and stable trajectories (i.e., nonsignificant slope with nonsignificant between-students variability). This stable linear pattern provides an adequate representation of the trajectories for most students in this latent class (very small time-specific residuals), $SD(\varepsilon_t)$ = 1.09–2.57, who also present similar trajectories (the intercept factor shows low variability: SD = 0.80).

The low class (Figure 2e) is the most distinctive. These students appear to present low levels of GSE (intercept = 27.58) showing no average level of change over time (a nonsignificant slope with nonsignificant variability). However, the elevated time-specific residuals observed during the second-to-last waves, $SD(\varepsilon_t)$ = 5.49–6.88, rather show that this trajectory includes students with unstable levels of GSE that cannot be effectively represented by trait-like, linear or nonlinear, trends.

These results suggest that high and moderate levels of GSE are stable throughout adolescence and present strong trait-like properties (see Morin, Maïano, Marsh, et al., 2011). Conversely, although low levels of GSE appear mostly stable at the trait level, they present a profile that suggests highly reactive state-like properties (Roberts & Monroe, 1992, 1999). Changes in trait-like GSE levels are possible, however, as illustrated by the last trajectory class (see Figure 2d), at least for 11% of the students. Indeed, students from this increasing class are similar to those from the low and moderate classes for the first three measurement points, characterized by a moderate average intercept (31.94) and by elevated time-specific residuals, $SD(\varepsilon_{t1-t3})$ = 5.09–6.32. However, their GSE levels increase up to the levels of the elevated class in the 3rd year of the study. Indeed, the increasing latent trajectory class presents a significant and substantial slope (6.38) characterized by change occurring mostly between the third and fourth measurement points. This is illustrated by the fact that the only significant loading on the slope factor corresponds to the 3rd year of the study (λ_{4k} = 0.88). This loading reveals that 88% of the total change occurred between the 2nd and 3rd years of the study. From this point forward (i.e., ninth grade), students' GSE levels remain high and stable, as shown by very low levels of time-specific residuals at the last two measurement points, $SD(\varepsilon_{t4-t5})$ = 1.38–2.04.

Conditional Models

The results from the multinomial logistic regression predicting class membership are reported in Table 1. For the significant interactions involving gender, simple slopes were calculated for male students and female students and reported in Table 2. Results from multinomial logistic regressions differ from those from standard linear or logistic regressions. First, each predictor has six different complementary effects for each pairwise class comparison. Second, the regression coefficients represent the effects of the predictors on the log odds of the outcome (i.e., the probability of membership in one class vs. another in a pairwise comparison) that can be expected for a one-unit increase predictor. Since these coefficients are expressed in log-odds units, they are complex to interpret and even graphical representation of simple slopes of interactions is a confusing venture (e.g., Jaccard, 2001). We therefore provide easy-to-interpret odds ratios, which reflect the change in likelihood of membership in the target class versus the comparison class for each unit increase in the predictor. Odds ratios allow the size of the different effects to be compared more directly. For instance, an odds ratio of 2 indicates that for each unit increase in the predictor, participants are twice as likely to be member of the target class versus the comparison class. Odds ratios under 1, related to negative logistic regression coefficients, indicate that the likelihood of membership in the target class is reduced. Thus, an odds ratio of .5 shows that the likelihood of membership in the target class is reduced by 50% per unit increase in the predictor.

Regarding the control variables, being a female student and having repeated a grade in elementary school predict membership in the lower GSE trajectory classes compared to the higher GSE classes. These factors allow most of the classes to be clearly differentiated (the odds ratio showed that female students are 3.8–20.6 times less likely to be members of the higher GSE classes and that likelihood of membership in the higher GSE classes is reduced 1.4–8.1 times for each repeated grade), with a few exceptions involving the increasing trajectory. This is not surprising, since this trajectory overlaps with the moderate trajectory at the beginning of the study and with the elevated one at the end, and includes students who apparently switch from one trajectory to the other over the course of the study. Membership in this trajectory is thus unlikely to be predicted by stable covariates, unless they had sleeper effects. Although many school experiences and climate variables predicted membership in the latent trajectory classes, few of them have nonmoderated effects. Indeed, whereas the effects of the instructional component of school life appear to be more pronounced for male students than for female students, those of the relational component appear greater for female students than for male students. In contrast, the effects of the organizational component showed qualitative differences according to gender, with a stabilization effects for males GSE and a decrystallizing effects for females GSE.

Instructional components. Results regarding the effects of the instructional components of school life show that higher levels of GPA predict a higher likelihood of membership in the moderate and increasing trajectory classes compared to the low class. However, these effects are moderated by gender in the comparison between the low class and the increasing class. Simple slopes showed that GPA predicts membership only in the increasing class (vs. the low one) for male students and have no effect for female students. A similar moderated effect is observed in the prediction of membership in the increasing class versus the moderate one. However, in this case, the results show that higher GPA predict a lower likelihood of membership in the increasing versus moderate class for female students and have no effect for male students. Although the significant odds ratios observed for these effects appear small (ORs = 1.08, 1.08, 0.88), GPA is coded on a 1–100 scale. For instance, these results indicate that for each unit increase in GPA, the likelihood of males' membership in the increasing class versus the low one increases by 8%, or alternatively by approximately 80% for each standard deviation of increases in GPA (SD = 10.11). In addition, positive perceptions of schools' educative climate predict students' membership in the increasing class versus the low one, an effect limited to male students. Interestingly, this effect is quite strong (OR = 1.68, based on a rating scale of 1–4 for educative climate ratings).

In summary, instructional components seem particularly important for GSE levels, especially in reducing students' likelihood of membership in the low trajectory class and in maximizing their likelihood of membership in the moderate and increasing classes—especially for male students. The fact that higher levels of GPA are in some cases deleterious for female students, while strictly beneficial for male students, may reflect the known gender differences in the importance attributed to affiliation versus achievement goals (Cross & Madson, 1997; Helgeson, 1994), and particularly to performance

Table 1
Main Results From the Multinomial Logistic and Multiple Regressions Predicting Latent Trajectory Class Membership

	Versus C2 (low)						Versus C1 (moderate)				Versus C3 (increasing)	
	C1 (moderate)		C3 (increasing)		C4 (elevated)		C3 (increasing)		C4 (elevated)		C4 (elevated)	
Predictor	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR
Gender	−1.68 (0.25)**	0.19	−2.04 (0.99)*	0.13	−3.03 (0.45)**	0.05	−0.36 (1.16)	0.70	−1.34 (0.42)**	0.26	−0.99 (1.11)	0.37
Nationality	−0.37 (0.40)	0.69	−0.51 (0.26)	0.60	−0.67 (0.36)	0.51	−0.14 (0.34)	0.87	−0.30 (0.36)	0.74	−0.16 (0.35)	0.85
Parental education	0.13 (0.54)	1.14	0.07 (0.55)	1.07	0.32 (0.83)	1.38	−0.06 (0.91)	0.94	0.19 (0.61)	1.21	0.26 (1.00)	1.29
Repeated a year	−0.31 (0.08)**	0.73	−0.55 (0.09)**	0.58	−2.09 (0.48)**	0.12	−0.24 (0.15)	0.79	−1.78 (0.42)**	0.17	−1.55 (0.51)**	0.21
Grade point average (GPA)	0.07 (0.03)**	1.08	0.08 (0.04)*	1.08	0.08 (0.06)	1.08	0.01 (0.03)	1.01	0.01 (0.04)	1.01	0.00 (0.06)	1.00
Warm rel. w. teachers (WRT)	0.22 (0.20)	1.24	0.22 (0.30)	1.25	0.32 (0.43)	1.37	0.00 (0.18)	1.00	0.10 (0.26)	1.11	0.10 (0.33)	1.10
Conflicts w. teachers (CWT)	0.13 (0.52)	1.14	0.23 (0.68)	1.26	−0.62 (1.03)	0.54	0.10 (0.51)	1.11	−0.75 (1.11)	0.47	−0.85 (1.07)	0.43
Victimization	−0.04 (0.64)	0.97	−0.03 (0.39)	0.97	−0.04 (1.44)	0.97	0.00 (0.66)	1.00	−0.00 (1.06)	1.00	−0.00 (1.26)	1.00
Loneliness	−1.47 (0.03)**	0.23	−0.60 (0.07)**	0.55	−3.16 (0.07)**	0.04	0.87 (0.08)**	2.38	−1.70 (0.06)**	0.18	−2.57 (0.10)**	0.08
Between-stud. rel. clim. (BSRC)	0.48 (0.39)	1.61	0.74 (0.71)	2.10	0.81 (0.88)	2.24	0.26 (0.58)	1.30	0.33 (0.89)	1.39	0.06 (1.41)	1.07
Teachers-stud. rel. clim. (TSRC)	−0.02 (0.34)	0.98	0.06 (0.33)	1.06	0.45 (0.28)	1.57	0.07 (0.21)	1.08	0.47 (0.27)	1.60	0.40 (0.20)*	1.48
Security climate (SC)	−0.24 (0.16)	0.79	−0.50 (0.36)	0.61	0.04 (0.38)	1.04	−0.26 (0.48)	0.77	0.29 (0.38)	1.33	0.54 (0.56)	1.72
Bonding climate (BC)	−0.22 (0.50)	0.80	−0.09 (0.63)	0.91	−0.96 (0.50)	0.38	0.13 (0.23)	1.14	−0.74 (0.27)**	0.48	−0.87 (0.33)**	0.42
Educative climate (EC)	0.51 (0.40)	1.67	0.52 (0.26)*	1.68	0.57 (0.47)	1.76	0.01 (0.21)	1.01	0.06 (0.36)	1.06	0.05 (0.27)	1.05
Justice climate (JC)	0.18 (0.02)**	1.20	−0.20 (0.04)**	0.82	0.26 (0.03)**	1.29	−0.38 (0.02)**	0.68	0.07 (0.03)**	1.08	0.45 (0.03)**	1.57
GPA × Gender	−0.01 (0.06)	0.99	−0.14 (0.06)*	0.87	0.02 (0.12)	1.02	−0.13 (0.04)**	0.88	0.03 (0.12)	1.03	0.16 (0.13)	1.17
WRT × Gender	−0.51 (0.47)	0.60	0.36 (0.49)	1.43	−0.23 (0.56)	0.80	0.87 (0.70)	2.38	0.28 (0.20)	1.33	−0.58 (0.82)	0.56
CWT × Gender	−0.86 (0.67)	0.43	−0.44 (1.35)	0.65	−0.13 (1.15)	0.88	0.42 (1.39)	1.52	0.72 (1.03)	2.06	0.30 (1.13)	1.35
Victimization × Gender	−0.08 (0.61)	0.92	−0.06 (0.45)	0.94	−0.14 (1.25)	0.87	0.02 (0.33)	1.02	−0.05 (1.35)	0.95	−0.08 (1.35)	0.93
Loneliness × Gender	−1.64 (0.96)	0.19	0.55 (1.48)	1.73	−0.60 (1.48)	0.55	2.19 (0.89)*	8.91	1.04 (0.89)	2.83	−1.15 (0.01)**	0.32
BSRC × Gender	−0.45 (0.49)	0.64	−1.97 (1.33)	0.14	0.46 (0.76)	1.58	−1.52 (1.37)	0.22	0.91 (0.78)	2.48	2.43 (2.03)	11.33
TSRC × Gender	0.29 (0.42)	1.34	0.30 (0.51)	1.35	−0.68 (0.52)	0.51	0.01 (0.44)	1.01	−0.97 (0.58)	0.38	−0.98 (0.82)	0.38
SC × Gender	0.71 (0.49)	2.03	1.53 (1.29)	4.61	1.01 (0.81)	2.74	0.82 (1.14)	2.28	0.30 (0.73)	1.35	−0.52 (1.67)	0.59
BC × Gender	0.34 (0.83)	1.41	1.30 (0.52)*	3.66	2.47 (0.81)**	11.79	0.95 (0.42)*	2.59	2.12 (0.54)**	8.37	1.17 (0.65)	3.23
EC × Gender	−0.45 (0.53)	0.64	−0.84 (0.22)**	0.43	−1.06 (0.93)	0.35	−0.39 (0.61)	0.68	−0.61 (0.54)	0.54	−0.22 (1.02)	0.80
JC × Gender	−0.68 (0.04)**	0.51	0.11 (0.06)	1.12	−0.97 (0.06)**	0.38	0.79 (0.03)**	2.21	−0.28 (0.05)**	0.75	−1.08 (0.05)**	0.34

Note. C1–C4 = latent trajectory classes 1–4.
*$p \leq .05$. **$p \leq .01$.

Table 2
Simple Slopes From the Significant Interactions Predicting Latent Trajectory Class Membership

	Interaction effect		Simple slope (males)		Simple slope (females)	
Significant interaction	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR	Coeff. (*SE*)	OR
GPA × Gender						
C1 (moderate) versus C2 (low)	−0.01 (0.06)	0.99				
C3 (increasing) versus C2 (low)	−0.14 (0.06)*	0.87	0.08 (0.04)*	1.08	−0.07 (0.08)	0.94
C4 (elevated) versus C2 (low)	0.02 (0.12)	1.02				
C3 (increasing) versus C1 (moderate)	−0.13 (0.04)**	0.88	0.01 (0.03)	1.01	−0.13 (0.04)**	0.88
C4 (elevated) versus C1 (moderate)	0.03 (0.12)	1.03				
C4 (elevated) versus C3 (increasing)	0.16 (0.13)	1.17				
Loneliness × Gender						
C1 (moderate) versus C2 (low)	−1.64 (0.96)	0.19				
C3 (increasing) versus C2 (low)	0.55 (1.48)	1.73				
C4 (elevated) versus C2 (low)	−0.60 (1.48)	0.55				
C3 (increasing) versus C1 (moderate)	2.19 (0.89)*	8.91	0.87 (0.08)**	2.38	3.06 (0.08)**	21.22
C4 (elevated) versus C1 (moderate)	1.04 (0.89)	2.83				
C4 (elevated) versus C3 (increasing)	−1.15 (0.01)**	0.32	−2.57 (0.10)**	0.08	−3.71 (0.10)**	0.02
BC × Gender						
C1 (moderate) versus C2 (low)	0.34 (0.83)	1.41				
C3 (increasing) versus C2 (low)	1.30 (0.52)*	3.66	−0.09 (0.63)	0.91	1.20 (0.32)**	3.33
C4 (elevated) versus C2 (low)	2.47 (0.81)**	11.79	−0.96 (0.50)	0.38	1.51 (0.49)**	4.52
C3 (increasing) versus C1 (moderate)	0.95 (0.42)*	2.59	0.13 (0.23)	1.14	1.08 (0.54)*	2.95
C4 (elevated) versus C1 (moderate)	2.12 (0.54)**	8.37	−0.74 (0.27)**	0.48	1.39 (0.27)**	4.00
C4 (elevated) versus C3 (increasing)	1.17 (0.65)	3.23				
EC × Gender						
C1 (moderate) versus C2 (low)	−0.45 (0.53)	0.64				
C3 (increasing) versus C2 (low)	−0.84 (0.22)**	0.43	0.52 (0.26)*	1.68	−0.32 (0.33)	0.73
C4 (elevated) versus C2 (low)	−1.06 (0.93)	0.35				
C3 (increasing) versus C1 (moderate)	−0.39 (0.61)	0.68				
C4 (elevated) versus C1 (moderate)	−0.61 (0.54)	0.54				
C4 (elevated) versus C3 (increasing)	−0.22 (1.02)	0.80				
JC × Gender						
C1 (moderate) versus C2 (low)	−0.68 (0.04)**	0.51	0.18 (0.02)**	1.20	−0.50 (0.02)**	0.61
C3 (increasing) versus C2 (low)	0.11 (0.06)	1.12				
C4 (elevated) versus C2 (low)	−0.97 (0.06)**	0.38	0.26 (0.03)**	1.29	−0.71 (0.06)**	0.49
C3 (increasing) versus C1 (moderate)	0.79 (0.03)**	2.21	−0.38 (0.02)**	0.68	0.41 (0.03)**	1.51
C4 (elevated) versus C1 (moderate)	−0.28 (0.05)**	0.75	0.07 (0.03)**	1.08	−0.21 (0.06)**	0.81
C4 (elevated) versus C3 (increasing)	−1.08 (0.05)**	0.34	0.45 (0.03)**	1.57	−0.62 (0.06)**	0.54

Note. C1–C4 = latent trajectory classes 1–4; GPA = grade point averages; BC = bonding climate; EC = educative climate; JC = justice climate.
$^{*}p \leq .05$. $^{**}p \leq .01$.

versus mastery achievement goals (Grant & Dweck, 2003; Wigfield & Wagner, 2005). However, this result should be put into perspective of the entire set of six complementary effects of GPA on class membership. Indeed, GPA levels have very few (positive or negative) significant effects for female students, and are also associated with a higher likelihood of membership in the moderate versus the low class for male students and female students—showing that female students still benefit from investing in the academic domain. What the results suggest, however, is that investing in this domain too much may prevent subsequent increases in GSE that would likely result from investments in alternative domains of adolescent school life.

Organizational components. Surprisingly, student's perceptions of schools' security climate and experiences of victimization at school have no relation with class membership. However, we proposed that justice climate, reflecting a balance between autonomy and security, represents the core of the organizational component of school life. Consistent with this proposal, student's perceptions of justice climate have consistent effects on membership in all

latent trajectory classes, although most of these effects are moderated by gender. Indeed, positive perceptions of the justice climate predict a higher likelihood of membership in the elevated (OR = 1.29) and moderate (OR = 1.20) classes versus the low one and in the elevated versus the moderate (OR = 1.08) and increasing (OR = 1.57) classes for boys, but a lower likelihood of membership in these classes for girls (respectively, ORs = 0.49, 0.61, 0.81, and 0.54). Justice climate also predicts a lower likelihood of membership in the increasing versus low class for all students (OR = 0.82), and showed an inverted interaction in predicting membership in the increasing versus moderate class (i.e., beneficent for female students).

In summary, the results show that once students' perceptions of schools' justice climate are considered, their personal experiences of victimization and perceptions of schools' security climate have no remaining effects on trajectory class membership. Specifically, the results show that students' perceptions of justice climate increase boys' likelihood of membership in higher trajectory classes characterized by stable levels of GSE (elevated or moderate vs. low or increasing), while they decrease girls' likelihood of membership in the same classes. Conversely, positive perceptions of justice climate help girls with initially moderate and reasonably stable levels of GSE to increase these levels (i.e., increasing class). These results suggest that a positive perception of the justice climate may stabilize boys' levels of GSE, helping them to reach higher levels of GSE. Conversely, for female students, more positive perceptions of the school's justice climate appear to exert a more decrystallizing effect on GSE trajectories (i.e., increasing the likelihood of membership in the increasing class).

Relational components. Surprisingly, sharing warm and supportive or conflicting relationships with teachers has no effect on class membership. Similarly, positive perceptions of the teacher–student relational climate have few effects on class membership, only slightly predicting membership in the elevated versus increasing class (OR = 1.48). Conversely, students' perceptions of schools' bonding climate predict membership in multiple latent trajectory classes. First, more positive perceptions of schools' bonding climate predict a substantially lower likelihood (OR = 0.42) of membership in the elevated versus increasing latent trajectory class for all students. This suggests that the benefits of this facet of the school climate are more likely to be subsequent increases in GSE rather than persistently high levels of GSE. This is consistent with the fact that bonding develops over time. However, among girls, more positive perceptions of the school bonding climate predict a substantially higher likelihood of membership (ORs = 1.39–4.5) in the increasing and elevated latent trajectory classes in comparison to the low and moderate classes for female students.

Although between-students relational climate has no main effect on class membership, students' experiences of loneliness at school predict membership into all latent trajectory classes. However, these effects are sometimes moderated by gender. First, higher levels of loneliness predict a substantially lower likelihood of membership in all trajectory classes in comparison to the low one for all students (ORs = 0.04–0.55; showing that they are 1.8–23.6 times less likely to be members of these classes). Similarly, loneliness predicts an importantly lower likelihood of membership in the elevated versus moderate class (OR = 0.18) and in the elevated versus increasing class (OR = 0.08; 13 times less likely). This last effect, however, is more pronounced for female students (OR = 0.02; 41 times less likely). Surprisingly, loneliness also predicts an increased likelihood of membership in the increasing versus moderate class (OR = 2.38; i.e., loneliness measured at the start of the study results in subsequent increases in initially moderate levels of GSE) and this effect is more pronounced for female students (OR = 21.22). This result could be explained by the fact that loneliness was measured right after the school transition, when students are still unfamiliar with their new schools, which may have helped them to externally attribute their social isolation (e.g., Abramson et al., 2002; Haines, Metalsky, Cardamone, & Joiner, 1999). External attributions may have compensated for the initial shock of loneliness by subsequent increases in GSE, possibly as social integration into the new schools improves. This hypothesis needs to be more systematically investigated in future studies.

In summary, the results appear to confirm Janosz et al.'s (1998) proposal that schools' bonding climate forms the core of the relational component of school life. In fact, the results show that students' personal relationships with their teachers and perceptions of the teachers–students relational climate have few remaining effects on class membership once perceptions of schools' bonding climate are considered. Indeed, students' perceptions of schools' bonding climate predict membership in most trajectory classes characterized by higher levels of GSE, an effect that is generally limited to female students. The results also show that loneliness, but not

perceptions of schools' between-students relational climate, also have consistent effects on membership in latent trajectory classes with lower levels of GSE for all students. These effects, however, are often more pronounced for girls. The fact that the effects of most of the relational components of school life tend to be more pronounced for female students was expected and is fully consistent with the fact that girls tend to attribute more importance to interpersonal relationships than boys (Cross & Madson, 1997; Helgeson, 1994).

Discussion

This study sought to model heterogeneity in the trajectories of GSE in adolescence, after the school transition. Interestingly, the results from the unconditional GMA models provide a way to reconcile the apparently diverging results from previous studies, suggesting that the differences may have been due to the presence of subgroups presenting qualitatively different trajectories. Indeed, two of the latent trajectory classes show that for a majority of students (69.7%), GSE levels remain stable throughout adolescence; either persistently high (13.5%) or moderate (56.2%). These results are consistent with an interpretation of GSE as a trait (Morin, Maïano, Marsh, et al., 2011). However, an additional latent trajectory class shows that trait-GSE can evolve in adolescence. Indeed, a subgroup comprising 11% of students appear to switch (also see Dolan, Schmittmann, Lubke, & Neale, 2005) from the moderate to the elevated trajectory over the course of the study, between Grades 8 and 9. Interestingly, this is a period in which most adolescents are likely to have entered puberty and become familiar with their secondary school environments (Eccles et al., 1993; Steinberg & Morris, 2001). It would have been interesting to have access to data prior to the school transition to see whether this trajectory class did in fact include students who matured over the course of the study, becoming more pleased with themselves over time, or if it rather included students with GSE levels that are highly reactive to life transitions (i.e., whether GSE levels were high before the school transition, decreased with the transition, and subsequently returned to previous levels). This would clearly suggest different practical implications for the results. Similarly, future studies would do well to examine this specific latent trajectory class in greater detail, to identify what occurs to these students during the secondary school years to help them reach higher, and stable, levels of GSE. At the moment, it is impossible from this study to disentangle the possibility that this class characterized by (a) internal maturation into a more consolidated identity, (b) acceptance or solving of previous life difficulties or unresolved developmental tasks, (c) positive change in life conditions, or (d) a mixture of these possibilities that varies across individuals or classes or both.

These three latent trajectory classes (high, moderate, and increasing) suggest that moderate to elevated levels of GSE tend to be stable and crystallized into trait-like trajectories, although evolution is possible. These results illustrate that most adolescents (i.e., at least 80%) appear to cope well with the adolescent transition and associated changes, providing further disconfirmation of Hall's (1904) "storm and stress" theory, depicting adolescence as a period of identity crisis (Arnett, 1999; Molloy et al., 2011; Steinberg & Morris, 2001). Surprisingly, although two of the previous three cluster analyses of GSE trajectories identified one decreasing trajectory (Hirsch & DuBois, 1991; Zimmerman et al., 1997; but see Deihl et al., 1997), no such trajectory was identified in this study. It is interesting to note that both studies in which a decreasing trajectory was observed started during Grade 6, before the school transition (Hirsch & DuBois, 1991; Zimmerman et al., 1997), whereas both studies in which an increasing trajectory was observed started in Grade 7, after the transition (Deihl et al., 1997; this study). It is well documented that reliance on different time periods and intervals tends to induce variability in the results of longitudinal analyses (e.g., Ployhart & Vandenberg, 2010). However, the different results obtained in this study may also be due to the greater flexibility of GMAs in which we allowed time-specific residuals to vary across latent classes, contrary to cluster analyses where they are specified as invariant (Morin, Maïano, Nagengast, et al., 2011). This is an important difference, because in this study, the last latent trajectory class was defined mainly by elevated time-specific residuals, showing that at low levels, GSE becomes more state-like and does not appear to follow any stable or continuous (linear or nonlinear) trajectory. Therefore, constraining time-specific residuals to equality over time and across classes would have likely resulted in different and potentially biased results. Indeed, in this study, 19.3% of the students presented low and highly unstable levels of GSE. This nicely complements the previous results and provides strong support to the self-equilibrium hypothesis by showing that GSE

stability seems to increase as a function of GSE levels and, consequently, that there are likely very few students with stable low or unstable high levels of GSE.

These results suggest that low-GSE students may present permeable or reactive self-esteem and would thus benefit particularly from interventions aimed at consolidating their self-images. However, our proposition that low GSE present reactive state-like properties also deserves further investigation to verify whether low GSE levels simply vary at random or whether they present an exacerbated reactivity to external or internal events as suggested by previous studies (Baldwin & Hoffmann, 2002; Molloy et al., 2011; Morin, Maïano, Marsh, et al., 2011; Roberts & Monroe, 1992). Understanding the origin of these fluctuations would help in designing interventions targeting this subgroup of adolescents. Indeed, this latent trajectory class has the potential to bring new light to the "storm and stress" theory, suggesting that for a subsample comprising close to 20% of adolescents, adolescence may indeed be characterized by persistent identity turmoil. Interestingly, these students are the most likely to be referred to school counsellors, thereby reinforcing the notion that storm and stress is normative. The question that remains, however, is whether GSE levels in this subgroup consolidate or increase by the end of adolescence, which would be consistent with Hall's (1904) proposition, or whether they remain low or unstable upon entering adulthood.

We also verified whether latent trajectory class membership could be predicted by school experiences and school climate perceptions measured right after the secondary school transition. One limitation of this study is that we could not evaluate school-level effects with appropriate multilevel analyses due to the small number of schools included in the sample. However, we relied on group-mean centering of the school-related predictors to obtain properly disaggregated student-level effects and on the Mplus design-based correction of standard errors to obtain proper estimates. The results from the conditional model can thus be interpreted as reflecting the effects of students' perceptions once the effects of school-level effects are partialed out (i.e., individual deviations from the school means, also misleadingly known as *school psychological environment*). This represents a strength of this study, which is, to our knowledge, the first to provide proper student-level estimates of school-life effects on GSE trajectories. The results clearly confirm the proposition that students' perceptions of their transitional school's environment do indeed play a determining role in GSE development over and above the impact of macroscopic school characteristics (e.g., Ciani et al., 2010; Roeser & Eccles, 1998; Way et al., 2007). However, further studies are needed to verify the extent to which these effects translate to the school level. Additional analyses (see online supporting information Appendix S8) based on grand-mean centered predictors converged on highly similar results (and when they did not, the differences were related mostly to the significance of the effects, not the size of the effects themselves). This finding is consistent with the fact that five schools are not enough to properly study school-level effects and with the generally low percentage of variation in GSE and school variables occurring at the school level (see online supporting information Appendix S1). In fact, the percentage of school-level variance in probabilities of membership in the various classes remained well under 2% (intraclass correlations = 0.002–0.015).

These conditional analyses investigated whether individual-level variations in school experiences and school climate perceptions corresponding to the organizational, instructional, and relational facets of the transitional school life predicted trajectory class membership and whether these relations are moderated by gender. Consistent with known gender differences in the importance attributed to social relationships and intimacy (girls) versus personal achievement and status (boys) in identify formation (Cross & Madson, 1997; Helgeson, 1994; Morin et al., 2009), we found that most of the relations were indeed moderated by gender in the expected direction.

First, we found that school-life instructional facets were related to membership in the various GSE trajectories. Indeed, higher levels of GPA and more positive perceptions of the school's educative climate decreased the likelihood of membership in the low trajectory and increased the likelihood of membership in the moderate and increasing classes, especially for male students.

The fact that the instructional components of school life had fewer effects for female students may reflect the limited set of variables that were available in this study. Indeed, schools' educative climate is known to be better represented by two dimensions reflecting the reliance on a performance-oriented structure, in which personal achievement, success, and competitiveness is valued, versus a mastery-oriented structure, in which mastery of school-related tasks, competency development, and cooperation is prioritized (Ames, 1992; Midgley, 2002). Since boys are known to anchor their

self-esteem in achievement-related issues more strongly than girls, who prefer cooperation (e.g., Cross & Madson, 1997; Helgeson, 1994), it is not surprising that previous research showed that girls benefit more from mastery-oriented structures and boys from performance-oriented structures (e.g., Grant & Dweck, 2003; Wigfield & Wagner, 2005). In this study, measures of schools' instructional facets clearly taps into performance-goal orientations. Indeed, we simply measured students' personal achievement levels (i.e., GPA) and educative climate perceptions based on a measure reflecting the importance attributed to achievement and success. Therefore, the gender-differentiated results support previous research and show that a strong focus on achievement may in some cases be deleterious for girls. Moreover, girls who invest in the academic world to a greater extent after the school transition may do so to the detriment of building social ties in their new school, and this may cancel out potential benefits of academic investment. Future studies would do well to expand on these results by including variables related to mastery goals (e.g., mastery-goal climate, support for academic difficulties).

Among the organizational facets of school life, perceptions of schools' justice climate seemed particularly important for students' GSE. Positive perceptions of schools' justice climate stabilized boys' GSE, increasing their likelihood of membership in the higher and more stable GSE trajectories. Conversely, similar perceptions predicted a greater likelihood of improvement in girls' GSE levels, predicting membership in the increasing trajectory. However, victimization and security climate perceptions had no effects on their own, or in interaction, on students' GSE once justice climate perceptions were considered. This potentially important result is surprising since these variables significantly correlate with GSE levels (see online supporting information Appendix S1). Indeed, previous studies showed strong negative effects of exposure to school violence, indiscipline or insecurity on youths' development (e.g., Greene & Way, 2005; Janosz et al., 2008; Way et al., 2007). However, these studies generally failed to simultaneously consider students' perceptions of the justice climate. Since social comparison processes are known to play a determining role in adolescents' GSE development (e.g., Marsh, 2007), perceptions of interpersonal justice could play a major role in shaping GSE. What our results show is that once the effects of justice climate perceptions are considered, the effects of victimization and security climate perceptions disappear. This suggests that the active ingredient in the effects of school violence on GSE is the perception that these experiences are inherently fair or unfair (or occur at schools that are inherently fair or not), rather than victimization per se. This has important implications and suggests that interventions targeting perceptions of justice (e.g., student consultation, democratic control procedures) are likely to be at least as important as interventions directly targeting violence.

However, these results are limited by the fact that we relied on an incomplete operationalization of the organizational component of school life. As previously noted, this component relates to students' needs for autonomy and security, and thus cover control and security as well as support for autonomy, which are important to youths' development (e.g., Roeser et al., 1998, 2000; Way et al., 2007). Both these facets should be balanced because students need to learn to function autonomously in a context where they feel free to be themselves without fearing for their security, while learning to do so in a respectful manner (e.g., Deci & Ryan, 2004; Eccles & Roeser, 2009). Although justice climate perceptions lie at the interface of these two facets and were found to play a determining role, we had no direct measures of school support for autonomy, a factor previously found to be important in self-esteem development (Roeser & Eccles, 1998; Roeser et al., 1998, 2000; Way et al., 2007). This should be more thoroughly investigated in future studies.

Results regarding the relational facets of school life are more straightforward, perhaps due to a broader coverage of this component. These results confirm previous studies in showing that relational facets play an important role in shaping GSE trajectories, especially for female students (Reddy et al., 2003; Roeser & Eccles, 1998; Way et al., 2007). Students' perceptions of bonding climate and feelings of loneliness played a particularly important role in this regard, while the effects of other relational facets (see online supporting information Appendix S1) faded out once these two components were considered. These results confirm current knowledge (e.g., Cross & Madson, 1997; Helgeson, 1994), showing that loneliness and bonding climate perceptions had stronger effects for girls, who tend to value closer social ties.

We previously addressed some limitations concerning the need to replicate the current results based on a greater number of schools—allowing for multilevel analyses—and including an extended coverage of the instructional and organizational facets of school life. Apart from these limitations and although

precautions were taken to avoid the problems most commonly associated with GMA (Morin, Maïano, Nagengast, et al., 2011), a number of limitations remain. This study relied on a short-term (4-year) follow-up of a convenience sample of students following secondary school transition and ending before the next transition. The attrition rate, albeit consistent with the rates reported in similar studies, remains high, and its impact on generalizability remains unknown. This underscores the need to replicate the present findings, and to do so with more representative samples. For instance, the present sample was reasonably homogenous in terms of racial and ethnic background, which clearly limits the generalizability of the results, especially given the known effects of ethnicity (confirmed in this study) on self-esteem (e.g., Greene & Way, 2005; Morin, Maïano, Marsh, et al., 2011; Twenge & Crocker, 2002), as well as its likely effects on school experiences and school perceptions.

Furthermore, pending replication, these latent trajectories remain preliminary, and care should be taken to avoid their reification. Even if GMAs are more person than variable centered, they are still not purely individual-centered methods as their conclusions do not necessarily generalize equally to all members of the latent trajectory classes, although one main objective of GMAs is to minimize within-class variations. In addition, GMAs also include estimates of within-class variability, allowing for a consideration of individual-level variations in the results. Furthermore, although we relied on a state-trait analogy in the interpretation of the latent trajectory classes (Morin, Maïano, Marsh, et al., 2011), this study comprises widely spaced time points not ideally suited to state-trait analyses. We already noted that studies based on intensive idiographic designs (daily measurements) covering 1- or 2-week periods were not ideally suited to understand the long-term evolution of the trait-component of GSE. However, studies such as this one are also not ideally suited to fully understanding lability and reactivity in state GSE, although both designs include complementary information. It would be interesting to complement these results with intermediate measurement periods (e.g., weekly measurement over a full year). To this end, time-series analyses or dynamic factor analyses, directly applied to individuals, to the full sample, and even to subsamples, would be ideally suited to a far more precise analysis of GSE lability, patterns in these fluctuations, and predictors of these patterns (e.g., Box & Jenkins, 1976; du Toit & Browne, 2007; Ferrer & Nesselroade, 2003).

Similarly, although the predictors and the predicted intercepts were appropriately ordered in time, we still cannot fully attribute the results to the "effects" of school-life characteristics. Indeed, we showed that GSE presented a high level of trait-like developmental stability for most students. Since GSE may also directly influence students' perceptions of their schools' characteristics, the present design does not allow us to properly disentangle the part of the effects that are due to the impact of previous (and stable) levels of GSE on students' perceptions of their schools. Previous studies with GSE measures starting before the school transition would help to clarify this issue. In a related way, extending this study through the inclusion of time-varying covariates would help us better understand the relations between what occurs later during the secondary school years, after the transition, and GSE trajectories, especially the increasing one. Finally, this study relied on student-level, residualized perceptions of climate, which are neither meaningful individual characteristics—only perceptual differences—nor aggregated school-level climate. There is thus no way to assume that the effects will generalize to the school level. However, the results clearly show that students' perceptions do have an effect over and above the effects of school-level characteristics.

Conclusion

This study was a substantive methodological synergy in which we applied state-of-the-art methodologies to investigate heterogeneity in adolescents' GSE trajectories and to verify whether membership in GSE trajectory classes can be predicted from various facets of adolescents' school lives measured right after the transition. Methodologically, we illustrated the use of GMAs in estimating longitudinal trajectories and how properly disaggregated student-level effects can be obtained when the study incorporates multiple schools, but not enough to support multilevel analyses. The results confirmed that GSE present strong trait-like properties and remain high for a majority of students who possess the resources to successfully negotiate the developmental tasks of adolescence. These results also show that this trait-GSE can improve with successful maturation. Conversely, our results also support a circumscribed interpretation of Hall's (1904) "storm and stress" theory by showing that 20% of the sample presents low levels of GSE, suggesting that low GSE presents strong state-like properties mostly characterized by unstable, reactive levels. Similarly, this study supports the

self-equilibrium hypothesis showing that levels and stability of GSE are not orthogonal characteristics, but rather tend to co-occur so that students with high self-GSE show a greater level of longitudinal equilibrium in their levels of GSE whereas students with low GSE present an apparently highly reactive, unstable, longitudinal profile. Similarly, the results also confirm that individual perceptions of school life played a significant role in shaping GSE trajectories through gender-differentiated processes. Interestingly, the results supported our proposed two (experiences and climate) by three (instructional, organizational, and relational) conception of school characteristics. Furthermore, they confirmed that perceptions of the schools' justice and bonding climates play a key role in determining the effects of school life on students' identity construction.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's website:

Appendix S1. Correlations and Descriptive Statistics for the Variables Under Study.

Appendix S2. Additional Technical Considerations in the Estimation of the Models.

Appendix S3. The Figural Representation of the Growth Mixture Analysis Model Estimated in the Present Study.

Appendix S4. Fit Indices From Alternative Unconditional and Conditional GMA Models.

Appendix S5. Results From the Final Unconditional Four-Class GMA Model.

Appendix S6. Annotated Mplus Input Code for the Final GMA Model.

Appendix S7. Alternative Results Based on Traditional Growth Curve Models.

Appendix S8. Main Results From the Predictive Analyses Based on Grand-Mean Centered Predictors.