Academic Self-concept and Educational Attainment Level: A Ten-year Longitudinal Study

Frédéric Guay, Simon Larose, Michel Boivin
Université Laval, Québec, Canada

Abstract

The purpose of this study was to test children's academic self-concept, family socioeconomic status, family structure (single parent vs. two parent family) and academic achievement in elementary school as predictors of children's educational attainment level in young adulthood within a ten-year longitudinal design. Participants (254 girls, 211 boys) were three cohorts of students in Grades 3, 4, and 5 from ten elementary schools. Results from structural equation modeling revealed that academic self-concept predicted educational attainment level ten years later over and above prior achievement. Moreover, this pattern of results was invariant across cohorts. In addition, regression analyses based on a restricted sample (n = 243) indicated that the academic self-concept/educational attainment level relation was still significant while controlling for family SES, family structure (single parent vs. two parent family), and academic achievement. Discussion focuses on the theoretical and practical implications of the results.

Academic self-concept is an evaluative self-perception that is formed through experience with and interpretation of one's school environment (Marsh & Craven, 1997; Shavelson, Hubner, & Stanton, 1976). Academic self-concept has been extensively studied in relation to academic achievement. Marsh and Yeung (1997) reviewed the literature on this relationship and concluded that despite some methodological limitations and a wide variety of different designs, samples, and ages, the research was consistent in support of a reciprocal relation between these variables (see also Guay, Marsh, & Boivin, 2003).

From the academic self-concept literature, it is also possible to posit that academic self-concept influences educational attainment level (Marsh & Craven, 1997). However, because academic self-concept and academic achievement are moderately correlated and given that educational attainment level is related to socioeconomic status (SES) (Bachman & O'Malley, 1986) and family structure (married vs. divorced; Evans, Kelley, & Wanner, 2001), an important question is whether academic self-concept could predict educational attainment level over and above academic achievement, family SES, and family structure. Are young children with a high academic self-concept able to attain a high level of education, regardless of their academic achievement and their family SES and structure?

The purpose of the present study was to verify this question using a ten-year longitudinal design. This study contributes to the existing literature in three important respects. First, predicting educational attainment level is an important topic because recent studies reported that occupations with high literacy and cognitive skills registered the strongest increase in employment in both

Canada and the United States (Herr, 1999; Massé, Roy, Gingras, 1998). In addition, a high level of educational attainment is related to healthy functioning (i.e., Keating & Hertzman, 1999). Second, although academic self-concept research has devoted considerable attention to the multidimensional nature of self-concept and its relation with educational outcomes such as achievement, academic choices, educational aspirations, and academic behaviors (Marsh & Craven, 1997), little is known about the long-lasting effects of academic self-concept. Testing the long-lasting effects of academic self-concept may thus inform us about factors in childhood that affect the quality of adult life. Below, we review theoretical and empirical work on the relation between academic self-concept and educational attainment level.

Theoretical and Empirical Work

Beliefs about one's ability (or self-concept) is a key construct in various motivational and self-concept theories. An exhaustive review of these theories is beyond the scope of the present article. Nevertheless, we briefly review some theoretical postulates regarding the role of perceived ability on behavior.

The expectancy value model of achievement-related choices and engagement (e.g., Eccles, 1987; Wigfield & Eccles, 1992) proposed that academic self-concept (i.e., actual beliefs about ability) influence persistence, performance, and choices through expectations of success (i.e., beliefs about how well one will do on an upcoming task). However, Eccles and Wigfield (1995) revealed that expectations of success and academic self-concept are highly related and empirically similar. Thus, using this framework, one may posit a direct influence of academic self-concept on persistence (or educational attainment level).

The social cognitive model of motivation (i.e., Bandura, 1997) emphasized the role of perceptions of efficacy (i.e., confidence in ability to organize and execute a given course of action to solve a problem or accomplish a task) in determining individuals' striving for achievement. Specifically, Bandura proposed that self-efficacy beliefs are the major determinant of goal setting, activity choice, willingness to expend effort, and persistence (or educational attainment level; Bandura, 1997).

The model of self-system processes (Connell and Wellborn, 1990) proposed that when perceived competence (i.e., perceiving oneself as being effective in one's interaction with school activities) is fostered by the school context, engagement is likely to be manifested in affect, cognition and behavior, which in turn lead to school outcomes such as grades, skills, persistence, and adjustment. Similarly, in their self-determination theory, Deci and Ryan (1985) included individuals' need for competence as a source of influence on intrinsic and extrinsic motivation and related consequences such as performance and persistence (or educational attainment level).

Finally, self-concept theorists focus on how good one is at different activities and the consequences of such beliefs on performance and persistence (Harter, 1999; Marsh & Craven, 1997). Although the aforementioned theorists may diverge somewhat in their conceptualization and measurement of ability beliefs (see Wigfield & Eccles, 2000, and Zimmerman, 2000, for more details), they nevertheless posit that perceptions of ability (i.e., academic self-concept, perceived competence, and self-efficacy) have an influence on persistence or educational attainment level.

There are very few empirical studies on the relation between perceptions of ability and educational attainment level. Indeed, we reviewed the literature and we found only one relevant study on this issue (Bachman & O'Malley, 1986). Given the paucity of research on this relationship, we decided to review studies that have focused on a similar concept, namely school persistence, which may provide indirect but relevant empirical support on this important relation.

Empirical work has provided some support for the relation between perceptions of ability and subsequent persistence. For instance, a meta-analytic review on the topic of persistence revealed that students' self-efficacy beliefs were related to number of academic terms completed (Multon, Brown, & Lent, 1991). More importantly, Schaefers, Epperson, and Nauta (1997) revealed that math and sciences self-efficacy beliefs predicted persistence in engineering, physical science, and mathematics college majors over and above the contributions of ability measures (i.e., first semester GPA, cumulative GPA, and scores on the Mathematics subtest of the American College Test).

In the academic self-concept literature (or perceived competence literature), Phillips (1984) showed that among equally able students, those with low academic self-concept were portrayed by their teachers as lacking in persistence (see also Ayres, Cooley, Dunn, 1990). In addition, Vallerand, Fortier, and Guay (1997) showed that persistent students perceived themselves as more competent than dropout students. In a longitudinal study over a four-year period, House (1992) showed that academic self-concept was a predictor of school persistence in college. In contrast to most research, Bachman and O'Malley (1986), using SEM analyses, found a negative relation (– .09) between self-concept of ability and level of educational attainment after controlling for family SES, grades, ability, global self-concept, and school mean academic ability. However, because the product moment correlations between self-concept indicators and level of educational attainment were positive and moderate (.38, .43, .30), it cannot be concluded that self-concept of ability had any subsequent influence on educational attainment level. The negative effect of academic self-concept on later level of educational attainment observed in Bachman and O'Malley's (1986) study may stem from a multi-collinearity problem.

Although the research reviewed above was reasonably consistent regarding a relation between prior ability beliefs and later persistence or educational attainment level, whether this relation occurs over and above academic achievement, family SES, and family structure has not systematically been verified. Nor have these relations been tested using a ten-year time lag.

The Present Study

The purpose of the present study was to test the relation between academic self-concept and level of educational attainment. Based on the theoretical framework and previous research outlined above, we therefore hypothesized that over and above academic achievement, SES, and family structure, academic self-concept would predict positively children's level of educational attainment ten years later. To test this hypothesis, we used data from a ten-year longitudinal study that was conducted among three cohorts of elementary school children who, at the start of the study, attended third, fourth, and fifth grade.

Method

Participants

Participants were three cohorts of 465 French Canadian children (254 girls, 211 boys) from ten elementary schools from a variety of socioeconomic environments in Québec City, Canada. At the start of the study, children in cohorts 1 (n = 160), 2 (n = 155), and 3 (n = 150) were in third, fourth, and fifth grade respectively. Participation required parental consent and the parental participation rate was over 98%.

Procedure

Data from this study were obtained from a longitudinal project on children's social relations conducted by the third author. This project included three cohorts and three waves of data collection in 1988, 1989, and 1990 with a follow-up data collection in 1999. In order to maximize the number of participants, we used the 1989 data to predict level of educational attainment in 1999. In May 1989, children completed various measures and the Self-Perceptions Profile for Children (Harter, 1985). In addition, teachers completed a questionnaire assessing children's academic achievement in three subjects: writing, reading, and mathematics. Questionnaires were administered in the classroom by two well-trained research assistants. In May 1999, children were contacted by a research assistant and were asked to complete a telephone interview. This interview included various questions on their social relations as well as on their level of educational attainment, family SES, and family structure. Among the 1124 children who participated in the 1989 data collection, 513 of them could not be contacted. That is, after ten years, 513 of the 1124 children had moved or changed their telephone number. Among the 611 children whom we were able to contact, 465 agreed to participate in the second wave, for a response rate of 76%. However, it is important to keep in mind that only 41% of the original sample participated in the ten-year follow-up.

Analyses were conducted to ensure that this smaller subsample (n = 465) was equivalent and thus representative of the whole sample (n = 1124). Consequently, scores on all variables at time 1 were tested for mean differences between the subsample included in the main analyses (n = 465) and people from whom data were not available for time 2 (n = 659). A MANOVA was performed and this analysis revealed a multivariate significant effect, $F(6, 1117) = 3.83$, $p = .001$. Table 1 presents the means and effects size (partial η^2) for each dependent variable as a function of both subsamples. Significant differences ($p < .05$) were found on all variables. Partial η^2 for significant effects ranged between .010 to .013. Cohen (1992) characterizes = $\eta^2 = .01$ as small, $\eta^2 = .06$ as medium, and $\eta^2 = .14$ as large effects size. Although the group that did not participate at both measurement times has lower scores on every measure than the group who did participate, the size of these significant effects was low.

Measures

Academic self-concept. Children completed the perceived academic competence subscale from the French version (Boivin, Vitaro, & Gagnon, 1992) of the Self-Perceptions Profile for Children (Harter, 1985). This six-item subscale employs a structured alternative format (e.g., ''Some kids believe that they have problems remembering things but other kids believe that they remember

things easily''). Items are scored on a four-point scale where a score of one indicates low academic self-concept and a score of four reflects high levels of academic self-concept. In the present study, our structural equation models were based on three indicators. Thus, the six items were used to construct three indicators by averaging the responses of the first two items to form the first indicator, the second two items to form the second indicator, and so forth. This procedure reduces the number of items and results in more valid and reliable indicators (Marsh & Yeung, 1997).

Academic achievement. The measure used to assess academic achievement was a three-item teacher rating scale. Each of the three items was designed to assess academic achievement in reading, writing, and mathematics. Teachers rate a child's academic performance in these three subjects relative to other classmates using the following scale: 1 = quite under the mean, 2 = slightly under the mean, 3 = at the mean, 4 = slightly above the mean, 5 = quite above the mean (see Frentz, Greshman, & Elliot, 1991, and Hay, Ashman, & van Kraayenoord, 1997, for a similar methodology). This method was chosen because it can be used to classify children's academic performance in relation to the mean achievement of other children in the same class, thereby controlling for varying levels of strictness in teachers' grading systems. A score of 5 represents the best academic performance, whereas a score of 1 represents the worst level of performance.

Three reasons led us to use teachers' ratings of achievement instead of standardized test scores. First, in the Que´ bec educational system there are no standardized test scores until high school. Second, Frentz et al. (1991) reported correlations ranging from .43 to .72 between teacher ratings of achievement and the Peabody Individual Achievement Test and the Wechsler Intelligence Test for Children – Revised, thereby providing good support for the validity of teachers' ratings of achievement. Third, Guay et al. (2003) found a test – retest correlation of .69 based on responses by different teachers from one year to the next, thereby providing good support for the construct validity of teacher ratings of achievement.

Educational attainment level. This measure is made up of one item in which young adults were asked to report which educational degree they had completed. Possible answers could range from a high school first degree to a second university degree. In the Que´ bec educational system, after high school, students may enroll in a two-year college program (leading to university) or a three-year program (self-contained technical program). Results showed a sufficient variability in educational attainment level for each cohort (see Table 2). However, not all students across cohort had the same chance to attain the same level of education. For example, in Cohort 1 the highest level of education that a child could attain was a second year in college whereas for Cohort 3, it was a second year at the university. In order to correct for this restriction of range, we have taken children's level of educational attainment and then we have divided this value by the highest level of education that children of these cohorts may have completed. For example, in Cohort 1 the highest level of education is a second year of college. If a child in the first cohort had attained a first year of high school than his/her value on the new variable is 1/7 (i.e., 1 = first year of high school, 7 = second year of college) thus .14. This procedure thus corrects for the restriction of range across cohorts. Indeed, a one-way ANOVA revealed no significant differences on this variable among cohorts.

Socioeconomic status and family structure. SES was assessed using children's mother and father annual income at time 2. Participants were asked to indicate the annual income of his/her mother and father, in Canadian dollars (CDN$), using the following scale: (1) less than 9,999$;

(2) between 10,000$ and 14,999$;(3) between 15,000$ and 19,999$; (4) between 20,000$ and 29,999$; (5) between 30,000$ and 39,999$; (6) between 40,000$ and 49,999$; (7) between 50,000$ and 59,999$; (8) between 60,000$ and 69,999$; and (9) above 70,000$. Of the 465 participants, 243 have answered this question. For the total sample, the average annual family income was between 30,000$ and 39,999$. Family structure at time 2 was assessed by the following question: Are your parents living together or are they living apart?

Results

Unfortunately, we have many missing values on family SES. In order to maximize the number of participants in the analyses, we used a three-step strategy. First, using the total sample ($n = 465$) we performed CFA and SEM analyses on each cohort to verify if academic self-concept at time 1 would predict levels of educational attainment at time 2 (i.e., ten years later) over and above academic achievement measured at time 1. Second, we verified if the pattern of results observed within these three cohorts ($n = 465$) differed across cohorts using invariance analyses. Third, using the restricted subsample ($n = 243$) we verified via regression analyses if the relation between academic self-concept and educational attainment level is still significant while controlling not only for academic achievement but also for family SES and family structure.

Step 1: CFA and SEM Analyses

The adequacy of the models tested in the present study was assessed via Structural Equation Modeling with the EQS program (Version 5.1; Bentler, 1993). Models were all tested with the maximum likelihood method of estimation. To ascertain the model fit, we used the comparative fit index (CFI), the nonnormed fit index (NNFI, also known as the Tucker – Lewis Index), and the root mean square error of approximation (RMSEA) as well as the χ^2 test statistic.

The NNFI and CFI vary along a 0 to 1 continuum (although the NNFI could be greater than 1) in which values greater than .90 and .95 are typically taken to reflect acceptable and excellent fits to the data (Schumacker & Lomax, 1996). Browne and Cudeck (1993; see also Joreskog & Sorbom, 1993) suggest that RMSEAs less than .05 are indicative of a ‘‘close fit’’ and that values up to .08 represent reasonable errors of approximation. The CFI contains no penalty for a lack of parsimony so that the addition of new parameters leads to an improved fit that may reflect capitalization on chance, whereas the NNFI and RMSEA contain a penalty for a lack of parsimony.

We began with a brief evaluation of CFA solutions for each cohort (see Table 3 and Appendix). Correlations among the three constructs are presented in Table 3. As expected, for each cohort the relation between academic self-concept and academic achievement was significant as well as the one between academic self-concept and educational attainment level. These findings therefore provided some support for our hypothesis.

Three SEM analyses were performed on each cohort. Results of these analyses are presented in Figure 1. It should be noted that these three SEM models are equivalent to the corresponding CFA models (see above) in that the goodness of fit and degrees of freedom are the same, the factor loadings and uniquenesses are the same, and the remaining parameters (factor covariances in the CFA model; path coefficients, factor covariances, and residual factor covariances in the SEM model) are merely reparameterizations of each other. The fit of these models are good and exactly

the same as the CFA models (see Appendix for fit indices). Results of Cohort 1 indicated no significant relation between academic self-concept and educational attainment level ($\beta = .08$, $p < .05$) whereas significant relations were observed for Cohort 2 ($\beta = .24$, $p < .05$) and Cohort 3 ($\beta = .26$, $p < .05$). For each cohort there was a significant relation between academic achievement and educational attainment level.

Step 2: Invariance Analyses

In order to verify if these results are the same across cohorts, we performed a set of invariance analyses. Following Marsh, Craven, and Debus (1998), we evaluated the invariance of different sets of parameters across seven models (see Table 4): No invariance (Model 1); factor loadings (Model 2); factor variances (Model 3); factor covariances (Model 4); path coefficients (model 5); uniquenesses of academic self-concept (Model 6); and uniquenesses of academic achievement (Model 7). The minimum condition of factorial invariance is the invariance of factor loadings (Model 1). Comparison of models was facilitated by positing a nested ordering of models in which the parameter estimates for a more restrictive model are a proper subset of those in a more general model (for further discussion see Bentler, 1990). The difference in chi-square between two nested models can be tested in relation to statistical significance.

Results of the invariance procedure are detailed in Table 4. Overall, these analyses suggest that all parameters were invariant. That is, the final model (Model 7) offered a good fit to the data (see Table 4) in that the chi-square was not significantly different from Model 1 and the fit indices were as good or better for Model 7 than for any of the other models (although there is a significant difference with Model 6). Final results are depicted in Figure 2. Results of invariance analyses are different from those based on each cohort. Indeed, results showed that for each cohort, the path between academic self-concept and level of educational attainment is significant (.18). In sum, analyses of invariance provided some support for the generalizibility of the link between academic self-concept and educational attainment level for each cohort.

Step 3: Regression Analyses

As mentioned at the outset, it was not possible to control for family SES in the main analyses because we have too many missing cases on this variable (n = 222). In order to verify if the relation between academic self-concept and educational attainment level is still significant while controlling for achievement, family SES, and family structure, we performed a regression analysis on each cohort.

Before performing regression analyses, analyses were conducted to ensure that this smaller subsample ($n = 243$) was equivalent and thus representative of the whole sample ($n = 465$). Consequently, scores on all variables were tested for mean differences between the subsample included in the analyses ($n = 243$) and people from whom data were not available for this variable ($n = 222$). A MANOVA was performed and this analysis revealed a multivariate significant effect, $F(4, 460) = 6.43$, $p < .001$. Significant differences ($p < .05$) were found on all variables. These differences indicate that those who have missing values on this variable have lower scores on academic achievement, educational attainment level, and academic self-concept and are more likely to have parents who are living apart. Effects size ranged between .01 and .03.

Regression analyses tested if academic self-concept, academic achievement, family SES and family structure predicted educational attainment level. Educational attainment level at time 2 was thus regressed onto time 1 academic achievement, time 1 academic self-concept, and time 2 family SES, and time 2 family structure. Correlations among these variables are presented in Table 5. For Cohort 1 (n = 71), results indicated that only academic achievement (β = .26, p < .05) and family SES (β = .28, p < .05) were significantly related to educational attainment level. For Cohort 2 (n = 86), academic self-concept (β = .22, p < .05) and academic achievement (β = .34, p < .05) were significantly associated to educational attainment level whereas SES was marginally significantly related to educational attainment level (β = .18, p < .10). However, for Cohort 2, family structure was not significantly related to educational attainment level. For Cohort 3 (n = 83), academic self-concept (β = .26, p < .05) was significantly associated to educational attainment level whereas academic achievement and SES were not significantly related to this variable. However, family structure was significantly and negatively associated to educational attainment level (β = – .21, p < .05; i.e., children of parents who are living apart are less likely to attain a high educational attainment level). Overall, these results parallel those obtained with SEM in that the magnitude of the paths connecting academic self-concept to educational attainment level were similar. Indeed, for Cohort 1 the path in SEM analysis and in regression analysis was nonsignificant (but this path was significant in invariance analyses). For Cohort 2, the path was .24 in SEM analysis whereas in regression analysis the path was .22. For Cohort 3 the path was .26 in SEM analysis and .26 in regression analysis. However, it is important to keep in mind that there are significant mean differences on educational attainment level, academic self-concept, academic achievement, and family structure between those who have no missing values on SES and those who have missing values. Consequently, one should be careful about the generalizibility of these findings.

Discussion

The main purpose of the present study was to verify if the academic self-concept of elementary school children is related to their level of educational attainment in young adulthood over and above their level of academic achievement in elementary school years, family structure, and family SES. Results provided good support for this hypothesis. That is, structural equation modeling for Cohort 2 (children in Grade 4 at the start of the study) and Cohort 3 (children in Grade 5 at the start of the study) revealed that academic self-concept, over and above prior achievement, predicted educational attainment level ten years later. However, for Cohort 1 (children in Grade 3 at the start of the study) this relation was nonsignificant. In addition, regression analyses indicated that the relation between academic self-concept and level educational attainment level was significant for Cohorts 2 and 3 while controlling for family SES, family structure, and for academic achievement. Although there is no significant relation between academic self-concept and educational attainment level for Cohort 1, it is important to keep in mind that invariance analyses indicated that across cohort this relation is equivalent and significant. Thus, we believe that there is reasonable support for this relation in each cohort.

These results thus suggest that, among equally able students, those who perceived themselves as competent in school activities attain a high educational level in young adulthood. In addition, results indicated that the fact that children with high academic self-concept have higher educational attainment level is not necessarily related to the fact that these children may benefit from more family resources (e.g., support from both parents, university tuition paid), which in turn lead to higher academic self-concept and higher educational attainment levels. These findings are

impressive, given the ten-year gap between each measurement point, and provide good support for the long-lasting effects of academic self-concept. In addition, these findings confirm predictions, based on various theoretical frameworks, that ability beliefs have a reasonable influence on educational attainment level (Bandura, 1997; Connell & Wellborn, 1990; Deci & Ryan, 1985; Eccles, 1987; Harter, 1999; Marsh & Craven, 1997; Wigfield & Eccles, 1992). In addition, our results are in line with some empirical evidence on the relation between ability beliefs and persistence (House, 1992; Multon, Brown, & Lent, 1991; Phillips, 1984; Schaefers, Epperson, & Nauta, 1997; Schunk, 1981; Vallerand, Fortier, & Guay, 1997).

Because a high educational degree is related to healthy functioning (Keating & Hertzman, 1999) and because occupations with high literacy and cognitive skills registered the strongest increase in employment in both Canada and the United States (Herr, 1999; Massé, Roy, Gingras, 1998), researchers and practitioners should design interventions to foster high levels of educational attainment. We believe that interventions designed to enhance academic self-concept such as praise, feedback, and attribution training would be useful in this regard. Such interventions may plant the seeds of later school adjustment and healthy functioning.

Although the present results provide some support for the relation between prior academic self-concept and educational attainment level, five limitations should be taken into consideration when interpreting these findings. First, we did not focus on the processes that could intervene in the academic self-concept/educational attainment level relation. For instance, Vallerand, Fortier, and Guay (1997) showed that self-determined academic motivation (i.e., acting out of pleasure and choice) and behavioral intentions could mediate the effect of academic self-concept on school persistence. Specifically, the less positive students' perceptions of competence are, the lower are their levels of self-determined school motivation. In turn, low levels of self-determined motivation lead students to develop intentions to drop out of high school, which are later implemented, leading to actual dropout behavior. In addition, it is possible that academic self-concept leads to an internal locus of control (Rotter, 1982) which in turn fosters a high educational attainment level. Clearly, further research is needed to understand the psychological processes that could intervene in the academic self-concept/educational attainment level relation.

Second, we did not assess academic self-concept in multiple school subjects. According to Marsh (1993) such an evaluation is important to demonstrate processes underlying the formation of academic self-concept in different domains and their relation to school adjustment. Third, level of educational attainment was measured via a single indicator. As pointed out by Marsh and Yeung (1997), it is preferable to assess constructs with at least three indicators.

Fourth, results demonstrated significant mean differences between the initial sample of students and the remaining sample ten years later. More precisely, students who participated in both waves of data collection had higher levels of academic self-concept and achievement than students who only participated in the first data collection. Although the effect sizes on these mean differences were quite low, it is possible that the effects became large over time and that different results may emerged for people who did not participated in the second data collection. Moreover, it is important to keep in mind that there are significant mean differences in educational attainment level, academic self-concept, academic achievement and family structure between those who have no missing values on SES and those who have missing values. Consequently, one should be also

careful about the generalizibility of these findings. However, results from regression analyses parallel those obtained in SEM analyses.

Fifth, it is possible that teachers' evaluations of academic achievement in the present study are biased in that they may be influenced by children's self-concept of abilities. However, Jussim (1989) concluded from his study on teachers expectations that there is a modest biasing effects on grades teachers assigned to children. Thus although teachers' expectations do bias their evaluation of children, these effects are relatively small. The possibility of bias raises alternative interpretations for our results, but because the bias is typically small, it is not necessarily an important problem in the present study.

In conclusion, all these questions deserve scientific scrutiny to further our understanding of the relation between academic self-concept and school persistence. Such an understanding may be quite useful in fostering students' academic adjustment in schools.

References

Ayres, R., Cooley, E., & Dunn, C. (1990). Self-concept, attribution, and persistence in learning-disabled students. *Journal of School Psychology, 28*, 153 – 163.

Bachman, J. G., & O'Malley, P. M. (1986). Self-concepts, self-esteem, and educational experiences: The frog pond revisited (again). *Journal of Personality and Social Psychology, 50*, 35 – 46.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman.

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

Bentler, P. M. (1993). *EQS: structural equation program manual*. Los Angeles: BMDP Statistical Software.

Boivin, M., Vitaro, F., & Gagnon, C. (1992). A reassessment of the self-perception profile for children: Factor structure, reliability, and convergent validity of a French version among second through six grade children. *International Journal of Behavioral Development, 15*, 275 – 290.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. Bollen & R. Stine (Eds.), *Testing structural equation models* (pp. 136 – 162). Newbury Park, CA: Sage.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155 – 159.

Connell, J. P., & Wellborn, J. G. (1990). Competence, autonomy and relatedness: A motivational analysis of self-system processes. In M. R. Gunnar & L. A. Sroufe (Eds.), *Self processes and development: Minnesota symposium on child psychology* (Vol. 23, pp. 43 – 77). Hillsdale NJ: Lawrence Erlbaum Associates, Inc.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Eccles, J. S. (1987). Gender roles and women's achievement-related decisions. *Psychology of Women Quarterly, 11*, 135 – 172.

Eccles, J. S., & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin, 21*, 215 – 225.

Evans, M. D. R., Kelley, J., & Wanner, R. (2001). Educational attainment of children of divorce: Australia, 1940 – 90. *Journal of Sociology, 37*, 275 – 297.

Frentz, C., Greshman, F. M., & Elliot, S. N. (1991). Popular, controversial, neglected, and rejected adolescents: Contrasts of social competence and achievement difference. *Journal of School Psychology, 29*, 109 – 120.

Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: Developmental perspectives on their causal ordering. *Journal of Educational Psychology*.

Harter, S. (1985). *Manual for the self-perception profile for children*. Denver, CO: University of Denver.

Harter, S. (1999). *The construction of the self: A developmental perspective*. New York: Guilford Press.

Hay, I., Ashman, A., & van Kraayenoord, C. E. (1997). Investigating the influence of achievement on self-concept using an intra-class design and a comparison of the PASS and SDQ-I self-concept tests. *British Journal of Educational Psychology, 67*, 311 – 321.

Herr, E. L. (1999). *Counseling in a dynamic society: Contexts & practices for the 21st century* (2 editions). Alexandria, VA: American Counseling Association.

House, J. D. (1992). The relationship between academic self-concept, achievement-related expectancies, and college attrition. *Journal of College Student Development, 33*, 5 – 10.

Joreskog, K. G., & Sorbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software International.

Jussim, L. (1989). Teacher expectations: Self fulfilling prophecies, perceptual biases, and accuracy. *Journal of Personality and Social Psychology, 57*, 469 – 480.

Keating, D. P., & Hertzman, C. (1999). *Developmental health and the wealth of nations: Social, biological, and educational dynamics*. New York: The Guilford Press.

Marsh, H. W. (1993). Academic self-concept: Theory measurement and research. In J. Suls (Ed.), *Psychological perspectives on the self* (Vol. 4, pp. 59 – 98). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Marsh, H. W., & Craven, R. (1997). Academic self-concept: Beyond the dustbowl. In G. Phye (Ed.), *Handbook of classroom assessment: Learning, achievement, and adjustment* (pp. 131 – 198). Orlando, FL: Academic Press.

Marsh, H. W., Craven, R. G., & Debus, R. (1998). Structure, stability, and development of young children's self-concepts: A multicohort-multioccasion study. *Child Development, 69*, 1030 – 1053.

Marsh, H. W., & Yeung, A. S. (1997). Causal effects of academic self-concept on academic achievement: Structural equation models of longitudinal data. *Journal of Educational Psychology, 89*, 41 – 54.

Massé, P., Roy, R., & Gingras, Y. (1998). The changing skill structure of employment in Canada. Direction générale de la recherche appliquée, Politique stratégique, Dévelopement des ressources humaines, Canada.

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes; A meta-analytic investigation. *Journal of Counseling Psychology, 38*, 1, 30 – 38.

Phillips, D. (1984). The illusion of incompetence among academically competent children. *Child Development, 55*, 2000 – 2016.

Rotter, J. B. (1982). Social learning theory. In N. T. Feather (Ed.), *Expectations: Expectancy value models in psychology* (pp. 241 – 260). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Schaefers, K. G., Epperson, D. L., & Nauta, M. M. (1997). Women's career development: Can theoretically derived variables predict persistence in engineering majors? *Journal of Counseling Psychology, 44*(2), 173 – 183.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Schunk, D. H. (1981). Modeling and attributional effects on children's achievement: A self-efficacy analysis. *Journal of Educational Psychology, 73*, 93 – 105.

Shavelson, R. J., Hubner, J. J., & Stanton, G. C. (1976). Self-concept: Validation of construct interpretations. *Review of Educational Research, 46*, 407 – 441.

Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72*, 1161 – 1176.

Wigfield, A., & Eccles, J. S. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12*, 265 – 310.

Wigfield, A., & Eccles, J. S. (2000). Expectancy-value theory of achievement motivation. *Contemporary Educational Psychology, 25*, 68 – 81.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*, 82 – 91.

Table 1. Mean and Effects Size for Participants Involved in the Study and Participants Not Involved in the Study

	$\bar{x}$ Involved $n = 465$	$\bar{x}$ Not involved $n = 659$	p	Effect size
Academic self-concept 1	3.13	2.96	.001	.012
Academic self-concept 2	3.18	3.06	.010	.006
Academic self-concept 3	3.22	3.14	.053	.003
Reading	3.55	3.28	.001	.012
Writing	3.48	3.22	.001	.010
Math	3.63	3.35	.001	.013

Table 2. Frequencies and Percent for Educational Attainment Level as a Function of the Total Sample and Each Cohort

	C1		C2		C3	
	Freq	%	Freq	%	Freq	%
High school	2	1.3				
	4	2.5	2	1.3	2	1.3
	4	2.5	2	1.3	1	.7
	11	6.9	8	5.2	6	4.0
	46	28.8	40	25.8	26	17.3
College	81	50.6	22	14.2	15	10.0
	12	7.5	74	47.7	36	24.0
			5	3.2	32	21.3
University			2	1.3	27	18.0
					5	3.3
	160		155		150	

Freq = frequency; C1 = Cohort 1; C2 = Cohort 2; C3 = Cohort 3.

Table 3. Correlations Between Academic Self-concept, Academic Achievement, and Level of Educational Attainment for Each Cohort ($n = 465$)

	Cohort 1			Cohort 2			Cohort 3		
	ASC	ACH	EAL	ASC	ACH	EAL	ASC	ACH	EAL
ASC	—			—			—		
ACH	.42	—		.48	—		.64	—	
EAL	**.22**	.37	—	**.41**	.47	—	**.46**	.48	—

ASC = academic self-concept; ACH = academic achievement; EAL = educational attainment level. Correlations are between latent variables based on the confirmatory factor analysis model (see Appendix). Standardized coefficients were reported to facilitate interpretation.

Table 4. Fit Indices for Analyses of Invariance Across the Three Cohorts

Model descriptions	χ^2	*RMSEA*	*CFI*	*NNFI*	*df*	Df_{diff}	χ^2_{diff}
Model 1	46.509		.994	.990	36	—	
Model 2	49.075	.016	.997	.996	44	(M2 vs M1) 8	2.56
Model 3	51.36	.009	.999	.999	50	(M3 vs M2) 6	2.28
Model 4	56.595	.014	.998	.997	52	(M4 vs M3) 2	5.23
Model 5	59.219	.012	.998	.998	56	(M5 vs M4) 4	2.62
Model 6	63.724	.009	.999	.999	62	(M6 vs M5) 4	4.50
Model 7	97.242	.031	.984	.985	68	(M7 vs M6) 4	33.52*

M1 = no invariance constraints were imposed; M2 = factor loadings were invariant; M3 = factor loadings and variances were invariant; M4 = factor loadings, variances, and factor covariance were invariant; M5 = factor loadings, variances, factor covariances, and path coefficients were invariant; M6 = factor loadings, variances, factor covariances, path coefficients, and academic self-concept uniquenesses were invariant; M7 = all parameters were invariant.

Tests of statistical significance are based in the χ^2_{diff} in relation to the df_{diff}.

* = $p < .01$.

Table 5. Correlations Between Academic Self-concept, Academic Achievement, Ses, Family Structure, and Level of Educational Attainment for Each Cohort (n = 243)

	Cohort 1				Cohort 2				Cohort 3			
	ASC	ACH	SES	FS	ASC	ACH	SES	FS	ASC	ACH	SES	FS
ASC	—				—				—			
ACH	.44	—			.41	—			.54	—		
SES	.18	.10	—		.10	.03	—		.25	.21	—	
FS	− .14	.12	.16	—	− .12	.02	.12	—	− .17	.08	.11	—
EAL	**.19**	.18	.29	− .04	**.39**	.44	.21	− .07	**.41**	.32	.17	− .23

ASC = academic self-concept; ACH = academic achievement; EAL = educational attain-ment level; SES = socioeconomic status; FS = family structure (1 = two parents, 2 = single parent). Correlation ranging between .20 and – .20 are nonsignificant.

Figure 1. Results for each cohort. Standardized coefficients were reported to facilitate interpretation.

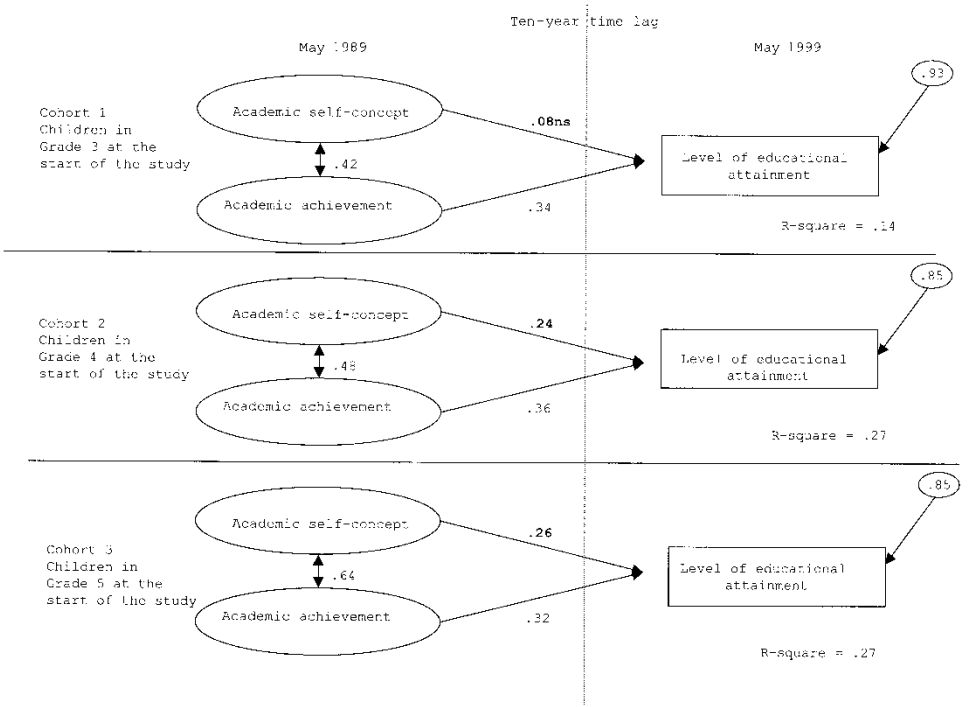
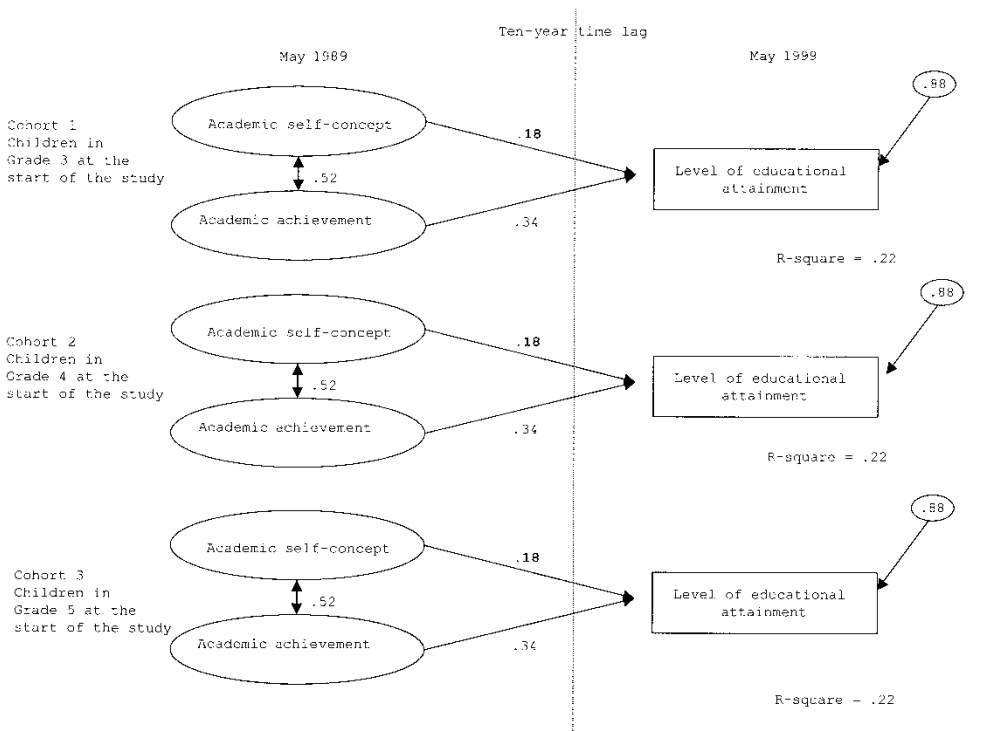


Figure 2. Results of invariance analyses (Model 7). Standardized coefficients were reported to facilitate interpretation.



Appendix

CFA Analyses: Factor Loadings and Uniquenesses for Each Cohort

	Cohort 1	Cohort 2	Cohort 3
Factor loadings			
ACS1	.622	.692	.731
ACS2	.781	.780	.763
ACS3	.895	.811	.895
Uniquenesses			
ACS1	.783	.722	.682
ACS2	.624	.626	.646
ACS3	.445	.585	.447
Factor loadings			
ACH1	.900	.956	.927
ACH2	.905	.954	.934
ACH3	.784	.877	.850
Uniquenesses			
ACH1	.436	.292	.375
ACH2	.425	.300	.358
ACH3	.621	.481	.529
Fit indices			
RMSEA	.096	.000	.000
CFI	.967	1.00	1.00
NNFI	.942	1.01	1.01
CHISQ	29.576	9.914	6.938
DF	12	12	12

FL = factor loadings, U = uniquenesses, ASC = academic self concept, ACH = academic achievement. Standardized coefficients were reported to facilitate interpretation.