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Longitudinal Analysis of the Role of Perceived Self-Efficacy for Self-Regulated Learning in Academic Continuance and Achievement

Gian Vittorio Caprara, Roberta Fida,
Michele Vecchione, Giannetta Del Bove,
Giovanni Maria Vecchio, and Claudio Barbaranelli
"Sapienza" University of Rome

Albert Bandura
Stanford University

The present study examined the developmental course of perceived efficacy for self-regulated learning and its contribution to academic achievement and likelihood of remaining in school in a sample of 412 Italian students (48% males and 52% females ranging in age from 12 to 22 years). Latent growth curve analysis revealed a progressive decline in self-regulatory efficacy from junior to senior high school, with males experiencing the greater reduction. The lower the decline in self-regulatory efficacy, the higher the high school grades and the greater the likelihood of remaining in high school controlling for socioeconomic status. Reciprocal cross-lagged models revealed that high perceived efficacy for self-regulated learning in junior high school contributed to junior high school grades and self-regulatory efficacy in high school, which partially mediated the relation of junior high grades on high school grades and the likelihood of remaining in school. Socioeconomic status contributed to high school grades only mediationally through junior high grades and to school drop out both directly and mediationally through junior high grades.

Keywords: perceived self-regulatory efficacy, self-regulated learning, academic achievement, latent growth curves, school drop out

The present study analyzed the developmental course of perceived self-efficacy for self-regulated learning from junior high to high school and its contribution to academic achievements and the likelihood of remaining in school. The role of perceived self-efficacy in the academic domain has been examined at three different levels. These include students' beliefs in their efficacy to regulate their learning activities and to master academic subjects, teachers' beliefs in their instructional efficacy to manage classrooms and to motivate and promote learning in their students, and faculties' collective sense of efficacy that their schools can accomplish significant academic progress. These different lines of theorizing and research have been reviewed in some detail (Bandura, 1997; Pajares & Urdan, 2006; Schunk & Pajares, 2002).

The present longitudinal study focuses on the central role played by perceived self-regulatory efficacy in one's academic self-development and functioning. The capacity to regulate one's thoughts, motivation, affect, and action through self-reactive influence constitutes one of the core properties of human agency within the conceptual framework of social cognitive theory (Bandura, 2006b; in press). For linguistic brevity, perceived self-efficacy for self-regulated learning will be referred to as *self-regulatory efficacy*.

Self-regulatory efficacy was selected as a key factor because of its growing primacy in contemporary life. Information technologies are globalizing knowledge and altering educational systems (Bandura, 2002). In the past, students' educational development depended on the quality of the schools in which they were enrolled. Students can now exercise greater personal control over their own learning, independently of time and place, through multimedia instruction on the Internet. In this new era, the construction of knowledge will rely increasingly on electronic inquiry. In research in self-instruction through the Internet, students with high efficacy for self-regulated learning are the ones who make the best use of Internet-based instruction (Debowski, Wood, & Bandura, 2001; Joo, Bong, & Choi, 2000). Moreover, the accelerated pace of social, informational, and technological change is placing a premium on capability for self-directed learning and self-renewal. People now have to educate themselves throughout their lifetime.

Within the agentic framework of social cognitive theory, self-regulation operates through three generic subfunctioning (Bandura, 1986; in press). These include self-monitoring of one's activities and the cognitive and social conditions under which one engages in them; adoption of proximal goals, rooted in a value system, to motivate and guide one's efforts and the strategies for realizing the challenges set for oneself; and the exercise of self-influence that includes the enlistment of self-motivating incentives and social supports to sustain one's academic pursuits. Different

Gian Vittorio Caprara, Roberta Fida, Michele Vecchione, Giannetta Del Bove, Giovanni Maria Vecchio, and Claudio Barbaranelli, Department of Psychology, "Sapienza" University of Rome, Rome, Italy; Albert Bandura, Department of Psychology, Stanford University.

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Correspondence concerning this article should be addressed to Gian Vittorio Caprara, Department of Psychology, "Sapienza" University of Rome, Via dei Marsi 78, 00185, Rome, Italy. E-mail: Gianvittorio.Caprara@uniroma1.it

models of self-regulation have been proposed (Schunk & Zimmerman, 1994; Zimmerman & Schunk, 1989). Although the models differ in particulars, they generally include self-assessment through self-monitoring, instrumental cognitive and metacognitive guides, goal setting, and self-motivational strategies.

Analyses of the role of self-regulation in the acquisition of knowledge and cognitive skills have been largely confined to enhancement of academic learning by use of task-related metacognitive strategies. A number of theorists have addressed the pragmatics of self-regulation in terms of selecting appropriate strategies, testing one's comprehension and state of knowledge, correcting one's deficiencies, and recognizing the utility of cognitive strategies (Brown, 1987; Paris & Newman, 1990). Self-directive use of cognitive strategies is a part of the way in which students regulate their own cognitive development and functioning. Social cognitive theory integrates the cognitive and metacognitive factors with motivational self-regulation mechanisms (Bandura, 1986; Zimmerman, 2000; Zimmerman & Cleary, 2006). This theory expands the conception of self-regulation in two directions. First, it incorporates a larger set of self-regulatory mechanisms governing cognitive functioning. Second, it encompasses social and motivational skills as well as cognitive ones.

Zimmerman (1989, 2000) has been the leading exponent of an expanded model of academic self-regulation. Viewed within the conceptual framework of social cognitive theory, people must develop skills to regulate the motivational, affective, and social determinants of their intellectual functioning as well as the cognitive aspects. This requires bringing self-influence to bear on every aspect of their learning experiences. There is a major difference between possessing self-regulatory knowledge and skills and being able to put them into practice and to stick with them. Self-regulatory skills will not contribute much if students cannot get themselves to apply them persistently in the face of difficulties, stressors, and competing attractions. Firm belief in one's self-regulatory efficacy provides the staying power. Children's belief that they can regulate their own learning raises their efficacy for academic activities. Their academic efficacy increases their achievement both directly and by raising their academic aspirations (Zimmerman & Bandura, 1994; Zimmerman, Bandura, & Martinez-Pons, 1992).

The belief that people hold about their capabilities affects the quality of their functioning through four major processes: cognitive, motivational, affective, and decisional (Bandura, 1997). The independent contribution of efficacy beliefs to cognitive functioning is verified experimentally by Bouffard-Bouchard (1990) in research in which high or low self-efficacy beliefs were instilled arbitrarily in students irrespective of their actual performance. Students whose sense of efficacy was raised set higher aspirations for themselves, showed greater strategic flexibility in the search for solutions, achieved higher intellectual performances, and were more accurate in evaluating the quality of their performances than were students of equal cognitive ability who were led to believe they lacked such capabilities. Efficacy beliefs contributed to accomplishments both motivationally and through support of strategic thinking. Self-regulatory efficacy also raises academic goals and aspirations, personal standards for the quality of work considered to be acceptable, and beliefs in one's capabilities for academic achievement after one controls for instructional level, prior academic performance, and relevant aptitude (Zimmerman & Bandura, 1994; Zimmerman et al., 1992).

The present study focused on adolescence because it is an especially taxing transitional phase that presents a host of new challenges (Bandura, 2006a; Graber, Brooks-Gunn, & Petersen, 1996; Pajares & Urdan, 2006). Adolescents have to manage major biological, educational, and social role transitions concurrently. Learning how to deal with pubertal changes, differently structured school environments, enlarged peer networks, and emotionally invested partnerships becomes important. Moreover, this is the time when the roles of adulthood must begin to be addressed in almost every dimension of life. Adolescents must also begin to consider seriously what they want to do with their lives (Bandura, Barbaranelli, Caprara, & Pastorelli, 2001). They have to master many new skills and the ways of adult society. The way in which adolescents develop and exercise their personal efficacy during this period can play a key role in setting the course their life paths take (Bandura, 2006b; Pajares & Urdan, 2006).

The transition from middle-level school to high school involves a major environmental change that can tax personal efficacy (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Under the new social structural arrangements, the adolescents have to reestablish their sense of efficacy, social connectedness, and status within an enlarged heterogeneous network of new peers. During this adaptational period, young adolescents sense some loss of personal control, become less confident in themselves, and suffer some decline in self-motivation (Eccles & Midgley, 1989). But these adverse effects are neither universal nor enduring for every adolescent. It was predicted that adolescents who have a high sense of efficacy to regulate their learning activities in junior high school are likely to do better academically in high school and less likely to drop out of school.

We used a latent growth curve approach (Duncan & Duncan, 1995; McArdle, 1988; McArdle & Anderson, 1989; Meredith & Tisak, 1990; Stoolmiller, 1994) to investigate the level and stability of self-regulatory efficacy and the extent to which these beliefs at age 12 and their subsequent change can predict academic achievement at the end of high school in males and females.

For reasons given earlier, we predicted decline in self-regulatory efficacy after the transition from junior school to high school. In a cross-national study on a sample of 1,180 children ranging in age from 10 to 15 years (Pastorelli et al., 2001), girls exhibited a higher sense of efficacy to exercise control over their academic development than did boys. It was, therefore, expected that females would be more successful than males in maintaining their perceived efficacy to manage their academic activities as they progress in the educational system.

We used reciprocal cross-lagged relationships to evaluate the unique contribution of self-regulatory efficacy in junior high school to academic achievement in junior and senior high school and to continuing in school over and above the effects of prior academic performance and socioeconomic status (SES). Both experimental and naturalistic studies have shown that perceived academic self-efficacy makes an independent contribution after the effects of prior performance are partialled out (Bandura, 1997; Bouffard-Bouchard, 1990; Gore, 2006; Zimmerman & Martinez-Pons, 1986).

It was predicted that self-regulatory efficacy in junior high would contribute to academic achievement and continuance in

school through two pathways: by supporting a high sense of self-regulatory efficacy in high school and by mediating the effects of junior high academic performance and SES.

SES was selected because it can affect academic aspirations, availability of resources conducive to intellectual development, choice of peers who may support academic pursuits or disengagement from them, and the range of occupational pursuits that are seriously considered (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Bandura et al., 2001; Sirin, 2005). Diverse lines of evidence show that SES affects performance, in large part, through its impact on psychosocial processes rather than directly (Bandura et al., 1996, 2001; Elder, 1995; Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999). It was, therefore, predicted that SES influences academic achievement in high school and school drop out both directly and indirectly, through its impact on self-regulatory efficacy and academic performance in junior high school.

Method

Participants

The participants were part of an ongoing longitudinal project that began in 1989 designed to clarify the personal and social determinants of developmental pathways from childhood to early adulthood. A total of 412 children (196 males and 216 females) participated in the study. This longitudinal project used a staggered, multiple cohort design ranging from 1994 to 2004. The study includes two cohorts assessed at six different time points. Both cohorts were age 12 years at Time (T) 1, age 13 at T2, age 14 at T3, age 16 at T4, age 18 at T5, and age 20 and 22 at T6. Cohort effects were tested and found to be nonsignificant on all variables examined in this study. Therefore, the data from the two cohorts were combined.

Participants were originally drawn from the two public junior high schools in a community located near Rome. This sample represents a socioeconomic microcosm of the larger Italian society, composed of families of skilled workers, farmers, professionals, local merchants, and their service staff. In particular, 16% of families were in professional or managerial ranks, 37% were merchants or employees in various types of businesses, 14% were skilled workers, 31% were unskilled workers, 1% were retired, and 1% were unemployed. This occupational socioeconomic distribution matches the national profile (Istituto Italiano di Statistica, 2002). The composition of the family also matches national data with regard to type of families and number of children. Most children were from intact families (94%). The participation rate was high during the longitudinal data collection: 100% from T1 to T2 for both cohorts; 97% and 96% from T1 to T3 for first cohort and second cohort, respectively; 90% and 96% from T1 to T4 for first cohort and second cohort, respectively; 81% and 93% from T1 to T5 for first cohort and second cohort, respectively; 62% and 69% from T1 to T6 for first cohort and second cohort, respectively. Multivariate analysis of variance and Box's M test, carried out separately for males and females, revealed that there were no statistically significant differences on the means of the variables of interest (males: $F[1, 143] = 1.34$, $\Lambda = .95$, *ns*; females: $F[1, 165] = 1.69$, $\Lambda = .95$, *ns*) and on the covariance matrices (males: $M = 32.24$, $F[21, 38033.7] = 1.46$, *ns*; females: $M = 21.06$, $F[21, 12531.5] = 0.93$, *ns*) between the participants who provided complete data for the present study and the ones who dropped out over the years.

Procedures

At T1, T2, and T3 two experimenters administered in the classroom the scale measuring perceived efficacy for self-regulated learning. A stringent consent procedure for the research was followed including, at various stages, parents' consent and approval from school councils and freedom of children to decline participation if they choose to do so. The researchers explained that responses to the questionnaires would be confidential. At T4, T5, and T6 the participants received the questionnaire after being contacted by phone. Adolescents received a small payment (€25 or a dinner token) for their participation.

Measures

Perceived efficacy for self-regulated learning. We assessed perceived efficacy for self-regulated learning (Bandura, 1990) from T1 to T5. This scale was previously validated on Italian samples (Bandura et al., 1996; Caprara, 2001) and American samples (Zimmerman et al., 1992). It includes 11 items that measure children's self-efficacy to plan and organize their academic activities (e.g., "How well can you organize your school work?"), to structure environments conducive to learning (e.g., "How well can you arrange a place to study without distractions?"), and to motivate themselves to do their school work (e.g., "How well can you study when there are other interesting things to do?"). For each item, participants rated the strength of their efficacy to execute the designed activities using a 5-point scale ranging from 1 (*cannot do at all*) to 5 (*highly certain can do*).

A principal-axis factor analysis revealed a one-factor structure at all time points. The percentage of the variance explained ranged from 33% to 38%. Cronbach's alpha was .83 at T1, .85 at T2, .86 at T3, .84 at T4, and .87 at T5.

Academic achievement. At the end of junior high school (T3), we assessed children's academic achievement for different subject matters (mathematics, science, language, and social studies) using a five-level grade system. We created a composite measure of academic achievement from the grades assigned by the group of teachers. In T6, high school academic achievement was assessed with a stringent examination system. The final high school grade was based on a national written exam supplemented with an oral exam. Students reported whether they graduated from high school and, if so, their final grade. In the Italian educational system, grades range from 60 to 100. Final high school grades and high school drop out (0 = drop out; 1 = graduated) served as the outcome variables.

As a check on students' reports of their high school grades, we compared the self-reported grades for a sample of 30 students against the grades recorded by the schools. In 29 of the 30 students, the self-reported grade was identical with the recorded school grades.

SES. Family SES was based on the occupation and education of the fathers and the mothers (see Sirin, 2005). We performed a confirmatory factor model, using the WLSMV as the method of

Table 1
Means and Standard Deviations in Self-Regulatory Efficacy, Junior High School, and High School Grades

	Males			Females		
Self-regulatory efficacy	*n*	*M*	*SD*	*n*	*M*	*SD*
T1 (12 years old)	193	3.07	0.48	213	3.21	0.43
T2 (13 years old)	196	3.05	0.44	216	3.20	0.45
T3 (14 years old)	188	3.05	0.44	209	3.18	0.44
T4 (16 years old)	181	2.89	0.47	202	3.07	0.48
T5 (18 years old)	170	2.88	0.51	190	3.12	0.46
Junior high school grades (T4)	191	2.95	0.84	210	3.16	0.86
High school grades (T6)	77	75.34	13.07	132	80.13	12.63

Note. The items of the perceived efficacy for self-regulated learning scale were on a 5-point scale ranging from 1 (*cannot do at all*) to 5 (*highly certain can do*). Junior high school grades ranged from 1 to 5. High school grades ranged from 60 to 100.

estimation[1] (Muthén & Muthén, 1998), where SES was defined by parent's education and occupation. After establishing the monodimensionality of this set of indicators (52% of variance explained; $\alpha = .77$), we estimated the factor score of SES. This variable was included as observed time invariant covariate in the analysis.

Results

Descriptive Statistics

Observed means and standard deviations for self-regulatory efficacy across the five time points (from T1 to T5) are reported in Table 1 separately for males and females.

In longitudinal research it is common to have attrition over time (Hansen, Tobler, & Graham, 1990). With missing data, parameters' estimation must be adjusted. Among the different methods used for taking into account missing data, we selected the most commonly used maximum-likelihood parameters' estimation (Muthén & Shedden, 1999; Schafer & Graham, 2002). Thirty-three percent of males and 15% of females dropped out of the school.

Pairwise correlations (disattenuated for unreliability) between self-regulatory efficacy from T1 to T5 are provided in Table 2. They reveal a medium-to-high relative stability across time with lower relations the longer the elapsed time period.

Growth Models

The analysis of self-regulatory efficacy development was conducted within a latent variable framework. We specified a multigroup growth curve model that simultaneously estimated the same pattern of relationships among variables for males and females. To examine gender differences in the estimated parameters, we constrained all parameters to be equal across groups, and we used the chi-square difference test to compare nested models. Modification indices were used to assess the tenability of the equality constraint imposed across gender.

Two latent variables were specified from multiple indicators, that is, the five repeated measures of self-regulatory efficacy (from T1 to T5). The first factor is the intercept and it represents the baseline of self-regulatory efficacy (T1). The second factor is the slope or the shape of the trajectory over time and its mean gives the growth rate of self-regulatory efficacy.

The following equation shows the mathematical representation of the growth model:

$$y_t = \eta_0 + \eta_1 x_t + \varepsilon_t; \quad t = 1, 2, 3, 4, 5;$$

where y_t is the observed score at time t, η_0 is the unobserved score for the intercept factor, η_1 is the unobserved score for the growth rate factor, and x_t is the factor loading relating y_t to latent growth variables.

Because factor loadings of the slope give the shape of the growth, alternative models were tested and compared with each other. We could establish the parameterization that provided the best fit to the data. We fixed the starting point for self-regulatory efficacy at T1 at 0 for all the models. Following McArdle and Anderson (1989), the first model tested was a no-growth model (with values for males followed by values for females), $\chi^2(29, N = 196; 216) = 110.70$, $p < .001$, comparative fit index (CFI) = .88, root-mean-square error of approximation (RMSEA) = .117 (.094; .140), standardized root-mean-square residual (SRMR) = .170. This model assumes that the level of self-regulatory efficacy is stable over time except for a random error component at each point of assessment. The second is a linear model representing a constant change over time, $\chi^2(23, N = 196; 216) = 26.28$, $p = .29$, CFI = 1.00, RMSEA = .026 (.000; .065), SRMR = .090. In this model we fixed the factor loadings at 0, 0.5, 1, 2, and 3. The third model examines a nonlinear growth where the form of the change over time is not specified a priori, $\chi^2(20, N = 196; 216) = 19.70$, $p = .48$, CFI = 1.00, RMSEA = .000 (.000; .059), SRMR = .083. Several parameters were added to the examined models. In particular, we specified the covariance between the residual variance of self-regulatory efficacy. Because these models are nested, we performed a chi-square differences test ($\Delta\chi^2$) to compare the models (Bollen, 1989). This test revealed that the linear model provided the best fit to the data compared to the no-growth model, $\Delta\chi^2(6) = 84.42$, $p < .001$. The chi-square for the linear model was not statistically different from the chi-square for the nonlinear model, $\Delta\chi^2(3) = 6.58$, $p = .086$, but it was more parsimonious. Table 3 presents parameter estimates for the linear model.

The mean of the slope reveals a decline in self-regulatory efficacy over the time course for male and female subsamples.

[1] The WLSMV is a weighted least square parameter estimates that uses a diagonal weight matrix with robust standard errors and mean and variance adjusted chi-square test statistics (see Muthén & Muthén, 1998). This estimator is particularly suited for dealing with nonnormal or categorical data (Flora & Curran, 2004).

Table 2
Correlations Among Self-Regulatory Efficacy Across Time

Variable	1	2	3	4	5
1. T1 (12 years old)	—	.71**	.70**	.57**	.52**
2. T2 (13 years old)	.67**	—	.76**	.64**	.59**
3. T3 (14 years old)	.63**	.59**	—	.68**	.68**
4. T4 (16 years old)	.50**	.47**	.60**	—	.81**
5. T5 (18 years old)	.27*	.43**	.50**	.58**	—

Note. Coefficients for females are above the diagonal; coefficients for males are below the diagonal. Correlations were disattenuated for unreliability.
* $p < .05$. ** $p < .01$.

However, the decrease was greater for males, as confirmed by a significant chi-square difference among constrained and unconstrained models, $\Delta\chi^2(1) = 12{,}19$, $p < .001$. In particular self-regulatory efficacy decreases .077 for males and .035 for females each year. Moreover, the level of self-regulatory efficacy at baseline was higher for females, $\Delta\chi^2(1) = 4{,}498$, $p < .05$. The variances of the growth factors were also estimated, and they indicated that there was a significant variation in individual differences both in the initial status and in the growth rate for males as well as for females. Figure 1 shows the trajectory for self-regulatory efficacy across junior high school and high school levels in the educational system for both males and females.

Predicting High School Grades and School Drop Out

After establishing the best fitting growth curve model, we added SES as the time invariant covariate. To evaluate the contribution of the initial level of self-regulatory efficacy and its change over time on academic achievement, we tested two models. In the first model, we considered high school grades as the outcome. In the second model the probability of graduating from high school served as the second outcome.

The results of the first model are provided in Table 4. The posited model provided a good fit to the empirical data, $\chi^2(41, N = 196; 216) = 52.90$, $p = .10$, CFI = .98, RMSEA = .038 (.000, .064), SRMR= .095. The higher the self-regulatory efficacy at T1, the higher the grades at the end of the high school. Moreover, the less self-regulatory efficacy declined from T1 to T5, the higher the high school grades. The higher the SES the smaller the decline of self-regulatory efficacy. SES did not influence self-regulatory efficacy at T1. Although SES did not directly influence the grades, it contributed indirectly through its influence on self-regulatory efficacy change (total indirect effects were $\beta = .11$, $t = 3.93$ for males and $\beta = .12$, $t = 3.93$ for females). There were no significant differences on any of the parameters estimated in the samples of males and females. The model explains 17% of variance in high school grades for males and 21% of variance for females.

Table 3
Growth Curve Parameters for the Linear Model

	Males		Females	
Growth parameter	Parameter	*t*	Parameter	*t*
Mean				
Intercept	3.09	105.24	3.20	117.88
Slope	−.08	−5.56	−.03	−3.23
Variances				
Intercept	.11	5.98	.12	7.31
Slope	.01	3.59	.01	4.32
Correlation				
Intercept ↔ Slope	−.38	−2.23	−.26	−2.09

Note. The *t* values greater than 1.96 (1.65 for variances) indicate a parameter estimate that is significantly different from zero. Parameters estimated for correlations (↔) are presented in standardized form. All other parameter estimates are presented as unstandardized coefficients.

The results of the second model concerned with school drop out are provided in Table 5. The posited model also provided a good fit to the data, $\chi^2(21, N = 107, 142) = 20.65$, $p = .48$, CFI = 1.00, RMSEA = .000; weighted root-mean-square residual = .89. The higher self-regulatory efficacy at T1, the lower the probability of dropping out of high school. Moreover, the more self-regulatory efficacy decline from T1 to T5, the higher the probability of dropping out of school. Furthermore, the higher the SES, the lower the probability of dropping out and the lower the decrease in self-regulatory efficacy. As in the case of grades, SES did not influence self-regulatory efficacy measured at T1. There were no significant differences on any the parameters estimated in the samples of males and females. The model explained 55% of variance of dropping out for males and 57% of variance for females.

The Relation of Perceived Efficacy for Self-Regulated Learning to High School Grades and School Drop Out

We performed multigroup structural equation modeling to examine the role of self-regulatory efficacy, prior academic performance, and SES on high school grades and high school drop out. Except for a small variation in the role of SES in the two outcomes, the pattern of relations among the variables in the structural model are highly similar for high school grades and high school drop out. The structural relations among the variables are presented in Figures 2 and 3.

As shown in the figures, self-regulatory efficacy was relatively stable at the junior high level. Self-regulatory efficacy in junior high school contributed to both junior high grades and self-regulatory efficacy in high school. Self-regulatory efficacy in high school partially mediated the relation of junior high grades to high school grades (total indirect effects were $\beta = .07$, $t = 3.19$ for males and $\beta = .07$, $t = 3.19$ for females) and school drop out (total indirect effects were $\beta = .06$, $t = 2.13$ for males and $\beta = .06$, $t = 2.13$ for females). Self-regulatory efficacy thus contributed

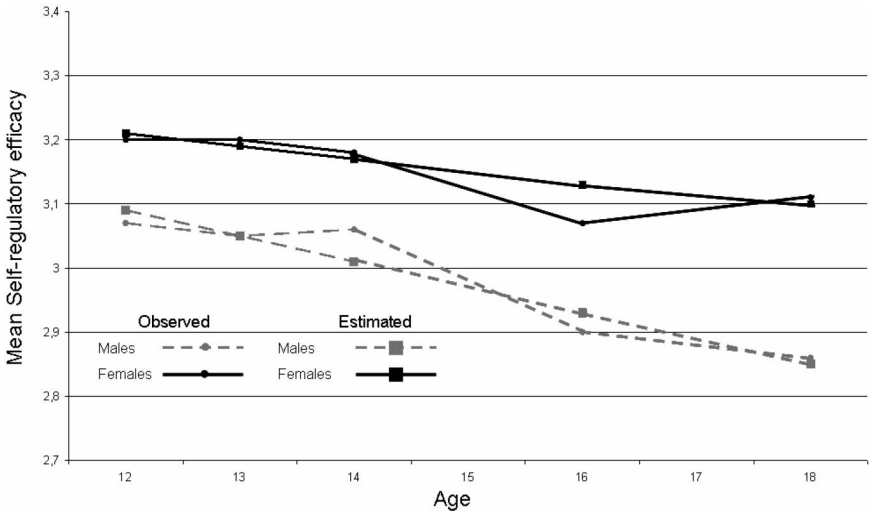

Figure 1. Differential change in self-regulatory efficacy in male and female students across different levels of education.

uniquely to high school grades and retention in school after we controlled for prior academic achievement.

Junior high grades were also related to high school grades and school drop out and completely mediated the relation of SES to high school grades (total indirect effects were $\beta = .09$, $t = 2.64$ for males and $\beta = .10$, $t = 2.64$ for females). In the case of school drop out, SES also contributed directly as well as through its relations to high school grades (total indirect effects were $\beta = .13$, $t = 4.13$ for males and $\beta = .14$, $t = 4.13$ for females).

The posited models provided a good fit to the empirical data. Regarding high school grades, the values for the various fit indices were $\chi^2(17) = 14.85$, $p = .61$, CFI = 1.00, RMSEA = .000 (.000, .055), SRMR = .065. The model accounted for 25% of the variance in high school grades for males and 28% of the variance for females. The chi-square difference test revealed that all parameters were equal across gender, with the exception of the regression coefficient between self-regulatory efficacy during junior high school. This coefficient was larger for females indicating a slightly higher stability for females.

The model also provided a good fit to the empirical data for high school drop out, $\chi^2(14) = 9.733$, $p = .78$, CFI = 1.00, RMSEA = .000, weighted root-mean-square residual = .720. The model accounted for 53% of the variance of high school performance for males and 61% of the variance for females. The chi-square difference tests suggested that all parameters were equal across gender.

Discussion

Analysis of the trajectory of self-regulatory efficacy reveals a progressive decline as students advance through the educational system. Other studies have reported a similar decline but for students' beliefs in their efficacy for academic achievement, rather than self-regulatory efficacy (Britner & Pajares, 2006; Harter, 1996; Midgley, Feldlaufer, & Eccles, 1989). Several factors may account for students' loss of confidence in their capabilities to manage their academic activities. With increasing levels of schooling, the complexities of academic demands increase and cumulating scholastic deficits become increasingly salient. These changes confront students with adaptational pressures that inevitably shake their sense of efficacy. Students also gain new information about the nature of the academic activities, which provides them with a basis for reappraising their efficacy to get themselves to do them.

Table 4
Predicting High School Grades: Structural Model

	Males		Females	
Regression	Parameter	*t*	Parameter	*t*
Intercept → Grades	.33	4.81	.37	4.81
Slope → Grades	.32	3.20	.34	3.20
SES → Intercept	.09	1.20	.09	1.20
SES → Slope	.18	2.20	.20	2.20
SES → Grades	.08	1.21	.09	1.21

Note. The *t* values greater than $|1.96|$ indicate a parameter estimate that is significantly different from zero. Parameters estimated for regressions (→) are presented in standardized form. SES = socioeconomic status.

Table 5
Predicting the Probability of Dropping Out of High School: Structural Model

	Males		Females	
Regression	Parameter	*t*	Parameter	*t*
Intercept → Drop out	.29	3.72	.30	3.72
Slope → Drop out	.46	2.94	.41	2.94
SES → Intercept	.06	0.76	.06	0.76
SES → Slope	.25	2.55	.29	2.55
SES → Drop out	.46	4.64	.49	4.64

Note. The *t* values greater than $|1.96|$ indicate a parameter estimate that is significantly different from zero. Parameters estimated for regressions (→) are presented in standardized form. SES = socioeconomic status.

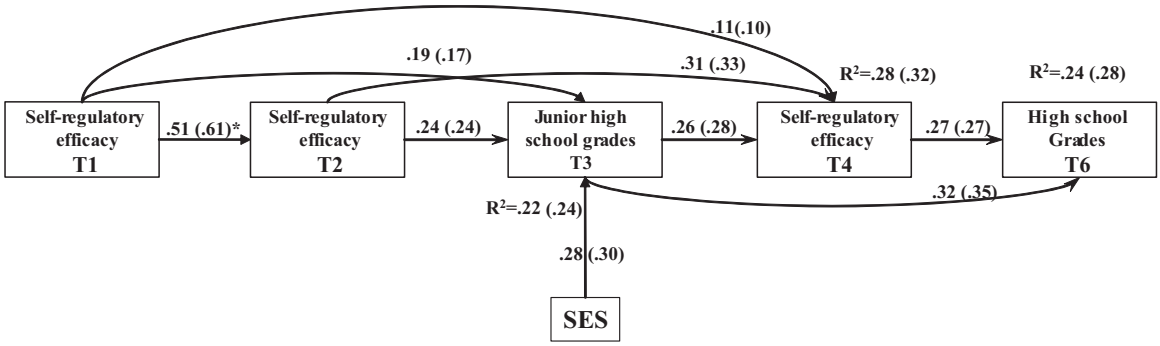

Figure 2. Contribution of self-regulatory efficacy to high school grades operating in conjunction with prior academic achievement and socioeconomic status (SES). The figure includes all of the coefficients that are significant beyond the $p = .05$ level. The first coefficient in each structural link is for males, and the second coefficient in parentheses is for females.

Academic development is a product of a collaborative process within a social system rather than residing solely in students. Teachers also report a decline across grade level in their efficacy to motivate and promote their students' academic attainments (Bandura, 1997). Thus, students' adaptational problems are likely to be exacerbated if the teachers doubt they can achieve much success by their instructional efforts at higher grade levels (Midgley et al., 1989). Moreover, as students progress to late adolescence and young adulthood there are more competing activities that command their attention. Students report the lowest sense of efficacy to manage their academic activities when there are other interesting things to do (Zimmerman et al., 1992).

Both the initial level of self-regulatory efficacy and the degree of decline vary as a function of gender. Compared to male students, female students exhibit higher self-regulatory efficacy and a lesser decline as they progress in the educational system. The differential gender level is replicated cross-culturally. Female students in both Eastern and Western European countries exhibit higher perceived efficacy to regulate their academic activities than do male students (Pastorelli et al., 2001). The findings of the present study reveal that this gender gap widens as students progress in the educational system. Pastorelli and her collaborators (2001) also found that students in more authoritarian systems perceive themselves as less efficacious for self-directed learning.

There are several possible explanations for the gender gap in self-regulatory efficacy. During the socialization process, girls are generally subjected to more social constraints on the range of activities they can engage in, especially outside the home, than are boys (Bussey & Bandura, 1999). Attractive competing options reduce opportunities to develop a sense of efficacy for self-directed academic learning and put a strain on efforts to stick to academic tasks. Differences in social and normative influences may also undermine the differential development and exercise of self-regulatory efficacy in the academic domain. Peer pressures for engagement in activities that compete with academic pursuits are likely to be stronger for boys than for girls (Jessor, Donovan, & Costa, 1991; Ogbu, 1990). Research is also needed to determine whether the educational system instills a belief of lesser academic self-regulatory efficacy in males, as suggested in research by Dweck and her collaborators (Dweck, Davidson, Nelson, & Enna, 1978).

The developmental trajectory is an aggregate measure for the students as a whole. It varies not only by gender but as a function of belief in one's efficacy to exercise some control over one's

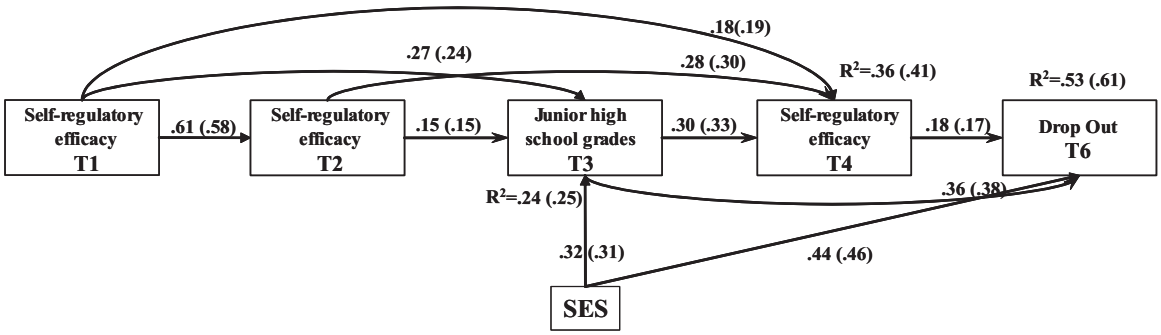

Figure 3. The role of self-regulatory efficacy in school drop-out operating in conjunction with prior academic achievement and socioeconomic status (SES). The figure includes all of the coefficients that are significant beyond the $p = .05$ level. The first coefficient on each structural link is for males, and the second coefficient in parentheses is for females.

educational development. Thus, a high level of self-regulatory efficacy in junior high is accompanied by a lesser decline in perceived efficacy to manage learning activities with age, higher academic achievement in high school, and a lower likelihood of dropping out of school. These findings are in accord with those from other spheres of life showing that strong belief in one's personal efficacy enables people to weather taxing and stressful conditions and facilitates recovery from adverse experiences (Allen, Leadbeater, & Aber, 1990; Benight & Bandura, 2004; Lent, Brown, & Larkin, 1984).

In the longitudinal analysis, students' perceived efficacy to regulate their learning activities at the junior high level contributed to their academic achievement in high school and their likelihood of completing their high school education. Self-regulated efficacy retained its relation to academic achievement and continuance in school after we controlled for variations in prior academic performance and socioeconomic level. Academic competence is not a fixed property that one has in one's behavioral repertoire (Bandura, 1990; Sternberg & Kolligan, 1990). Rather, it is the product of ability factors and a host of self-regulatory and motivational influences (Bandura, 1997). Hence, control for prior performance not only controls for the effects of actual self-regulatory efforts but for other possible influences as well.

Findings from diverse lines of research on the contributions of self-efficacy beliefs to academic achievement further confirm that belief in one's capabilities contributes independently to academic achievement rather than simply being an ephiphenomenal reflection of prior performance (Bandura, 1997; Pajares & Schunk, 2001; Schunk & Zimmerman, 1994). The unique contribution applies equally for perceived efficacy to regulate one's learning activities (Zimmerman & Bandura, 1994; Zimmerman et al., 1992).

Advancing knowledge on academic self-development requires converging evidence from diverse methodologies because no one approach can do it alone. The research cited above sheds light on the influential role of perceived self-regulatory learning based on experimental and short-run prospective studies. The present analysis extends the analysis longitudinally. Mulaik (1987, 1993, 2001) advanced a probabilistic conception of causality that is applicable both to experimental and naturalistic studies. In his conception, causality is expressed as functional relation between variables with total independence providing the necessary condition for probabilistic causality (Mulaik, 1993). The posited conceptual model specifies the relations among the variables by fixing and constraining certain parameters in the model (Mulaik, 2007). Goodness-of-fit indices provide the means for evaluating the posited structural model. Although no single method can prove causation, verifying functional relations among factors in longitudinal analysis increase confidence in theoretically specified paths of influence.

Nor is perceived self-regulatory efficacy simply a reflection of SES. Although influenced by one's socioeconomic life conditions, perceived self-regulatory efficacy contributes independently to academic attainments and completion of high school education. These findings are in accord with those of other studies showing that the impact of SES on psychosocial functioning is, in large part, mediated through its effects on people's beliefs on their efficacy to manage their life conditions (Bandura et al., 1996, 2001; Elder, 1995; Elder, Conger, Foster, & Ardelt, 1992; Fernández-Ballesteros, Díez-Nicolás, Caprara, Barbaranelli, & Bandura, 2002).

SES affected academic performance in high school only indirectly through its impact on prior academic attainment in junior high. However, it affected whether students continued their high school education both directly as well as mediationally. The link between SES and academic outcomes is indirect because differences in capital can lead to variations in learning opportunities. For example, family SES may provide supportive relationships among parent and school collaborations (Coleman, 1988; Dika & Singh, 2002; Sirin, 2005). It may also create quality of educational facilities, instructional materials, teacher experience, and teacher–student ratio (Wenglinsky, 1998) that can affect success in school. Finally, lacking socioeconomic resources and performing marginally in school would create disincentives for remaining in the educational system when one is free to drop out and enter the workforce.

The findings of the present longitudinal study further demonstrate that self-regulatory efficacy can affect the course of life paths through choice processes. Occupationally relevant choices play a key role in setting the course of lifestyle trajectories (Bandura et al., 2001; Lent, Brown, & Hackett, 1994). Dropping out of school can have a widespread effect on one's future life. Many of the participants in this study have gone on to college, others have enrolled in various professional schools, and still others have entered the general workforce without further education. Some have begun to establish families. Additional assessments at the transitional phase into young adulthood should shed further light on how early self-regulatory efficacy sets in motion concatenating psychosocial changes that can eventuate in major long-term impact on one's life conditions.

Prevention of erosion of children's beliefs in their academic capabilities has greater societal implications in contemporary society than it did in the past. Decline in self-regulatory efficacy foreshadows low academic performance and school drop out. Such outcomes foreclose many options in life. In the past, youth with limited schooling had recourse to well-paying industrial and manufacturing jobs demanding minimal cognitive skills. The rapid pace of informational and technological change requires the development of cognitive competencies (Bandura, 2002). Moreover, with rapid change, knowledge and technical skills are quickly outmoded unless they are updated to fit the new occupational demands. Individuals now have to take charge of their self-development over the course of their work life.

The body of knowledge on self-regulatory processes provides guidelines for enhancing students' efficacy to manage their educational development. Some progress has been made in translating this knowledge into operational models that foster self-directedness in academic pursuits (Bandura, 1997; Pajares & Urdan, 2006; Schunk & Zimmerman, 1994; Zimmerman, 1990; Zimmerman & Cleary, 2006). Teachers and parents can teach students how to set goals, monitor their learning progress, and assess their self-efficacy for learning and self-regulation for guiding the level of motivation in ways that build their sense of efficacy for managing their academic activities. Pajares and Urdan (2006) underscored the importance to set short-term goals, foster mastery goal orientation, provide students with frequent and immediate feedback on their academic activities, assess their self efficacy for

adjusting instructional practices, and make self-regulatory practices habitual and automatic.

There are no adaptive benefits to being immobilized by self-doubts about one's capabilities and belief in the futility of effort. Cross-cultural tests of self-efficacy theory demonstrate that a resilient sense of efficacy has functional value regardless of whether one resides in an individualistic or collectivistic cultural system (Bandura, 2002; Bong, 2001; Joo et al., 2000; Lent, Brown, Nota, & Soresi, 2003). The findings of the present study, based on the Italian educational system, lend further support to the cultural generalizability of self-regulatory efficacy as well. It has the same functional value as in other educational systems.

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