CONTEMPORARY EDUCATIONAL PSYCHOLOGY 20, 257–274 (1995)

Academic Motivation and School Performance: Toward a Structural Model

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The purpose of this study was to propose and test a motivational model of school performance based on Deci and Ryan's theoretical framework (Deci & Ryan, 1985, 1991) using structural equation modeling. Students completed the French version of the Academic Motivation Scale as well as measures of perceived academic competence and perceived academic self-determination during the spring semester. Subsequently, their final grades in four central subjects were collected at the end of the school year. Results supported the hypothesized model. More specifically, perceived academic competence and perceived academic self-determination positively influenced autonomous academic motivation, which in turn had a positive impact on school performance. The proposed model explained 28% of the variance in performance. Results highlight the importance of academic motivation in the prediction of school performance and future research directions are offered. © 1995 Academic Press, Inc.

Over the past decade, much research has been conducted on variables predictive of academic achievement. Researchers that have sought to discover factors associated with high academic performance have examined an array of variables such as social behavior (e.g., DeBaryshe, Patterson, & Capaldi, 1993; Wentzel, 1993), academic self-concept (e.g., Marsh, 1984, 1992; Skaalvik & Hagtvet, 1990), learning strategies (e.g., Andreassen & Salatas-Waters, 1989; Pintrich & DeGroot, 1990), academic engagement (e.g., Derevensky, Hart, & Farrell, 1983; Gamoran & Nystrand, 1991), and parenting styles (e.g., Baumrind, 1991; Steinberg, Elmen, & Mounts, 1989; Steinberg, Lamborn, Dornbush, & Darling, 1992).

Another line of work has focused on the relationship between academic motivation and school performance (e.g., Eccles, Adler, & Meece, 1984; Grolnick, Ryan, & Deci, 1991; Keeves, 1986; Schiefele, Krapp, & Winteler, 1992; Skinner, Wellborn, & Connell, 1990; Wentzel, 1989; Wong & Csikszentmihalyi, 1991). In general, such research reveals that academic motivation positively influences academic performance.

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0361-476X/95 $6.00

Researchers have used various motivational approaches such as expectancy-value theory (e.g., Berndt & Miller, 1990), goal theory (e.g., Meece & Holt, 1993), and self-efficacy theory (e.g., Zimmerman, Bandura, & Martinez-Pons, 1992) to examine the link between academic motivation and school performance. Another perspective that appears promising and pertinent for the study of academic performance is Deci and Ryan's (1985, 1991) motivational approach. Indeed, this theoretical perspective has generated a considerable amount of research in the field of education (see Deci, Vallerand, Pelletier, & Ryan, 1991) and has been used recently to better understand important educational outcomes such as dropout behavior (Vallerand & Bissonnette, 1992; Vallerand, Fortier, Daoust, & Blais, 1995; Vallerand & Senécal, 1992), personal adjustment in the school context (Connell & Wellborn, 1990; Ryan & Connell, 1989; Vallerand, Blais, Brière, & Pelletier, 1989), as well as learning and school performance (see Benware & Deci, 1984; Grolnick & Ryan, 1987; Grolnick *et al.*, 1991). Furthermore, this approach makes specific predictions concerning motivational determinants and consequences and thus can lead to an *antecedents* → *motivation* → *outcome* sequence that permits a fuller understanding of the psychological processes involved in various phenomena such as school performance.

The purpose of this article is to propose and test a structural motivational model of school performance based on Deci and Ryan's motivational framework and more specifically on the integration of Self-Determination Theory and Cognitive Evaluation Theory (Deci & Ryan, 1985, 1991).

A MOTIVATIONAL MODEL OF SCHOOL PERFORMANCE

The proposed model is presented in Fig. 1 and can be summarized in two basic propositions. First, perceived academic competence and perceived academic self-determination serve as motivational antecedents and are hypothesized to directly and positively influence autonomous academic motivation. Second, autonomous academic motivation is predicted to have a direct impact on school performance. Thus, a student who comes to feel incompetent in the academic domain and who feels controlled and manipulated in the school context, should experience a loss of academic motivation which should eventually lead to a drop in his/her school performance. The rationale and available evidence for each proposition of the model are presented below. However, before reviewing the literature pertinent to this model, we first define and explain the concept of autonomous academic motivation.

Autonomous Academic Motivation

Many theoretical perspectives have been proposed to better understand

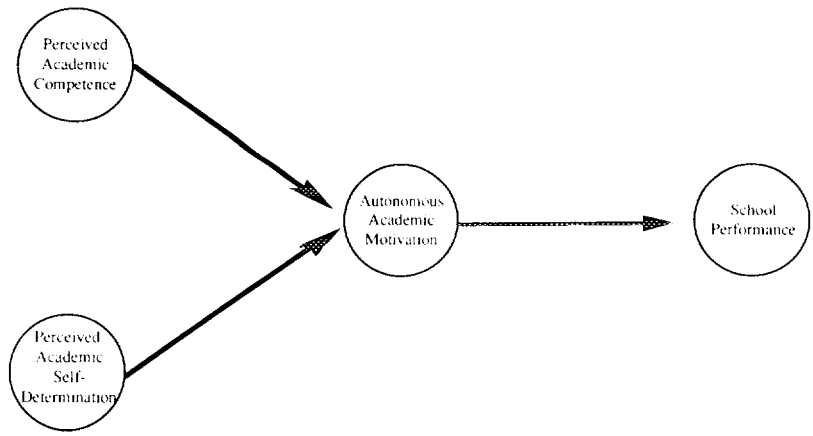

FIG. 1. Motivational model of school performance.

the concept of academic motivation (see Pintrich, 1991, and Weiner, 1990, for reviews). One approach which has generated a considerable amount of research is Self-Determination Theory (SDT; Deci & Ryan, 1985, 1991). This theory posits that behavior, in this case academic behavior can be seen as intrinsically motivated, extrinsically motivated, or amotivated. Intrinsically motivated behaviors are engaged in for their own sake, that is, for the pleasure and satisfaction derived from their performance (Deci, 1975). The activity is engaged in without the involvement of external constraints. Reading a book or doing an essay for the sheer pleasure of learning something new and interesting is an example of intrinsic motivation.

Contrary to intrinsically motivated behaviors, extrinsically motivated behaviors are instrumental in nature and are performed as a means to an end. According to Deci and Ryan (1985), there are at least three types of extrinsic motivation which can be ordered along an autonomy continuum. From lower to higher levels of autonomy, they are: external regulation, introjected regulation, and identified regulation. External regulation corresponds to extrinsic motivation as it generally appears in the literature. That is, behavior is regulated in order to attain positive consequences or avoid negative ones. For example, students may do their homework in order to receive praise from their teacher or because they feel urged to do so by their parents. In this case, the activity is performed not for fun or pleasure but to obtain rewards (e.g., praise) or to avoid negative consequences (e.g., criticisms from parents). Introjected regulation refers to the process whereby an external demand becomes an internal representation which the person uses to approve or disapprove of his or her own actions. Thus, a student might say, "I study the night before exams

because I feel guilty if I don't." Finally, identified regulation is in operation when the individual comes to value and judge the behavior as being important and therefore performs it out of choice. That is, the behavior is now personally chosen without any external or internal pressure from the environment. The student might say, for instance: "I've *chosen* to go to class today because it is important for me."

In addition to intrinsic and extrinsic motivation, Deci and Ryan (1985) have posited that a third type of motivational construct is important to consider in order to fully understand human behavior. This concept is termed amotivation and can be seen in many ways as similar to learned helplessness (Abramson, Seligman, & Teasdale, 1978). When people are in such a state, they perceive their behaviors as caused by forces out of their own control; they are neither intrinsically motivated nor extrinsically motivated, they are amotivated. This construct corresponds to the lowest level of autonomy on the continuum. The reader is referred to Deci and Ryan (1985) as well as Deci *et al.* (1991) for a more elaborate discussion of these different forms of motivation.

Recently, in the educational domain, researchers (e.g., Grolnick & Ryan, 1987; Vallerand & Bissonnette, 1992; Vallerand *et al.*, 1995) have taken an interest in ascertaining individuals' motivational styles toward education and examining the relationship between this orientation and various outcomes. Hence, students who go to school out of choice (i.e. identified regulation) or for the pleasure and satisfaction experienced while doing academic activities (i.e. intrinsic motivation) have been defined as people with an autonomous motivational style toward education, whereas students who do their school activities because of external pressures (i.e., external regulation) and internal controls (i.e., introjection) or even feel that they are not motivated (i.e., amotivation) have been defined as people who exhibit a nonautonomous motivational style in the academic domain.

Perceived Academic Competence and Perceived Academic Self-Determination as Determinants of Autonomous Academic Motivation

Cognitive Evaluation Theory (CET; Deci & Ryan, 1985, 1991), a minitheory within Self-Determination Theory, focuses on the determinants of motivation and proposes that autonomous motivation varies as a function of one's feelings of competence and self-determination. Increases or decreases in either of these processes lead to corresponding changes in motivation (see Deci & Ryan, 1985, for a review). Thus, when students come to feel incompetent in the academic domain, there should be a drop in their autonomous academic motivation. However, when students ex-

perience a high level of academic competence, autonomous academic motivation should be maintained or increased (see Boggiano, Main, & Katz, 1988; Gottfried; 1985, 1990; Harter & Connell, 1984; Harter & Jackson, 1992; Harter, Rumbaugh-Whitesell, & Kowalski, 1992; Vallerand *et al.*, 1989, 1993; Vallerand *et al.*, 1995, for evidence of a positive link between academic competence and autonomous academic motivation, also see Vallerand & Reid, 1984, 1988).

Similarly, if students feel self-determined in the school context, for instance, if they perceive that they are allowed choices at school, their autonomous academic motivation should be maintained or perhaps even enhanced. However, if the opposite situation occurs, that is, if students feel constrained or controlled in school settings, their autonomous academic motivation will be diminished (see Deci, Sheinman, & Nezlek, 1981; Ryan & Grolnick, 1986; Vallerand *et al.*, 1993, 1995, for evidence of a positive relationship between academic self-determination and autonomous academic motivation).

On the Role of Autonomous Academic Motivation in School Performance

In addition to postulating different types of motivation, Self-Determination Theory makes specific predictions concerning motivational consequences. According to this theory, autonomous forms of motivation (e.g., intrinsic motivation) lead to positive outcomes, whereas less autonomous types (e.g., amotivation) bring about negative consequences. Many studies examining the relationship between motivation and outcome variables have been conducted in the educational domain. Such research reveals that autonomous academic motivation, as well as similar motivational constructs (e.g., intrinsic value, learning goal orientation, task involvement) produce higher levels of creativity (Amabile, 1979, 1982, 1983), less dropout behavior (Vallerand & Bissonnette, 1992; Vallerand *et al.*, 1995; Vallerand & Senécal, 1992), more cognitive engagement (Ames & Archer, 1988; Meece, Blumenfeld, & Hoyle, 1988; Miller, Behrens, & Greene, 1993; Nolen, 1988; Nolen & Haladyna, 1990; Pintrich & De Groot, 1990; Pokay & Blumefeld, 1990), as well as better conceptual learning (Benware & Deci, 1984; Graham & Golan, 1991; Grolnick & Ryan, 1987; Ryan, Connell, & Deci, 1985).

Another educational outcome that has received quite a bit of attention in the past few years is school performance. This research reveals a positive relationship between autonomous academic motivation/similar motivational constructs (e.g., intrinsic value, intrinsic intellectuality, learning goal orientation) and academic performance (Beck, Rorrer-Woody, & Pierce, 1991; Boggiano *et al.*, 1992; Gottfried, 1985, 1990; Grolnick *et al.*, 1991; Hagborg, 1992; Lloyd & Barenblatt, 1984; Meece &

Holt, 1993; Mevarech, 1988). Furthermore, laboratory research has supported the causal influence of motivation on performance (Boggiano & Barrett, 1985; Elliot & Dweck, 1988; Licht & Dweck, 1984; also see Butler, 1987, 1988; Butler & Kedar, 1990; Butler & Nisan, 1986).

THE PRESENT STUDY

Although past research has examined the relationship between the various components of this model on an independent basis, no study to date has tested this particular model in its totality. This was the main objective of the present study. Specifically, the effects of two educational motivational antecedents, namely perceived academic self-determination and perceived academic competence on autonomous academic motivation and the influence of academic motivation on school performance was assessed using structural equation modeling. Based on the motivational model presented above, we made three specific hypotheses: (1) the more students experience high levels of academic competence, the more they will exhibit high levels of autonomous academic motivation; (2) the more students feel self-determined in the school context, the more they will be motivated in an autonomous way toward education; and (3) the more students are motivated toward school in an autonomous fashion, the better their school performance (i.e. grades) will be.

METHOD

Subjects

Two hundred and sixty-three French-Canadian 9th-grade students from two Montreal high schools served as subjects for this study. The students were 54% female and 46% male and had a mean age of 14.9 years.

Variables in the Model

Perceived academic competence. Academic competence was defined as a sense of being effective in the academic domain. Two indicators were used to provide a measure of perceived academic competence. These indicators were individual items taken and adapted from Harter's Perceived Competence Scale (1982). These items measured students' feelings of competence in the academic domain: (1) "In general I believe I am a good student," (2) "In general I don't do very well at school" (reverse scoring). Responses to these questions were rated on a 5-point Likert scale ranging from not at all in agreement (1) to completely in agreement (5).

Perceived academic self-determination. Academic self-determination was defined as the capacity to choose among several courses of action (Deci & Ryan, 1985). This latent construct was also measured by two items. These items assessed students' feelings of self-determination in the school context: (1) "At school, I feel like I am in a prison" (reverse scoring) and (2) "I go to school out of personal choice." Responses to these questions were also rated on a 5-point Likert scale.

Autonomous academic motivation. Students completed the French form of the Academic Motivation Scale (AMS; Vallerand *et al.*, 1992, 1993) namely, L'Échelle de Motivation en

Éducation (EME; Vallerand *et al.*, 1989) which assesses students' motivation toward education. In line with Self-Determination Theory (Deci & Ryan, 1985, 1991), this scale assesses intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. Furthermore, the scale assesses the three different types of intrinsic motivation postulated by Vallerand *et al.* (1989), namely intrinsic motivation to know, to accomplish things, and to experience stimulation. Each item of this scale represents a possible reason why students go to school. These reasons are scored on a 5-point Likert scale ranging from not at all (1) to exactly (5). Four items assess each of the 7 motivational constructs (thus a total of 28 items): amotivation (e.g., "Honestly I don't know; I really feel that I am wasting my time at school"; standardized Cronbach alpha of .81), external regulation (e.g., "In order to get a more prestigious job later on"; standardized Cronbach alpha of .58), introjected regulation (e.g., "To prove to myself that I can get my high school degree"; standardized Cronbach alpha of .83), identified regulation (e.g., "Because I think that a high school education will help me better prepare for the career I have chosen"; standardized Cronbach alpha of .77), intrinsic motivation-knowledge (e.g., "Because I experience pleasure and satisfaction while learning new things"; standardized Cronbach alpha of .87), intrinsic motivation–accomplishment (e.g., "For the pleasure I experience while surpassing myself in my studies"; standardized Cronbach alpha of .84), and intrinsic motivation–stimulation (e.g., "For the high feeling that I experience while reading on various interesting subjects"; standardized Cronbach alpha of .77). Thus, the internal consistency of the various subscales seems adequate.

In previous research (see Vallerand *et al.*, 1989, 1992, 1993), this scale as well as it's English counterpart were also found to have high internal consistency levels, a stable seven factor structure, as well as acceptable test–retest reliability. In addition, results from confirmatory factor analyses (e.g. LISREL), as well as correlations between the subscales and various motivational antecedents and consequences also supported the construct validity of this scale.

For the purpose of this study, four seperate autonomy indexes using individual items of the AMS subscales were computed. These four indexes served as multiple measures of the latent construct of autonomous academic motivation. An autonomy index consists of a summation of specifically weighted scores and is used to integrate the information from the different motivational subscales under one score. In line with previous studies using the index, weights were assigned to the motivational items according to their respective placement on the autonomy continuum (see Connell & Ryan, 1986; Grolnick & Ryan, 1987, 1989). Intrinsic motivation and identified regulation items, because they are considered autonomous forms of motivation, were assigned the weights of +2, and +1, respectively. On the other hand, amotivation and external regulation items, because they are conceptualized as less autonomous forms of motivation, were assigned the following respective weights: −2, and −1. As there were four items for each of the motivational subscales, four indexes were computed using the following formula: [(2 × (IM knowledge + IM accomplishment + IM stimulation)/3 + identified regulation) − ((external regulation + 2 × (amotivation))]. Introjected regulation items were not included in this formula since the specifics weights have to be equally balanced between non self-determined types of motivation and self-determined ones. Support for this type of composite index has been obtained in several studies (Blais, Sabourin, Boucher, & Vallerand, 1990; Grolnick & Ryan, 1987; Vallerand & Bissonnette, 1992; Vallerand *et al.*, 1995). The Cronbach alpha of the autonomous academic motivation measure (involving the 4 indexes) was .91.

School performance. Four manifest indicators were used to represent students' school performance: math final grade, French final grade, geography final grade, and biology final grade. These subjects were chosen because they are important subjects in 9th grade in the Province of Quebec. This measure had a standardized Cronbach alpha of .86.

Procedure

In the spring semester students completed in their classroom a questionnaire which included items for all the variables described above except for the construct of academic performance. A trained experimenter provided standardized instructions to the subjects. The experimenter explained that the purpose of the questionnaire was to find out more about the feelings and behaviors of high school students. It was also explained that additional information would be gathered later on and, accordingly, it was important to put their student ID number down on the questionnaire. It was clearly stated that anonymity and confidentiality of their answers would prevail at all times. The experimenter also explained the type of questions that students would be asked to answer and provided examples. Following these instructions, questions were answered and subjects completed the questionnaire. Following completion of the questionnaire, students were thanked for their collaboration.

Three months later, at the end of the school year, students' final grades in math, French, geography, and biology were collected.

Data Analysis

The full model of hypothesized relationships was statistically tested using LISREL VII (Jöreskog & Sörbom, 1989). Using maximum likelihood estimation, LISREL generates estimates of all parameters not constrained to specific values, generally, 1 or 0. Goodness of fit of the estimated model is assessed by comparing the reproduced covariance matrix, based on the specified constraints, with the observed covariance matrix. Indexes of fit provided by LISREL and reported in this section are the chi-square statistic, the root-mean square residual (RMSR), the goodness-of-fit index (GFI), the adjusted goodness-of-fit index (AGFI), and the total coefficient of determination (TCD). The RMSR is a measure of the average residuals between the observed covariance matrix and the estimated matrix. The smaller the RMSR relative to the average of the observed variances and covariances, the better the fit. On the other hand, the GFI represents the proportion of the variance and covariance explained, so that the closer this value is to 1.00, the better the fit. The AGFI adjusts the GFI for the degrees of freedom used to estimate free parameters. In addition to the indexes provided by LISREL, an additional index was calculated: the normed fit index [NFI = $(\chi^2_{null} - \chi^2_{model})/\chi^2_{null}$] suggested by Bentler and Bonett (1980). This index involves a comparison of fit of a given model to the null model when all the observed variables are constrained to be independent of each other. This index represents the percentage of the variance in the observed covariance matrix that is accounted for by the theorized model and also takes on values from zero to one.

RESULTS

The correlation coefficients of the 12 observed variables which were used as database for the analysis are shown in Table 1. Figure 2 displays the path coefficients of the integrated model, the coefficients for the measurement model as well as measurement errors associated with the observed variables. All effects were statistically significant (t values > 2.00). As can be seen in Fig. 2, three errors involving interrelations of items assessing the same latent construct were allowed to correlate freely. This change was performed following examination of LISREL modification indices. To test whether these changes disturbed the fundamental associations among the latent constructs, the factor intercorrelations between

TABLE 1
CORRELATION MATRIX

Variables	1	2	3	4	5	6	7	8	9	10	11	12
Perceived academic self-determination												
1. Selfdet1	—											
2. Selfdet2	.364[b]	—										
Perceived academic competence												
3. Comp1	.179[b]	.252[b]	—									
4. Comp2	.102[b]	.364[b]	.422[b]	—								
Autonomous academic motivation												
5. Index 1	.307[c]	.507[c]	.470[c]	.379[c]	—							
6. Index 2	.347[c]	.490[c]	.318[c]	.272[c]	.720[a]	—						
7. Index 3	.318[c]	.463[c]	.394[c]	.408[c]	.719[a]	.658[a]	—					
8. Index 4	.282[c]	.481[c]	.433[c]	.314[c]	.719[a]	.711[a]	.744[a]	—				
School performance												
9. Geography	.029[c]	.195[c]	.420[c]	.319[c]	.329[a]	.132[a]	.207[a]	.209[a]	—			
10. French	.154[c]	.221[c]	.382[c]	.344[c]	.389[a]	.231[a]	.351[a]	.332[a]	.499[a]	—		
11. Mathematics	.089[c]	.219[c]	.396[c]	.363[c]	.398[a]	.289[a]	.360[a]	.326[a]	.579[a]	.632[a]	—	
12. Biology	.132[c]	.215[c]	.439[c]	.366[c]	.400[a]	.250[a]	.336[a]	.302[a]	.634[a]	.607[a]	.686[a]	—

[a] Pearson correlations.
[b] Polychoric correlations.
[c] Polyserial correlations.

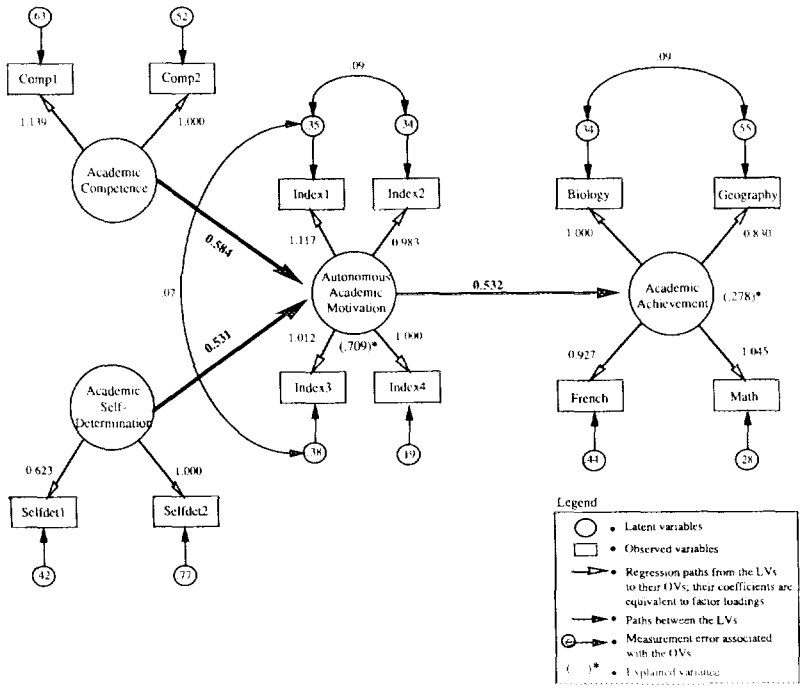

FIG. 2. Path diagram of the estimated measurement and structural models of the motivational model of school performance.

the initial and final model were computed (Newcomb & Bentler, 1988). This correlation was .99. In addition, the correlation between the initial and final factor loadings was computed. This correlation was .97. These findings reveal that the model modifications did not alter the basic pattern of factor intercorrelations and factor loadings.

The chi-square for the overall model, χ^2 (47, N = 263) was 109.81, $p <$ .001. The GFI was .935, the AGFI .891, the NFI .932, and the RMSR .071. The total coefficient of determination (TCD) for the overall model was .709 (71%). Although the chi-square was significant, all other measures of goodness of fit provided support for the hypothesized causal model. The integrated structural model accounted for 28% of the variance observed in School Performance.

DISCUSSION

The purpose of this study was to propose and test a structural motivational model of school performance based on the integration of Deci and Ryan's Self-Determination Theory and Cognitive Evaluation Theory (1985, 1991). Results consistently supported the proposed model. As

predicted, perceived academic competence was positively related to autonomous academic motivation. This finding is in line with previous studies conducted in academic settings (Boggiano, Main, & Katz, 1988; Gottfried; 1985, 1990; Harter & Connell, 1984; Harter & Jackson, 1992; Harter, Rumbaugh-Whitesell, & Kowalski, 1992; Vallerand *et al.*, 1989, 1993, 1995), as well as with studies conducted in the laboratory (Vallerand & Reid, 1984, 1988) which have shown a positive link between perceived competence and autonomous forms of motivation.

Also as expected, the structural positive relation between academic self-determination and autonomous academic motivation was significant. This result is consistent with past research (Deci, Sheinman, & Nezlek, 1981; Ryan & Grolnick, 1986; Vallerand *et al.*, 1993, 1995) which has indicated that the experience of academic self-determination is conducive to autonomous academic motivation. These past two findings are in line with the first proposition of the motivational model and also corroborate Cognitive Evaluation Theory's (Deci & Ryan, 1985, 1991) contention that competence and self-determination are important determinants of motivation.

Finally, as expected, the more students' were motivated toward education in an autonomous fashion, the higher was their school performance (i.e., their grades). This result is consonant with both field studies (Beck *et al.*, 1991; Boggiano *et al.*, 1992; Gottfried, 1985, 1990; Grolnick *et al.*, 1991; Hagborg, 1992; Lloyd & Barenblatt, 1984; Meece & Holt, 1993; Mevarech, 1988) and past laboratory research (Boggiano & Barrett, 1985; Elliot & Dweck, 1988; Licht & Dweck, 1984; also see Butler, 1987, 1988; Butler & Kedar, 1990; Butler & Nisan, 1986) which have revealed that autonomous forms of motivation increase performance. This finding is in line with the second proposition of the motivational model and is also consistent with Self-Determination Theory's (Deci & Ryan, 1985, 1991) predictions that autonomous forms of motivation lead to positive outcomes.

This result is also in line with recent research examining other educational outcomes which have shown that autonomous students are less likely to dropout (Vallerand & Bissonnette, 1992; Vallerand *et al.*, 1995; Vallerand & Senécal, 1992), report better cognitive engagement (Ames & Archer, 1988; Meece, Blumenfeld, & Hoyle, 1988; Miller, Behrens, & Greene, 1993; Nolen, 1988; Nolen & Haladyna, 1990; Pintrich & De Groot, 1990; Pokay & Blumefeld, 1990), are well adjusted in the school context (Connell & Wellborn, 1990; Ryan & Connell, 1989; Vallerand, Blais, Brière, & Pelletier, 1989), and show higher levels of conceptual learning (Benware & Deci, 1984; Graham & Golan, 1991; Grolnick & Ryan, 1987; Ryan, Connell, & Deci, 1985). Finally, it is also consistent with studies examining motivational consequences from other life do-

mains such as sport (Pelletier *et al.*, 1995), work (Blais, Lachance, Vallerand, Brière, & Riddle, 1993) and interpersonal relations (Blais *et al.*, 1990), which also suggest that autonomous forms of motivation lead to positive consequences (e.g., greater dyadic happiness, more work satisfaction).

In sum, the three hypotheses postulated by the motivational model were confirmed. Thus, it seems that students who feel competent and self-determined in the school context develop an autonomous motivational profile toward education which in turn leads them to obtain higher school grades.

Although the present results provided support for the proposed model, certain limitations should be acknowledged and kept in mind when interpreting the findings. First, the measures of academic competence and self-determination were assessed with only two items each. While the LISREL measurement model showed that these measures were fairly reliable, it would have been preferable, nevertheless, to use more items to assess these two constructs. Second, this model did not control for prior achievement or ability level (e.g., IQ). It would have been preferable to examine the effects of the various components of the model on school performance with the effects of these types of variables partielled out. Future research in this area would do well in controlling for students' past performance and/or academic ability level. Nevertheless, other studies (Lloyd & Barenblatt, 1984; Pokay & Blumefeld, 1990; Zimmerman *et al.*, 1992) have shown that academic motivation predicts academic achievement over and above the effects of ability level or prior performance.

Third, although we used structural equation analyses to test the proposed model, the present study did not use an experimental or longitudinal design. It is thus inappropriate to make clear statements concerning causality. However, one cannot help but compare the present findings with those of laboratory experiments which have shown that situationally induced perceptions of competence influence autonomous motivation (Vallerand & Reid, 1984, 1988) and that situationally induced motivation affects performance (Amabile, 1985; Boggiano & Barrett, 1985; Elliot & Dweck, 1988; Licht & Dweck, 1984). In any event, longitudinal designs would be preferable to confirm on a more solid empirical basis the causal hypotheses postulated in this study. That higher levels of autonomous academic motivation led to improved school performance does not, of course, rule out the very plausible possibility that achievement also influences academic motivation. Future research using longitudinal designs could also examine these possible reciprocal pathways of influence.

Fourth, this study focused on a limited number of factors. Considering the complex nature of school performance, it must be acknowledged that many other variables are likely to influence this important educational outcome. Thus, it would be interesting to incorporate some of these vari-

ables into the model in order to better predict academic performance. A first variable to consider is cognitive engagement (i.e., use of learning strategies). Indeed, recent research shows that this variable seems to represent an important mediator between motivational and achievement variables (e.g., Meece & Holt, 1993; Pintrich & De Groot, 1990; Pokay & Blumefeld, 1990). Second, parental variables could be incorporated into the model. Indeed, many studies indicate a link between parenting styles and school performance (Baumrind, 1991; DeBaryshe *et al.*, 1993; Dornbush *et al.*, 1987; Steinberg *et al.*, 1989, 1992). Also of interest is the fact that parenting styles have been related to perceived academic competence and perceived academic self-determination (Grolnick *et al.*, 1991; Guay & Vallerand, 1994). Thus, parenting style or perceptions of parenting style could possibly precede self-perception variables (i.e., perceived academic competence and perceived academic self-determination) in an extended model of school performance. Finally, in order to account for a greater amount of variance in school performance it would be interesting to analyze the relation between motivation and achievement in a more subject-specific manner. Future research could assess autonomous motivation toward a specific subject (e.g., math) and predict academic achievement in that given subject (see Gottfried, 1985, 1990; Gottfried *et al.*, 1994, for examples of such a strategy).

Despite these caveats, the present results are of obvious relevance to academic professionals as well as parents. These data suggest that a direct way to improve school performance is to increase student's autonomous academic motivation. As shown in the model, this could be done by increasing students' academic competence possibly with encouragement and positive feedback (Vallerand & Reid, 1984, 1988) and/or their academic self-determination, for instance by providing choices during learning activities (Zuckerman, Porac, Lathin, Smith, & Deci, 1978).

In summary, results from the present study supported the proposed motivational model of school performance based on Deci and Ryan's theoretical perspective. More specifically, it was found that perceived academic competence and perceived academic self-determination positively influenced autonomous academic motivation, which in turn had a positive impact on school performance. These findings are in line with the motivation literature and highlight the importance of autonomous forms of academic motivation in the prediction of successful educational outcomes such as school performance. Finally, these results also provide potential insights for the conduct of future research.

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