Autonomous Motivation for Teaching: How Self-Determined Teaching May Lead to Self-Determined Learning

Guy Roth, Avi Assor, Yaniv Kanat-Maymon, and Haya Kaplan
Ben-Gurion University of the Negev

This study examined teachers' experience of autonomous motivation for teaching and its correlates in teachers and students. It was hypothesized that teachers would perceive various motivations posited by E. L. Deci and R. M. Ryan's (2000) self-determination theory as falling along a continuum of autonomous motivation for teaching. Autonomous motivation for teaching was predicted to be associated positively with teachers' sense of personal accomplishment and negatively with emotional exhaustion. Most important, teachers' self-reported autonomous motivation for teaching was expected to promote students' self-reported autonomous motivation for learning by enhancing teachers' autonomy-supportive behavior, as indicated by students' reports. Results from a sample of 132 Israeli teachers and their 1,255 students were consistent with the hypotheses. Discussion focuses on the importance of the experience of autonomous motivation for teaching for teachers and students.

Keywords: autonomous motivation, teaching, autonomy support

In his seminal work on personal causation, deCharms (1968) distinguished between two types of perceived sources for intentional action: extrinsic and intrinsic. He suggested that in states of extrinsic motivation people perceive the source of initiation and regulation of their goal-directed activities as external to themselves, whereas in states of intrinsic motivation the locus of initiation and regulation is perceived to be internal.

Proponents of self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000b) expanded and elaborated on deCharms's perspective and suggested several types of motivations or reasons for intentional action that can be placed along a continuum ranging from perceived autonomy to perceived control or coercion. According to Deci and Ryan (1985), autonomous motivations enable people to realize their authentic self, whereas controlled motivations are experienced as sources of external or internal pressure. Thus, SDT replaced the extrinsic/intrinsic dichotomy with a more differentiated continuum of autonomous versus controlled motivations. To assess the extent to which a person is autonomously motivated in a certain domain, SDT researchers usually compute a general index of relative autonomous motivation that weighs the various motivations according to the degree of autonomy versus control they are posited to reflect (e.g., Ryan & Connell, 1989).

SDT and other humanistic views in psychology and education (e.g., Aviram, 1986; deCharms, 1968, 1976; Rogers, 1969) posit that autonomous motivation and the experience of autonomy are extremely important for growth and well-being. In contrast, there are traditions in education and in psychology that clearly do not value the experience of autonomy as much (e.g., Hand, 2006; B. Schwartz, 2000; B. F. Skinner, 1971)

Empirical studies in various work settings have shown that autonomous motivation is associated with desirable outcomes (e.g., Deci, Connell, & Ryan, 1989; Deci et al., 2001), and there is ample research documenting the benefits of autonomous motivation for students (e.g., Reeve, Deci, & Ryan, 2004). Yet, to our knowledge, there is no published quantitative evidence showing that autonomous motivation for teaching is associated with positive student attributes, or even with indicators of desirable teacher behavior that are not based on teachers' self-reports. Given the absence of such evidence, and the critical importance ascribed to autonomous motivation in humanistic traditions in psychology and education, the main objective of the present study was to examine whether autonomous motivation for teaching is indeed associated with students' self-reports of positive teacher attributes and desirable teacher behavior.

The dearth of research concerning autonomous motivation for teaching is surprising, especially when compared to the rich research concerning teachers' orientations toward autonomy and autonomy-supportive teaching (e.g., Assor & Kaplan, 2001; Assor, Kaplan, & Roth, 2002; Deci, Schwartz, Sheinman, & Ryan, 1981; Grolnick & Ryan, 1987; Reeve, 2002; Reeve, Bolt, & Cai, 1999; Reeve, Nix, & Hamm, 2003; Vallerand, Fortier, & Guay, 1997). Whereas autonomous motivation for teaching refers to teachers' thoughts and feelings regarding their own motivations for engaging in teaching (e.g., "Why do I invest effort in preparing for class?"), orientation toward autonomy and autonomy-supportive teaching refers to teachers' preferred and actual teaching styles.

In recent research that was the first to explore correlates of autonomous motivation for teaching, Pelletier, Seguin-Levesque, and Legault (2002) showed that the more teachers perceive pressure from above (e.g., they have to comply with a curriculum or with performance standards) and pressure from below (i.e., they perceive their students to be non-self-determined), the less they are to be self-determined toward teaching. In addition, teachers' sense of self-determination toward work was related to teachers' autonomy support toward students.

Although the Pelletier et al. (2002) study pointed to important potential antecedents of teachers' autonomous motivation and orientation toward autonomy support, it did not focus on student outcomes and relied only on teachers' self-reports. In addition, in the study by Pelletier and his colleagues, teachers' autonomous motivation was measured with the Work Motivation Inventory developed by Blais, Lachance, Vallerand, Briere, and Riddle (1993). This measure was developed to capture workers' autonomous versus controlled motivations in various work settings and does not refer specifically to teachers' tasks in school.

Thus, although the work of Pelletier et al. (2002) yielded valuable information concerning teachers' autonomous motivation, it appears that the phenomenon of autonomous motivation for teaching should be further investigated via a more specific, teaching-oriented measure and by examining students' consequences using sources of information other than teachers' self-reports.

Research not based on SDT has also highlighted the importance of autonomous motivation for teaching by showing that, at least in the initial phases of their careers, many teachers do strive for authentic self-realization and accomplishment in their work (Huberman, 1993), and, as noted by Ryan (1993), the realization of one's authentic self lies at the core of the experience of autonomously motivated action. According to Ryan (1991, 1993), people feel that they realize themselves in an authentic way when they engage in actions with which they deeply identify and that they experience as emanating from their inner self.

Overall, then, although there has been considerable agreement that autonomous motivation for teaching and authentic self-realization is valuable for teachers, past research has not examined whether autonomous motivation for teaching is indeed associated with desirable student attributes, or even with indicators of positive teacher behaviors that are not based on teachers' self-reports. Furthermore, although SDT has led us to expect that teachers' sense of autonomy would contribute to students' autonomous motivation for learning (e.g., Pelletier et al., 2002), we have no evidence bearing on this issue, and we have no research on the kinds of teacher behaviors that might mediate the link between perceived teacher and student autonomy. Finally, although there has been considerable agreement that striving for autonomy might be valuable for many teachers, until now there has been no instrument that has allowed a differentiated assessment of teachers' sense of autonomy in specific teaching tasks that has been validated using multiple informants.

Given the scarcity of research on autonomous motivation for teaching and its correlates, the present research sought to examine the following issues: (a) Do teachers distinguish between the various motivations posited by SDT (e.g., extrinsic, intrinsic) when referring to specific teaching tasks? (b) Do those teaching-related motivations fall along the continuum of perceived autonomy posited by SDT? and (c) Is autonomous motivation for teaching associated with meaningful, theoretically predictable outcomes for both teachers and students?

With regard to outcomes, our major focus was to examine the potential role of autonomous motivation for teaching as a predictor of students' autonomous motivation for learning. Specifically, we examined the possibility that autonomous motivation for teaching contributes to autonomous motivation for learning among students by leading teachers to act in ways that students perceive as autonomy supportive.

Autonomous Motivation for Teaching: Conceptualization and Measurement

SDT posits five types of perceived motivations (i.e., sources or reasons for intentional action) that can be placed along a continuum of perceived autonomy. The least autonomous motivation is termed *external*. Behavior so regulated is controlled by external contingencies involving threats of punishments or the offering of material rewards rather than enacted volitionally (Ryan & Connell, 1989). The behaviors persist only when the contingencies are present and they are associated with poor adjustment and well-being (Grolnick & Ryan, 1989). Next along the autonomy continuum is the construct of *introjected* motivation. In this type of motivation, behavior is controlled by the desire to avoid feeling guilty, ashamed, or unworthy, as well as the striving for highly positive evaluations (self- and others' evaluations).

Although in introjected motivation the enactment of behavior is not dependent on specific external contingencies, this style is still considered relatively controlled (rather than autonomous) because people feel that they are acting because they have to and not because they want to. In other words, the source of the coercion that was once external to the person has been introjected and now resides within the person, so that he or she now feels controlled by internal contingencies that link feelings of self-esteem and social acceptance to the enactment of specific behaviors or attributes (e.g., Assor, Roth, & Deci, 2004).

The next motivation is referred to as *identified* and is considered relatively autonomous because the person has accepted the value of the activity as his or her own. Identified motivation, although not purely autonomous, is said to result from identifying with the importance of the behavior vis-à-vis the person's own values and goals. Research has shown this form of motivation to be accompanied by the experience of choice rather than by pressure and by proactive coping and well-being (Grolnick & Ryan, 1989; Ryan, Rigby, & King, 1993). The next motivation, *integrated*, results from reciprocally assimilating the identifications with other aspects of the person's self. Both identified and integrated motivations are considered relatively autonomous, and when so regulated, people experience a sense of self-determination. The most autonomous motivation is termed *intrinsic*. Purely intrinsic motives involve engagement in an activity for its own sake. They are characterized by enthusiasm, spontaneity, excitement, intense concentration, and joy. To summarize, the SDT model of motivation proposes five motivation types reflecting different levels of perceived autonomy versus coercion.

Ryan and Connell (1989) assessed four of the five types of motivations posited by SDT (external, introjected, identified, and intrinsic) by asking students to indicate the reasons for their actions in two domains (academic achievement and prosocial

behavior). Their findings supported the notion that these motivations indeed can be ordered along a single dimension of perceived autonomy. Ryan and Connell also created an overall indicator of autonomous motivation by giving positive weights to the two autonomous motivations and negative weights to the two controlled motivations. Their own study as well as additional research (e.g., Fortier, Vallerand, & Guay, 1995; Grolnick, Ryan, & Deci, 1991; Kaplan, Assor, & Roth, 2003; Kim, Deci, & Zuckerman, 2002; Roth, Assor, Kanat-Maymon, & Kaplan, 2006) have shown that the overall indicator of autonomous motivation (often termed the *relative autonomy index*) is associated positively with various desirable outcomes and negatively with various undesirable outcomes.

Further studies using instruments similar to those developed by Ryan and Connell (1989) have found that the more autonomous motivations are related to positive outcomes, whereas the more controlled motivations are associated with negative outcomes across domains as varied as politics, student functioning, religion, health care, and aging (Assor, Kaplan, Kanat-Maymon, & Roth, 2005; Koestner, Losier, Vallerand, & Carducci, 1996; O'Connor & Vallerand, 1990; Vallerand & O'Connor, 1989; Vallerand et al., 1993; Williams & Deci, 1996; Williams, Grow, Freedman, Ryan, & Deci, 1996).

Using Ryan and Connell's (1989) approach, the present research examined the hypothesis that teachers perceive the motivation types posited by SDT as distinct and as falling along the continuum of perceived autonomy. To examine the hypothesis, we developed a questionnaire aimed at assessing the different motivations, and we subjected the items to a multidimensional scaling procedure that examined whether the various motivations indeed fell on the expected continuum.

Autonomous Motivation for Teaching and Teachers' Feelings Concerning Their Work

A theoretical construct can be considered psychologically meaningful only if it is linked, in a predictable way, with important psychological correlates. Therefore, in this research we examined whether autonomous motivation for teaching is associated with important processes and outcomes in teachers and students. Starting with teachers, we focused on the relations between autonomous motivation for teaching and teachers' feelings of personal accomplishment and emotional exhaustion (e.g., Friedman & Farber, 1992). Whereas the experience of personal accomplishment refers to the feeling that teaching enables the person to realize his or her abilities to the fullest and feel satisfied, the experience of exhaustion refers to the feeling that teaching is associated with feelings of exhaustion, lack of energy, and depletion of mental resources (see Friedman & Farber, 1992; Maslach & Jackson, 1981).

According to SDT, autonomous motivation for teaching should be positively associated with feelings of personal accomplishment and negatively associated with feelings of exhaustion. In fact, the link between autonomous motivation and personal accomplishment is a basic tenet of SDT (e.g., Ryan, 1993; Ryan & Deci, 2000a). Hence, although being autonomously motivated (or self-determined) might lead a person to generate great efforts, SDT and research based on it suggest that autonomous efforts are accompanied by feelings of vitality and energy that are the opposite of feeling drained and exhausted (La Guardia, Ryan, Couchman, & Deci, 2000; Niemiec et al., 2006; Ryan & Frederick, 1997). Consistent with these findings, we posited that because autonomously motivated teachers perceive their engagement in various teaching tasks as interesting and meaningful, they will experience less exhaustion. Thus, teachers' sense of autonomy at work may allow them to tolerate occasional frustrations and setbacks and to prevent those negative experiences from leading to feelings of exhaustion and loss of vitality.

Research focusing on teachers' exhaustion has demonstrated a strong negative correlation between teachers' exhaustion and their sense of significance (Pines, 2002) and self-actualization in teaching (Malanowski & Wood, 1984). However, no research until now has examined the relations between autonomous motivation for teaching and teachers' sense of accomplishment or exhaustion at work.

In this study, teachers' feelings of exhaustion or accomplishment were correlated with both the global indicator of autonomous motivation for teaching and with the four motivations composing the global indicator (e.g., intrinsic, identified). Whereas the correlations with the global indicator were used to examine if autonomous motivation for teaching is associated with important outcomes for teachers, the correlations with the four motivation types provided an additional, less direct, way of examining the idea that the various motivations reflect different degrees of perceived autonomy. Thus, we used feelings of accomplishment and exhaustion as external criteria whose correlations with the various motivations should vary as a function of the extent to which each motivation is experienced as autonomous. Because accomplishment can be assumed to be positively associated with autonomous motivation for teaching, we expected that the correlations between the various motivations and feelings of personal accomplishment would gradually become more positive as teachers moved from more controlled to more autonomous motivations. In a similar way, we predicted that the correlations among the various motivations and feelings of exhaustion would gradually become more negative as teachers moved toward the more autonomous motivations.

This pattern of correlations was described by Ryan and Connell (1989), following Guttman (1954), as Simplex-like structure. The Simplex concept is derived from Guttman's (1954) Radex theory, which described ordered relations between correlated variables. Guttman (1954) argued that a Simplex model reflects an ordered arrangement of variables along a certain parameter. In Ryan and Connell's work, the parameter along which variables are ordered is, of course, the continuum of perceived autonomy. Moreover, according to these authors, a useful criterion for assessing the validity of scales assessing the different motivations is the extent to which those scales exhibit the theoretically expected pattern of increasing or decreasing correlations.

How Autonomous Motivation for Teaching May Lead to Autonomous Motivation in Students' Learning

If autonomous motivation for teaching is indeed an important psychological construct, then it should predict desirable characteristics not only for teachers, but also for students. The specific student outcome on which the present research focused was autonomous motivation for learning. A large body of research has shown that it is possible to distinguish between various types of

motivation for learning among students, and that those motivations can be placed along the perceived autonomy continuum already described in relation to the notion of autonomous motivation for teaching (Kaplan et al., 2003; Patrick, Skinner, & Connell, 1993; Ryan & Connell, 1989; Vallerand et al., 1993). Furthermore, it has been demonstrated that autonomous motivation for learning is associated with a variety of positive student outcomes, including experiencing positive feelings in relation to the task at hand, and considerable behavioral engagement (Deci & Ryan, 1991; Deci, Ryan, & Williams, 1996; Grolnick et al., 1991; Grolnick & Ryan, 1987; Kaplan et al., 2003).

Research conducted within the framework of SDT has shown that autonomous motivation for learning among students can be promoted by autonomy-supportive teaching behaviors (Kaplan et al., 2003; Patrick et al., 1993; Reeve, 2002; Reeve et al., 1999). Autonomy-supportive teaching involves behaviors that seek to promote students' tendency to engage in learning because they value this activity or find it interesting, for example, by explaining the relevance of the learned subject to students' lives and future goals or by providing choice (e.g., Assor et al., 2002; Black & Deci, 2000; Reeve et al., 1999). As was already noted, autonomous motivation for teaching clearly differs from autonomy-supportive teaching. It is, however, reasonable to hypothesize that autonomous motivation for teaching enhances autonomy-supportive teaching, which in turn contributes to autonomous motivation for learning among students.

Autonomous motivation for teaching was hypothesized to promote autonomy-supportive teaching due to several processes. The first process involves teachers' increased understanding of the value of the subjects they teach and of the variety of ways leading to mastery of those subjects. Autonomous motivation in any domain involves deep understanding of the value of this domain (Ryan, 1993). Consistent with this view, research conducted by Vansteenkiste, Simons, Lens, Sheldon, and Deci (2004) showed that autonomous motivation to engage with a certain topic among students leads to deeper processing of that topic.

Because autonomously motivated teachers have developed a deep understanding of the merits of the subjects they teach and of the methods they use, they can provide their students with convincing explanations and examples for the value and relevance of those subjects and for their methods of teaching. Autonomous teachers' understanding of the subjects they teach also enables them to apprehend that there are many facets to those subjects and many ways of learning them, and this understanding may enable them to provide some choice for their students.

The second process by which autonomous motivation for teaching might lead to autonomy-supportive teaching involves teachers' personal, experience-based understanding of autonomous motivation and its benefits. In this process, teachers who have experienced the advantages of autonomous motivation prefer that their students also act and learn from autonomous motivations because they understand that these types of motivations lead to a high quality of learning and increased appreciation of the subjects they teach and love. Thus, autonomously motivated teachers use their own motivational experiences as a basis for inferring that students would engage in learning in the most serious way if the students understood the value of the subject being learned and found it interesting. Due to this understanding, those teachers then engage in autonomy-supportive actions such as clarifying the relevance of various subjects to students' goals and allowing students to choose learning activities they find interesting.

The third process by which autonomous motivation for teaching might lead to autonomy-supportive teaching involves the greater resilience of autonomous teachers to the pressures of achievement and concerns of impression formation, and the greater investment of these teachers in high-quality learning. Thus, we assume that teachers who are more autonomously motivated are more willing to allow some choice and to take the time to clarify the relevance of various subjects because they feel less pressed to produce quick and impressive formal achievements, and they are more concerned with promoting deep understanding of the subjects they teach.

Based on the foregoing considerations, we hypothesized that teachers would perceive the various motivations posited by SDT as distinct from one another and as falling along a continuum of autonomous motivation for teaching. In addition, we predicted that autonomous motivation for teaching would be associated with the following outcomes in teachers and in students: (a) Autonomous motivation for teaching would be positively related to sense of personal accomplishment and negatively related to feelings of exhaustion in teachers; and (b) autonomous motivation for teaching would predict autonomy-supportive teaching, which, in turn, would predict autonomous motivation for learning among students.

Method

Participants

Participants were 132 female teachers from seven Jewish urban elementary schools in Israel and their students (62 classes; 6–12 classes in each school; 1,255 students from Grades 3–6, 51% of whom were girls). The schools served middle- and lower-class populations.

Procedure

Questionnaires were administered to teachers and students at the beginning of the spring semester. Two trained research assistants administered the students' questionnaires in one session when the teachers were not present in the classroom. In a separate session, a third research assistant administered the teachers' questionnaires simultaneously to all of the teachers of the same school. On average, teachers took 30 min and students took 45 min to complete the questionnaires.

Teachers completed a questionnaire assessing autonomous motivation for teaching, feelings of exhaustion, personal accomplishment, and social desirability bias. Students completed a questionnaire assessing their perceptions of their main teacher's autonomy-supportive and competence-supportive teaching behaviors, as well as their autonomous motivation for studying in the classes taught by that teacher. Social desirability and competence-supportive teaching were measured for methodological validation purposes. Specifically, social desirability was assessed in an attempt to control for bias in the measurement of autonomous motivation for teaching. Competence-supportive teaching was assessed in an attempt to ascertain that the relation of autonomy-supportive teaching with students' autonomous motivation for learning cannot be

explained by teacher behavior that actually supports students' need for competence.

Thus, because past research has shown that students perceive teachers' support for autonomy and competence needs as positively correlated (e.g., Kaplan, Assor, & Roth, 2002; E. A. Skinner & Belmont, 1993), we controlled for the effects of competence-supportive teaching in our tests of the role of autonomy-supportive teaching as a possible mediator of the relations between teachers' autonomous motivation for teaching and students' autonomous motivation for learning. The students' and teachers' questionnaires also assessed several other variables unrelated to this research.

Instruments

Autonomous motivation for teaching. This was a new measure developed for this study. Following Ryan and Connell (1989) and Pelletier et al. (2002), we examined four types of motivation: external, introjected, identified, and intrinsic.[1] Two stems pertained to specific common tasks of teachers in elementary schools (e.g., "When I devote time to individual talks with students, I do so because. . ."), and one stem referred to teachers' effort investment in general ("When I invest effort in my work as a teacher, I do so because. . .").

For each task-specific stem, there were four responses representing the four types of motivation. For the one general stem, there were eight responses, two for each type of motivation. Teachers indicated the extent to which they agreed with each response using a 5-point scale. The following examples are of responses representing various motivations: external (". . . because I want the parents to be satisfied so they won't complain"), introjected (". . . because otherwise I would feel guilty"), identified (". . . because it is important for me to make children feel that I care about them") and intrinsic (". . . because I enjoy finding unique solutions for various students"). Each motivation was assessed with four items. Items were mixed across the four motivation types, so that the items representing the same type of motivation were not grouped together. Cronbach's alpha coefficients for the four motivation subscales ranged from .68 to .76. A more detailed analysis and a description of the composite measure of autonomous motivation for teaching appear in the Results section. The complete scale appears in the Appendix.

Teachers' emotional exhaustion and personal accomplishment. These variables were assessed using a slightly shortened version of the scales used by Friedman and Farber (1992). Feelings of emotional exhaustion were assessed with seven items, and feelings of personal accomplishment were assessed with three items. Teachers indicated the extent to which they agreed with each response using a 7-point scale. Factor analysis using Varimax rotation revealed a clear distinction between the two scales. An example of exhaustion was "I feel exhausted at the end of a day in school." An example of personal accomplishment was "I feel that teaching allows me to utilize my abilities to the fullest." Cronbach's alpha coefficients for the two scales were .88 and .79, respectively, and the correlation between them was −.50.

Teachers' social desirability bias. This variable was measured with a shortened 15-item version of Crowne and Marlowe's (1964) scale. For each item, teachers indicated whether it was true or not true for them. An illustrative item was "I sometimes feel resentful when I don't get my way." Cronbach's alpha was .79.

Students' autonomous motivation for learning. This variable was assessed with Ryan and Connell's (1989) scale of perceived locus of causality for the academic domain, which was adapted and validated for Jewish Israeli elementary students by Kaplan et al. (2003) and Assor et al. (2005). The scale includes four subscales assessing external, introjected, identified, and intrinsic motivations for studying. In the Israeli version, each type of motivation is assessed with four items. Students indicated the extent to which they agreed with each response using a 4-point scale. Cronbach's alphas for the four subscales ranged from .72 to .81. Consistent with theoretical expectations, the correlations among the four subscales formed a perfect Simplex structure (see Guttman, 1954; Ryan & Connell, 1989). To get an overall indicator of autonomous motivation for learning, we used the relative autonomy index weighting system (e.g., Grolnick & Ryan, 1987; Patrick et al., 1993). In this system, the various motivations are assigned weights representing the sense of autonomy they are assumed to reflect (−3, −1, for external and introjection, respectively, and +1 and +3 for identified and intrinsic, respectively) and are then added together.

Students' perception of autonomy-supportive teaching. The scale assessing this variable was a shortened version of a scale developed and validated by Assor et al. (2002). Students indicated the extent to which they agreed with each response using a 4-point scale. Examples of items were "The teacher explains why it is important to study certain subjects in school" (fostering relevance) and "The teacher encourages me to work in my own way" (providing choice). Cronbach's alpha for the scale was .68.

Students' perception of competence-supportive teaching. This was a 4-item measure developed and validated by Kaplan et al. (2002). Students indicated the extent to which they agreed with each response using a 4-point scale. An illustrative item was "The teacher explains what we have to know in order to succeed at the test." Cronbach's alpha was .72. Kaplan et al. (2002) showed, in a longitudinal research, that competence-supportive teaching and autonomy-supportive teaching each made an independent contribution to the prediction of students' autonomous motivation for learning, positive affect, and grades.

Results

Data analyses were designed to answer several questions. The first two questions were: Do teachers distinguish among the various motivations posited by SDT when referring to their engagement in specific teaching tasks and teaching in general, and do those motivations fall along the continuum of perceived relative autonomy posited by SDT? The next, and more important, question was this: Is autonomous motivation for teaching associated with meaningful, theoretically predictable outcomes for both teachers and students? Finally, we examined the possibility that autonomous motivation for teaching promotes students' autonomous motivation for learning by enhancing autonomy-supportive teaching.

---

[1] Integrated motivation was not examined (a) because of the difficulty in distinguishing between identified and integrated motivations using self-reports, and (b) following past work that also did not distinguish between those levels (e.g., Blais et al., 1993; Pelletier et al., 2002; Ryan & Connell, 1989).
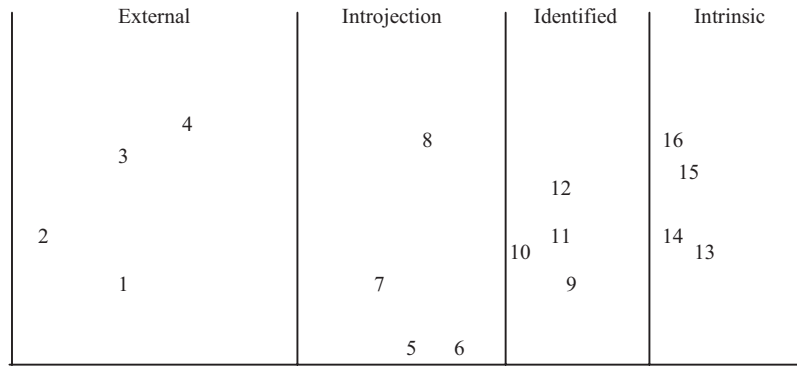
Figure 1.   Smallest space analysis of items assessing teachers' motivations based on self-determination theory. The numbers in the figure represent the items measuring the four motivation levels. The items are presented in the Appendix with the same numbers.

Do Teachers Differentiate Among Four Types of Motivation That Fall Along a Relative Autonomy Continuum?

The hypothesis pertaining to teachers' capacity to differentiate among different types of motivations reflecting varying degrees of autonomy was examined by means of smallest space analyses (SSA; Guttman, 1968; Roth et al., 2006; Shye, Elizur, & Hoffman, 1994). SSA, a well-established technique for multidimensional scaling (Shye et al., 1994), maps the location of each variable (item) in a multidimensional space. Each variable is represented as a point in Euclidian space. The distances between the points reflect the empirical relations among the items, as measured by the correlations between them. The higher the positive correlation between two items the closer they are in space, and the higher the negative correlation between the items the more distant they are in space (Guttman, 1968).

The SSA method was preferred over a factor analytic method because it allowed us to distinguish among multiple constructs that, theoretically, were expected to be highly related. Research using the SSA method has demonstrated its usefulness in cases in which theory predicts the existence of multiple highly related constructs (see Assor et al., 2002; Roth et al., 2006; S. H. Schwartz, 1992; Shye et al., 1994). Figure 1 presents the results of the SSA for the four types of motivation for teaching.

Examination of Figure 1 indicates that, as expected, teachers differentiated among items belonging to the four types of motivations. This conclusion was supported by a satisfactory alienation coefficient of .12.[2] Furthermore, each set of theoretically distinct items fell at its expected location along a horizontal continuum that appeared to represent the relative autonomy continuum proposed by Ryan and Connell (1989). Items representing the different types of motivations are perfectly separated in Figure 1 by straight lines. The nonarbitrary nature of those lines is supported by their theoretical origin.

A second, less direct way to assess the extent to which the various motivations fall along a continuum of perceived autonomy was to examine the correlations of those motivations with teachers' attributes that, theoretically, should be related to teachers' autonomous motivation. Because SDT assumes that autonomous motivation is closely connected to well-being and personal accom-

plishment, we used teachers' feelings of personal accomplishment and emotional exhaustion as attributes that should be related in a predictable way to the various motivations. Based on the Simplex concept (Guttman, 1954) and consistent with Ryan and Connell's (1989) approach to the validation of scales reflecting varying degrees of perceived autonomy, we expected a pattern in which the correlations between the various motivations and feelings of accomplishment would gradually become more positive as teachers moved from more controlled to more autonomous motivations. In a similar way, we expected that the correlations among the various motivations and feelings of exhaustion would gradually become more negative as teachers moved toward the more autonomous motivations. Table 1 presents the correlations among the four types of motivations and teachers' feelings of accomplishment or exhaustion.

Examination of Table 1 reveals that, as expected, the correlations of the various motivations with feelings of accomplishment gradually became more positive as teachers moved from more controlled to more autonomous motivations, whereas the reverse was true for the correlations with exhaustion. The significance of the differences between the correlations of the various motivations with each of the teachers' two well-being indicators was computed using Fisher z tests.

For both exhaustion and personal accomplishment, significant or marginally significant differences were found between correlations involving nonadjacent motivations. Specifically, there was a significant difference between the correlations of exhaustion with the external and the identified motivations ($z = 2.15$; $p < .05$, two-tailed). The difference between the correlations of exhaustion with introjected and intrinsic was also significant ($z = 1.71$; $p < .05$, two-tailed). For personal accomplishment, the results revealed

---

[2] The alienation coefficient serves as a goodness-of-fit indicator in SSA. It is measured by the monotone correlation between the input correlations and the output interpoint distances. The coefficient of alienation ranges between 0 and 1, so that perfect fit is represented by the value of 0 and the worst possible fit is represented by the value of 1. There is no absolute acceptable level of satisfactory goodness of fit. As a rule of thumb, a coefficient of alienation of less than .15 is considered satisfactory, although studies have revealed empirical lawfulness even when the coefficient of alienation is equal to .20 (Guttman, 1968).

Table 1

Correlations of Teachers' Motivations and Autonomous Motivation for Teaching With Feelings of Exhaustion and Personal Accomplishment

Autonomous motivation for teaching and its components	Exhaustion	Personal accomplishment
External	.14†	−.11
Introjected	.06	.01
Identified	−.16†	.15†
Intrinsic	−.19*	.23**
Autonomous motivation for teaching	−.22*	.20*

† $p < .10$.   * $p < .05$.   ** $p < .01$.

a significant difference between the correlations involving external and identified ($z = 1.79$; $p < .05$, two-tailed), and the difference between the correlations with introjected and intrinsic was close to significant ($z = 1.46$; $p < .07$, two-tailed).

From a theoretical point of view, it is not surprising that the differences between correlations involving motivations that are theoretically close to each other (e.g., external and introjected) were not significant, whereas the differences between the correlations involving motivations that are more distinct theoretically (e.g., external and identified, introjected and intrinsic) were larger and often significant. However, the lack of significant differences between correlations involving theoretically adjacent motivations suggests that the psychological experiences captured by scales assessing those constructs are not very distinct.

Taken together, the results of the SSA analysis and the correlations between the various motivation types and teachers' exhaustion and personal accomplishment suggest that the four types of teacher motivations we examined indeed fell in the expected locations on the continuum of perceived autonomy posited by SDT.

Examining the Correlates of Autonomous Motivation for Teaching: Zero-Order Correlations

To measure autonomous motivation for teaching we used the relative autonomy index already described in relation to the indicator of autonomous motivation for learning. Thus, to arrive at an overall score of autonomous motivation for teaching, we assigned weights to participants' scores on the four motivations according to the sense of autonomy they are assumed to reflect (−3, −1, for external and introjection, respectively, and +1 and +3 for identified and intrinsic, respectively) and then added them together.

The correlations between the teachers' self-reports of autonomous motivation for teaching and the students' reports of that teacher were calculated subsequent to aggregation of students' reports. Thus, the scores produced by the students for a given teacher on autonomous motivation for learning, perceived autonomy-supportive teaching, and perceived competence-supportive teaching were first averaged, and then the students' mean group score was correlated with the teacher's self-reported autonomous motivation for teaching score. Table 2 presents the correlations among the study's variables and descriptive statistics.

In this study, our major interest was whether teachers who feel more autonomous have classrooms whose students perceive them as more autonomy supportive and who feel more autonomous in learning. This means that our major interest was in between-class effects of teacher-reported autonomous motivation for teaching on class reports concerning autonomy-supportive teaching and autonomous motivation for learning. The correlations presented in Table 2 provide an estimate of those effects. Yet variables assessed via student reports also have a within-class component. Although this component is, by definition, unrelated to variables assessed only via teacher reports (which do not vary within classrooms), the within-class component should be controlled when we assess the effects of students' perceptions of autonomy-supportive teaching on students' autonomous motivation for learning. This is done in the next section, in which the role of autonomy-supportive teaching as a mediator of the effects of autonomous motivation for teaching on autonomous motivation for learning is examined.

Examination of Table 2 indicates that the results supported the hypotheses. Autonomous motivation for teaching was found to be positively related to autonomous motivation for learning, autonomy-supportive teaching, and personal accomplishment; and negatively related to emotional exhaustion. In addition, autonomous motivation for teaching was unrelated to teachers' social desirability and had a weak and nonsignificant relation with competence-supportive teaching. Consistent with the hypothesis, autonomy-supportive teaching was found to be positively correlated with autonomous motivation for learning. As found in pre-

Table 2

Descriptive Statistics and Correlations Among Study Variables: Zero-Order Correlations

Variable	M	SD	1	2	3	4	5	6	7
Teachers' reports									
1. Autonomous motivation for teaching	7.31	3.08	—						
2. Exhaustion	3.38	0.98	−.22*	—					
3. Personal accomplishment	5.14	1.06	.20*	−.50**	—				
4. Social desirability	23.61	3.51	.04	−.27*	.25*	—			
Students' reports[a]									
5. Autonomy-supportive teaching	2.89	0.33	.22*	.03	.05	−.18†	—		
6. Competence-supportive teaching	5.09	0.31	.12	−.17†	.27*	.02	.51**	—	
7. Autonomous motivation for learning	3.4	1.08	.22*	−.08	.07	.14	.35**	.52**	—

[a] The scores of Variables 5 through 7 are the group means of the reports of the students of one teacher; the correlations link the self-reported scores of each teacher on Variables 1 through 4 with the group means of the reports of the students taught by that teacher on Variables 5 through 7.
† $p < .08$.   * $p < .05$.   ** $p < .01$.

vious research, autonomy-supportive teaching, competence-supportive teaching, and autonomous motivation for learning were positively and significantly correlated. This finding suggests that it is possible that the relation of autonomy-supportive teaching with autonomous learning might have been a product of the relations of competence-supportive teaching with those two variables. Therefore, in the mediation analysis assessing the role of autonomy-supportive teaching as a mediator of the effect of autonomous motivation for teaching on autonomous motivation for learning, we controlled for the effect of competence-supportive teaching on autonomous motivation for learning. Overall then, the results supported the hypotheses that teachers' autonomous motivation for teaching would be related to meaningful, theoretically predictable outcomes for both teachers and students.

Testing the Hypothesis That Teachers' Autonomous Motivation for Teaching Leads to Students' Autonomous Motivation for Learning by Enhancing Autonomy-Supportive Teaching

First we examined the role of competence-supportive teaching. The original plan was to include the variable of students' perceptions of competence-supportive teaching in the mediation analysis as a second mediator of the relation between autonomous motivation for teaching and autonomous motivation for learning, as presented in Figure 2. This was aimed at ruling out the possibility that the effect of students' perceptions of autonomy-supportive teaching as a mediator of the relation between autonomous motivation for teaching and autonomous motivation for learning could be explained by students' perceptions of the teacher as competence supportive.
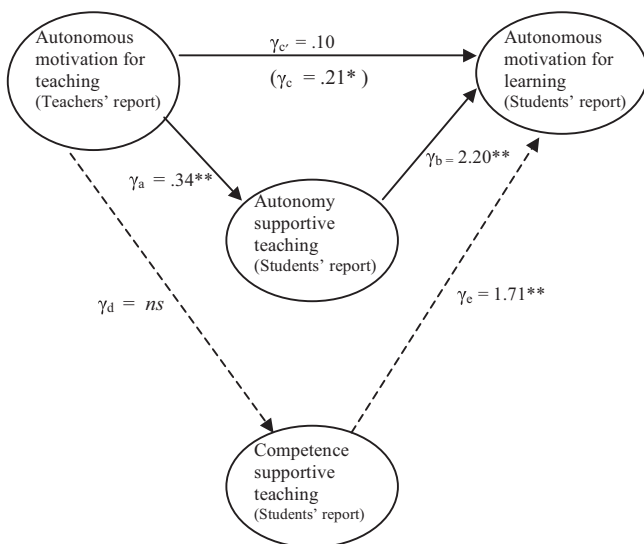

Figure 2. Multilevel model of autonomy-supportive teaching as a mediator of the relations between autonomous motivation for teaching and autonomous motivation for learning. γ_c is the direct association between autonomous motivation for teaching and autonomous motivation for learning, and $\gamma_{c'}$ is the same association while controlling for the mediator. *ns* = not significant. $^*p < .05$. $^{**}p < .01$.

The aggregate-based correlation in Table 2 indicated that students' perceptions of competence-supportive teaching were not likely to act as a mediator because they were not significantly related to teachers' autonomous motivation for teaching. Yet to allow a more rigorous examination of the link between autonomous motivation for teaching and perceptions of teachers as competence supportive we used hierarchical linear modeling (HLM; Raudenbush & Bryk, 2002).

HLM divided the total variation in variables assessed via student reports into a within-classroom component and a between-classroom component. Student-level and classroom-level parameters were estimated simultaneously. Krull and MacKinnon (1999, 2001) described procedures for testing multilevel mediation models in which some variables are measured at the group level (only within-group variation) and some variables are measured at the individual level (with both between- and within-group variation). In our case, teachers' autonomous motivation for teaching was a group-level variable (with between-group variation only), whereas students' perceptions of competence supportive teaching were an individual-level variable (with both between- and within-group variation).

Following Krull and MacKinnon (1999, 2001), we tested whether teachers' autonomous motivation for teaching predicted students' perceptions of competence-supportive teaching. The equations here represent the individual- and class-level models tested. For the sake of brevity we use the following variable acronyms in the equations: competence-supportive teaching (CST), autonomous motivation for teaching (AMT), autonomy-supportive teaching (AST), and autonomous motivation for learning (AML). Individual (within) effects are symbolized by β, and class effects are symbolized by γ:

(1a) Level 1 equation (individual): $\gamma_{ij}(CST) = \beta_{0j} + r_{ij}$,
(1b) Level 2 equation (class): $\beta_{0j} = \gamma_{00} + \gamma_d(AMT) + u_{0j}$.

Results yielded a nonsignificant effect, $\gamma_d = 0.01$, $t(64) = 1.2$, $p = .21$. This finding was consistent with the nonsignificant correlation reported in Table 2 between autonomous motivation for teaching and students' perceptions of competence-supportive teaching. Given this nonsignificant relation, the mediation analysis did not control for the effects of students' perception of competence-supportive teaching as an additional mediator.

However, given the moderate and significant positive correlations between students' reports of competence-supportive teaching, autonomy-supportive teaching, and autonomous motivation for learning (see Table 2), it was still important to establish that students' perceptions of autonomy-supportive teaching mediated the relations between teachers' autonomous motivation for teaching and students' autonomous motivation for learning when the relations of students' perceptions of teachers as competence supportive with the two other student-reported variables were controlled.

The mediation analyses were done using HLM. The steps for testing a multilevel mediation model are similar to those used to test a traditional mediation model, as described by Baron and Kenny (1986). Following the procedures described by Krull and MacKinnon (1999, 2001), we treated teachers' autonomous motivation for teaching as a group-level variable (with only between-group variation), and students' reports of autonomy-supportive teaching, competence-supportive teaching, and autonomous moti-

vation for learning as individual-level variables (with both between- and within-group variation).

Based on Krull and MacKinnon (1999, 2001), we first tested whether autonomous motivation for teaching predicted autonomous motivation for learning at the class level. The following equations represent the individual- and class-level models tested:

(1a) Level 1 equation (individual): $\gamma_{ij}(AML) = \beta_{0j} + r_{ij}$,
(1b) Level 2 equation (class): $\beta_{0j} = \gamma_{00} + \gamma_c(AMT) + u_{0j}$.

Results yielded a significant effect, $\gamma_c = 0.21$, $t(64) = 2.07$, $p < .05$. Thus, as predicted by the model shown in Figure 2, the higher teachers rated their own autonomous motivation for teaching, the higher their students perceived themselves as autonomous in learning.

The next step was to test whether autonomous motivation for teaching predicted students' perceptions of autonomy-supportive teaching at the class level (γ_a in Figure 2). Using the procedure proposed by Krull and MacKinnon (2001), we calculated the following equations:

(2a) Level 1 equation (individual): $\gamma_{ij}(AST) = \beta_{0j} + r_{ij}$,
(2b) Level 2 equation (class): $\beta_{0j} = \gamma_{00} + \gamma_a(AMT) + u_{0j}$.

Results yielded a significant γ_a coefficient, suggesting that teachers who described themselves as more autonomous in teaching had students who perceived them as more autonomy supportive, $\gamma_a = 0.34$, $t(64) = 2.89$, $p < .01$.

The final stage was to test whether (a) the mediator (autonomy-supportive teaching) predicted the dependent variable also when we controlled for the effects of autonomous motivation for teaching and competence-supportive teaching, (b) the direct path between autonomous motivation for teaching and the dependent variable became nonsignificant when the mediator (autonomy-supportive teaching) and the independent variable of competence-supportive teaching were controlled for ($\gamma_{c'}$), and (c) the mediation path was significant.

In line with the Krull and MacKinnon (2001) procedure, the following equations were used:

(3a) Level 1 equation (individual): $\gamma_{ij}(AML) = \beta_{0j} + \beta_b(AST) + \beta_e(CST) + r_{ij}$,
(3b) Level 2 equation (class): $\beta_{0j} = \gamma_{00} + \gamma_{c'}(AMT) + u_{0j}$.

Analyses yielded a significant γ_b parameter, suggesting that students' perception of their teachers as autonomy supportive predicted students' autonomous motivation for learning at the class level, $\gamma_b = 2.20$, $t(64) = 7.85$, $p < .01$, when the two other predictors were controlled for. This relation was significant also at the within-class level, $\beta_b = 2.19$, $t(807) = 5.98$, $p < .01$. In addition, these analyses estimated the $\gamma_{c'}$ coefficient, which, as predicted, became nonsignificant when the mediator (autonomy-supported teaching) and the independent variable of competence-supportive teaching were controlled for, $\gamma_{c'} = .10$, $t(64) = 1.27$, ns. Because autonomous motivation for teaching only had effects at the class level, we calculated the Sobel test (see Baron & Kenny, 1986) for the mediation path at the class level. The Sobel test indicated that the mediation path was significant ($z = 2.00$; $p = .04$). It appears, then, that the analyses supported the mediation hypothesis.

It is important to note that HLM analyses showed that students' perceptions mediated the relations between teachers' autonomous motivation for teaching and students' autonomous motivation for learning also when the variable of students' perceptions of competence-supportive teaching was not included in the analyses.

In sum, it appears that the results supported the following claims: (a) Students' perceptions of autonomy-supportive teaching have a unique association with students' autonomous motivation for learning also when the effects of students' perceptions of competence-supportive teaching are held constant, and (b) students' perceptions of autonomy-supportive teaching function as a mediator of the relation between teachers' autonomous motivation for teaching and students' autonomous motivation for learning.

Discussion

The present study had three goals: (a) to examine whether teachers would perceive the various motivation types posited by SDT as distinct from one another and as falling along a continuum of autonomous motivation for teaching, (b) to test the idea that autonomous motivation for teaching is associated with positive outcomes in teachers and in students, and (c) to examine the hypothesis that autonomous motivation for teaching promotes autonomous motivation for learning by enhancing students' perceptions of their teachers as autonomy supportive.

Overall, the results suggest that teachers differentiate among four types of motivation that, as posited by SDT, fall along a continuum of relative autonomy. As expected, autonomous motivation for teaching was associated positively with teachers' sense of personal accomplishment and negatively with teachers' feelings of exhaustion. Also as predicted, autonomous motivation for teaching was positively related to students' perceptions of teachers as autonomy supportive and to students' autonomous motivation for learning. Autonomous motivation for teaching was unrelated to teachers' social desirability bias. Finally, our findings are consistent with the hypothesis that autonomous motivation for teaching promotes students' autonomous motivation for learning by enhancing students' experience of their teachers as autonomy supportive. Autonomous motivation for teaching was not significantly related to students' perceptions of their teachers as competence supportive.

The finding concerning a positive association between autonomous motivation for teaching and autonomy-supportive teaching is consistent with the results obtained by Pelletier et al. (2002). However, in contrast to Pelletier et al.'s study, in the present research autonomous motivation for teaching and autonomy-supportive teaching were assessed with different informants. The fact that teachers' reports of autonomous motivation for teaching were positively related to autonomy-supportive teaching as assessed with students' reports suggests that this relation is not a product of teachers' self-report bias.

More generally, the present study is the first to provide quantitative research evidence that autonomous motivation for teaching is indeed associated with positive student attributes and with indicators of desirable teacher behaviors not based on teachers' own reports. As such, our study supports the critical importance ascribed to the experience of autonomy in education by the humanistic tradition in psychology and education (e.g., Aviram, 1986; deCharms, 1968, 1976; Pelletier et al., 2002; Reeve et al., 2004; Rogers, 1969).

The current research also adds to the extant literature by exploring the processes through which autonomous motivation for teach-

ing may lead to autonomous motivation for learning among students. Specifically, the findings suggest that the provision of choice and the clarification of relevance mediate the effect of autonomous teacher motivation on autonomous student motivation. It should be noted that this mediation process is far from trivial, because one can claim that teachers who perceive the subjects they teach as very valuable would not be willing to provide choice because they might think that everything in the subject they teach is important. Similarly, these teachers might be less inclined to clarify the relevance of the subject they teach because they might take its importance and relevance for granted. The association of autonomous teacher motivation with the provision of choice and relevance suggests that this type of motivation is indeed highly desirable and growth promoting.

It is important to note, however, that the magnitude of the relations detected among the variables of interest was small or modest at best. Modest associations are to be expected in the case of relations among teachers' self-reports and students' self-reports (e.g., E. A. Skinner & Belmont, 1993) because there is no shared method variance and because teachers' autonomous motivation for teaching is only one factor that affects students' perceptions of teachers and students' experience of learning. For example, it is possible that teachers' autonomy-supportive behavior is also affected by various contextual and personal factors such as the amount of achievement pressure the teachers are exposed to from the principal or the parents (as has been found by Pelletier et al., 2002), the degree of heterogeneity within the classroom in terms of basic skills or emotional needs, or teachers' level of identity development (Marcia, 1993). Moreover, it is important to note that in the current study teachers and students were not asked to report on the same phenomena. Thus, students reported on their perception of their teachers' autonomy-supportive behavior, whereas the teachers reported on their sense of autonomy in teaching.

As for the associations of autonomous motivation for teaching with feelings of exhaustion or accomplishment, we did expect somewhat higher correlations because those measures were all based on teachers' self-reports. However, as in the case of the student outcomes, it is reasonable to assume that teachers' feelings of exhaustion or accomplishment are affected by a variety of contextual and personal factors other than autonomous motivation for teaching. Thus, research suggests that teachers' feelings of exhaustion or accomplishment at work are affected by low wages relative to other groups (Farber, 1991), lack of appreciation from the community (Mazur & Lynch, 1989), role conflict (Burke & Greenglass, 1995; Schwab & Iwanicki, 1982), role ambiguity (Capel, 1987), work overload (Jenkins & Calhoun, 1991; Mazur & Lynch, 1989), peer support and general social support (Brenner, Sorbom, & Wallius, 1985; Byrne, 1999; Talmor, Reiter, & Feigin, 2005), number of students with special needs in class (Talmor et al., 2005), prevalence of behavior problems in the classroom (Byrne, 1999), teachers' level of education (Rosenblatt, 2001), and religious beliefs (Lau, Yuen, & Chan, 2005).

It appears, then, that given the number of factors that can affect the teacher- and student-reported correlates of autonomous motivation for teaching, the associations obtained are not trivial at all, especially in the case of student-reported correlates that share no method variance with autonomous motivation for teaching. Those modest associations, though, suggest that, in addition to autonomous motivation for teaching, there are many other factors that affect teachers' behavior and well-being, as well as students' sense of autonomy.

The discussion focuses on several issues. First, given the potential importance of autonomous motivation for teaching, we examine processes that might affect autonomous motivation for teaching, and discuss possible implications for training, intervention, and policy. Then we consider methodological limitations of the present research and discuss directions for future research.

Processes Affecting Autonomous Motivation for Teaching: Implications for Training, Intervention, School Administration, and Policy

The present research demonstrates the importance of autonomous motivation for teaching as a correlate and a potential determinant of autonomy-supportive teaching, as well as a correlate and a potential determinant of teachers' well-being. Therefore, it appears important to consider various educational and administrative processes that might affect teachers' sense of autonomy and, consequently, might also lead to additional important outcomes for students.

According to SDT (Deci & Ryan, 2000), individuals are likely to be autonomously motivated in a certain social context if they feel that other people in that context support their need for autonomy. This need is supported mainly by showing understanding for the other perspective and feelings, fostering relevance and allowing some choice. It follows, then, that school principals can promote teachers' autonomous motivation for teaching (and consequently students' autonomy) by encouraging teachers' participation in major decisions, by delegating authority, by making an effort to gain some understanding of the needs of each teacher, and by fostering an organizational structure and climate that supports teachers' sense of relatedness and competence (see Assor & Oplatka, 2003).

Individuals' sense of autonomy at work is not only a product of the present context (Vallerand, 1997), but is also a product of developmental processes of personal integration and identity development (see Marcia, 1993; Ryan, 1993). Accordingly, another way to support teachers' sense of autonomy is to facilitate processes of professional identity exploration and vision formation among teachers (see Assor & Oplatka's [2003] application of this principle to the area of principals' professional growth). As part of these processes, teachers can explore the dreams and hopes they had when they entered the teaching profession (e.g., Huberman, 1993), the values and type of knowledge they aspire to transmit to students, and the subjects they consider important and enjoyable. A clear sense of their values and priorities as teachers can enhance and invigorate teachers' sense of autonomy, provided the organizational structure and culture of the school allow teachers to realize the vision they have formed. The emphasis on fostering teachers' sense of autonomy through work on teachers' personal professional development is highly consistent with deCharms's (1968) seminal research on teachers as origins.

The importance of autonomous motivation for teaching was recognized by Feinberg, Assor, Kaplan, Kanat-Maymon and Roth (2005) in their school reform program, which was aimed at enhancing caring among students. Consistent with the approach to fostering teachers' autonomy outlined previously, Feinberg et al. (2005) assumed that teachers would be willing to apply the reform in a serious way only if: (a) the reform process were to provide teachers with an opportunity for personal and professional development, and (b) the organizational and pedagogic changes aimed at enhancing students' sense of autonomy and caring were intro-

duced in ways that support rather than threaten teachers' needs for autonomy, relatedness, and competence.

Accordingly, as part of the reform process, teachers participated in development and application groups that met regularly throughout the year (for two consecutive years), in which teachers were encouraged to share their questions and doubts concerning the reform and discuss the extent to which their needs were considered and supported as part of the reform. The groups' norms emphasized its function as a safe and caring place that supports growth through empathic listening, consultation, and constructive criticism.

Results of research on the teachers' groups (Feinberg et al., 2005) indicated that teachers indeed felt that the groups supported their needs and their personal and professional development, and consequently increased their sense of autonomy as teachers and their identification with the reform. Moreover, results also indicated that after two years of involvement in the program, teachers showed a significant decrease in coercive and controlling behaviors, and their students reported a significant increase in prosocial behaviors in the classroom. No such changes were observed in a control group made up of teachers from schools with similar socioeconomic and demographic attributes.

Support and respect for teachers' need for autonomy become particularly important in reform and training programs aimed at promoting autonomy-supportive teaching. Thus, it appears that teachers would be more inclined to internalize the value of supporting their students' autonomy and more willing to learn various ways of supporting autonomy if this orientation were fostered in them in ways that support their own autonomy as teachers. This implies that in training and reform processes aimed at enhancing teachers' inclination to support students' autonomy, principals, trainers, and reform agents should themselves act toward teachers in autonomy-supportive ways.

For example, it is important that principals and reform agents provide a convincing rationale for engaging in autonomy-supportive behavior, enable teachers to choose the ways in which they apply the new autonomy-supportive approach in the classroom, and allow teachers to raise doubts and negative feelings concerning the value of autonomy-supportive teaching. Recent interventions aimed at promoting internalization of an autonomy-supportive orientation in teachers, indeed, employed many of the practices outlined previously (see Assor, Kaplan, Alfi, Roth & Katz, 2000; Feinberg et al., 2005; Reeve, 2002).

So far we have discussed reform and training processes that can affect autonomous motivation for teaching and, hopefully, through it also autonomy-supportive teaching and students' autonomous motivation for learning. However, autonomous motivation for teaching can also be strongly affected by policies instituted at the level of the district or the whole state. One such policy involves what is often described as "high-stakes testing" (e.g., Koretz, 2002; Ryan & Sapp, 2005). The phrase high-stakes testing has varied uses, but the common denominator in such initiatives is that the governing body mandates standardized testing of all students and then administers sanctions based on the results. Teachers, principals, and schools that do well are rewarded, and those that do badly are punished. Sometimes principals, teachers, and even students receive monetary rewards.

Research based on achievement goal theories (e.g., Butler, 1987, 1988) and on SDT (Deci & Ryan, 1985) indicates that processes involving comparative evaluation often undermine intrinsic moti-

vation. Pelletier et al. (2002) have found that the more teachers perceive pressure from above (e.g., they have to comply with a rigid curriculum and with performance standards) the less they feel a sense of autonomy in teaching.

The studies linking comparative evaluation with decreased autonomy and reduced intrinsic motivation suggest that high-stakes testing is likely to cause teachers to feel less autonomous and consequently act in more controlling ways toward their students. In addition, because autonomous motivation for teaching is associated with decreased exhaustion and increased personal accomplishment in teachers, it is possible that high-stakes testing might also undermine those aspects of teachers' well-being.

Moreover, for teachers with a highly autonomous orientation (i.e., teachers valuing personal autonomy and seeking to support students' autonomy), the institution of high-stakes testing might lead to a difficult dissonance. Specifically, it is likely to create administrative pressures to teach in ways that are highly controlling, and therefore stand in sharp contrast to the values of highly autonomous teachers. The dissonance between what one believes and what one is required to do is likely to evoke feelings of anger, bitterness, and exhaustion, which ultimately might lead some of the best teachers to leave the profession.

Limitations and Future Research

In the present investigation, teachers' and students' self-reports were collected at the same time, and therefore the data cannot support causal inferences. Future research can use a longitudinal design with repeated measurement across time. This design can increase our ability to draw causal inferences, of course within the limits of nonexperimental research. As the teachers who participated in the study were all women, it is important to replicate the findings also with male teachers. Future research can assess autonomy-supportive teacher behaviors via observations (for example, using the observation instruments developed by Reeve (e.g., Reeve, 2002). It would also be important to examine our assumption that autonomous motivation for teaching leads teachers to develop high levels of understanding and knowledge of the subjects they teach, which in turn, enables them to support students' autonomy in learning.

In summary, the present research adds to previous research on teaching an important aspect that until now was hardly examined: teachers' autonomous motivation for teaching as a possible determinant of autonomy-supportive teaching, of students' autonomous motivation for learning, and of teachers' well-being. The results highlight the importance of teachers' sense of autonomy and raise interesting questions regarding policy, reform, and administration processes that may affect teachers' sense of autonomy.

References

Assor, A., & Kaplan, H. (2001). Mapping the domain of autonomy support: Five important ways to enhance or undermine students' experience of autonomy in learning. In A. Effklides, J. Kuhl, & R. Sorrentino (Eds.), *Trends and prospects in motivation research* (pp. 101–120). Dordrecht, The Netherlands: Kluwer.

Assor, A., Kaplan, H., Alfi, O., Roth, G., & Katz, I. (2000, May). *The Autonomy-Relatedness-Competence (ARC) program: Goals, implementation principles, description and some results.* Symposium presented at the 7th Workshop on Achievement and Task Motivation, Leuven University, Leuven, Belgium.

Assor, A., Kaplan, H., Kanat-Maymon, Y., & Roth, G. (2005). Directly controlling teacher behaviors as predictors of poor motivation and engagement in girls and boys: The roles of anger and anxiety. *Learning and Instruction, 15,* 397–413.

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-enhancing and -suppressing teacher behaviors predicting students' engagement in schoolwork. *British Journal of Educational Psychology, 72,* 261–278.

Assor, A., & Oplatka, I. (2003). Towards a conceptual framework for understanding heads' personal growth and development. *Journal of Educational Administration, 41,* 471–497.

Assor, A., Roth, G., & Deci, E. L. (2004). The emotional costs of perceived parents' conditional regard: A self-determination theory analysis. *Journal of Personality, 72,* 47–89.

Aviram, A. (1986). The paradoxes of education for democracy, or the tragic dilemmas of the modern liberal educator. *Journal of Philosophy of Education, 20,* 187–199.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education, 84,* 740–756.

Blais, M. R., Lachance, L., Vallerand, R. J., Briere, N. M., & Riddle, A. S. (1993). The Work Motivation Inventory. *Revue Quebecoise de Psychologie, 14,* 185–215.

Brenner, S. D., Sorbom, D., & Wallius, E. (1985). The stress chain: A longitudinal study of teacher stress, coping and social support. *Journal of Occupational Psychology, 58,* 1–14.

Burke, R. J., & Greenglass, E. R. (1995). A longitudinal study of psychological burnout in teachers. *Human Relations, 48,* 187–202.

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different evaluation conditions on motivational perceptions, interest and performance. *Journal of Educational Psychology, 79,* 474–482.

Butler, R. (1988). Enhancing and undermining intrinsic motivation: Effects of task-involving and ego-involving evaluation on interest and performance. *British Journal of Educational Psychology, 56,* 51–63.

Butler, R. (2006). Are mastery and ability goals both adaptive? Evaluation, initial goal construction, and the quality of task engagement. *British Journal of Educational Psychology, 76,* 595–611.

Byrne, B. M. (1999). The nomological network of teacher burnout: A literature review and empirically validated model. In R. Vandenberghe & A. M. Huberman (Eds.), *Understanding and preventing teacher burnout* (pp. 15–37). Oxford, England: Cambridge University Press.

Capel, S. A. (1987). The incidence of and influences on stress and burnout in secondary school teachers. *British Journal of Educational Psychology, 57,* 279–288.

Crowne, D. P., & Marlowe, D. (1964). *The approval motive.* New York: Wiley.

deCharms, R. (1968). *Personal causation: The internal affective determinants of behavior.* New York: Academic Press.

deCharms, R. (1976). *Enhancing motivation: Change in the classroom.* New York: Irvington.

Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in work organization. *Journal of Applied Psychology, 74,* 580–590.

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

Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 237–288). Lincoln: University of Nebraska Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11,* 227–268.

Deci, E. L., Ryan, R. M., Gagne, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organization of a former Eastern Bloc country. *Personality and Social Psychology Bulletin, 27,* 930–942.

Deci, E. L., Ryan, R. M., & Williams, G. C. (1996). Need satisfaction and the self-regulation of learning. *Learning and Individual Differences, 8,* 165–183.

Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of Educational Psychology, 73,* 642–650.

Farber, B. A. (1991). *Crisis in education: Stress and burnout in the American teacher.* San Francisco: Jossey-Bass.

Feinberg, O., Assor, A., Kaplan, H., Kanat-Maymon, Y., & Roth, G. (2005, August). *SDT as a basis for a comprehensive school reform: Principles, description, and some outcomes of the community growth program.* Paper presented at the conference of the European Association for Learning and Instruction, Nicosia, Cyprus.

Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology, 20,* 257–274.

Friedman, I. A., & Farber, B. A. (1992). Professional self-concept as a predictor of teacher burnout. *Journal of Educational Research, 86,* 28–35.

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology, 52,* 890–898.

Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. *Journal of Educational Psychology, 81,* 143–154.

Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). The inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology, 83,* 508–517.

Guttman, L. (1954). A new approach to factor analysis: The Radex. In P. Lazarfeld (Ed.), *Mathematical thinking in the social sciences* (pp. 258–348). New York: Free Press of Glencoe.

Guttman, L. (1968). A general non-metric technique for finding the smallest coordinate space for a configuration of points. *Psychometrica, 33,* 469–506.

Hand, M. (2006). Against autonomy as an educational aim. *Oxford Review of Education, 32,* 535–550.

Huberman, A. M. (1993). *The lives of teachers.* London: Cassell.

Jenkins, S., & Calhoun, J. F. (1991). Teacher stress: Issues and intervention. *Psychology in the Schools, 28,* 60–70.

Kaplan, H., Assor, A., & Roth, G. (2002, June). *Effects of autonomy support and competence support on academic functioning.* Paper presented at the 8th Workshop on Achievement and Task Motivation, Moscow, Russia.

Kaplan, H., Assor, A., & Roth, G. (2003, April). *Is autonomy important for all students? Evidence from a longitudinal study of children with different levels of parental education.* Paper presented at the 84th Annual Meeting of the American Educational Research Association, Chicago, IL.

Kim, Y., Deci, E. L., & Zuckerman, M. (2002). The development of the self-regulation of withholding negative emotions questionnaire. *Educational and Psychological Measurement, 62,* 316–336.

Koestner, R., Losier, G. F., Vallerand, R. J., & Carducci, D. (1996). Identified and introjected forms of political internalization: Extending self-determination theory. *Journal of Personality and Social Psychology, 70,* 1025–1036.

Koretz, D. (2002). Limitations in the use of achievement tests as measures of educator's productivity. *Journal of Human Resources, 38,* 752–777.

Krull, J. L., & MacKinnon, D. P. (1999). Multilevel mediation modeling in group-based intervention studies. *Evaluation Review, 23,* 418–444.

Krull, J. L., & MacKinnon, D. P. (2001). Multilevel modeling of individual and group level mediated effects. *Multivariate Behavioral Research, 36,* 249–277.

La Guardia, J. G., Ryan, R. M., Couchman, C. E., & Deci, E. L. (2000). Within-person variation in security of attachment: A self-determination theory perspective on attachment, need fulfillment, and well-being. *Journal of Personality and Social Psychology, 79,* 367–384.

Lau, P. S. Y., Yuen, M. T., & Chan, R. M. C. (2005). Do demographic characteristics make a difference to burnout among Hong Kong secondary school teachers? *Social Indicators Research, 71,* 491–516.

Malanowski, J. R., & Wood, P. H. (1984). Burnout and self-actualization in public school teachers. *Journal of Psychology, 117,* 23–26.

Marcia, J. E. (1993). The relational roots of identity. In J. Kroger (Ed.), *Discussions on ego identity* (pp. 101–120). Hillsdale, NJ: Erlbaum.

Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Occupational Behavior, 2,* 99–113.

Mazur, P. V., & Lynch, M. D. (1989). Differential impact of administrative, organizational and personality factors on teacher burnout. *Teaching and Teacher Education, 5,* 337–353.

Niemiec, C. P., Lynch, M. F., Vansteenkiste, M., Bernstein, J., Deci, E. L., & Ryan, R. M. (2006). The antecedents and consequences of autonomous self-regulation for college: A self-determination theory perspective on socialization. *Journal of Adolescence, 29,* 761–775.

O'Connor, B. P., & Vallerand, R. J. (1990). Religious motivation in the elderly: A French-Canadian replication and an extension. *Journal of Social Psychology, 130,* 53–59.

Patrick, B. C., Skinner, E. A., & Connell, J. P. (1993). What motivates children's behavior and emotions? Joint effects of perceived control and autonomy in the academic domain. *Journal of Personality and Social Psychology, 65,* 781–791.

Pelletier, G. L., Seguin-Levesque, C., & Legault, L. (2002). Pressure from above and pressure from below as determinants of teachers' motivation and teaching behaviors. *Journal of Educational Psychology, 94,* 186–196.

Pines, A. M. (2002). Teacher burnout: A psychodynamic existential perspective. *Teachers and Teaching: Theory and Practice, 8,* 121–140.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods.* London: Sage.

Reeve, J. (2002). Self-determination theory applied to educational setting. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 183–203). Rochester, NY: University of Rochester Press.

Reeve, J., Bolt, E., & Cai, Y. (1999). Autonomy-supportive teachers: How they teach and motivate students. *Journal of Educational Psychology, 91,* 537–548.

Reeve, J., Deci, E. L., & Ryan, R. M. (2004). Self-determination theory: A dialectical framework for understanding socio-cultural influences on student motivation. In S. Van Etten & M. Pressley (Eds.), *Big theories revisited* (pp. 31–60). Greenwich, CT: Information Age Press.

Reeve, J., Nix, G., & Hamm, D. (2003). Testing models of the experience of self-determination in intrinsic motivation and the conundrum of choice. *Journal of Educational Psychology, 95,* 375–392.

Rogers, C. (1969). *Freedom to learn.* Columbus, OH: Merrill.

Rosenblatt, Z. (2001). Teachers' multiple roles and skill flexibility: Effects on work attitudes. *Educational Administration Quarterly, 37,* 684–708.

Roth, G., Assor, A., Kanat-Maymon, Y., & Kaplan, P. (2006). Assessing the experience of autonomy in new cultures and contexts. *Motivation and Emotion, 30,* 365–376.

Ryan, R. M. (1991). The nature of the self in autonomy and relatedness. In J. Strauss & G. R. Goethals (Eds.), *The self: Interdisciplinary approaches* (pp. 208–238). New York: Springer-Verlag.

Ryan, R. M. (1993). Agency and organization: Intrinsic motivation, autonomy and the self in psychological development. In J. Jacobs (Ed.), *Nebraska Symposium on Motivation: Vol. 40. Developmental perspectives on motivation* (pp. 1–56). Lincoln: University of Nebraska Press.

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology, 57,* 749–761.

Ryan, R. M., & Deci, E. L. (2000a). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52,* 141–166.

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55,* 68–78.

Ryan, R. M., & Frederick, C. M. (1997). On energy, personality and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality, 65,* 529–565.

Ryan, R. M., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology, 65,* 586–596.

Ryan, R. M., & Sapp, A. (2005). Considering the impact of test-based reforms: A self-determination theory perspective on high stakes testing and student motivation and performance. *Unterrichts Wissenschaft, 33,* 143–159.

Schwab, R. L., & Iwanicki, E. F. (1982). Who are our burned out teachers? *Educational Research Quarterly, 7,* 5–16.

Schwartz, B. (2000). Self-determination: The tyranny of freedom. *American Psychologist, 55,* 79–88.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 25, pp. 1–65). New York: Academic Press.

Shye, S., Elizur, D., & Hoffman, M. (1994). *Introduction to facet theory.* London: Sage.

Skinner, B. F. (1971). *Beyond freedom and dignity.* New York: Knopf.

Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85,* 571–581.

Talmor, R., Reiter, S., & Feigin, N. (2005). Factors relating to regular education teacher burnout in inclusive education. *European Journal of Special Needs Education, 20,* 215–229.

Vallerand, J. R. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271–360). New York: Academic Press.

Vallerand, J. R., 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.

Vallerand, J. R., & O'Connor, B. P. (1989). Motivation in the elderly: A theoretical framework and some promising findings. *Canadian Psychology, 30,* 538–550.

Vallerand, J. R., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1993). On the assessment of intrinsic, extrinsic and amotivation in education: Evidence on the concurrent and construct validity of the academic motivation scale. *Educational and Psychological Measurement, 53,* 159–172.

Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: The synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of Personality and Social Psychology, 87,* 246–260.

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70,* 767–779.

Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70,* 115–126.

(*Appendix follows*)

Appendix

Subscales Assessing Four Types of Motivation for Teaching

External Motivation

1. When I devote time to individual talks with students, I do so because I want the parents to appreciate my knowledge and familiarity with their children.

2. When I try to find interesting subjects and new ways of teaching, I do so because I want the parents to be satisfied so they won't complain.

3. When I invest effort in my work as a teacher, I do so because I do not want the principal to follow my work too closely.

4. When I invest effort in my work as a teacher, I do so in order to prevent disruptions and discipline problems during the lessons.

Introjected Motivation

5. When I try to find interesting subjects and new ways of teaching, I do so because I think it is a shame to keep on teaching in the same way all the time.

6. When I invest effort in my work as a teacher, I do so because if I do not invest enough I would feel ashamed of myself.

7. When I invest effort in my work as a teacher, I do so because otherwise I would feel guilty.

8. When I devote time to individual talks with students, I do so because it makes me feel proud to do this.

Identified Motivation

9. When I try to find interesting subjects and new ways of teaching, I do so because it is important for me to keep up with innovations in teaching.

10. When I devote time to individual talks with students, I do so because I can learn from them what happens in the class-room

11. When I invest effort in my work as a teacher, I do so because it is important for me to make children feel that I care about them.

12. When I invest effort in my work as a teacher, I do so because it is important for me to feel that I help people.

Intrinsic Motivation

13. When I try to find interesting subjects and new ways of teaching, I do so because it is fun to create new things.

14. When I invest effort in my work as a teacher, I do so because I enjoy finding unique solutions for various students.

15. When I invest effort in my work as a teacher, I do so because I enjoy creating connections with people.

16. When I devote time to individual talks with students, I do so because I like being in touch with children and adolescents.