

Optimal Learning in Optimal Contexts: The Role of Self-Determination in Education

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Abstract

This literature review provides an overview of education studies that have been guided by self-determination theory (SDT). First, the authors examine studies that have assessed motivation based on SDT. Second, the authors detail research that has focussed on the linkages between motivation types and students' behavioural, affective, and cognitive outcomes. Third, the authors present studies on how learning contexts (parents, teachers) contribute to students' motivational resources. The authors conclude that the motivation types proposed by SDT are important for understanding how students thrive and succeed at school. The authors also highlight the significant role played by teachers and parents in the development of student motivation. The authors conclude with a summary of the benefits of self-motivation for learning and offer some recommendations for the field.

Résumé

Le présent article procure une vue d'ensemble des études sur l'éducation qui ont été guidées par la théorie de l'autodétermination. En premier lieu, nous examinons les études qui ont évalué la motivation fondée sur la théorie de l'autodétermination. Nous expliquons ensuite la recherche portant sur les liens existant entre les types de motivation et les résultats des étudiants en matière de comportement et de composantes affectives et cognitives. Nous présentons aussi les études sur les contextes d'apprentissage (parents, enseignants) qui contribuent aux ressources motivationnelles des étudiants. Nous en déduisons que les types de motivation proposés par la théorie de l'autodétermination permettent de comprendre les éléments qui permettent aux étudiants de se démarquer et de réussir en milieu scolaire. Nous mettons aussi en relief le rôle important que jouent les enseignants et les parents dans le développement de la motivation de l'étudiant. En conclusion, nous présentons un résumé des bienfaits de l'automotivation dans le cadre de l'apprentissage et offrons quelques recommandations pertinentes au domaine en question.

The Canadian Policy Research Networks revealed that over one in 10 Canadians between the ages of 20 and 24 have dropped out of high school (Saunders, 2006). While Canada's dropout rate has declined by nearly 10% in the past 15 years, we rank only 10th amongst the 25 OECD countries. Needless to say, this dropout rate implies negative consequences for the students themselves as well as Canadian society. Young adults with little education are more likely to be unemployed or to hold an unskilled job, which is problematic in a labour market that is shifting from industrial- to knowledge-based. Given that, as a society, we have the financial and

professional resources to educate our children, these statistics are surprising. What factors could explain student difficulties in persevering at school? According to self-determination theory (SDT; Ryan & Deci, 2007), some of our educational institutions place too much emphasis on control, rewards, and competition, which hamper self-motivation. As a result, students may be more inclined to drop out of high school and experience academic difficulties (Vallerand, Fortier, & Guay, 1997).

The conceptual lenses of SDT have guided more than 200 empirical education studies. Most have emphasised contextual and personal factors that facilitate optimal learning, engagement and well-being. Part of SDT's popularity in motivational science derives from the fact that it not only increases our understanding of the underlying motivations in the learning process, but it also has practical utility (Pintrich, 2003). For example, research showing how teachers' controlling practises had detrimental effects on student self-motivation led to the development of teacher training designed to decrease the use of these methods while increasing the use of autonomy-supportive practises (e.g., Connell & Klem, 2000; Reeve, Jang, Carrell, Jeon, & Barch, 2004). In this article, we briefly review research that has focussed on measuring SDT motivations as well as their determinants and consequences. Many studies have used the SDT framework, but given the scope of this article, we review only a portion here. We refer the reader to the introductory article of this special issue, written by Deci and Ryan (2008), for a definition of the central constructs and a complete presentation of the theoretical principles underlying SDT.

Measuring SDT's Self-Regulatory Types in the School Setting

Motivation has been targeted by parents and teachers as the key explanation of whether or not children succeed at school. Most of us have been told by our parents and teachers that, "You'd better study hard if you want to pass this exam." However, according to SDT, motivation is not a global and undifferentiated concept that is synonymous with effort. Rather, motivation is a multidimensional concept that varies in terms of quality. Student motivation is of high quality (i.e., associated with optimal indices of functioning) when primarily based on intrinsic, integrated and identified regulations, and is of poor quality (i.e., associated with negative indices of functioning) when based on external and introjected regulations.

Many efforts have been made to measure motivation at school.¹ In fact, carefully designed instruments are required to make genuine advances in motivational research and theory as well as to derive practical applications.

Vallerand and his colleagues (1989) have developed the Academic Motivation Scale (AMS), which assesses three types of intrinsic motivation (knowledge, accomplishment, and stimulation), three types of extrinsic motivation (identified, introjected, and external), and amotivation. Results of Vallerand et al. (1989) provide good support for the underlying seven-factor structure of the AMS and the construct validity and reliability of each factor (see also Vallerand et al., 1992, 1993). In addition, the psychometric quality of the AMS has been supported in numerous field studies on

¹ It is important to note that SDT's central constructs are measured not only with self-report scales. Motivation toward education has also been assessed by projective methods and induced in the laboratory. However, because these methods are less frequently used, we have focused on the self-report questionnaire.

the determinants and outcomes of SDT motivational components (Otis, Grouzet, & Pelletier, 2005; Ratelle, Larose, Guay, & Sénécal, 2005). Recently, Grouzet, Otis, and Pelletier (2006) went a step further by showing that the AMS is time- and gender-invariant, which allows it to accurately test developmental and gender hypotheses. In addition, the AMS has been used in several cultures, including Canada (Vallerand et al., 1992, 1993), Mexico (Lucas, Izquierdo, & Alonso, 2005), and the US (Fair-child, Horst, Finney, & Barron, 2005).

Ryan and Connell (1989) also published the Self-Regulation Questionnaire-Academic (SRQ-A), a self-report scale that assesses three types of extrinsic motivation (external, introjected, and identified) as well as intrinsic motivation. Their results provide good support for the validity and reliability of the SRQ-A. In addition, the SRQ-A has been widely used and applied across different cultures, including North America (Grolnick, Ryan, & Deci, 1991), Germany (Levesque et al., 2004; Wild & Krapp, 1995), Japan (Hayamizu, 1997; Yamauchi & Tanaka, 1998), and Belgium (Vansteenkiste, Simons, Lens, & Soenen, 2005).

Various naturalistic studies using the AMS or SRQ-A have supported the proposed simplex pattern of correlations amongst motivational components (Grouzet et al., 2006; Otis et al., 2005; Ryan & Connell, 1989; Vallerand et al., 1989). That is, proximal motivations (e.g., intrinsic motivation and identified regulation) were more highly and positively correlated with each other than with distal ones (e.g., intrinsic motivation and external regulation). Simplex correlation patterns support one of SDT's central postulates, which is that the energy underlying a given behaviour varies in terms of quality. If motivation were a matter of intensity alone, then all motivations would correlate highly and positively with each other (except for amotivation). It is important to note that the simplex pattern has been also supported in nonwestern cultures such as Japan (Hayamizu, 1997).

To our knowledge, the AMS and SRQ-A are currently the main scales used to assess SDT's motivational constructs in the educational field. These two scales assess motivation types at school in general or in specific school subjects without accounting for the dynamic interplay amongst motivation types in different school subjects. However, there is a trend in the field of academic motivation to assess variations in school motivation across subjects (see Elliot, 2005; Gottfried, 1985, 1990; Green, Martin, & Marsh, 2007; Pintrich, 2003), which raises the important question as to whether motivations are subject-specific. Recently, our team used an adapted version of the AMS to assess three types of motivation (intrinsic, identified, and controlled regulation—a mixture of introjection and external regulation) in three school subjects (reading, writing, and mathematics; Guay, Chanal, Ratelle, Marsh, Larose, & Boivin, 2008). Results revealed that some motivations were specific to school subjects, whereas others were not. For example, intrinsic motivation differed in intensity for math, writing, and reading. Hence, a student who experiences pleasure while doing math does not necessarily experience the same pleasure while reading. This differentiation effect was also obtained for identified regulation, but not for external regulation. Consequently, when it comes to assessing intrinsic and identified regulation, it would appear useful to assess them separately for specific school subjects.

Optimal Learning and Educational Outcomes

One of SDT's central hypothesis is that students who are regulated by autonomous motivations

(i.e., intrinsic and identified) experience positive consequences at school. These consequences can take different forms (behavioural, cognitive, or affective).

Behavioural Outcomes

Persistence. In a study with over 4,000 high school students, Vallerand et al. (1997) showed that students who dropped out of high school had lower intrinsic motivation and identified regulation, and higher amotivation compared to students who persisted (also see Vallerand & Bissonnette, 1992 for similar results). No differences were observed on external regulation. Surprisingly, students who persisted had higher levels of introjected regulation than those who dropped out. In a similar study conducted in a sample of rural high school students, Hardre and Reeve (2003) showed that autonomous forms of motivation predicted dropout intentions, over and beyond prior achievement (also see Otis et al., 2005; Ratelle et al., 2005). Finally, Vansteenkiste et al. (2004; Study 2) showed that autonomous motivation and persistence (e.g., picking up additional reading, optional exercise) in college students can be enhanced by activating intrinsic educational goals. Previous research on persistence indicates that when students are autonomously motivated toward scholastic work, they are more likely to persist. However, a surprising finding was that introjected regulation was positively related to persistence (Otis et al., 2005; Vallerand et al., 1997; Vansteenkiste, Simons, Sheldon, & Deci, 2004). According to SDT, introjection might enhance behavioural persistence, especially at school, because students are frequently asked to perform uninteresting school tasks. However, this type of motivation should carry psychological costs in the form of poor cognitive strategies and lower well-being.

Achievement. Achievement is probably the standard indicator of student learning. Research has shown that autonomous academic motivation is positively associated with academic achievement (Fortier, Vallerand, & Guay, 1995; Grolnick, Ryan, & Deci, 1991; Guay & Vallerand, 1997; Miserandino, 1996; Ratelle, Guay, Vallerand, Larose, & Sénécal, 2007, Studies 2 and 3). More importantly, Guay and Vallerand (1997) have shown that autonomous motivation predicted greater achievement over a 1-year period. Overall, these studies show that investment in educational activities for pleasure or because of identification with their importance contributes to school performance. At a time when highly selective and competitive schools are growing, we need to be very careful about the “no pain no gain” educational philosophy. In fact, SDT studies clearly show that the more students feel pressured, the worse they perform. Nevertheless, as in every research field, these results have not been completely corroborated. Some studies have found weak correlations between SDT motivational types and GPA (Cokley, Bernard, Cunningham, & Motoike, 2001; Fairchild, Horst, Finney, & Barron, 2005). Further research is therefore needed to unravel these inconsistent findings.

Cognitive Outcomes

Learning and challenge-seeking. Autonomous motivation has been associated with cognitive outcomes such as increased retention and depth of learning (e.g., Benware & Deci, 1984; Grolnick & Ryan, 1987; Vansteenkiste et al., 2004) and preference for optimal challenge (e.g., Boggiano, Main, & Katz, 1988). In an experimental study with 5th graders, Grolnick and Ryan (1987) showed that students retained and learned differently according to their level of autonomy. Students who expected to be tested displayed poorer rote and conceptual learning than students who were asked to learn without the pressure of testing. These results were recently corroborated by Vansteenkiste

et al. (2004), who found that autonomous motivation mediated the effect of experimental manipulations (goal and social contexts) on students' self-reports of superficial and deep processing. Boggiano et al. (1988) demonstrated that both perceived competence and autonomy in the classroom were important predictors of challenge preferences (i.e., preference to cope with optimal challenging tasks instead of opting for easy work). Interestingly, these results demonstrate that, under highly controlling conditions, students who felt competent and autonomous chose the most challenging activities.

Creativity. “Creative potential is one of the most important forms of human capital. The benefits for both individuals and societies are easy to see. It contributes to advances in science and technology, for instance, and provides us with many kinds of pleasure and satisfaction” (Runco, 2005, p. 609). One education mandate is to foster children's creativity. However, external contingencies present in the school setting may undermine student creativity. For example, Amabile (1985) demonstrated in a sample of graduate and undergraduate students that writing haiku poems for extrinsic reasons decreased creativity.

Affective Outcomes

One very satisfying experience as parents is when our children come home from school and say that they enjoyed their day. In line with SDT postulates, Vallerand et al. (1989) showed that students with higher autonomous motivation reported more positive emotions in the classroom, greater enjoyment of academic work, and more satisfaction at school (also see Ryan & Connell, 1989). In a study with German and American university students, Levesque, Zuehlke, Stanek, and Ryan, (2004) investigated links between students' motivations and subjective well-being. They showed that, despite mean differences between samples for autonomous regulation, autonomous motivation was positively associated with subjective well-being in both cultures. As previously observed, introjected regulation was positively correlated with behavioural persistence in educational studies. However, Ryan and Connell (1989) found that introjected regulation was positively correlated with cognitive anxiety in children, providing support for our earlier contention that introjection bears affective costs.

A Person-Centered Approach to the Study of Academic Outcomes

Studies examining the relations between motivations and different student outcomes have demonstrated the importance of promoting autonomous forms of motivation. However, these studies examined motivation using a variable-centered approach, which tests relations between motivation types and outcomes. However, they did not compare different motivational profiles, using a person-oriented approach. In a recent paper (Ratelle et al., 2007), we used this approach to investigate motivation in high school students. Specifically, we tested whether students have different motivational profiles and whether certain profiles are more beneficial for academic adjustment. Analyses (Studies 1 and 2) revealed three distinct profiles, one of which involved a combination of high autonomous (intrinsic and identified regulations) and controlled motivations (external and introjected regulations). These students experienced the most positive indices of academic adjustment (i.e., higher achievement, concentration and satisfaction, with lower absenteeism and anxiety). Surprisingly, we did not find a profile characterised by low controlled motivation and high autonomous motivation. In other words, we could not identify a group of students attending high school solely for autonomous reasons. Our interpretation of this peculiar

result was that the high school climate is most probably too controlling to promote such a profile in students. For this reason, we examined the college context (Study 3), which offers students more opportunities to choose (i.e., programme selection, schedule flexibility, possibility of dropping out of some courses without sanctions, possibility of skipping classes, etc.). In this third study, we uncovered a profile characterised by high autonomous motivation and low controlled motivation. This group of students was more persistent than students in the high autonomous/high controlled group. Taken together, results of Ratelle et al. (2007) suggest that students' motivational profiles are context-sensitive, and that the autonomous profile is more liable to be developed in college than in high school.

Boiché, Sarrazin, Pelletier, and Chanal (in press) also used a person-centered approach to study high school students' motivation toward physical education, a school subject characterised by fewer constraints. They found an autonomous motivational profile associated with higher achievement scores in physical education compared to other motivational profiles. Overall, the findings obtained in these studies highlight the importance of comparing motivational profiles. In addition, they suggest that the school climate can be an important factor in fostering different profiles.

Optimal Contexts and Antecedents of Motivational Resources

Knowing that the optimal motivational profile is autonomous (high intrinsic and identified regulations but low external and introjected regulations), it is important to identify the environmental conditions that will contribute and support it. SDT research and theorizing has identified three dimensions of interpersonal style that are important for the developmental of autonomous regulation in students: autonomy support, involvement, and structure. Below, we review the three dimensions in relation to two important adult figures in students' lives: parents and teachers.

Autonomy Support

Parental support for autonomy. Because parents are the main socializing agents in the child's life, we expect them to have a significant influence on students' autonomous regulation (Pomerantz, Grolnick, & Price, 2005). Parents who are autonomy supportive recognise their children's perspectives, offer them opportunities to feel volitional and choiceful, and provide meaningful rationales for why they have to perform less interesting activities. This allows children to develop an autonomous motivational orientation at school. This finding was obtained in studies that used objective ratings of parental autonomy support (i.e., external judges; Grolnick & Ryan, 1989) as well as children's perceptions of their parents (Grolnick et al., 1991; Niemiec, Lynch, Vansteenkiste, Bernstein, Deci, & Ryan, 2006; Ratelle et al., 2005; Vallerand et al., 1997).

When examining the role of parental style to explain student motivation, researchers have often used students' perceptions of their parents. In general, mothers tend to be perceived as more autonomy supportive than fathers (Grolnick et al., 1991), although mothers' and fathers' perceptions tend to be positively correlated (Niemiec et al., 2006). In fact, when evaluated by external judges, mothers and fathers were found to display similar amounts of autonomy supportive behaviours (Grolnick & Ryan, 1989). When predicting autonomous school motivation,

there are inconsistent findings as to the relative importance of each parent. Some studies (e.g., Grolnick et al., 1991; Guay & Chanal, 2008) have found that the autonomy supportive styles of both parents significantly predicted children's autonomous self-regulation. Others (e.g., d'Ailly, 2003; Grolnick & Ryan, 1989) found that only mothers' autonomy supportive style predicted students' feeling of autonomy at school. Since most of the research on parental autonomy support deals with either mothers' style or a composite of both parents' styles, further research is needed to disentangle the specific roles of mothers' and fathers' support for their children's autonomy. For example, it would be interesting to examine whether having two autonomy supportive parents is associated with the most positive outcomes for students, such as high autonomous regulation. In the absence of this optimal parenting context, having at least one parent who is autonomy supportive might "protect" the child from the deleterious consequences associated with the controllingness of the other parent (see Simons & Conger, 2007).

It is arguable that the importance of autonomy support decreases as children grow older. As children mature, they are more likely to be independent from their parents to perform educational tasks. However, studies in elementary school (Grolnick & Ryan, 1989; Grolnick et al., 1991), high school (Vallerand et al., 1997), and college/university students (Ratelle, Guay, Larose, & Senecal, 2004, Ratelle et al., 2005; Vansteenkiste, Zhou, Lens, & Soenens, 2005) show that parental autonomy support is important for students to be able to autonomously regulate their behaviour. Hence, even as young adults, students benefit from having parents who support their autonomy. This may be especially true during stressful periods such as the transition to high school or college (Grolnick, Kurowski, Dunlap, & Hevey, 2000; Ratelle et al., 2004, 2005). For example, our findings revealed that perceiving one's parents as autonomy supportive was associated with more autonomous motivational trajectories in the transition to college (Ratelle et al., 2004).

We could also argue that the benefit of parental autonomy support is only observed for regular students in northwestern cultures. We might intuitively expect students with emotional handicaps and/or learning difficulties to function more effectively in a context where their behaviour is regulated by reinforcements (Maag, 2001; see Deci, Hodges, Pierson, & Tomassone, 1992 for a discussion). We might also expect students from collectivist cultures to benefit less from parental autonomy support than students from individualist cultures. However, studies have shown that the benefits of autonomy support operate for students with learning difficulties (Deci et al., 1992) as well as for students in nonwestern cultures such as China (d'Ailly, 2003; Vansteenkiste et al., 2005) and Russia (Chirkov & Ryan, 2001).

Teacher support of student autonomy. Because teachers are the primary adult figures in the educational realm, we would expect them to have a strong influence on children's autonomous regulation. Like parents, teachers who are autonomy supportive have been found to foster students' autonomous motivation (Reeve, 2002, 2006). Importantly, this finding was obtained in students at elementary (e.g., Ryan & Grolnick, 1986), secondary (e.g., Trouilloud, Sarrazin, Bressoux, & Bois, 2006), and college/university levels (e.g., Williams & Deci, 1996). Similar to parents, and regardless of academic level, the fact that teachers adopt an autonomy supportive teaching style contributed to the autonomous internalization of educational activities. While most studies have used students' perceptions of the teaching climate, similar findings were obtained with teachers' self-reported teaching styles (e.g., Deci, Schwartz, Sheinman, & Ryan, 1981). Moreover, the motivational benefits of teachers' autonomy supportiveness do not appear to be culture-bound, as they have been replicated in non-western cultures such as Russia (Chirkov & Ryan, 2001) and

China (Hardré, Chen, Huang, Chiang, Jen, & Warden, 2006).

Some studies have examined how autonomy support can make a difference for students enrolled in demanding (and often rigid) academic programmes. For instance, in a study with medical students, exposure to an autonomy supportive instructor predicted greater feelings of autonomy toward an interviewing course. Moreover, this effect lasted over a 2-year period, where the autonomy supportiveness of the instructor predicted interns' autonomy toward learning more about patient interviewing (Williams & Deci, 1996). Similarly, a study by Sheldon and Krieger (2007) showed that law students who perceived more autonomy support from faculty reported higher autonomous self-regulation. These findings suggest that teachers' autonomy support may buffer the negative effects associated with certain characteristics of these academic programmes (e.g., demandingness, competition, and rigidity).

Testing the relative autonomy support of parents and teachers. So far, we have presented the contributions of parents and teachers separately, since few studies have tested the relative contribution of parents and teachers to explain students' autonomous regulation. A first study (d'Ailly, 2003) tested adults' contributions to students' motivational resources and academic outcomes in a large sample of Chinese grade school students. Their findings suggest that parents (mostly mothers) have a role relatively similar to teachers' in predicting children's self-regulation at school. In a second study with a sample of Quebec high school students, parents' autonomy support predicted higher autonomy than teachers' and school administrators' (Vallerand et al., 1997). Interestingly, teachers' and school administrators' autonomy support made similar contributions to students' autonomy. This suggests that, in an academic setting, adults other than teachers can contribute to students' motivational resources. In sum, while there is ample evidence for the benefits associated with both parents' and teachers' autonomy support, the findings suggest that parental autonomy support is the most important for the development of students' motivational resources.

Involvement

Parents' involvement in children's education. By being involved in their children's education, parents communicate that school is important, and that it has value (Grolnick, 2003). To the extent that this message is given in a control-free way, it can facilitate the internalization processes whereby children identify with the value of education. Accordingly, parental involvement has been positively associated with autonomous motivation at school (Grolnick et al., 1991; Grolnick & Slowiaczek, 1994; Ratelle et al., 2005).

However, some studies did not find a significant relationship between parental involvement and children's autonomous regulation at school (e.g., Grolnick & Ryan, 1989). According to some researchers, parental involvement facilitates academic achievement through the development of competence (Pomerantz et al., 2005). By being involved in their children's education, parents can provide encouragement, act as a model and give feedback and instruction, which are important to develop children's perceptions of competence (Hoover-Dempsey & Sandler, 1995; Walker, Wilkins, Dallaire, Sandler, & Hoover-Dempsey, 2005). Hence, while autonomy support is crucial for students to develop autonomous self-regulation of academic behaviour, involvement appears central for the development of academic competence.

Some researchers have proposed a multidimensional conceptualization of parental involvement to better explain parental allocation of important resources (Hoover-Dempsey & Sandler, 1995). For instance, Grolnick and Slowiaczek (1994) distinguished between: (a) personal involvement, which concerns the allocation of emotional resources to the child; (b) cognitive/intellectual involvement, which implies exposing children to intellectual or cognitive stimulation through activities such as reading books or discussing current events; and (c) behavioural involvement, which can be observed when a parent goes to the child's school. Using this multidimensional conceptualization, research by Grolnick and her colleagues (Grolnick et al., 2000; Grolnick & Slowiaczek, 1994) suggests that the intellectual/cognitive form of involvement best facilitates student competence.

Teacher involvement. In the examination of teachers' practises that promote students' motivational resources, involvement as a variable has received scant attention. Presumably, this neglect has to do with the fact that providing important resources to students is part of the teacher's job description. What is important, however, is how these resources are administered (in an autonomy supportive or controlling way). One study examining the teaching context considered both involvement and structure, and found that involvement was positively associated with perceived control in the classroom (Skinner, Wellborn, & Connell, 1990). The manner in which teachers invest in the students (i.e., autonomy supportiveness) therefore appears to be more relevant than the quantity of investment (i.e., involvement).

Structure

Highly structured teaching and parenting practises involve communicating to students what is expected of them as well as the consequences of meeting or not meeting those expectations (Pomerantz et al., 2005; Reeve, 2005, 2006). Basically, structure pertains to everything that helps make the learning environment consistent and predictable. This enables students to self-regulate their academic behaviours more efficiently. However, communicating expectations, guides and rules to students should be done in an autonomy supportive manner so that they will not be internalised in a controlled fashion (Koestner & Losier, 2002). It is important to note that these two dimensions are not opposites on a continuum, but rather two orthogonal constructs (Ryan, 1993). Providing structure can therefore be autonomy supportive as well as controlling.

Conclusion and Recommendations

From this brief overview of SDT educational studies, we can draw three main conclusions. First, intrinsic and extrinsic motivations can be reliably assessed with the AMS and SRQ-A, whereas amotivation is assessed solely by the AMS. In addition, research has shown that some motivational types are specific to certain school subjects. Second, the more students endorse autonomous forms of motivation, the higher their grades are, the more they persist, the better they learn, and the more they are satisfied and experience positive emotions at school. Moreover, research using a person-centered approach has shown that a motivational profile characterised by high autonomous and controlled motivation is generally associated with positive outcomes, but that the most positive educational outcomes ensue from a purely autonomous profile. Third, parents and teachers who are involved and autonomy supportive and who provide structure can contribute to the development of students' autonomous motivation. Overall, results of the reviewed

studies provide support for SDT's central proposals in the education realm. Nevertheless, more research is needed to specifically test some propositions. To this end, we offer five recommendations.

Recommendation 1: A meta-analytic study on the interrelations between motivation types. While literature reviews on the motivation continuum have been mainly narrative (Boiché et al., in press; Ratelle et al., 2007), a quantitative synthesis of this research is needed to determine whether motivation types actually interrelate in a simplex pattern. Such an investigation would take into account the variables, such as age, educational context, and measurement strategies (specific vs. global), that are liable to moderate the simplex correlation pattern. Importantly, this should yield new theoretical insights on the nature of autonomous and controlled motivation and their interrelations.

Recommendation 2: More longitudinal field studies with multiple data points. Although some basic SDT propositions have been tested using longitudinal designs (Vallerand & Bissonnette, 1992; Vallerand et al., 1997), educational studies using cross-lagged longitudinal data are less frequent. By conducting such studies, we could more accurately test the direction of causality amongst variables. For example, multiple assessments of motivation and achievement could delineate whether: (a) motivation causes achievement, or (b) achievement causes motivation, or (c) the two constructs are reciprocally related.

Recommendation 3: More studies on the socioecological niche of friends. So far, research efforts have mostly studied the role of parental and teaching styles (autonomy support, involvement, and structure) in predicting students' autonomous motivation. Thus, an important social agent in students' lives has been neglected: friends. Developmental psychologists have long recognised that friends have a strong influence on individual development and social adjustment (Hartup & Stevens, 1997). However, little is known on the relative influence of friends compared to parents and teachers on the motivational process (see Ryan, Stiller, & Lynch, 1994 for some insights). Research has shown that having deviant friendships during adolescence is a predictor of low academic achievement, over and beyond parental socioeconomic status (Véronneau, Vitaro, Pedersen, & Tremblay, 2008), and that characteristics of adolescent peer groups are predictors of school engagement over and beyond parental and teacher involvement (Kindermann, 2007). Longitudinal studies are needed to focus on the relations between friends' motivational characteristics and students' autonomous and controlled regulations at school and to verify whether these effects can be explained by the need for relatedness.

Recommendation 4: More studies on the proactive nature of motivation. As previously mentioned, research has shown that autonomous motivation flourishes under autonomy supportive conditions, leading to positive academic consequences. However, autonomous motivation implies proactivity, whereby individuals act on the environment to exert some control over it. Accordingly, it would be useful to test whether autonomous motivation buffers the effects of negative contextual conditions such as controlling teaching practises. Specifically, a cycle may exist where interacting with students in an autonomy supportive way promotes students' autonomous motivation, which in turn enables them to cope with a controlling/evaluative and perhaps aversive school context. That is, autonomous motivation may immunise students against some of the negative effects of teachers' controlling strategies (see Black & Deci, 2000; Guay, Boggiano, & Vallerand, 2001).

Recommendation 5: More intervention studies. There have been recent attempts to modify teaching practises to increase students' autonomous regulation at school (Connell & Klem, 2000; Larose et al., 2006; Reeve et al., 2004). Teachers' autonomy supportive practises can be promoted either by training teachers to be autonomy supportive (e.g., Reeve et al., 2004) or by intervening in the determinants of teacher autonomy support, for instance by increasing self-determined motivation at work (Pelletier, Séguin-Lévesque, & Legault, 2002; Roth, Assor, Kanat-Maymon, & Kaplan, 2007; Taylor, Ntoumanis, & Standage, 2008) and reducing work-related constraints (Pelletier et al., 2002). However, we need more intervention studies at different education levels and in children from different backgrounds (e.g., ethnic minorities and disadvantaged students). In this way, we could help students learn and succeed, and we could obtain a clearer picture of the causal processes underlying autonomous motivation.

Although there are already more than 200 publications on the application of SDT to education, we hope that this brief literature review will stimulate new research ideas and intervention programmes. Despite the need for additional research on this topic, practitioners can use the existing research findings to improve parenting and teaching. Parents and teachers that use autonomy support, involvement and structure help students develop autonomous types of motivation, which are known predictors of school attendance and persistence, graduation rates, achievement, and school satisfaction.

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