The number of autonomy-supportive relationships: Are more relationships better for motivation, perceived competence, and achievement?

Frédéric Guay, Catherine Ratelle & Simon Larose
Laval University, Quebec City, Canada

Robert J. Vallerand
University of Quebec at Montreal, Montreal, Canada

Frank Vitaro
University of Montreal, Montreal, Canada

Abstract

Does the perception of many close relationships as autonomy-supportive make students more motivated and competent? The goal of this study was to use latent class analysis (LCA) to compare the educational correlates of having one vs. several autonomy-supportive relationships. Participants were 1406 high school students (47% boys, 52% girls). LCA revealed three groups: Group 1 (17%) included students who perceived low autonomy support by their mother, father, and teacher; Group 2 (7%) included students who perceived low autonomy support by their father, but moderate autonomy support by their mother and teacher; and Group 3 (76%) included students who perceived all sources as moderately autonomy-supportive. Results of multiple comparisons suggest that more is not necessarily better: Students in Group 2, who perceived low autonomy support by fathers, reported equivalent autonomous (intrinsic and identified) and controlled (external and introjected) regulations and perceived competence to those of students in Group 3, who perceived all sources as moderately autonomy-supportive. One difference was that Group 3 showed better academic achievement than Group 2. Results are discussed in light of research on close relationships and self-determination theory (SDT).

1. Introduction

Autonomy-supportive behavior involves recognizing others' perspectives, offering them opportunities to feel volitional, providing them with meaningful rationales for performing less interesting activities, and avoiding control and punishments to motivate behaviors (Ryan & Deci, 2009). Perceiving one's parents and teachers as autonomy-supportive fosters adolescents' school persistence (Hardre & Reeve, 2003), academic achievement (Guay & Vallerand, 1997), self-determination (Soenens & Vansteenkiste, 2005), conceptual learning (Grolnick & Ryan, 1987), well-being (Chirkov & Ryan, 2001), and career decidedness (Guay, Senécal, Gauthier, & Fernet, 2003). However, few studies have examined the academic benefits of receiving autonomy support from many vs. only a few significant individuals.

The goal of the present study was to compare the educational correlates associated with having only one or several autonomy-supportive relationships (Deci & Ryan, 1985, 2002; Ryan & Deci, 2009). In this study, we assessed father–child, mother–child, and teacher–student relationships, while considering the educational correlates perceived competence, autonomous and controlled regulations, and achievement. We used a person-centered analysis (latent class analysis; LCA) to allow identifying in a given sample groups of individuals with similar sources of autonomy

support. Hence, this study tests the hypothesis that receiving autonomy support from many significant individuals (i.e., mother, father, and teacher) would better sustain motivation, perceived competence, and achievement over receiving autonomy support from only a few individuals. However, lack of support for this hypothesis could indicate that some sources of autonomy support are more influential than others. The next section outlines the theoretical background for this study and the empirical evidence for the association between the number of autonomy supportive relationships and individual outcomes.

1.1. Theoretical background: Self-determination theory

Self-determination theory (SDT; Deci & Ryan, 1985, 2002; Ryan & Deci, 2009) endorses an organismic perspective on individual functioning whereby individuals—in the present case, students—are viewed as inherently self-motivated to master their environment. They are eager to learn, develop their skills, and assimilate school values. However, in some schools, students may be unmotivated, feel incompetent, achieve little, and eventually drop out of school. SDT suggests that these behaviors could be partly explained by the failure or inability of parents and school professionals (e.g., teachers) to support more autonomous forms of regulation.

According to SDT, different types of motivation exist, and they differ in their degree of self-determination. *Intrinsic motivation* is the most autonomous form of motivation. It occurs when an individual engages in an activity for its own sake, for the pleasure and satisfaction derived from it (Ryan & Deci, 2009). However, not all behaviors are intrinsically motivated; some are extrinsically motivated. Extrinsic motivation involves engaging in an activity for non-intrinsic reasons. SDT proposes four types of extrinsic regulations according to degree of autonomy. From the lowest to highest degree, they are external regulation, introjected regulation, identified regulation, and integrated regulation. *External regulation* refers to behaviors that are not internalized in the self but are instead regulated by external means such as rewards, constraints, and punishments. Regulation is *introjected* when behaviors are partly internalized in the self, but this internalization is not coherent with other aspects of the self (i.e., it is not autonomous). This degree of internalization tends to prompt behaviors in the absence of environmental cues in order to satisfy esteem concerns based on shame and guilt. *Identified regulation* occurs when behaviors are performed out of choice and volition, such as when the individual considers them to be important. *Integrated regulation* occurs when the activity is congruent with the individual's identity, values, and needs. This last form of regulation was not addressed in the present study because Vallerand, Blais, Brière, and Pelletier (1989) reported that high school students have difficulty distinguishing it from identified regulation. In fact, this form of regulation is not assessed in many studies because it does not emerge in a meaningful way until early adulthood. Nevertheless, researchers have measured it in the contexts of exercise (e.g., McLachlan, Spray, & Hagger, 2011) and psychotherapy (Pelletier, Tuson, & Haddad, 1997) in adult samples.

Many researchers have classified these types of regulation into two broad categories: autonomous and controlled regulations (Van den Broeck et al., 2011). *Autonomous regulation* includes intrinsic and identified regulations, whereas *controlled regulation* includes introjected and external regulations. Numerous studies have shown that autonomous regulations are related to a host of positive educational outcomes, including academic achievement, whereas controlled regulations are negatively related to these outcomes (Guay, Ratelle, & Chanal, 2008). In the next sections, we review the literature on motivation in terms of these two broad categories, which were selected to simplify the presentation of results.

2

Perceived school competence is defined as students' perceptions of their abilities at school (Deci & Ryan, 2002). Like autonomous regulations, it has been also identified as a fundamental motivational resource that is related to a host of positive educational outcomes (Connell & Wellborn, 1991; Grolnick, Ryan, & Deci, 1991). For example, Guay, Marsh, and Boivin (2003) showed that students' perceived competence predicts changes in academic achievement over time.

1.2. Autonomy support, autonomous and controlled regulations, perceived competence, and achievement

According to SDT, autonomous regulations will flourish when interpersonal relationships are autonomy-supportive. In this study, we focused on three significant individuals likely to support school autonomy in students: mother, father, and teachers. These are central figures during adolescence, a time when students face important developmental tasks such as developing a positive orientation toward school and achievement (Mahoney, Larson, Eccles, & Lord, 2005).

1.2.1. Parents

Several empirical studies have supported a relationship between parents' autonomy support and their children's motivational resources (autonomous vs. controlled regulation, perceived competence) as well as positive educational outcomes (e.g., achievement). Within this research stream, some studies have assessed these perceptions without distinguishing between the contribution of mothers and fathers (e.g., Guay & Vallerand, 1997; Vallerand, Fortier, & Guay, 1997), whereas others have made this distinction (Grolnick et al., 1991). Research on undifferentiated perceptions of parents has repeatedly shown that autonomy support by parents is a strong predictor of positive motivational resources and educational outcomes such as achievement and persistence (Guay & Vallerand, 1997; Vallerand et al., 1997). Moreover, research on adolescents' perceptions of autonomy support by their mother and father has shown that both sources are strong predictors of autonomous regulation and perceived competence (Grolnick et al., 1991; Guay & Chanal, 2008). However, these results have been challenged by findings that perceived autonomy support by fathers is sometimes unrelated to regulation types in students (Gillet, Vallerand, & Lafrenière, 2012; Soenens & Vansteenkiste, 2005), although it predicted students' perceived competence and achievement (Grolnick & Ryan, 1989). Overall, past studies suggest that autonomy support by parents, whether measured differentially or non-differentially, is a strong predictor for the type of regulations for school activities, perceived competence, and achievement. However, the role of perceived autonomy support by fathers needs clarification.

1.2.2. Teachers

Teachers and teaching styles constitute a fundamental factor in student achievement (see Hattie, 2009, for a review). In the motivational literature, Reeve and colleagues (Hardre & Reeve, 2003; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Su & Reeve, 2011) have shown that teachers' autonomy support is related to students' autonomous regulation, perceived competence, and achievement (see also Guay, Boggiano, & Vallerand, 2001; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). In addition, studies have shown that teachers' styles complement parents' input in predicting students' motivational resources and achievement (e.g., Vallerand et al., 1997). More importantly, the relationship between teachers' autonomy support and students' motivational resources was independent of students' achievement. Specifically, this relationship could not be solely attributable to the fact that teachers were more autonomy-supportive of high achievers, who

were as a result more autonomously regulated for school activities (Guay & Vallerand, 1997). Hence, if they perceive their teachers as autonomy-supportive, low-achieving students should experience the same educational benefits as high-achieving students.

1.2.3. *The number of autonomy-supportive relationships*

Whereas previous studies have shown that parents and teachers uniquely predict variance in students' educational outcomes, they did not test whether the number of autonomy-supportive relationships matters. We therefore do not know whether individual autonomy-supportive relationships have incremental effects on students' outcomes or whether one highly autonomy-supportive relationship suffices to foster motivational resources and achievement. This question can be tested in light of additive and threshold models (see Laursen & Mooney, 2008). According to the additive model, psychological adjustment reflects the addition of support from all significant or close relationships. Hence, psychological adjustment improves with each additional supportive relationship. In the present case, students' adjustment should improve with each additional source of autonomy support. In contrast, the threshold model assumes that individuals do not need support from many sources. Relational support is redundant, such that additional sources do not improve psychological adjustment. In the present case, high autonomy support by one source should buffer against the adverse consequences associated with lack of autonomy support by other sources.

To our knowledge, only two studies can shed light on this issue. A study on social support (Laursen & Mooney, 2008) measured adolescents' perceptions of the quality of relationships (e.g., reliance, intimacy, and nurturance) with three sources: mother, father, and same-sex best friend. Results suggested that students who perceived all three relationships as positive felt more competent at school than students who perceived only two, one, or none of these relationships as positive. Moreover, Furrer and Skinner (2003) showed that sense of relatedness to peers, parents, and teachers predicted students' emotional and behavioral engagement. Specifically, they found that self-reported emotional and behavioral engagement were highest when children perceived high relatedness with all significant sources (peers, parents, and teachers). Overall, previous findings appear consistent with an additive model in which all sources of support or relatedness are determinant for students' adjustment.

1.3. The present study

The general goal of this study was to compare the educational correlates associated with distinct profiles of autonomy-supportive relationships in a sample of young adolescents. A first objective was to identify distinct groups of students based on their perceptions of autonomy support received from three sources: mother, father, and teacher. Given the exploratory nature of this study, we did not formulate hypotheses about the number of groups and their configurations. We applied LCA, which yields individual-specific groups by empirically identifying relatively homogeneous subpopulations from a sample, based on observed variables. For example, LCA could reveal a group of students who perceived all three sources (mother, father, and teacher) as providing high or low autonomy support as well as other groups for which one or two significant individual(s) were perceived as autonomy-supportive. A second objective was to compare these groups of students in terms of their regulation types, perceived competence, and achievement in French. French was selected because, in the French-speaking educational system in the province of Quebec, Canada, high school students spend more time studying this subject than any others (Quebec's Education Act, 2013). In line with previous studies (e.g., Furrer & Skinner, 2003),

compared with students who perceived only one or two individuals as autonomy-supportive, students who perceived all three significant individuals as autonomy-supportive should show higher autonomous regulations (intrinsic regulation and identified regulation), perceived competence, and achievement in French, with lower controlled regulations (external and introjected regulations).

Importantly, we controlled for the contribution of gender, age, and family structure, in light of previous research showing that (a) girls were more autonomously motivated than boys (e.g., Vallerand et al., 1997), (b) younger children were more autonomously motivated than older children (e.g., Gottfried, Fleming, & Gottfried, 2001), and (c) divorced parents provided less support to their children (e.g., Vandervalk, Sprujit, De Goede, Meeus, & Maas, 2004).

2. Method

2.1. Participants and procedure

Data were obtained from a study on adolescents' academic achievement, motivation, and personal relationships. The Quebec Ministry of Education provided us with a random, stratified sample of 4000 high school students for the 2007–2008 school year. The students were representative of the 430,000 public high school students in grades 7, 8, and 9 in the province of Quebec. Students and their parents were mailed a consent form and a questionnaire. Of the total students, 1407 (666 boys, 738 girls; M_{age} = 13.74, SD = 1.09) returned a completed questionnaire. On average, fathers (21%) and mothers (28%) had completed at least a college degree and 66% of the students lived with both parents. The Quebec high school system comprises 5 years of schooling. Students were in first (32%), second (36%), and third year of high school (32%).

2.2. Measures

2.2.1. *Perceptions of autonomy support by parents and teacher*

We assessed perceived autonomy support by mother, father, and the student's French teacher with the short form of the Learning Climate Questionnaire (LCQ; Williams & Deci, 1996), which contains six items that can be adapted to specific sources. The LCQ is a unidimensional scale with high internal consistency (Williams & Deci, 1996). We adapted the items to assess students' perceptions of autonomy-supportive behaviors by their mother (6 items), father (6 items), and French teacher (6 items). Students were asked to think of only their French teacher when rating teacher's autonomy support, whereas for mother and father, the items addressed school in general. Participants had to rate on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree) the extent to which they agreed with each item (e.g., *With respect to my studies, I feel that my mother/father/teacher provides me with choices and options*). Cronbach's alphas were .86 (mother's autonomy support), .92 (father's autonomy support), and .92 (teacher's autonomy support).

2.2.2. *Perceived academic competence*

We assessed perceived academic competence in French with the Academic Subscale of the Perceived Competence Scale developed by Losier, Vallerand, and Blais (1993). Losier et al. (1993) demonstrated that this scale has high internal consistency and acceptable test-retest reliability as well as factorial, convergent, and divergent validity. Students rated on a seven-point

scale from 1 (*strongly disagree*) to 7 (*strongly agree*) four items (e.g., *I have difficulty doing my French school work well*). Cronbach's alpha was .72.

2.2.3. *Autonomous and controlled academic regulations*

We assessed autonomous and controlled academic regulations with the French version (Vallerand et al., 1989) of the Academic Motivation Scale (AMS). The AMS includes seven subscales, each containing four items representing a possible reason (or regulation) for attending French class. Three subscales assess three types of intrinsic motivation: knowledge, accomplishment, and stimulation. Three subscales assess three types of extrinsic motivation: identified, introjected, and external regulation. The seventh subscale assesses amotivation. Items are scored on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Numerous studies have supported the factorial, convergent, and divergent validity and the internal consistency of the AMS (Vallerand et al., 1989, 1992, 1993).

To reduce questionnaire length, students completed only the following subscales: intrinsic regulation for knowledge (e.g., *Because I experience pleasure and satisfaction while learning new things)*, identified regulation (e.g., *Because eventually it will enable me to enter the job market in a field that I like*), introjected regulation (e.g., *To show myself that I am an intelligent person)*, and external regulation (e.g., *In order to have a better salary later on*), resulting in a 16-item scale (4 items per subscale). A CFA analysis was conducted on this short version of the AMS (16 items) to test factorial validity. Fit indices were adequate (χ^2 [98] = 425.106; CFI = .98, NNFI = .97; RMSEA = .049 [.044, .054], SRMR = .032) and all factor loadings were above .65 (*ps* < .05). Correlations among subscales were moderate and in line with past research (e.g., Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Cronbach's alphas for the four regulation types were .92 for intrinsic, .87 for identified, .88 for introjected, and .81 for external.

2.2.4. *Academic achievement*

Academic achievement in French was obtained from official school transcripts. In Quebec's educational system, achievement is reported as a percentage.

2.3. Data analysis

LCA uncovers unobserved heterogeneity in a sample and identifies meaningful groups of individuals who are similar in their pattern of responses on specified variables (Muthén, 2004), in this case perceived autonomy support by mother, father, and teacher. LCA was conducted using Mplus (Version 6; Muthén & Muthén, 1998-2009). In line with Nylund, Asparouhov, and Muthén (2007), we used the following fit indexes to select the optimal number of groups: the Bayesian information criterion (BIC), the Akaike Information Criteria (AIC), the Vuong-Lo-Mendell-Rubin-Likelihood Ratio Test (VLMR), the Lo-Mendell-Rubin adjusted LRT test (LMR-A), the Bootstrapped Likelihood ratio Test (BLRT), and the entropy test. Lower BIC and AIC indicate better fit. A significant *p* value on the VLMR, LMR-A, and BLRT indicates that a solution with a *k* number of groups is better than the *k-1* solution. Entropy designates the degree of certainty in the classification of participants into groups. A value near 1 indicates a high degree of certainty.

Once the best-fitting solution was identified, we identified group membership for each participant and used a MANOVA to compare groups on measures of intrinsic regulation, identified regulation, introjected regulation, external regulation, perceived academic competence, and

achievement. Post hoc comparisons of these variables were estimated using one-way ANOVAs (one analysis per outcome variable).

Missing data ranged from 2% for identified regulation to 19.7% for achievement in French (see Table 1). Note that from 1% to 20% missing data is considered a common percentage (see Schlomer, Bauman, & Card, 2010). Little's test was computed for all individual items using the Missing Values Analysis add-on module in SPSS. The p value was significant ($\chi^2(1979) = 2271,700$, $p = .001$), indicating that the data were not missing completely at random (MCAR). In addition, because more data were missing on achievement, we tested for differences between students with complete or missing data on all other variables (i.e., types of regulation, perceived competence). A MANOVA yielded statistically nonsignificant results ($F[8, 1327] = .07$, $p = .66$).

To account for missing data with LCA, full information maximum likelihood (FIML) was used to compute the product of individual likelihood functions in order to estimate analysis parameters. Missing data for all other analyses conducted (MANOVAs) were estimated using the EM estimator embedded in SPSS (Version 13.0). These procedures (FIML and EM) for treating missing data are considered superior to Listwise deletion and other ad hoc methods, such as mean substitution (Davey, Shanahan, & Schafer, 2000; Peugh & Enders, 2004).

3. Results

3.1. Preliminary analyses

Correlations, means, and standard deviations are presented in Table 1. Correlational analyses revealed that perceived autonomy support by all three significant sources—mother, father, and teacher—was positively associated with perceived academic competence, the four regulation types, and achievement. Results also indicated that perceptions of autonomy support by the three significant individuals were relatively independent. With the exception of a high correlation between perceived autonomy support by mother and father (.49), correlations among perceptions of autonomy support were moderate (±.30), thereby justifying the use of LCA.

3.2. Identifying groups of autonomy-supportive relationships

LCA estimated solutions using centered scores. Table 2 presents the fit indexes for LCA. Results indicated that the three-group solution best fit the data. Although in solutions with four and five groups the BLRT was statistically significant, entropy was low and the VLMR and LMR-A were nonsignificant. Moreover, the decrement in AIC and BIC was insubstantial for the four- and five-group solutions. Inspection of the four- and five-group solutions revealed no differences in perception patterns of autonomy support across the three sources. Instead, these solutions regrouped existing groups into two groups with highly similar patterns. This may explain the lower entropy in the four- and five-group solutions than the three-group solution. Results on the fit indices indicated that the three-group solution provided the best fit.

The LCA results are illustrated in Fig. 1. Table 3 presents means of autonomy support by each source for each group. Group 1 (Low) accounted for 17% of the sample and includes students who perceived low autonomy support by mother, father, and teacher. Group 2 (Father Low) accounted for 7% of the sample and includes students who perceived low autonomy support by father, but

moderate autonomy support by mother and teacher. Group 3 (Moderate) comprised 76% of the sample and includes students who perceived all sources as moderately autonomy-supportive. A chi-square test indicated a statistically nonsignificant relationship between the proportion of girls and boys in each group (χ^2 [6] = 5.21, $p > .05$). Moreover, an ANOVA revealed a nonsignificant group difference in students' age (F[2, 1403] = 2.127, $p = .12$). Consequently, gender and age were not taken into account for further group comparisons. However, a chi-square test (χ^2 [8] = 76.425, $p < .05$) revealed a significant relationship between family structure (living with both parents, living with mother only, living with father only, shared custody, and other family structures) and the three groups (see Table 4). More specifically, a higher proportion of students living with mother only was found in the Father Low group (53.6% with mother only vs. 42.3% with both parents), suggesting that less frequent contact with the father might explain the Father Low group. Less frequent contact with father was therefore considered in a supplementary analysis.

3.3. Comparing groups on regulation types, perceived competence, and achievement

Once groups of autonomy-supportive relationships were identified, they were compared on measures of autonomous and controlled regulations, perceived competence, and achievement. A MANOVA was performed to compare groups. Using Wilks' criterion, the multivariate test for group differences was statistically significant, F(12, 2778) = 20.612, $p < .001$, indicating that groups varied on several outcome measures. Six univariate F tests were performed to identify between-group differences in dependent variables (see Table 5). Significant differences were found in perceived competence, intrinsic regulation, identified regulation, introjected regulation, and external regulation between groups 1 and 2 and between groups 1 and 3. Specifically, Group 2 (Father Low) and Group 3 (Moderate) scored significantly higher than Group 1 (Low) on perceived competence as well as intrinsic, identified, introjected, and external regulation, but did not differ from each other. Significant between-group differences were found in achievement: Group 3 showed the highest achievement, followed by Group 2 and Group 1. Most of these differences were of medium magnitude, based on Cohen (1977; $\eta^2 = .01$ as small, $\eta^2 = .06$ as medium, as $\eta^2 = .16$ as large).

In a supplementary analysis, we examined whether less frequent contact with father would explain the relationship between the Father Low group and outcomes. A MANOVA was therefore performed to compare two groups: (1) students who had regular contact with their father (i.e., students living with both parents, students with divorced parents and father as primary custodian) and (2) students who had less frequent contact with their father (i.e., students with divorced parents and mother as primary custodian). We included an interaction effect between the variable less frequent contact with father and group membership on profiles of autonomy-supportive relationships. Neither the main effect of the dummy variable less frequent contact (F[6, 1380] = .43, $p > .05$) nor the interaction effect (F[12, 2762] = .73, $p > .05$) were statistically significant. However, the group effect remained significant (F[12, 2762] = 17.73, $p < .05$). This alternative hypothesis was therefore not supported.

4. Discussion

The goal of this study was to compare the educational correlates of having one or several autonomy-supportive relationships. First, correlational analyses revealed that perceptions of autonomy support by three significant individuals (mother, father, and teacher) were relatively

independent, thereby justifying the examination of their unique and combined roles using a person-centered approach (i.e., LCA). Second, LCA results yielded a three-group solution. A first group of students (17%) perceived their mother, father, and teacher as non-autonomy-supportive. A second group (7%) perceived their father as non-autonomy-supportive and mother and teacher as moderately to highly autonomy-supportive. A third group (76%) perceived all sources as moderately autonomy-supportive. A chi-square test revealed that a greater proportion of students living with their mother only belonged to the Father Low group, suggesting that less frequent contact with father explains the Father Low group. Moreover, results of multiple comparisons revealed group differences on autonomous regulations (i.e., intrinsic and identified) and controlled regulations (i.e., introjected and external), perceived academic competence, and achievement. Specifically, students who perceived all sources as moderately autonomy-supportive (Moderate group) showed better achievement, were more autonomously regulated (intrinsic and identified regulations), and perceived themselves as more competent in this school subject (French), but also showed more controlled regulations (introjected and external) than students who perceived all sources as non-autonomy-supportive (Low group). Students who perceived their father as non-autonomy-supportive did not differ from students in the Moderate group, except on achievement.

4.1. Theoretical implications

Self-determination theory (SDT; Deci & Ryan, 2002; Ryan & Deci, 2009) proposes that autonomy support by significant others contributes to variables such as perceived competence, autonomous regulation, and achievement. Correlational results provided some support for this hypothesis, indicating that students who perceived their mother, father, and teacher as autonomy-supportive were more motivated by autonomous regulations, perceived themselves as more competent, and showed higher achievement. However, they were also more motivated by controlled regulations. Overall, these results are consistent with previous research in which perceived autonomy support by these three sources was associated with positive educational outcomes (Grolnick & Ryan, 1989; Vallerand et al., 1997). The counterintuitive positive relationships between sources of autonomy support and controlled regulations concur with previous findings that high school students typically do not show a purely autonomous profile characterized by high autonomous regulations and low controlled regulations (Ratelle et al., 2007). The finding that controlled regulations co-occur with autonomous regulations during high school might reflect the complexity of behaviors by significant others. Parents and teachers can be autonomy-supportive at some times and controlling at others, with the well-intentioned goal of ensuring that students meet educational prerequisites. However, this interpretation is speculative, and needs to be carefully tested in further studies.

We also found that outcomes were more strongly correlated with autonomy support by the teacher than by mother and father, which is consistent with other findings that teachers and teaching practices are the most proximal predictors of achievement (Hattie, 2009). Further research is needed to better understand why autonomy support correlated positively with controlled regulations and why some sources of support (e.g., teacher) were more strongly associated than others with regulation types, perceived competence, and achievement. However, we should keep in mind that the measures of mother's and father's autonomy support were more general (i.e., they did not specifically focus on French). This could explain why the correlations between perceptions of autonomy support and the outcome variables (regulation types, perceived competence, and achievement) were lower for parents than for the teacher.

Using LCA, our results revealed three distinct groups: students who perceived all three sources as autonomy-supportive, students who perceived only one significant source as non-autonomy-supportive, namely the father (group 2), and students who perceived all three sources as non-autonomy-supportive. Results of group comparisons revealed that although students in the second group perceived low autonomy support by their father, they showed equivalent autonomous and controlled regulations and perceived competence to those of students who perceived all three sources as autonomy-supportive. Nevertheless, it is important to underscore that perceiving less autonomy support by one's father bears an educational cost, in that these students obtained lower grades in French than students in the moderate group.

How can we interpret these findings in light of threshold and additive models? The additive model posits that psychological adjustment reflects the addition of support by all significant relationships, whereas the threshold model proposes that individuals do not need support from many sources to receive the psychological benefits (see Laursen & Mooney, 2008). For autonomous and controlled regulations and perceived competence, our results are in line with a threshold model. For achievement, the results concur with an additive model. Hence, autonomy support by mother and teacher might be sufficient to sustain autonomous regulations as well as perceived competence (threshold effect), whereas all sources (including the father) need to be autonomy-supportive in order to promote higher achievement (additive effect). It is therefore possible that father–child interactions are more focused on achievement, mastery, and skills development than interactions with other significant individuals (Collins & Russell, 1991). Thus, autonomy support by father might be more influential than autonomy support by other sources in fostering mastery- and achievement-related outcomes. Further studies are needed to support this hypothesis. It is also important to keep in mind that the results on the Father Low group could not be explained by household situations. In other words, the fact that some children have less frequent contact with their father was not a confounding factor explaining the significant relationships between the Father Low group and the dependent variables. However, the fact that some children did not live with their father might have explained why the Father Low group emerged.

The present study is not a conclusive test of the additive and threshold models. Testing them properly would have required eight groups representing all combinations of sources of autonomy support: (a) a group of students who perceived all three sources as autonomy-supportive, (b) three groups of students who perceived only one of the three sources as non-autonomy-supportive, (c) three groups of students who perceived any possible combination of two sources as non-autonomy-supportive, and (d) a group of students who perceived all three sources as non-autonomy-supportive. This complex group configuration would be nearly impossible to obtain in a single study, because a person-centered approach focuses on naturally occurring groups. Hence, future studies could attempt to identify other configurations of autonomy-supportive relationships and their associated academic variables in order to effectively test the additive hypothesis.

Whereas one of our goals was to identify groups of autonomy-supportive relationships in a sample of young adolescents, our findings raise the need for a better understanding of why some students develop specific patterns of perceived autonomy support. For example, 17% of the sample perceived that most sources were non-autonomy-supportive. Although these perceptions might be an accurate reflection of a lack of autonomy support, this finding might also be explained by a cognitive bias, whereby some students might view themselves and the world negatively, predisposing them to assess significant others as unsupportive. Future studies should therefore control for this possibility when estimating profiles of autonomy-supportive relationships.

4.2. Limitations and future directions

Although this study used a large sample and an objective measure of academic achievement, some limitations need to be considered when interpreting the findings. First, although achievement was measured objectively, other measures were self-reported. Future studies could collect data from multiple sources to reduce the shared method variance. Second, the cross-sectional, descriptive design precludes making any causal inferences from our findings. We cannot infer that perceptions of autonomy support by mother, father, and teacher *caused* the regulation types, perceived competence, or achievement. For example, it is plausible that students who achieved more, were more motivated, and viewed themselves as more competent would perceive their relationships as more autonomy-supportive (i.e., the causal flow may be in the opposite direction). Third, our findings should be replicated using a longitudinal design and considering other outcomes such as adjustment, well-being, and academic persistence. Fourth, the findings should be replicated using a more specific measure to assess mother's and father's autonomy support for French, as a lack of correspondence among measures could have affected the results. Fifth, although the Quebec Ministry of Education provided us with a random, stratified sample of 4000 students, it is important to note that only 36% agreed to participate in the study. These participants might have had characteristics that would explain why 76% of them were classified into the Moderate group. Sixth, there may have been a response set bias, such that students in the Father Low and Moderate groups may have tended to score all items higher, which might explain why these groups had higher autonomous and controlled regulations than students in the Low group.

In sum, our answer to the initial question "Are more autonomy-supportive relationships better for motivation, perceived competence, and achievement?" should be nuanced, given that the findings differed across outcomes. The answer is *yes* if we consider achievement alone, but *no* if we consider types of regulation. These results have practical implications. For example, parents and teachers could be informed about the influential role they play in fostering their child's academic competence, motivation, and achievement. Furthermore, efforts should focus on raising fathers' awareness of their role in fostering their children's achievement.

References

Chirkov, V. I., & Ryan, R. M. (2001). Parent and teacher autonomy-support in Russian and U.S. adolescents: Common effects on well-being and academic motivation. *Journal of Cross-Cultural Psychology, 32*(September), 618–635.

Collins, W., & Russell, G. (1991). Mother-child and father-child relationships in middle adolescence: A developmental analysis. *Developmental Review, 11*, 99–136.

Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. R. G. L. A. Sroufe (Ed.), *Self- processes and development* (pp. 43–77). Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.

Davey, A., Shanahan, M. J., & Schafer, J. L. (2000). Correcting for selective nonresponse in the national longitudinal survey of youth using multiple imputation. *The Journal of Human Resources, 36*, 500–519.

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

Deci, E. L., & Ryan, R. (2002). The paradox of achievement: The harder you push, the worse it gets. In J. Aronson (Ed.), *Improving academic achievement: Contributions of social psychology* (pp. 61–87). New York: Academic Press.

Furrer, C., & Skinner, C. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*, 148–162.

Gillet, N., Vallerand, R. J., & Lafrenière, M.-A. K. (2012). Intrinsic and extrinsic school motivation as a function of age: The mediating role of autonomy support. *Social Psychology of Education: An International Journal, 15*, 77–95.

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (2001). Continuity of academic intrinsic motivation from childhood through late adolescence: A longitudinal study. *Journal of Educational Psychology, 93*, 3–13.

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). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology, 83*, 508–517.

Guay, F., Marsh, H. W., & Boivin, M. (2003). Academic self-concept and academic achievement: A developmental perspective on their causal ordering. *Journal of Educational Psychology, 95*, 124–136.

Guay, F., Senécal, C., Gauthier, L., & Fernet, C. (2003). Predicting career indecision: A self-determination theory perspective. *Journal of Counseling Psychology, 50*, 165–177.

Guay, F., & Chanal, J. (2008). Meet the parents: Mothers and fathers' contextual and psychological resources associated to adolescents' perceptions of parental autonomy support. In H. W. Marsh, R. G. Craven, & D. M. McInerney (Eds.), *Self- processes, learning, and enabling human potential: Dynamic new approaches. Advances in Self Research* (Vol. 3, pp. 145–169). Charlotte, NC: Information Age Publishing.

Guay, F., Ratelle, C. F., & Chanal, J. (2008). Optimal learning in optimal contexts: The role of self-determination in education. *Canadian Psychology, 49*, 233–240.

Guay, F., & Vallerand, R. J. (1997). Social context, student's motivation, and academic achievement: Toward a process model. *Social Psychology of Education, 1*, 211–233.

Hagger, M. S., Chatzisarantis, N. L. D., Culverhouse, T., & Biddle, S. J. H. (2003). The processes by which perceived autonomy support in physical education promotes leisure-time physical activity intentions and behavior: A trans- contextual model. *Journal of Educational Psychology, 95*, 784–795.

Hardre, P. L., & Reeve, J. (2003). A motivational model of rural students' intentions to persist in, versus drop out of, high school. *Journal of Educational Psychology, 95*, 347–356.

Hattie, J. A. C. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.

Laursen, B., & Mooney, K. S. (2008). Relationship network quality: Adolescent adjustment and perceptions of relationships with parents and friends. *American Journal of Orthopsychiatry, 78*, 47–53.

Losier, G. F., Vallerand, R. J., & Blais, M. R. (1993). Construction et validation de l'Échelle des Perceptions de Compétence dans les Domaines de Vie (EPCDV). *Science et comportement, 23*, 1–16.

Mahoney, J. L., Larson, R., Eccles, J., & Lord, H. (2005). Organized activities as developmental contexts for children and adolescents. In J. Mahoney, R. Larson, & J. Eccles (Eds.), *Organized activities as contexts of development* (pp. 3–22). Mahwah, NJ: Erlbaum.

McLachlan, S., Spray, C., & Hagger, M. S. (2011). The development of a scale measuring integrated regulation in exercise. *British Journal of Health Psychology, 16*, 722–743.

Muthén, B. (2004). Latent variable analysis: Growth mixture modeling and related techniques for longitudinal data. In D. Kaplan (Ed.), *Handbook of quantitative methodology for the social sciences* (pp. 345–368). Newbury Park, CA: Sage.

Muthén, L. K., & Muthén, B. O. (2009). *Mplus User's Guide*. CA: Muthén & Muthén.

Nylund, K. L., Asparouhov, & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo Simulation Study. *Structural Equation Modeling, 14*, 535–569.

Pelletier, L. G., Tuson, K. M., & Haddad, N. K. (1997). Client Motivation for Therapy Scale: A measure of intrinsic motivation, extrinsic motivation, and amotivation for therapy. *Journal of Personality Assessment, 68*, 414–435.

Peugh, J. L., & Enders, C. K. (2004). Missing data in educational research: A review of reporting practices and suggestions for improvement. *Review of Educational Research, 74*, 525–556.

Quebec Loi sur l'instruction publique [Education Act] (2013). *Régime pédagogique de l'éducation préscolaire, de l'enseignement primaire et de l'enseignement secondaire*. <http://www2.publicationsduquebec.gouv.qc.ca/dynamicSearch/telecharge. php?type=2&file=//I_13_3/I13_3R8.htm> Retrieved 29.01.13.

Ratelle, C. F., Guay, F., Vallerand, R. J., Larose, S., & Senécal, C. (2007). Autonomous, controlled, and amotivated types of academic motivation: A person-oriented analysis. *Journal of Educational Psychology, 99*, 734–746.

Reeve, J., Jang, H., Carrell, D., Jeon, S., & Barch, J. (2004). Enhancing students' engagement by increasing teachers' autonomy support. *Motivation and Emotion, 28*, 147–169.

Ryan, R. M., & Deci, E. L. (2009). Promoting self-determined school engagement. In K. R. Wentzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 171–195). New York, NY: Routledge.

Schlomer, G. L., Bauman, S., & Card, N. A. (2010). Best practices for missing data management in counseling psychology. *Journal of Counseling psychology, 57*, 1–10.

Soenens, B., & Vansteenkiste, M. (2005). Antecedents and outcomes of self- determination in 3 life domains: The role of parents' and teachers' autonomy support. *Journal of Youth and Adolescence, 34*, 589–604.

Su, Y., & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review, 23*, 159–188.

Vallerand, R. J., Blais, M. R., Brière, N. M., & Pelletier, L. G. (1989). Construction and validation of the Motivation toward Education Scale/Construction et validation de l'Échelle de Motivation en Éducation (ÉMÉ). *Canadian Journal of Behavioural Science, 21*, 323–349.

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

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C. B., & Vallières, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and a motivation in education. *Educational and Psychological Measurement, 52*, 1003–1017.

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Sénécal, C., & Vallières, E. F. (1993). On the assessment of intrinsic, extrinsic, and a motivation in education: Evidence on the concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement, 53*, 159–172.

Van den Broeck, A., Schreurs, B., De Witte, H., Vansteenkiste, M., Germeys, F., & Schaufeli, W. B. (2011). Understanding workaholics' motivations: A self- determination perspective. *Applied Psychology: An International Review, 60*, 600–621.

Vandervalk, I., Sprujit, E., De Goede, M., Meeus, W., & Maas, C. (2004). Marital status, marital process, and parental resources in predicting adolescents' emotional adjustment: A multilevel analysis. *Journal of Family Issues, 25*, 291–317.

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*, 767–770.

Table 1. Correlations among variables, means, and standard deviations.

Variables	1	2	3	4	5	6	7	8	9
1. PAS from mother	–								
2. PAS from father	.49*	–							
3. PAS from French teacher	.35*	.30*	–						
4. Intrinsic Motivation	.25*	.14*	.50*	–					
5. Identified regulation	.24*	.15*	.37*	.50*	–				
6. Introjected regulation	.17*	.09*	.32*	.50*	.44*	–			
7. External regulation	.08*	.05	.10*	.11*	.34*	.27*	–		
8. Perceived competence	.27*	.20*	.40*	.39*	.28*	.19*	−.02	–	
9. Achievement	.20*	.18*	.26*	.16*	.09*	−.01	−.16*	.56*	–
Means	5.64	5.16	5.17	3.29	4.06	3.68	3.98	5.31	72.36
SD	1.04	1.39	1.41	1.15	.98	1.13	.99	1.17	10.58
Missing values	3%	4.7%	2.1%	2.1%	2.1%	2.2%	2.2%	2.3%	19.7%

Note 1: PAS = Perceived autonomy support.
Note 2: Means on autonomy support from mother, father, the French teacher, and perceived competence could vary between 1 and 7. Means on types of motivation could vary between 1 and 5. Means on French grades could vary between 0 and 100.
* $p < .05$ (2-tailed).

Table 2. Results of latent class analyses.

Number of groups	BIC	AIC	VLMR p value	LMR-A p value	BLRT p value	Entropy
2	11225.855	11173.377	.000	.000	.000	.795
3	11019.749	10946.280	.003	.004	.000	.845
4	10814.176	10719.716	.050	.060	.000	.777
5	10720.189	10604.738	.060	.060	.000	.769

Note: BIC = Bayesian information criteria; AIC = Akaike information criteria; VLMR = Vuong-Lo-Mendell-Rubin-likelihood ratio test; LMR-A = Lo-Mendell-Rubin adjusted LRT test; BLRT = Bootstrapped likelihood ratio test.

Table 3. Mean autonomy support scores from each source as a function of groups.

Variables/ groups	Group 1	Group 2	Group 3
	Low	Father Low	Moderately autonomy-supportive
Mother	4.036	5.468	5.983
Father	3.892	1.971	5.712
French Teacher	3.616	5.239	5.486

Table 4. Results of the Chi-square test: family structure by groups.

Family type/groups		Group 1 Low	Group2 Father Low	Group 3 Moderately autonomy-supportive
Intact Families	Count	155	41	748
	Expected	152	65	723
	% within family structure	16.4%	4.3%	79.2%
	% within groups	68.9%	42.3%	69.4%
	Total	11.1%	2.9%	53.4%
Living with the mother	Count	37	52	164
	Expected	41	18	195
	% within family structure	14.6%	20.6%	64.8%
	% within groups	16.4%	53.6%	15.2%
	Total	2.6%	3.7	11.7%
Living with the father	Count	10	0	107
	Expected	7	3	97
	% within family structure	22.7%	0%	84.9%
	% within groups	4.4%	0%	9.9
	Total	.7%	0%	7.6
Shared Custody	Count	16	3	107
	Expected	20	9	97
	% within family structure	12.7%	2.4%	84.9%
	% within groups	7.1%	3.1%	9.9%
	Total	1.1%	.2%	7.6%
Other family structure	Count	7	1	25
	Expected	5	2	25
	% within family structure	21.2%	3%	75.8%
	% within groups	3.1%	1%	2.3%
	Total	.5%	.1%	1.8%
Total	Count	225	97	1078
	Expected	225	97	1078
	% within family structure	16.1%	6.9%	77%
	% within groups	100%	100%	100%
	Total	16.1%	6.9%	77%

Table 5. Means differences for types of motivation, perceived competence, and grades.

Variables/groups	Group 1 Low	Group 2 Father Low	Group 3 Moderately autonomy-supportive	ANOVA F tests	Effect size η^2
Intrinsic motivation	2.50a	3.56b	3.43bc	$F(2,1400) = 68.32^{**}$	.09
Identified regulation	3.51a	4.17b	4.16bc	$F(2,1400) = 45.17^{**}$	.06
Introjected regulation	3.17a	4.00b	3.76bc	$F(2,1398) = 30.33^{**}$	.04
External regulation	3.80a	4.03ab	4.02bc	$F(2,1399) = 4.09^{*}$	.01
Perceived competence	4.59a	5.26b	5.47bc	$F(2,1403) = 57.89^{**}$	.08
Grades	66.75a	69.90b	73.81c	$F(2,1403) = 48.01^{**}$	.06

Note: Different subscripts indicate significant differences at $p < .05$ on post hoc comparisons using Tukey HSD.
* $p < .02$.
** $p < .01$.

Figure 1. Groups of autonomy supportive relationships from LCA (using centered scores).