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A self-determination theory perspective on autonomy support, autonomous self-regulation, and perceived school performance

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ABSTRACT

A self-determination theory perspective on motivation assumes that students' motivation may be described in terms of perceived autonomy support from their teacher, their basic need satisfaction, self-regulation and perceived competence. The present study investigated these aspects of motivation among 316 upper secondary school students. A path analysis showed that students' perceived autonomy support predicted their need satisfaction, which in turn predicted autonomous self-regulation, perceived competence and perceived school performance. The relation between basic need satisfaction and perceived school performance was fully mediated by autonomous self-regulation. Finally, the students' perceived autonomy support was partly accounted for at class-level, indicating that the students in the same class to some extent had similar experience of autonomy support. In conclusion, the present findings supported a motivational model in accordance with self-determination theory.

INTRODUCTION

Educational policy makers have recognized the importance of the teachers' in supporting students' self-regulation as means to enhance school performance (Kunnskapsdepartementet, 2009, 2011; OECD, 2004). An increasing amount of research suggests that autonomous self-regulation and perceived competence among students are important for school performance (Deci, Hodges, Pierson, & Tomassone, 1992; Fortier, Vallerand, & Guay, 1995; Miserandino, 1996). According to self-determination theory (SDT), both students' perception of their teachers' autonomy support and basic need satisfaction of autonomy, competence, and relatedness are important in promoting autonomous self-regulation and perceived competence (Deci & Ryan, 1985; Ryan & Deci, 2000b).

Previous research has found support for a model in which perceived autonomy support, need satisfaction, autonomous self-regulation, and perceived competence have been applied in motivational models in order to explain several beneficial educational outcomes (Guay & Vallerand, 1997; Ntoumanis, 2005; Vallerand, Fortier, & Guay, 1997). The present study will further investigate the validity of a model based on the abovementioned previous findings by applying such a model to a sample of upper secondary school students. From an educational perspective, it is important to examine upper secondary students since it is the final formal education before applying for college or job and in many instances school performance is vital for further school and job possibilities.

Whereas some studies have applied SDT principles in a Norwegian context (Danielsen, 2010; Diseth, Danielsen, & Samdal, 2012; Diseth & Samdal, 2014; Olaussen, 2009; Ommundsen &

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Kvalø, 2007; Stornes, Bru, & Idsoe, 2008), none of them have assessed upper secondary students, within the framework of a complete SDT model. Hence, the main purpose of the current study is to investigate an integrative model of need support, need satisfaction, perceived competence and autonomous self-regulation among Norwegian secondary school students in order to further test the validity of such a model within a SDT framework.

Self-determination theory

Self-determination theory assumes satisfaction of basic psychological needs as fundamental for students' intrinsic motivation (Ryan & Deci, 2000). These needs are fostered by teachers' autonomy supportive behaviours by identifying, nurturing, and developing students' inner motivational resources during instruction (Reeve, 2009). Autonomy supportive teachers acknowledge negative affect, provide choice, and provide opportunity for self-initiative and self-paced work, while being warm and caring (Niemiec & Ryan, 2009; Reeve & Jang, 2006). In contrast, controlling teachers pressure students to behave in particular ways (Deci & Ryan, 1985). Controlling teachers use controlling statements, take their own perspective and provide students with little choice (Reeve & Jang, 2006).

Furthermore, autonomy support and basic need satisfaction is considered to predict students' self-regulation, which is considered to parallel the abovementioned distinction between autonomous and controlled self-regulation (Ryan & Deci, 2002). Controlled self-regulation refers to behaviours done because it leads to a separable outcome, has an external perceived locus of causality, and are experienced as pressured and contingent upon external demands (Ryan & Deci, 2000a, 2002). In contrast, autonomous self-regulation refers to personally important behaviours done freely, volitionally and with an internal perceived locus of causality (Black & Deci, 2000; DeCharms, 1968). Students that experience school behaviours as personally important perceive their behaviour as self-determined. These students are more likely to perform a learning task out of pleasure, be more persistent, acquire knowledge and finally, achieve higher grades (Ryan & Deci, 2006). In contrast, students' that experience school behaviours as pressured and contingent upon external demands are more likely to give up when facing difficulty, have superficial learning strategies, and finally receive lower school grades (Niemiec & Ryan, 2009).

In the classroom, the teacher affects the motivational climate as an authority figure (Guay, Ratelle, & Chanal, 2008; Hattie, 2009). Accordingly, SDT asserts that perceived autonomy support and need satisfaction will promote autonomous self-regulation and perceived competence, while thwarting of the needs will foster controlled forms of motivation and incompetence (Deci & Ryan, 1985; Deci, Ryan, & Williams, 1996; Ryan & Deci, 2006).

Previous research has supported this line of reasoning. In an experiment by Deci, Eghrari, Patrick and Leone (1994) a group of students who received autonomy support in terms of acknowledgement of negative affect, meaningful rationale and choice, were more likely to enhance their autonomous self-regulation. In contrast, students who received less autonomy support were more likely to develop controlled self-regulation. For example, Williams and Deci (1996) performed a longitudinal study with medical students and found that the perception of their instructor as autonomy supportive led to perceived competence and

autonomous self-regulation. Similarly, Black and Deci (2000) found a positive relation between the students perceived autonomy support from their instructor and their academic achievement, perceived competence and increased interest during the course of the semester.

Generally, studies suggest that students report enhanced autonomous self-regulation and perceived competence to the extent that their teacher provides them with need satisfaction and autonomy support (Danielsen, 2010; Grolnick & Ryan, 1987, 1989; Koestner, Ryan, Bernieri, & Holt, 1984; Olaussen, 2009; Ommundsen & Kvalø, 2007; Reeve, Bolt, & Cai, 1999; Reeve, Nix, & Hamm, 2003; Ryan & Grolnick, 1986; Stornes, et al., 2008; Vallerand & Reid, 1984, 1988). Several studies have found that teachers' autonomy support is associated with autonomous self-regulation and enhanced school performance, while controlling behaviours is related to controlled self-regulation (Deci, Nezlek, & Sheinman, 1981; Deci, Schwartz, Sheinman, & Ryan, 1981; Flink, Boggiano, & Barrett, 1990). In addition, students who are exposed to the same teacher may be more likely to agree upon their perception of their teachers as autonomy supportive or controlling. According to SDT, a teacher's autonomy support or control can be perceived in relatively similar ways within a classroom (Deci & Ryan, 1985; Diseth, Danielsen, & Samdal, 2012).

Several studies have found a positive link between autonomous self-regulation, perceived competence and school performance. A study by Miserandino (1996) showed that autonomous self-regulation and perceived competence predicted school performance. A similar study by Fortier et al. (1995) showed that both autonomous self-regulation and perceived competence predicted school performance in four subjects. Research shows that students that are autonomous motivated have greater interest and conceptual understanding, higher competence, and better school performance (Benware & Deci, 1984; Black & Deci, 2000; Deci, et al., 1992; Grolnick & Ryan, 1987, 1989; Ryan & Connell, 1989; Velki, 2011).

Motivational model

Several motivational models based on SDT have found that the social climate and the students' personal motivation can predict educational outcomes. Guay and Vallerand (1997) found that students perceived autonomy support from their parents, teachers and administration, predicted autonomous self-regulation and perceived competence, which in turn predicted academic achievement. A similar study by Vallerand et al. (1997) found that students who reported less self-determined motivation and perceived autonomy support from parents, teachers and administration had stronger intentions to drop out and they were more at risk of actually dropping out of school one year later. Ntoumanis (2005) replicated the study on dropout by Vallerand et al. (1997) and found that perceived autonomy support predicted autonomous self-regulation via need satisfaction. Autonomous self-regulation in turn predicted drop out intentions and actual participation in optional physical education program.

Problems and hypotheses

On basis of the abovementioned theoretical assumptions and previous research findings, the present study investigates whether it is possible to find support for a model in which autonomy support predicts need satisfaction, which in turn predicts competence/self-regulation and perceived academic performance. This model is supported by the notion that to the extent that the teacher is perceived as autonomy supportive, the students will have their psychological needs of autonomy, competence and relatedness satisfied (Ryan & Deci, 2002). Furthermore, basic need satisfaction will promote autonomous self-regulation and perceived competence (Deci et al., 1996). Autonomous self-regulation and perceived competence is in turn, positively related to educational outcomes such as school performance (Ryan & Deci, 2000a).

The following hypotheses are put forward:

- Support for a model as follows:
  Autonomy support → need satisfaction → competence/self-regulation → achievement
- Need satisfaction, competence and self-regulation will mediate the relation between autonomy support and the students' perceived academic achievement.
- Autonomy support will be accounted for at class-level.

METHOD

Participants

The participants in the present study comprised student from an upper secondary education school in Hordaland County. The total school population of 395 students, 316 (80%) students from 16 classes (average class size: 19.75) volunteered to participate (155 boys and 159 girls, two students did not report gender).

Procedure

Potential ethical issues were addressed by obtaining approval for performing the study from the Norwegian Social Science Data Services Privacy Ombudsman for Research (NSD). The surveys were administered to the students one month after the students had begun the school year in order to ensure that the new students had an opportunity to become familiar with their contact teacher. The survey took approximately 10 minutes to complete. However, the school was asked to avoid having the students contact teacher present in the classroom during the administration of the survey. The students were informed that the participation was voluntary, their responses were anonymous, and that they could withdraw from participating at any time subsequent to data collection.

Although the choice between quantitative and qualitative method is an epistemological and ontological question, the present study applied an empirical approach in line with the scientific premise of understanding moderating and mediating processes (Ryan & Niemiec, 2009). SDT maintains that basic psychological needs are universal and thus reliably observed across cultures, hence quantitative assumptions was chosen in order to predict and suggest reliable and effective pedagogical practices.

Data analysis

A path analysis was performed in order to investigate the multivariate relations between the variables. The path analysis was performed by means of structural equation modelling (SEM) AMOS 20 (Arbuckle, 2007), according to abovementioned theoretical assumptions. The model fit was assessed in accordance with methodical recommendation from Hu and Bentler (1999) and Kline (2011). Comparative Fit Index (CFI) indicates the difference between the independent model and specified model, the root mean square error of approximation (RMSEA) on the other hand, estimates how well the model would fit the sample if optimal parameters were available (Hu & Bentler, 1999). Accordingly, a CFI value as low as .95 is an acceptable cut-off, while a RMSEA below .05 is preferable, however values as high as .08 is accepted, and a chi square/df ratio below two is recommended (Byrne, 2001).

MEASURES

Perceived autonomy support.

Students' perception of autonomy support from their contact teacher was measured by means of a short version of the Learning Climate Questionnaire (LCQ) obtained from www.selfdeterminationtheory.org. This version of the LCQ consists of six items (e.g. "I feel that my instructor provides me with choices and options"). Each item was measured on a 7-point likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Previous studies have shown adequate reliability with Cronbach's alpha of .96 (Williams & Deci, 1996) and .93 (Black & Deci, 2000). The present study showed an alpha level of .92. A principal component analysis (direct oblimin rotation) was conducted in order to estimate the number of factors. The PCA produced a one factor solution with eigenvalues>1, explaining 73.38 % of the variance.

Basic need satisfaction at school

Students support of the basic needs in school was assessed by using the Basic Psychological Need Scale (BPNS) obtained from www.selfdeterminationtheory.org. BPNS is a 21-item questionnaire adapted for school, and assesses the students basic need satisfaction for

autonomy (7 items; " At school I feel like I am free to decide for myself how to be"), competence (6 items; "People at school tell me I am good at what I do"), and relatedness (8 items; "I really like the people I interact with at school"). Ntoumanis (2005) reported alpha values of .70 for autonomy, .66 for competence, and .84 for relatedness. The present study found alpha values for autonomy (4 items; .73), competence (5 items; .73), and relatedness (8 items; .86), respectively. A principal component analysis (direct oblimin rotation) produced a one factor solution with eigenvalues>1 explaining 36.65 % of the variance in basic need satisfaction at school. Three items were removed from autonomy and one for competence, due to weak loadings, all of which were negatively worded.

Self-Regulation

Students' self-regulation was measured using the Academic Self-Regulation Questionnaire LD-version (ASRQ-LD). The SRQ measures students' reasons for doing school related behaviours. The scale consists of 17 items measuring the four subscales of,- extrinsic regulation (e.g. "I do my class work so that my teacher won't yell at me"), introjected regulation (e.g. "I try to answer hard questions in class because I want the other students to think I'm smart"), identified regulation (e.g. "I try to do well in school because I like doing a good job on my school work"), and intrinsic motivation (e.g. "I try to answer hard questions because it's fun to answer hard questions"). The students responded on a four-point scale (very true, sort of true, not very true, not at all true).

Previous studies have reported Cronbach's Alpha ranging from .62 to .82 (Deci, et al., 1992; Ryan & Connell, 1989). In the present sample, the following Cronbach's Alpha were found for extrinsic regulation (6 items, $\alpha = .61$), introjected regulation (5 items, $\alpha=.70$) identified regulation (3 items, $\alpha=.60$) and intrinsic motivation (2 items, $\alpha=.50$). A principal component analysis (direct oblimin rotation) was conducted to explore the underlying structure of the items. The analysis produced a four factor solution with eigenvalues >1, explaining 21.87 %, 15 %, 9.40 %, and 7.70 % of the variance, respectively. A Relative Autonomy Index (RAI) was calculated by weighting external regulation -2, introjected regulation -1, identified regulation +1, intrinsic motivation +2 (Deci, et al., 1992; Grolnick & Ryan, 1989). Thus, a higher score indicates that the student is more autonomously motivated.

Perceived Competence

Students perceived competence were measured by the Perceived Competence (PC) scale obtained from www.selfdeterminationtheory.org. PC contains 4 item, and measures the students felt competence. The students were asked to rate their agreement with the items on a 7-point scale ranging from 1 (not at all true) to 7 (very true). An example from the questionnaire is "I feel confident in my ability to learn the material we have at school". Williams and Deci (1996) reported alpha value of $\alpha=.80$, while Black and Deci (2000) found an alpha of .86. The current study found an alpha of .92. A principal component analysis

(direct oblimin rotation) supported a one-factor solution with eigenvalues>1 explaining 81.17 % of the variance.

School performance

Students' school performance was assessed using a one-item measure. In order to secure the subjects anonymity, the students perceived school performance (PSP) were measured as opposed to their actual achievement. The students were asked to respond to the item "What do you think your contact teacher thinks of your school grades compared to your classmates?" on a four point scale (very good, good, average, below average). Previous meta-analyses of the accuracy of students self-reported school grades concluded that self-reported grades reflects students actual grades, however, self-reported grades for low-ability students may be less accurate (Cole & Gonyea, 2010; Kuncel, Credé, & Thomas, 2005). A recent study by Felder-Puig et al. (2012) found substantial overlap between students achieved grades and perceived school performances. Hence, the students' self-reported level of school performance is assumed to be adequate for the current study.

RESULTS

Descriptive statistics and correlations

Descriptive statistics in Table 1 show acceptable distribution of data, as indicated by skewness and kurtosis (degree of peakedness/cluster) values. The high kurtosis value of the variable basic need satisfaction of relatedness (kurtosis = 5.96), is not critical to subsequent analyses, as all of the basic need satisfaction variables were collapsed into a common basic need satisfaction in general variable.

Furthermore, the correlation analysis in Table 2 shows increasing strength in correlation between the self-regulation variables and perceived school performance, depending on the degree to which self-regulation (learning toward school) has been internalized. More specifically, external regulation showed a non-significant correlation, introjected regulation shows a positive, but small correlation ($r=.18$, $p<.01$). Identified regulation shows a medium positive correlation ($r=.29$, $p<.01$), and intrinsic motivation shows medium positive correlation ($r=.36$, $p<.01$) with perceived school performance.

Table 1. Measures mean, standard deviations (SD), Cronbach's Alpha (α), skewness, and kurtosis.

Measure	Mean	SD	α	Skewness	Kurtosis

1.Perform	2.70	.70	-	-.16	-.13
2.PC	5.48	1.16	.92	-.69	.02
3.AutSupp	4.87	1.30	.92	-.57	.06
4.RAI	10.63	1.71	-	-.36	.11
5.BNSgen	5.49	.77	-	-.77	1.01
6.BNScomp	4.72	1.02	.73	-.29	-.06
7.BNSrel	6.18	.86	.86	-.1.97	5.96
8.BNSaut	5.56	.99	.73	-1.04	1.79
9.IN	2.42	.78	.50	-.14	-.73
10.ID	3.00	.63	.60	-.50	.28
11.IJ	2.45	.58	.70	-.15	-.24
12.EX	2.75	.56	.61	-.33	-.10

Note: Perform: Perceived school performance, PC: Perceived competence, AutSupp: Autonomy support, RAI: Relative Autonomy Index, BNSgen: Need satisfaction in general at school, BNScomp: Competence satisfaction at school, BNSrel: Relatedness satisfaction at school, BNSaut: Autonomy satisfaction at school, IN: Intrinsic motivation, ID: Identified regulation, IJ: Introjected regulation, EX: External regulation.

Table 2. Bivariate correlations between the measures.

Measures:						Correlations						
	1	2	3	4	5	6	7	8	9	10	11	12
1.Perform	-											
2.PC	.43**	-										
3.AutSupp	.35**	.15**	-									
4.RAI	.36**	.27**	.21**	-								
5.BNSgen	.33**	.36**	.30**	.33**	-							
6.BNScomp	.57**	.46**	.30**	.44**	.75**	-						
7.BNSrel	.06	.15**	.15**	.14*	.82**	.37**	-					
8.BNSaut	.11	.24**	.28**	.18**	.86**	.42**	.68**	-				

9.IN	.36**	.36**	.21**	.74**	.33**	.43**	.09	.24**	-			
10.ID	.29**	.27**	.25**	.74**	.35**	.44**	.16**	.21**	.60**	-		
11.IJ	.18**	.04	.13*	.67**	.14	.18**	.08	.04	.22**	.25**	-	
12.EX	.05	-.01	-.09	.47**	-.01	-.00	.04	-.02	-.04	.01	.45**	-

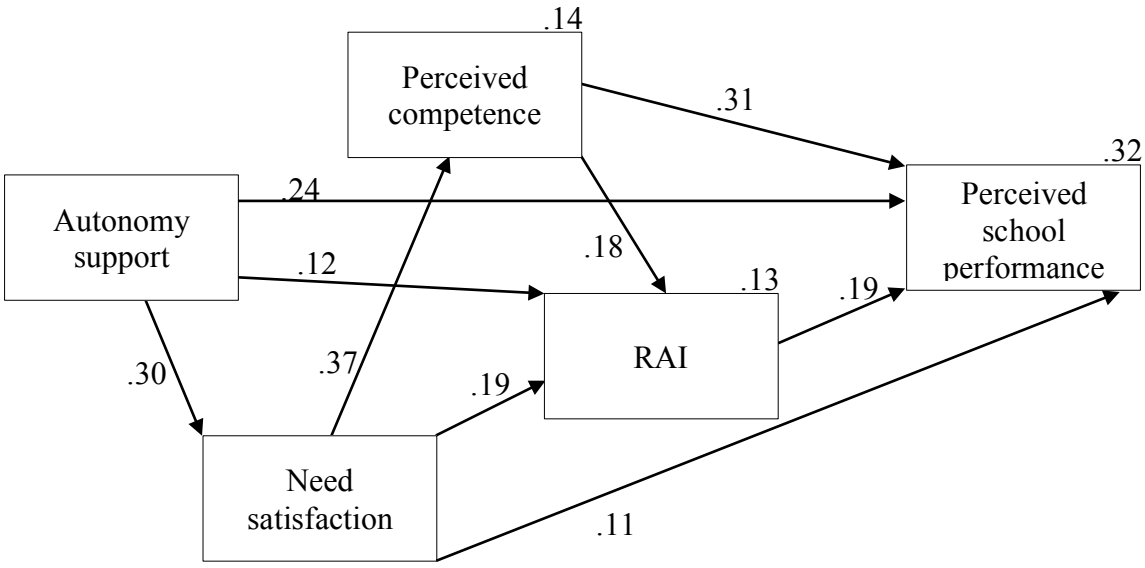
Note: ** Correlation is significant at 0.01 level (two-tailed)
* Correlation is significant at 0.05 level (two-tailed)

Perform: Perceived school performance, PC: Perceived competence, AutSupp: Autonomy support, RAI: Relative Autonomy Index, BNSgen: Basic Need satisfaction in general at school, BNScomp: Basic Need Satisfaction of Competence, BNSrel: Basic Need Satisfaction of Relatedness, BNSaut: Basic Need Satisfaction of Autonomy, IN: Intrinsic motivation, ID: Identified regulation, IJ: Introjected regulation, EX: External regulation.

Path analysis

A path analysis was performed in order to investigate the multivariate relations between the variables. The current model (Figure.1) produced satisfactory indices (chisq = .45, df = 1, p > .50, chisq/df = .45, CFI = 1.00, RMSEA = .00). The entire model accounted for 32 % of the variance in the students perceived school performance, mainly due to significant path from perceived competence (β = .31) , but also from autonomy support (β = .24) and relative autonomy index (β = .19). Hence, students' perception of their teachers autonomy support, students' satisfaction of their basic needs, perceived competence and autonomous self-regulation explained 32 % of the students' perceived school performance.

Figure 1. A path analysis of autonomy support, need satisfaction, perceived competence, relative autonomy index (RAI), and perceived school performance.



.09

Note: All the path coefficients are significant at the (p< .01), except the path between autonomy support and RAI (p<= .05). The path between need satisfaction and perceived school performance is not statistical significant. All the residuals are standard estimates.

Perceived competence, RAI, and need satisfaction may be considered as mediators in the current model. Hence, several Sobel tests were performed in order to investigate the significance of the mediators (Sobel, 1982). According to Kline (2011) certain assumptions must be met in order to test a mediator effect. Firstly, the independent variable (IV) must correlate significantly with the mediator variable (MV). Secondly, the mediator variable must correlate significantly with the dependent variable (DV). Lastly, the independent variable must correlate significantly with the dependent variable. To test the mediators significant level, the regression weights and standard error of the path between the IV and the MV, the MV and the DV, were calculated (Diseth & Kobbeltvedt, 2010). The parameters that were tested are shown below, with the respective results.

- Autonomy support → Need satisfaction → RAI
  showed a significant mediator effect, p < .01.
- Autonomy support → Need satisfaction → Perceived school performance
  showed a non-significant mediator effect (p > .01).
- Autonomy support → RAI → Perceived school performance
  showed a significant mediator effect, p < .01.
- Need satisfaction → RAI → Perceived School Performance
  showed a significant mediator effect, p< .01, indicating a full mediation due to the non-significant path between need satisfaction and perceived school performance.
- Need satisfaction → Perceived competence → Perceived school performance.
  showed a non-significant mediator effect (p > .01).
- Perceived competence → RAI → Perceived school performance
  showed a significant mediator effect, p< .01.

The Sobel test supported the abovementioned mediators. All, except need satisfaction and perceived school performance showed significant mediator effects. However, only need satisfaction→RAI→apperceived school performance showed a full mediation.

To further assess the validity of the model, two alternative models were tested. Alternative model 1 included the full mediated effect of students perceived autonomy support from their contact teachers on perceived competence and autonomous self-regulation, mediated by basic need satisfaction, in order to predict perceived school performance. However, this model

produced unsatisfactory indices (chisq = .46, df = 5, p < .000, chisq/df = .46, CFI = .81, RMSEA = .16). The model explained 23 % of the variance in perceived school performance. Perceived competence (β= .38) and autonomous motivation (β= .26) positively predicted perceived school performance. All the path coefficients were statistical significant, however the result shows that the alternative model 1 explained less than the current model.

An alternative model 2 included the full mediation effect of students perceived autonomy support from their contact teachers on perceived school performance, mediated by perceived competence and autonomous self-regulation. The model was tested in order to analyse if basic need satisfaction was redundant, in accordance with Ntoumanis (2005). However, SDT asserts that satisfaction of the basic need for autonomy, competence, and relatedness is necessary for the promotion of autonomous self-regulation. Hence, it is not a SDT model without basic psychological needs. The model produced unsatisfactory indices (chisq = .46, df = 2, p < .50, chisq/df = .46, CFI = .69, RMSEA = .26). The model as a whole explained 22 % of the variance in perceived school performance mainly explained by perceived competence (β= .38) and autonomous self-regulation (β= .27). Thus, no changes was made to further explore the model.

Intraclass correlations and design effect

Another purpose of the study was to test whether autonomy support from the students contact teacher, and the other variables, could be accounted for at class-level. An Analysis of Variance (ANOVA) was performed to obtain within and between group mean squares for each of the variables. To obtain intraclass correlation (ICC), the ANOVA results are calculated into an online ICC calculator (Soper, 2012). The scores were calculated along with the mean group size (mean = 20). Furthermore, the design effect (DEFF) were calculated using the following formula DEFF= 1+ (m-1) x p, where m is the group size, and p is the ICC (Diseth, et al., 2012; Hox, 2010). Table. 3 show that the ICC for perceived autonomy support were found to be .372, which means that 37.2 % of the variance in students perceived autonomy support can be explained at class-level (Tabachnick & Fidell, 2007). According to Hox (2010) a DEFF value of 2 is considered as a substantial value. The DEFF of the students perceived autonomy support from their contact teacher of 7.44 was regarded as a high value, while the DEFF of identified regulation (1.36) was estimates as below the cut-off of more than 2. Further, perceived school performance, perceived competence, relative autonomy index, need satisfaction, intrinsic motivation, introjected regulation, and external regulation, had a DEFF ranging from -.26 to .44 and thus below the cut-off value.

Table 3. Intraclass correlations (ICC) and design effect (DEFF).

Item	ICC	DEFF
1.Perceived school performance	0.02	0.44
2.Perceived competence	0.01	0.10

3.Autonomy support	0.37	7.44
4.Relative autonomy index	- 0.01	- 0.26
5.Basic need satisfaction in General	0.02	0.40
6.Basic need satisfaction of competence	- 0.03	- 0.68
7.Basic need satisfaction of relatedness	0.02	0.38
8.Basic need satisfaction of autonomy	0.04	0.78
9.Intrisic motivation	0.01	0.12
10.Identified regulation	0.07	1.36
11.Introjected regulation	0.01	0.16
12.External regulation	0.01	0.28

DISCUSSION

The purpose of the current study was to investigate the relations between several variables within a SDT framework, and to test how these variables may be accounted for by structural model in accordance with previous research (cf. Ntoumanis, 2005; Vallerand et al., 1997). It was hypothesized that the students perceived autonomy support from their contact teacher, their perceived competence, and their autonomous self-regulation (measured as RAI), would positively predict their perceived school performance. The findings in the current study provide support for this hypothesis. More specifically, the relation between autonomy support and perceived school performance was partly mediated by autonomous self-regulation. Furthermore, the path between need satisfaction and perceived school performance, showed a full mediation by autonomous self-regulation. Finally, the relation between perceived competence and school performance was partly mediated by autonomous self-regulation. The model showed a positive statistical significant relation between all paths, except between need satisfaction and perceived school performance.

Results from the study suggest that both autonomous self-regulation and perceived competence are positively related to perceived school performance. The correlation analysis showed that more autonomous forms of motivation (intrinsic, identified) are more positively associated with perceived school performance, as opposed to controlled self-regulation (introjected, external). Moreover, the relation between perceived competence and perceived school performance was partly mediated by autonomous self-regulation. This is in line with previous studies (Guay, Boggiano, & Vallerand, 2001; Reeve & Deci, 1996; Vallerand & Reid, 1984, 1988). Accordingly, a student that act out of choice, volition, and that identifies with the behaviour at hand is more likely to have an internal perceived locus of causality (Ryan & Connell, 1989), and thus, be more autonomous within their learning task and performance. Likewise, students that feel efficacious and competent within an activity is more likely to perform better at school (Deci & Moller, 2005; Schunk & Pajares, 2009). Both laboratory and correlation studies have shown that autonomous motivated and competent

students have a greater conceptual understanding (Benware & Deci, 1984; Grolnick & Ryan, 1987; Ryan, Connell, & Plant, 1990), are more persistent at school (Hardre & Reeve, 2003; Vallerand, et al., 1997), and have better school grades (Fortier, et al., 1995; Grolnick, Ryan, & Deci, 1991; Lepper, Corpus, & Iyengar, 2005; Miserandino, 1996).

The results showed that students perceived autonomy support from their contact teacher and need satisfaction of autonomy, competence and relatedness are related to both perceived competence and autonomous self-regulation. As expected, the relation between need satisfaction and perceived school performance showed a full mediation by autonomous self-regulation. This is in accordance with SDT which assumes that need satisfaction of autonomy, competence and relatedness is necessary for the promotion of autonomous self-regulation and healthy functioning (Deci & Ryan, 2000; Ryan & Deci, 2000b). A recent study by Diseth et al. (2012) showed that basic need satisfaction of competence and relatedness predicted achievement levels, partly mediated by mastery goals. Similar studies have also found a link between teachers' autonomy supportiveness and students' autonomous self-regulation and schoolwork initiative (Danielsen, 2010; Olaussen, 2009). Furthermore, Ntoumanis (2005) found that autonomy support predicted autonomous self-regulation, fully mediated by need satisfaction. Finally, Stornes et al. (2008) found that students' autonomy support from their teacher predicted mastery climate.

A secondary goal was to investigate if the students' perception of autonomy support from their contact teacher could be accounted for at class-level. It was hypothesized that of the current variables, only perceived autonomy support from the students contact teacher could be accounted for at class-level. The hypothesis was supported, shown by the design effect. These results are in line with previous research. Danielsen (2010) model of student initiative for schoolwork explained more at the class-level than individual-level. Diseth et al. (2012) found a design effect (3.34) for students' support of the need for relatedness by their teachers. The present study found a substantial design effect of 7.44. The large design effect could be attributed to the formulation of the items. Whereas previous research (Danielsen, 2010; Diseth et al., 2012; Ommundsen & Kvalø, 2007; Stornes et al., 2008) assessed students' perception of multiple teachers, the present study assessed students' perception of their contact teacher.

Furthermore, the path coefficient between perceived autonomy support and perceived school performance was partly mediated by the students' autonomous self-regulation. Studies of school children have also found both direct and indirect relations between autonomy support, autonomous self-regulation, and achievement (Grolnick & Ryan, 1989; Grolnick et al., 1991). The current model showed that perceived autonomy support was related to both autonomous self-regulation and perceived school performance, underscoring the importance of students' perceived autonomy support from their contact teacher.

Practical implications

The study has a number of practical implications. The research provides evidence for internalization and self-determined motivation in accordance with Self-Determination theory

(cf. Guay & Vallerand, 1997; Ntoumanis, 2005; Vallerand et al., 1997). Students that are more autonomously motivated, reports higher perceived school performance. Thus, teachers and schools would need to foster self-initiation, interest, and volition in students in order to be autonomous motivated. Teachers are recommended to be autonomy supportive, as opposed to controlling. That is, to try to understand the student internal frame of reference, provide them with choice, giving them appropriate challenges and giving them a meaningful rational (Reeve, 2009; Reeve & Jang, 2006).

Limitations

The current study is based on a cross sectional design and correlations. Additional methods could have made a clearer understanding of the cause-effect on school performance. Due to lack of experimental control, no causal inferences can be made. Assessment of the teachers' interpersonal style could have reduced shared method variance. On the other hand, it may be argued that it is not the motivators style per se that is essential, but the individual being motivated, and his or her perception of the motivator is important (Diseth, et al., 2010; Vallerand et al., 1997). Vallerand et al. (1997) further asserts that children's perception of teachers are often more accurate than teachers own judgment of their behaviour. Thus, measurement of the students' perceived autonomy support from their teacher was considered appropriate for the present study.

Secondly, the study use perceived school performance as an endogenous variable. The results of the present study cannot determine if increased perceived competence and autonomous self-regulation actually can increase school grades. Future research would have to use actual achieved school grades to increase the external validity of the findings in a prospective design. However, in order to ensure the participants anonymity, it was not possible to collect the students' school grades. Furthermore, perceived school performance have shown adequate construct validity, as described above (Felder-Puig et al., 2012). Hence, the strategy used was appropriate for the purpose of the study.

Finally, there are possibilities for several other factors (e.g. cognitive and socio-economic) to be related to perceived school performance as predictors and/or mediators.

In conclusion, the study highlights the importance of the students' perception of their teachers' autonomy support. Thus, the results of this study are in line with self-determination theory, which assumes a relation between the variables included in the present study. Future studies should replicate the current model with other students as sample, such as secondary students, and college students.

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