

What motivates students at school? Students' motivation profile from a Self-Determination perspective

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Abstract

In this study, 243 upper and 29 lower secondary school students from a private school in Bologna responded to a survey measuring the students' academic motivation, the satisfaction of basic psychological needs, and teacher autonomy support according to the Self-Determination Theory. The purpose was to investigate the distribution of these variables and school-level-based differences in the sample analysed. Results show that, overall, students have a high mean level of autonomous motivation and satisfaction of competence and relatedness needs. Instead, students report a medium level of teacher autonomy support and a low level of autonomy need satisfaction. The results also show a decrease in almost all motivational variables in the transition from lower to upper secondary school. These findings constitute an element of interest in orientating the learning-teaching process towards improving students' motivation.

Nel presente studio, 243 studenti di secondaria di secondo grado e 29 di primo grado di una scuola di Bologna hanno partecipato a un'indagine che analizzava, in base alla Teoria dell'Autodeterminazione, la motivazione scolastica, la soddisfazione dei bisogni psicologici di base e il supporto all'autonomia da parte degli insegnanti. Lo scopo era quello di indagare la distribuzione di queste variabili e le eventuali differenze a livello di grado scolastico. I risultati indicano che complessivamente gli studenti presentano un livello elevato di motivazione autonoma e di soddisfazione dei bisogni di competenza e di relazione, mentre riportano un livello medio di supporto all'autonomia da parte degli insegnanti e un basso livello di soddisfazione del bisogno di autonomia. I risultati evidenziano inoltre una diminuzione di quasi tutte le variabili motivazionali nel passaggio dalla scuola di primo grado a quella di secondo grado. I risultati costituiscono un elemento di interesse per orientare il processo di apprendimento-insegnamento al miglioramento della motivazione degli studenti.

Keywords: Self-Determination Theory; academic motivation; basic psychological needs; teacher autonomy support; grade level differences

Parole chiave: Teoria dell'Autodeterminazione; motivazione scolastica; bisogni psicologici di base; supporto all'autonomia; differenze di grado scolastico

1. Introduction

One of the greatest challenges faced by those working in education is to motivate students to learn. Student motivation has been, and still is, at the centre of the concerns of teachers, psychologists, and pedagogues (Beluce & De Oliveira, 2015; Murphy & Alexander, 2000; Pintrich, 2000). Theories of motivation have outlined that students only engage in deeper learning processes if they are interested and willing to do so (Pintrich, 2003; Reeve et al., 2004), thus emphasising the importance of motivational variables as individual prerequisites for successful learning processes (Furtak & Kunter, 2012). In recent years, psycho-pedagogical research has devoted a great deal of attention to the study of motivational processes and dynamics, especially as it has been consistently found to impact students' functioning at school. Research has repeatedly highlighted how motivation affects students' learning strategies, school performance, achievement, adjustment, and well-being in educational settings (e.g., Gottfried et al., 2013; Guay, et al., 2008; Kusrkar et al., 2012; Vansteenkiste, Zhou et al., 2005). Student motivation has been addressed in the literature by different motivational frameworks, including the Self-Determination Theory (SDT) (Deci & Ryan, 1985, 2000, 2002, 2008; Ryan & Deci, 2000a, 2017). SDT has proven to be particularly useful in accounting for changes in students' learning strategies, well-being, performance and persistence, as well as in helping to clarify how the school environment affects their motivation and performance (Kusrkar et al., 2012; Kusrkar et al., 2013; Lavigne et al., 2007; Ratelle et al., 2007; Vansteenkiste et al., 2006; Vansteenkiste et al., 2005).

The purpose of this study is to investigate, using a sample of Italian lower and upper secondary school students from a private school in Bologna, students' academic motivation, as well as perceptions of the satisfaction of basic psychological needs (i.e., autonomy, competence, and relatedness) and teachers' autonomy support according to the SDT. Understanding the school's driving forces for students and their perceptions of needs satisfaction and teaching styles, as well as identifying possible school-level-based differences, can be of considerable interest to teachers to better motivate their students at school and in the instructional and/or educational decisions they make in designing the learning-teaching process.

2. Self-determination theory

As a "macrotheory of human motivation" (Deci & Ryan, 2008, p. 182), SDT addresses several issues. Only those relevant to the paper's topic (motivational continuum, basic psychological needs, and the teaching environment) are outlined below.

2.1. Motivational continuum

SDT considers the reasons why individuals are motivated to engage in a particular behaviour. According to SDT, there is a motivational *continuum* from 'amotivation' to 'intrinsic motivation' through four different types of extrinsic motivation: external, introjected, identified, and integrated regulation (Deci & Ryan, 2000, 2008; Ryan & Deci, 2000a, 2000b, 2002, 2017). SDT distinguishes different types of motivation based on the perceived locus of causality and degree of autonomy in behaviour regulation (Deci & Ryan, 2000; Guay et al., 2008; Ryan & Deci, 2000b, 2002; Vallerand et al., 2008). According to SDT, both introjected and external regulation represent controlled motivation as they have an externally perceived locus of causality and are coupled with experiencing obligation and pressure, i.e., behaviours governed by external rewards or self-imposed introjected pressures (Deci & Ryan, 2000, 2008; Ryan & Deci, 2000a, 2000b, 2009; Vansteenkiste et al., 2006). Conversely, intrinsic, identified, and integrated regulations represent autonomous motivation as they have an internally perceived locus of causality and are coupled with experiencing a sense of self-determination, i.e.,

behaviours managed by volition and self-endorsement (Deci & Ryan, 2000, 2008; Ryan & Deci, 2000a, 2000b, 2009; Vansteenkiste et al., 2006). Autonomous and controlled motivation direct behaviour and stand in contrast to amotivation (Deci & Ryan, 2008).

In the school context, research has shown a link between autonomous motivation and greater school persistence (e.g., Howard et al., 2021; Lavigne et al., 2007; O’Neill & Thomson, 2013), more deep-level learning (Núñez & León, 2016; Vansteenkiste, Simons et al., 2005), greater use of adaptive learning strategies (e.g., Vansteenkiste, Zhou, et al., 2005; Ulstad et al., 2018), academic success (e.g., Howard et al., 2021; Ratelle et al., 2007), psychological well-being (e.g., Levesque et al., 2004; Tian et al., 2016), and higher academic achievement and performance (Black & Deci, 2000; d’Ailly, 2003; Guay et al., 2008; Hardre & Reeve, 2003; Howard et al., 2021; Kusurkar et al., 2013; Soenens & Vansteenkiste, 2005; Taylor et al., 2014; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). On the contrary, research has found that controlled motivation is associated with various undesirable outcomes. These include higher dropout rates (Vallerand, Fortier & Guay, 1997; Vansteenkiste, Zhou, et al., 2005), less engagement in adaptive learning strategies and more engagement in maladaptive ones (e.g., Vansteenkiste, Zhou, et al., 2005), superficial-level learning (Vansteenkiste, Simons, et al., 2005), lower achievement (e.g., Soenens & Vansteenkiste, 2005), and ill-being (Vansteenkiste, Zhou, et al., 2005).

2.2. Basic psychological needs

According to SDT, good quality motivation (i.e., autonomous motivation) is facilitated in social contexts that meet students’ needs for relatedness, competence, and autonomy (Ryan & Deci, 2000a, 2002, 2017). Autonomy includes the need to feel responsible and author of one’s own actions, to feel agentic, and to feel that one can make decisions related to one’s actions; autonomy takes the form of being able to make choices and decide what to do and how to do it (Deci & Ryan, 1985, 2016; Ryan & Deci, 2002, 2017). At school, autonomy occurs when a student’s school behaviour is initiated and managed on its own rather than externally controlled and when the behaviour originates from internal rather than external motives. It results in experiencing freedom and a sense of volition in one’s studying (Vansteenkiste et al., 2009). The need for competence refers to the need to feel effective, able, and capable to navigate one’s environment and to succeed, as well as to a sense of personal control; competence takes the form of being able to successfully achieve goals and master situations (Deci & Ryan, 1985, 2016; Ryan & Deci, 2002, 2017). When this need is satisfied, students believe in their competence to achieve desired outcomes and feel in control of their successes and failures. It makes one feel effective in studying (Vansteenkiste et al., 2009). Relatedness includes the need to feel securely and strongly close and connected to others in the social environment and to be capable and worthy of respect and love; relatedness takes the form of being supported by the social environment in one’s actions, of feeling welcomed, cared for, encouraged, and respected (Deci & Ryan, 1985, 2016; Ryan & Deci, 2002, 2017). When this need is satisfied, students feel connected, appreciated, supported, and valued by their teachers and classmates. It results in experiencing a sense of friendship and closeness with one’s peers and teachers (Vansteenkiste et al., 2009).

Within SDT, it is maintained that teachers foster autonomous motivation when they create an environment that facilitates the satisfaction of students’ needs for autonomy, competence, and relatedness. Such a need-supportive environment encourages the development and exercise of a sense of personal initiative and allows students to choose for themselves what to do and how to do it (need for autonomy); it enables them to demonstrate their skills and develop and exercise their potential (need for competence); in such an environment, teachers have confidence in students’ potential, support their actions and develop good relationships (need for relatedness) (Deci & Ryan, 2000; Ryan & Deci, 2000a, 2000b, 2002, 2017).

2.3. Teaching environment

Teachers can adopt different motivating styles to respond to students’ psychological needs and play an important role in influencing students’ motivational orientations and behaviours through the learning environment they create (Reeve, 2016; Ryan & Deci, 2017). Within the SDT, need-supportive teaching is a powerful way to motivate students, help them achieve better results, and have a positive school functioning (Ayllòn et al., 2019; Ryan & Deci, 2017). This type of supportive environment is characterised by providing autonomy, relatedness support (involvement), and competence support (structure) (Ayllòn et al., 2019; Ryan & Deci, 2017). In brief, teacher autonomy support involves taking the students’ perspective, nurturing their inner motivational resources, providing explanatory rationales, acknowledging, and accepting their negative feelings, displaying patience, offering control and choice over activities and how to approach them, and using informational, non-pressuring, and non-controlling language (Reeve & Jang, 2006; Reeve, 2011; Reeve, 2016; Su & Reeve, 2011). Teacher involvement refers to demonstrating attention, interest, and sincere concern, providing warmth, affection, and unconditional regard, as well as being welcoming (Hornstra et al., 2018; Stroet et al., 2013). Finally, teacher structure involves the provision of optimal challenging tasks, adequate help and supervision, and positive and informational competence-related feedback, together with communicating clear objectives, expectations, and guidelines for the upcoming assignment and activity and the tasks to be carried out (Jang et al., 2010; Mouratidis et al., 2013).

Although all three elements are important, research has paid special attention to autonomy support. Most studies on the effects of environmental events on intrinsic motivation have focused on autonomy rather than competence or relatedness (Guay, 2022; Ryan & Deci, 2000a). Moreover, it has been repeatedly found that support for competence (through the structure) and relatedness (through involvement) will foster intrinsic motivation and, in general, good quality motivation only if they are administered in an autonomy-supportive environment (Chang et al., 2017; Vansteenkiste et al., 2009). Similarly, autonomy-supportive practices by teachers are important catalysers of needs satisfaction: autonomy-supportive behaviours enable the teacher to support the need for autonomy, but also the need for competence and relatedness (Guay, 2022).

3. The study

3.1. Research questions

As the current study includes a representative sample of the school and its two school levels (see section 3.2.), it is possible to examine the means of the relevant variables and if the values vary between school levels. The research questions addressed by this study are summarised in Table 1.

Table 1. Research questions in relation to relevant variables.

Variables	Research questions
	In this school:
1. Academic motivation	1.1 What motivates students to go to school? 1.2 Are there differences between lower and upper secondary school students?
2. Basic psychological needs	2.1 What satisfaction of basic psychological needs do the students perceive? 2.2 Are there differences between lower and upper secondary school students?

3. Teacher autonomy support	3.1 How do students perceive their teachers in autonomy support? 3.2 Are there differences between lower and upper secondary school students?
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3.2. Participants and procedure

The study involved all classes, and almost all students, of a private school in Bologna. It involved 272 students, 243 upper secondary school and 29 lower secondary school students¹. Their average age was 17.33 years (SD = 1.61, range 13-22) for upper secondary school and 12.21 years (SD = .94, range 11-14) for lower secondary school. Of the upper secondary school students, 38.7% attended scientific high school (sports curriculum), 23.5 % attended applied sciences high school, 21.4% attended scientific high school (traditional curriculum), and 16.5% attended the technical institute of transport and logistics. The sample consists of students of 1st (11.1%), 2nd (9.9%), 3rd (8.2%), 4th (32.1%), and 5th (38.6%) grades. As for the lower secondary school students, the sample consisted of 1st (34.5%), 2nd (31%), and 3rd (34.5%) grades.

Before the study took place, students and parents were informed about the study. Parents or students, if over 18, had to sign the informed consent to participate in the study. Underage students could also opt out if they wished. During the data collection session, the students had to complete their answers to the survey. The instruments used for this study are illustrated in the next section.

3.3. Instruments

The study analysed the following variables - students' academic motivation, basic psychological need satisfaction and perceptions of teachers' autonomy support - as illustrated below.

Academic motivation. Students' academic motivation was investigated using the Italian version of the *Academic Motivation Scale* (AMS; Alivernini & Lucidi, 2008). AMS includes five subscales measuring Amotivation ($\alpha = .86$), External Regulation ($\alpha = .83$), Introjected Regulation ($\alpha = .85$), Identified Regulation ($\alpha = .81$) and Intrinsic Motivation ($\alpha = .87$). Each subscale consists of four items (20 items in total). Students should indicate how much each item corresponds to why they go to school on a 4-point Likert-type scale from 1 (Not at all) to 4 (A lot). The score of each subscale ranges between 4 and 16. Additionally, as a global measure of students' overall motivational orientation, the current study considered the *Relative Autonomy Index* (RAI), calculated as proposed by Vallerand and Ratelle (2002). RAI consists of the summation of the weighted subscale scores (except Introjected Regulation) and yields an overall motivational index (Vallerand et al., 1997). RAI ranges between -36 and +36, with positive scores indicating more and negative scores indicating more controlling regulation.

Basic psychological needs. Three basic psychological need satisfaction was investigated through 12 items. The researcher formulated the items from the *Adolescent Students' Basic Psychological Needs at School Scale* (ASBPNSS) by Tian and colleagues (2014) and previously studied its factorial structure and reliability in the Italian context². ASBPNSS includes three subscales measuring Competence (McDonald's ω calculated in the present study = .70), Autonomy (ω calculated = .66), and Relatedness (ω calculated = .85). Each subscale includes four items. Students should indicate their agreement with each item on a 5-point Likert-type scale from 1 (Strongly disagree) to 5 (Strongly agree). After reversing two items with negative wording, the overall subscale score is calculated by summing the scores of the individual items and ranges from 4 to 20.

Teacher autonomy support. Students' perceptions of teachers' autonomy support were investigated through the short version of the *Learning Climate Questionnaire* (LCQ) by Williams and Deci (1996). The researcher previously studied its factorial structure and reliability in the Italian context (ω calculated in the present study

= .87)³. The LCQ consists of 6 items. Students should indicate their agreement with each item on a 5-point Likert-type scale from 1 (Strongly disagree) to 5 (Strongly agree). The overall score is calculated by summing the individual item scores and ranges between 6 and 30.

3.4. Data analysis

Mixed analyses of variance (ANOVAs) and independent and one-sample T-tests were conducted to answer the research questions. Statistical analyses were performed using *Jamovi*⁴.

*Mixed ANOVA*⁵. Normality was assumed for the upper secondary school student sample by the central limit theorem and tested using the D'Agostino-Pearson normality test (D'Agostino & Pearson, 1973) for the lower secondary school student sample⁶. Mauchly's test of sphericity (Mauchly, 1940) was used to verify the assumption of sphericity; if it indicated that the assumption of sphericity had been violated ($p < .05$), the Greenhouse-Geisser degrees of freedom correction (Greenhouse & Geisser, 1959) was used. Effect sizes were calculated as *generalised* Eta-squared⁷ (η^2_G) (Olejnik & Algina, 2003). Post-hoc tests were used to test the between-group differences; effect sizes were calculated as Hedges' *g* (Cooper et al., 2009)⁸. The significance level was set at $p < .05$.

Independent sample T-test. Normality was assumed or tested as outlined above. The homogeneity of variances was tested using Levene's test for equality of variance (Levene, 1960); if it indicated that the equal variance assumption had been violated ($p < .05$), degrees of freedom correction for equal variances not assumed was used. The effect size was calculated again as Hedges' *g*.

One-sample T-test. Normality was assumed or tested as outlined above. The effect size was calculated by Cohen' *d* (1988)⁸.

4. Results

4.1 Descriptive statistics and one-sample T-tests

One-sample T-tests were performed to test the differences between the mean calculated for the students and the mean value of the scale. Descriptive statistics and one-sample T-tests (Table 2) showed significantly high (i.e., above the mean) mean level values of the following variables, in effect size decreasing order (for both lower and upper secondary school students): Identified regulation, External regulation, RAI, Competence, Relatedness, and Intrinsic motivation. For all the variables, except for External regulation, lower secondary school students reported a higher mean level of the variable than upper secondary school students ($L > U$). Furthermore, students, overall, demonstrated average values of Introjected regulation and Perceived teacher autonomy support. Specifically, lower secondary school students showed a significantly high mean level value of Perceived teacher autonomy support. In contrast, upper secondary school students showed a significantly low mean level value (i.e., below the mean). Similarly, lower secondary school students showed a significantly high mean level value of Introjected regulation, while upper secondary school students showed a medium level value (i.e., not different from the mean). Finally, the results showed significantly low mean level values, for both lower and upper secondary school students, of Amotivation ($L > U$) and Autonomy ($L = U$).

Table 2. Descriptive statistics and one-sample T-tests for academic motivation, basic psychological needs, and teacher autonomy support.

	Lower and upper secondary school students (N = 272)		Lower secondary school students (N = 29)		Upper secondary school students (N = 243)			Calculated mean ≠ Scale mean value
Variables	M	SD	M	SD	M	SD	Scale range and mean value	One-sample T-tests results and <i>d</i>
Amotivation	5.84	2.55	5.45	1.90	5.89	2.61	Range: 4 - 16 Mean value: 10	L&U: $t(271) = -26.94, p < .001; d = -1.63$ L: $t(28) = -12.9, p < .001; d = -2.39$ U: $t(242) = -24.54, p < .001; d = -1.57$
External regulation	12.64	2.65	12.45	2.75	12.67	2.64		L&U: $t(271) = 16.48, p < .001; d = 1$ L: $t(28) = 4.8, p < .001; d = .89$ U: $t(242) = 15.76, p < .001; d = 1.01$
Introjected regulation	10	2.91	11.24	3.08	9.85	2.86		L&U: $t(271) = 0, p = 1$ L: $t(28) = 2.17, p = .039; d = .40$ U: $t(242) = -.81, p = .42$
Identified regulation	13.03	2.66	14.10	1.90	12.90	2.71		L&U: $t(271) = 18.78, p < .001; d = 1.14$ L: $t(28) = 11.65, p < .001; d = 2.16$ U: $t(242) = 16.68, p < .001; d = 1.07$
Intrinsic motivation	10.65	3.06	12.66	3.14	10.41	2.97		L&U: $t(271) = 3.48, p < .001; d = .21$ L: $t(28) = 4.55, p < .001; d = .85$ U: $t(242) = 2.14, p = .034; d = .14$
RAI	10	10.8	16.07	9.65	9.27	10.68	Range: -36; +36 Mean value: 0	L&U: $t(271) = 15.3, p < .001; d = .93$ L: $t(28) = 8.97, p < .001; d = 1.66$ U: $t(242) = 13.5, p < .001; d = .87$
Autonomy	10.8	2.78	10.76	2.89	10.82	2.77	Range: 4 - 20 Mean value: 12	L&U: $t(271) = -7.03, p < .001; d = -.43$ L: $t(28) = -2.32, p = .028; d = -.43$ U: $t(242) = -6.62, p < .001; d = -.43$
Competence	14.1	3	16.03	2.32	13.88	3.00		L&U: $t(271) = -11.62, p < .001; d = .70$ L: $t(28) = 9.36, p < .001; d = 1.74$ U: $t(242) = 9.81, p < .001; d = .63$
Relatedness	14	3.23	15.62	3.40	13.79	3.16		L&U: $t(271) = 10.11, p < .001; d = .61$ L: $t(28) = 5.74, p < .001; d = 1.07$ U: $t(242) = 8.80, p < .001; d = .57$
Perceived teacher autonomy support	17.7	5.16	21.10	5.49	17.24	4.98	Range: 6 - 30 Mean value: 18	L&U: $t(271) = -1.1, p = .271$ L: $t(28) = 3.04, p = .005; d = .57$ U: $t(242) = -2.37, p = .018; d = -.15$

Note. L = Lower secondary school; U = Upper secondary school.

4.2. Academic motivation

A school level X motivation (i.e., scale) mixed ANOVA, with repeated measures on the motivation factor, was performed to test for school-level differences (between-subjects factor). Mauchly’s Test of Sphericity indicated that the assumption of sphericity had been violated, and therefore, the Greenhouse-Geisser degrees of freedom correction was used. The results showed the presence of main effects for school-level ($F(1, 270) = 7.84, p = .005, \eta^2_G = .009$) and motivation ($F(2.97, 802.3) = 147.76, p < .001, \eta^2_G = .275$). Post-hoc comparisons of the motivation’ main effect revealed that all types of motivation (i.e., subscales) differed from each other ($ps < .05$). The



most important types of motivation for the students in this sample were, in decreasing order: Identified Regulation, External Regulation, Intrinsic Motivation, Introjected Regulation, and Amotivation. However, these main effects must be interpreted in line with the significant school level X motivation interaction ($F(2.97, 802.3) = 5.12, p < .002, \eta^2_G = .013$). The means of the five types of motivation as a function of school level appear in Table 2. The post-hoc comparisons' results revealed that lower secondary school students scored higher than upper secondary school students on the Intrinsic Motivation subscale ($t(270) = 3.83, p < .001, g = .75$), Identified ($t(270) = 2.32, p = .021, g = .45$) and Introjected ($t(270) = 2.45, p = .015, g = .48$) Regulation subscales. No school level differences were found on External Regulation and Amotivation subscales ($ps > .05$). Moreover, considering the results of the two separate school levels, the most important types of motivation for the lower secondary school students were, in decreasing order: Identified Regulation, External Regulation, Intrinsic Motivation and Introjected Regulation, and Amotivation. Not too dissimilar from those of upper secondary school students: Identified Regulation and External Regulation, Intrinsic Motivation, Introjected Regulation, and Amotivation.

Finally, an independent sample T-test was performed to test for significant differences between lower and upper secondary school students for the RAI. The results showed that the RAI score of the former was significantly higher than that of the latter ($t(270) = 3.27, p < .001, g = .64$).

4.3. Basic psychological needs

A school level X basic psychological needs (i.e., scale) mixed measure ANOVA, with repeated measures on the needs factor, was performed to test for school-level differences (between-subjects factor). Mauchly's Test of Sphericity indicated that the assumption of sphericity had been fulfilled; therefore, no degrees of freedom correction was used. The results showed the presence of main effects for school level ($F(1, 270) = 8.7, p = .003, \eta^2_G = .018$) and needs ($F(2, 540) = 100.46, p < .001, \eta^2_G = .136$). Post-hoc comparisons of the needs' main effect revealed that the Autonomy subscale differed from the Competence and Relatedness subscales ($ps < .001$). In contrast, the latter two did not differ from each other ($p = .723$). The most satisfied basic psychological needs for the students in this sample were, in decreasing order: Competence and Relatedness and Autonomy. However, these main effects must be interpreted in line with the significant school level X scale interaction ($F(2, 540) = 6.6, p = .001, \eta^2_G = .01$). The means of the three basic psychological needs as a function of school level appear in Table 2. The post-hoc comparisons' results revealed that lower secondary school students scored higher than upper secondary school students on the Competence ($t(40.04) = 4.55, p < .001, g = .73$) and Relatedness ($t(270) = 2.93, p = .004, g = .57$) subscales. In contrast, no school level difference was found on Autonomy subscale ($p = .906$). Moreover, considering the results of the two separate school levels, the most satisfied basic psychological needs for lower and upper secondary school students were, in decreasing order: Competence and Relatedness, and Autonomy.

4.4. Teacher autonomy support

An independent sample T-test was performed to test for significant differences between lower and upper secondary school students for the perceived teacher autonomy support. The results showed that the LCQ score of the former was significantly higher than that of the latter ($t(270) = 3.90, p < .001, g = .76$).

5. Discussion

Academic motivation. Results of the ANOVA revealed that the most important types of motivation for lower and upper school students in this school were, in decreasing order: Identified Regulation, External Regulation, Intrinsic Motivation, Introjected Regulation, and Amotivation. This order is consistent with that found by Vallerand and colleagues (1992) with university students. Their study, whose version of the AMS considered three types of intrinsic motivation, found that all subscales differed from each other except for the External and Identification Regulation subscales and the Intrinsic Motivation to Accomplish and Introjected Regulation subscales, respectively. The most important types of motivation for the students in their sample were, in decreasing order: “identification, external regulation, IM to know, introjection, IM toward accomplishments, IM to experience stimulation, and amotivation” (Vallerand et al., 1992, p. 1014). Since the Intrinsic Motivation subscale considered in the current study seems to correspond to what Vallerand and colleagues call *Intrinsic Motivation - to know*⁹, the order of importance found in the current study for the types of motivation seems to be the same as that of Vallerand et al. (1992). Furthermore, comparisons between lower and upper secondary school students revealed differences in academic motivation. They reported that identified and intrinsic regulation (i.e., autonomous motivation) and introjected regulation were lower in upper secondary school students than in lower secondary school students. In contrast, external regulation and amotivation remained the same. However, RAI T-test results showed that the index score of the latter was significantly higher than that of the former. As RAI captures students’ level of autonomous motivation relative to their level of controlled motivation or amotivation (e.g., Alivernini & Lucidi, 2008; Vallerand et al., 1997), it can be said that lower secondary school students exhibit more autonomous forms of regulation and/or less controlled forms of regulation than upper secondary school students.

These results are generally not dissimilar to those found in the literature. For example, in examining the academic motivation of students over the period from primary to secondary school, research repeatedly highlighted how intrinsic motivation decreases as children move into higher grades (e.g., Harter, 1981; Gottfried et al., 2001; Lepper et al., 2005; Otis et al., 2005). Research also found that intrinsic motivation is less commonly endorsed by high school and college students than identified regulation or even introjected regulation (e.g., Taylor et al., 2014). Meanwhile, the literature has also investigated changes in extrinsic motivation. For example, in a cross-sectional study, Harter (1981) found that students in grades 3rd through 8th show an increase in extrinsic motivation at school, with a corresponding decrease in intrinsic motivation. Since then, several studies have also found moderate changes from intrinsic to extrinsic motivation over the school years (e.g., Otis et al., 2005). In contrast, however, Lepper et al. (2005) indicated that extrinsic motivation did not differ between grades 4th and 8th.

Basic psychological needs. Results of the ANOVA revealed that the most satisfied basic psychological needs for lower and upper secondary school students in this school were, in decreasing order: Competence and Relatedness, and Autonomy. This order does not seem to be dissimilar from what can be deduced from the study by Tian and colleagues (2014) involving junior (7th e 8th grades, ranging from 12 to 14 years old) and senior (10th e 11th grades, ranging from 15 to 18 years old) high school students. From a purely descriptive statistical point of view, the most satisfied needs for both groups were in order: Relatedness, Competence, and Autonomy. Moreover, post-hoc comparisons between lower and upper secondary school students in the current study revealed differences in needs satisfaction. They indicated that competence and relatedness decreased during upper secondary school while autonomy satisfaction remained unchanged. In addition, on-sample T-test results showed that autonomy satisfaction was below the scale mean value for both groups. These results differ from the findings of Tian et al. (2014). They found a significant effect of age on the need for autonomy - in particular,

compared with middle school students, high school students reported greater satisfaction with the need for autonomy -, while found no differences in relatedness and competence. However, literature shows heterogeneous trajectories of students' perceived basic psychological need satisfaction, especially at the end of primary school and during high school (Ratelle & Duchesne, 2014). In general, it can be stated that many students feel that their psychological needs are not fully met during the transition to secondary school (Duchesne et al., 2022).

Teacher autonomy support. Results of the T-test revealed that lower secondary school students perceived significantly more teacher autonomy support than upper secondary school students. This result seems consistent with a longitudinal study conducted by Barber and Olsen (2004). They found that students reported an overall decrease in the perceived quality of the school environment in the transition from lower to upper secondary school and that this transition was accompanied by a significant decrease in students' perception of teacher support. However, a cross-sectional study by Bru et al. (2010) yielded different results. Bru and colleagues found no negative change in the transition between school types (students in grades 5th-10th), but rather, a linear downward trend for perceived support from teachers in general as age increases, however, not for teacher autonomy support. Finally, this result is inconsistent with those of Diseth and Samdal (2014), that showed that students in 1st-grade upper secondary school (16-17 years old) scored significantly higher on autonomy support than students in 10th-grade lower secondary school (15-16 years old), or with a study that considered a similar variable and showed no differences in mean level between grades 8th and 10th (Diseth et al., 2012).

In conclusion, it is noteworthy that students at this school in Bologna have a high average level of motivation and that the students report higher scores on variables that primarily reflect autonomous motivation (intrinsic motivation and identified regulation) than scores on extrinsic motivation (external and introjected regulations) as well as amotivation. Students also describe reasonably high levels of competence and relatedness needs satisfaction. In contrast, they report a medium level of teacher autonomy support and a low level of autonomy need satisfaction. These findings may indicate a school - i.e., students - who have a generally positive view of their motivation for attending school and the support they receive from their teachers.

However, particular attention should be given to the differences between lower and upper secondary school students. The results may indicate that school transitions are an important factor influencing motivation, basic psychological needs satisfaction, and experience of autonomy support. The results seem to highlight a decrease in almost all motivational variables in the transition from lower to upper secondary school, consistent with what was found in some previous research. In particular, lower secondary school students reported significantly higher levels of variables than upper secondary school students, and the differences are medium (effect sizes between .45 and .76).

6. Conclusion

The present study aimed to investigate, in a sample of Italian lower and upper secondary school students at a private school in Bologna, students' academic motivation, basic psychological needs satisfaction and teachers' autonomy support according to SDT. Understanding the school driving forces for students and their perceptions of needs satisfaction and teaching styles, and identifying possible school-level-based differences, may be useful for several reasons.

From an applied perspective, it is instructive to gain insight into these aspects as they might be useful from diagnostic and intervention viewpoints. They yield diagnostic information regarding student scores on the various types of motivation, needs and teacher support. Gaining insight into students' motivational and needs-satisfaction profiles and their perceptions of teachers is also instructive because motivational interventions can then be better tailored to each school level, class, or individual student. For instance, whereas some

groups/students might particularly benefit from a more autonomy-supportive teaching climate, other groups might need more involvement or structure. For example, teachers who realise that the relatedness needs of their students are not being satisfied in school can develop plans to strengthen students' bonds with teachers and peers. Furthermore, in terms of the practical implications, the instruments (i.e., scales) used could help school professionals in the systematic development, monitoring, and evaluation of interventions for students who show suboptimal motivation or experience lower levels of need satisfaction at school, as well as for teachers whose students report low autonomy support.

Moreover, differences between lower and upper secondary schools can shed light on what students might need or want most, especially considering downward trends in autonomous motivation, competence and relatedness satisfaction and teacher autonomy support. For instance, based on the research literature and the results of the current study on needs satisfaction and teacher autonomy support, it can be assumed that the loss of students' intrinsic motivation and, in general, the shift from autonomous to controlled motivation across the school levels are in part because teachers, parents, and other important adults increasingly use controlling strategies such as deadlines, grades, and rewards to motivate school behaviours - also for behaviours that might be intrinsically motivated (Deci & Ryan, 1985; Gottfried et al., 2001; Lepper et al., 2005; Ryan & Deci, 2017). Students are likely to be gradually and prominently exposed to external factors such as norms and social pressures in the educational environment. This goes along with the fact that school becomes, over time (from primary to high school), increasingly formal, evaluative, and competitive (Gottfried et al., 2001; Harter, 1981; Ryan & Deci, 2017), and thus a more controlling environment. And this has a strong impact on students. It has repeatedly been pointed out that motivation varies as a function of the environment to which students are exposed and that students' motivation, at least situational motivation, is likely to be more influenced by the perceived teaching style (Vansteenkiste et al., 2009). Autonomous, particularly intrinsic, motivation can be systematically undermined or catalysed by teacher practices (Ryan & Deci, 2000b, 2017). Therefore, the issue of how motivation changes or can change is crucial. Indeed, if motivation leads to important outcomes, then changing suboptimal forms of motivation into more optimal (i.e., self-determined) ones should allow students to experience more adaptive outcomes. This issue was addressed several times in the research literature. In brief, schools and teachers should promote environments that satisfy students' basic psychological needs and are therefore characterised by autonomy support, structure, and involvement. For instance, given the most critical aspect that emerged in the current study relates to the fulfilment of the need for autonomy, it might be useful for teachers to know how to structure an autonomy-supportive environment. As previously mentioned, this includes many activities. For example, Su and Reeve (2011), in their meta-analysis, recognised the following five most significant interpersonal autonomy support conditions, listed in order: using non-controlling language, acknowledging negative feelings, providing meaningful rationales, nurturing inner motivational resources, and offering choices. Finally, the current study has several limitations that require consideration. Firstly, the generalisation of results. The sample - made up of students from the same school, albeit from both lower and upper secondary schools, and the limited sample size of lower secondary school students - cannot be considered representative of the population to make generalisations. However, generalisation was not the aim of the research. Secondly, the type of assessment that is exclusively self-report and quantitative. Data were self-reported, and responses may have been influenced by social desirability. However, answers were anonymous, and students would not benefit from inaccurately reporting their honest perceptions. Furthermore, students were not asked to provide any qualitative information. Thirdly, variables were measured at a general level in relation to general motivation (academic motivation) and several teachers (needs satisfaction, autonomy support). However, students might struggle to average their perceptions among different teachers and subjects. Alternatively, students could be asked to

identify these variables for each subject and teacher. Nevertheless, this would have required an extremely complex study design.

In conclusion, the current study's finding can be of considerable interest to teachers to better motivate their students at school and in the instructional and/or educational decisions they make in designing the learning-teaching process.

Notes

1. No sampling procedure was used for the population considered, i.e., the students at the school in question. Instead, all students were proposed to participate in the research, and the sample size corresponded to the students whose parents (and students themselves) gave their informed consent to participate and who were present during the data collection session. The lower secondary school students' numerosity is because the school had only one 1st class, only one 2nd class and only one 3rd class, with a total of 45 students. In addition, the parents of 32 students signed the consent, 29 of whom were present during the data collection session.
2. The instrument formulated from the ASBPNSS has been previously subjected to a preliminary psychometric assessment with Italian students. Based on preliminary analyses, the first version of the instrument has been refined from 15 items to 12. The psychometric properties of the 12-item instrument have been assessed in a sample of 355 students. First, the appropriateness of the data for EFA was verified (pseudo $\chi^2 = 956$, $df = 66$, $p < .001$; $KMO = .82$), and then EFA was conducted (principal-axis factoring extraction method with oblimin rotation). EFA yielded three factors (parallel analysis) corresponding to the three theoretical constructs considered, i.e., autonomy, competence and relatedness needs. Factor 1 (relatedness) included four items with factor loadings between .68 and .85, factor 2 (competence) four items with loadings between .56 and .63, and factor 3 (autonomy) four items with loadings between .36 and .77. The three factors explained 19.9%, 14.8% and 10.9% of the variance, respectively. Overall, the three-factor solution explained 45.5% of the variance in the correlation matrix. McDonald's ω was .85 for relatedness, .69 for competence and .65 for autonomy.
3. The Italian version has been previously subjected to a preliminary psychometric assessment in a sample of 324 students. After confirming that the correlation matrix was factorable (pseudo $\chi^2 = 942$, $df = 15$, $p < .001$; $KMO = .88$), it has been submitted for exploratory factor analysis (EFA) with principal-axis factoring extraction and oblique oblimin rotation. Exploring the factor structure produced a one-factor solution (scree-test and Kaiser-Guttman criterion) consistent with the expectations and theoretical framework. The factor has been saliently loaded by all six variables, with factor loadings ranging from .58 to .83 and had explained 55.4% of the variance in the correlation matrix. The factor also demonstrated good internal consistency reliability (McDonald's $\omega = .88$).
4. *The jamovi project* (2022). *jamovi*. (Version 2.3) [Computer Software]. Retrieved from www.jamovi.org.
5. The mixed ANOVA model was used since both repeated and between-subjects factors were present. E.g. in the case of *academic motivation*, this was a 2 *school level* (lower secondary school, upper secondary school) X 5 *motivation* (amotivation, external regulation, introjected regulation, identified regulation, intrinsic motivation) model, with the first factor being between-subjects and the second being repeated measures. The data analysis aimed to establish the mean effect of *motivation*, mean differences between *school levels*, and the *school level X motivation* interaction.

6. For both groups, normality was also tested using absolute skewness and kurtosis values. All values ranged between -1 and +1 (Muthén & Kaplan, 1985), except for Amotivation in upper secondary students ($SK = 1.46$, $KU = 1.31$) and Competence in lower secondary students ($KU = 2.99$).
7. Interpretation according to Bakeman's guidelines (Bakeman, 2005): $\eta^2_G = .02$ (small); $\eta^2_G = .13$ (medium); $\eta^2_G = .26$ (large).
8. Interpretation according to Cohen's guidelines (Cohen, 1988). Hedges' g and Cohen's $d = .20$ (small), $g, d = .50$ (medium), $g, d = .80$ (large).
9. "IM-to know can be defined as the fact of performing an activity for the pleasure and the satisfaction that one experiences while learning, exploring, or trying to understand something new" (Vallerand et al., 1992, p. 1005).

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