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Students' transition into higher education: The role of self-efficacy, regulation strategies, and academic achievements

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Abstract

Transition into higher education (HE) has received increased interest in recent years, since it represents a challenging period for students. The aim of this study was to further understand the associations between self-efficacy, academic achievements, and regulation in first-year university students during their transition into HE. The convenience sample consisted of 374 first-year university students (230 females, 61.5%), aged from 18 to 33 ($M = 19.86$, $SD = 1.51$) and recruited from an Italian university. Self-efficacy was assessed using the Motivated Strategies for Learning Questionnaire; regulation strategies were assessed with the Inventory of Learning Patterns of Students; and a self-reported grade point average was taken as an indicator of each student's academic performance. Result shows that students' self-efficacy was positively associated with self-regulation and negatively associated with a lack of regulation. Students with higher self-efficacy and self-regulation strategies had better academic performance. Female students performed better in academic activities and adopted more external regulation strategies. The findings represent an opportunity for university institutions to consider the interventions they provide to first-year students in order to facilitate the successful transition from secondary school;

they also provide researchers with further knowledge about the effect of self-efficacy, and regulation strategies on students' adjustment to HE.

Le transizioni scolastiche hanno ricevuto un crescente interesse negli ultimi anni, poiché rappresenta un periodo delicato e impegnativo per gli studenti. Lo scopo di questo studio è stato quello di comprendere le associazioni tra autoefficacia, risultati accademici e regolazione negli studenti universitari del primo anno durante la loro transizione all'Università. Il campione di convenienza consisteva in 374 studenti universitari del primo anno (230 femmine, 61,5%), di età compresa tra i 18 e i 33 anni (M = 19,86, SD = 1,51). I risultati mostrano come l'autoefficacia degli studenti era positivamente associata all'autoregolazione e negativamente associata alla mancanza di regolazione. Gli studenti con maggiore autoefficacia e strategie di autoregolazione hanno avuto migliori prestazioni accademiche. Le studentesse si sono comportate meglio nelle attività accademiche e hanno adottato più strategie di regolazione esterna. I risultati rappresentano un'opportunità per le istituzioni universitarie di considerare gli interventi a supporto degli studenti del primo anno al fine di facilitare la transizione.

1 | INTRODUCTION

With the advent of mass education, the increasing numbers of students from different backgrounds enrolled in higher education (HE), and the growing importance of lifelong learning in modernity (Bauman, 2013), research in education started to focus on the university education context (see Smart, 2008). At the beginning of the 21st century, HE institutions had to face unprecedented challenges concerning globalization, knowledge-based economic growth, and the communication revolution (Salmi, 2001). Universities started to pay attention to students' experiences of successful learning processes, high achievement, and satisfaction as matters of institutional prestige and teaching quality. Simultaneously, national and international policy-makers increased awareness about the importance of tertiary education as a means of increasing economic competitiveness (Gale & Parker, 2014; Milienos et al., 2021).

However, as Tinto (2017) points out, for years students have been viewed through the lens of institutions; institutions then ask what they can do to retain their students. Students, however, do not want to be retained; they want to stay (Tinto, 2017). The author explains that these two perspectives are different, though necessarily related. While the institution has an interest in increasing the percentage of its students who graduate, the student's interest is in graduating, often without regard to the institution in which it is earned (Tinto, 2017). For this reason, it is important to consider the student perspective and explore what might promote student persistence

at university. The purpose of this paper is to examine how students' motivations, beliefs, and attitudes affect their academic performance during the first-year transition.

2 | TRANSITION INTO HE

HE institutions have gradually focused their attention on the need to improve student engagement and retention and have, consequently, attributed increasing importance to successful student transition into tertiary education contexts (Heirdsfield et al., 2008; Hultberg et al., 2008). Gale and Parker (2014) defined transition as "the capability to navigate change," or possessing the resources to engage with change conditions, without having full control over and knowledge about what that change involves and while also referring to the mutuality of agency and structure. Transition is considered not as a single event, but rather as an ongoing process that is repeated over time (Longobardi et al., 2016, 2019). For students, making the transition into HE refers to the shift between secondary school and university education (Bozzato & Longobardi, 2021; Gale & Parker, 2014). A successful transition is fundamental for both students and educational institutions and plays an important role in students' academic adjustment and achievements and, consequently, in their future professional and personal development (Gale & Parker, 2014). Because of the great importance of the first year for a successful transition in HE, the focus of this article will be on this period of time. Research suggests that the first year in HE is "arguably the most critical time" (Krause, 2005), since it can decide students' success or failure in tertiary education settings. First-year students are at a higher risk of dropout from university, and research has shown that most withdrawals occur during this period (Hultberg et al., 2008). This can be a particularly stressful period for students as they have to face a number of challenges. Entering tertiary education, students have to deal with a new academic context, adapt their existing learning strategies, and develop new learning patterns (Vermunt, 2005). Educational institutions put a lot of effort into supporting their students' acquisition of the necessary cognitive factors, such as knowledge, skills, and competencies, during the transition to HE (Van Dinther et al., 2011). In turn, researchers in educational settings have increasingly paid attention to the role that students' beliefs and attitudes play in the learning process (Pajares, 2006; Schunk, 2003). A combination of non-cognitive factors, such as motivational aspects and regulation strategies, has been explored, as these can have an impact on successful student transitions from secondary school to the HE context and, consequently, on early academic achievements (Willems et al., 2019). Another area of interest for this paper is the impact of motivational aspects, such as self-efficacy, and regulation strategies in learning activities on the transition of first-year students in HE.

2.1 | Self-efficacy in HE

Introduced by Bandura in 1977, the psychological construct of self-efficacy represents a key element of social cognitive theory. Human functioning is viewed in a transactional way, depending on reciprocal interactions between individuals' behaviours, their internal personal factors (e.g., thoughts and beliefs), and environmental events (Bandura, 1986). Self-efficacy refers to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1977). Within the educational context, the self-efficacy construct is particularly important as it refers to students' personal judgements about their competencies and capabilities to organize and perform a specific task (Van Dinther et al., 2011). Self-efficacy beliefs that students develop about their academic capabilities influence, and are reciprocally influenced by, students' motivations, regulation strategies, and learning achievements (Pajares, 1997; Van Dinther et al., 2011).

Self-efficacy is derived from and can be modified by experience (Cattelino et al., 2019). Students acquire information to estimate and enhance their self-efficacy from four sources: their own performance accomplishments

(which provide the most reliable information), vicarious experience (e.g., observing peers), social persuasion (e.g., provided by teachers), and their own physiological states (e.g., anxiety).

Self-efficacy beliefs about academic capabilities tend to increase in students after the transition and during the first year of HE, but gender differences have been found. To be specific, male students tend to have higher self-efficacy than females (Virtanen & Nevgi, 2010). This paper examines gender differences in first-year university students' self-efficacy. Self-efficacy can influence students' motivation through affecting their task interest, goals, and choices and their use of cognitive, meta-cognitive, and self-regulatory strategies (e.g., Schunk, 2003). In general, students tend to engage more with and are more motivated by tasks with which they feel competent and confident, and avoid those with which they do not experience such feelings (Pajares, 1997). Self-efficacy also impacts students with regard to the amount of effort they make, their persistence when confronting obstacles, and their resilience in the face of adversity. Students with a strong sense of self-efficacy tend to approach difficult tasks as challenges to be mastered, rather than as threats to be avoided (Schunk & DiBenedetto, 2015).

3 | SELF-EFFICACY AND LEARNING REGULATION STRATEGIES

Self-efficacy beliefs enhance students' use of regulation strategies, such as monitoring and evaluation (Panadero et al., 2017). Regulation strategies in learning refer to activities that students adopt in order to control their cognitive processing strategies (Schunk & Zimmerman, 2012). In planning and monitoring their learning activities, students can employ self-regulation strategies (using thoughts, feelings, and actions to meet academic goals), externally regulated strategies (e.g., controlled by the teacher), or a lack of regulation (i.e., difficulty in regulating their own learning processes). Self-regulation is associated with higher academic achievements, while a lack of regulation is linked with lower academic achievements (Vermunt, 2005). Students with high self-efficacy for learning are able to engage in self-regulation behaviours (e.g., set goals, use effective learning strategies, monitor their comprehension, evaluate their goal progress) and create effective environments for learning (e.g., eliminate or minimize distractions, find effective study partners) (Schunk & DiBenedetto, 2015). The use of regulation strategies might vary in association with students' characteristics, such as gender. In the university context, females have been found to use more self-regulation strategies for learning (i.e., rehearsal, organization, metacognition, time management skills, elaboration, effort, help-seeking strategies, utility value, and performance anxiety) than males (Virtanen & Nevgi, 2010). In turn, Pérez et al. (2017) found similarities among females and males in the use of regulation strategies for learning, with no important differences observed with regard to the gender variable. The researchers concluded their study by stating that external regulation strategies can lead to success in academic achievement as long as they are accompanied by internal regulation and approach goals (Pérez et al., 2017).

Also, the amount of time that students dedicate to study seems to be related to their use of regulation strategies and might influence their academic performance. Huie and colleagues (2014) found that in first-year students the relation between the time set aside for study and achievements is mediated by their regulation strategies (Huie et al., 2014).

Specific to the HE context, after transition into university, first-year students' conceptions about learning have been found to directly influence regulation strategies and, in turn, enhance self-efficacy (Ferla et al., 2008). In addition, research conducted among undergraduate university students (Komarraju & Nadler, 2013) found that effort regulation partially mediates the relationship between self-efficacy and grade point average (GPA). This could indicate that self-efficacy plays an essential function in students' academic performance by facilitating the use of students' self-control and persistence abilities to gain achievements (Komarraju & Nadler, 2013). In addition, the

effects of gender differences and time spent studying among first-year students are examined in relation to the use of regulatory strategies in learning activities, feelings of self-efficacy, and academic achievement.

3.1 | Self-efficacy and academic achievements

Academic performance is, in part, the result of what students believe they have learned and can use in a specific field (Pajares, 1997). This does not mean that students can achieve tasks beyond their capabilities simply by believing that they can, but rather that self-efficacy beliefs are determinants of how knowledge and skills are acquired and how students are able to use them (Pajares, 1997).

Self-efficacy has been found to be the strongest predictor of academic performance in tertiary education (Richardson et al., 2012). Research conducted within HE in several areas (reading, writing, mathematics) and exploring different ability levels (average, talented, below average) has shown the direct and indirect effects of students' self-efficacy on their academic outcomes (Lane et al., 2004; Schunk, 2003). Specifically, in HE contexts, self-efficacy plays a predictive role in academic outcomes (Lane et al., 2004) and during the first year in HE, it is found to be associated with achieving significantly better results (Byrne et al., 2014). Students with higher self-efficacy achieve better results because they assign more importance to performance and mastery goals (Babenko & Oswald, 2019). Interestingly, previous research focusing on students' gender related to self-efficacy levels found few differences in academic outcomes, despite males generally tending to have higher self-efficacy levels (Byrne et al., 2014).

Given the importance of the transition into HE and the fundamental roles of motivation and beliefs with regard to students' academic adjustment, the impact of students' self-efficacy on regulation strategies and learning outcomes during the first year of university should be taken into account by institutions and researchers in order to promote the successful transition into HE and enhance students' well-being and satisfaction in tertiary education contexts.

4 | IN SUM: THE ROLE OF SELF-EFFICACY IN THE TRANSITION TO HE

The importance of the successful transition from secondary school to university, and the influence that students' self-efficacy has on their motivation, regulation strategies, and learning achievements are well established in literature (e.g., Pajares, 1997; Van Dinther et al., 2011). However, little research has been conducted on the effects of self-efficacy beliefs on first-year students' adjustment in HE. Yet, self-efficacy has been shown to have positive effects on students' perceptions of their own abilities, regulatory strategies, and academic performance as they transition into HE. (e.g., Bohndick et al., 2021; Byrne et al., 2014; Ferla et al., 2008).

Further, the aforementioned research separately analysed the contribution of self-efficacy in association with variables such as regulation strategies (Ferla et al., 2008) and academic achievements (Byrne et al., 2014). Some research has taken multiple variables into account in specific academic fields (Willems et al., 2019) Moreover, the gender variable and study mode during the first year in HE have only been analysed marginally in relation with self-efficacy (Byrne et al., 2014; Huie et al., 2014), but they might have an impact on students' outcomes and regulation strategies. For instance, in a recent review, Panadero et al. (2017) highlighted some influences of gender in its association with self-efficacy, and Huang (2013) reported that gender differences in self-efficacy tend to increase as age increases. Also, the amount of time that students dedicate to study has an impact on their academic achievements. Finally, to the best of our knowledge, in the Italian context, no existing study has focused on the mediating role of regulation strategies for learning in the relationship between students' self-efficacy and academic achievements during the transition into the first year of HE.

5 | AIMS AND HYPOTHESES

The present research was aimed to further understand the associations between self-efficacy, academic achievements, and regulation strategies for learning and performance among first-year students, after transition in HE. Based on the previous literature, we expect to find a relationship between self-efficacy, regulation strategies, and academic outcomes. Specifically, the present study will explore the following research hypothesis:

1. A correlation will exist between self-efficacy for learning and performance, the regulation of learning activities, and academic outcomes. We hypothesize that students' self-efficacy in learning and achievement will be positively correlated with self-regulation of learning activities and negatively correlated with lack of regulation.

We will also further examine the contribution of gender and mode of study as controlled variables within this relationship. Building on the findings from previous literature (Huie et al., 2014), we hypothesize that full-time students generally have higher GPAs than part-time students. Regarding gender, the literature is sparse and contains somewhat conflicting views. After further reviewing previous work (Byrne et al., 2014; Virtanen & Nevgi, 2010), we hypothesize that male students will have higher self-efficacy than female students, while female students may use more self-regulatory strategies for learning. In addition, since previous research has only marginally investigated how regulation mediates self-efficacy and outcomes (Komarraju & Nadler, 2013), we will more deeply explore the mediation role of the three dimensions of regulation strategies.

Specifically, the second hypothesis of the present study will be the following:

2. The three dimensions of regulation strategies (i.e., self-regulation, external regulation, and a lack of regulation) will mediate the relationship between students' self-efficacy and academic performance.

6 | METHOD

6.1 | Participants

In the current research, 374 first-year university students (230 females, 61.5%), aged from 18 to 33 ($M = 19.86$, $SD = 1.51$), were recruited from an Italian university located in north western Italy during early months of their enrolment at university. The students were selected through convenience sampling. The students were enrolled in different faculties (i.e., Education: 20.6%; Natural Science: 12.0%; Biology: 14.2%; Computer Science: 14.7%; Arts, Music, and Entertainment Disciplines: 6.1%; Sports and Physical Education: 17.6%; Economic Science: 5.6%; Foreign Languages and Literatures: 9.1%), of which the most represented was education. Most of the participants were full-time students at the university, while only a few of them were part-time students ($n = 20$, 5.3%).

In the Italian educational system, the following degrees are offered in HE: an undergraduate degree (Laurea), a graduate degree (Laurea Magistrale), a postgraduate degree (PhD/Dottorato di Ricerca), a specialized master's degree, and continuing education programmes. The Laurea, equivalent to a Bachelor of Science in the European college system, is obtained after three years of study. The requirement for admission to the first cycle is a high school diploma. As a rule, studies begin at the age of 19, after having attended school for 13 years. Admission to bachelor's degree programmes may be either restricted or open, or subject to a motivation test or entrance exam. The tertiary enrolment rate (44%) is the fourth lowest among all OECD countries, and the rate of first-time tertiary graduates is also below average (34%, compared to the OECD average of 49%).

The institutions of higher learning in Italy are autonomous. They set their own missions, governing bodies and teaching and research structures. In addition, Italy has 95 HE institutions and was among the first European countries to introduce assessment of student learning outcomes at the HE level to increase the focus on performance in Italian research. Despite these achievements, the 2016 European Semester Country Report reports that educational attainment in Italy is below the EU average. The rate of 30–34 year olds attaining tertiary education is the lowest in the European Union (25.3% in 2014) and remains slightly below the national Europe 2020 target of 26% to 27%. While underfunding hampers the HE system, more attention has recently been paid to the quality of HE. General government spending on HE in Italy was among the lowest in the European Union in 2014. However, the framework for allocating public funds has improved significantly in recent years (OECD, 2017).

6.2 | Procedure

First-year students were assessed through a printed questionnaire during early months of their enrolment at university. Participants completed the survey in their classrooms before or during lectures, and they were informed about the nature and objective of the study beforehand. The length of time required to complete the questionnaire was between 40 and 60 min. The form stated that data confidentiality was assured and that participation in the study was voluntary. Participation in this study was anonymous and unpaid. Prior to data collection, consent to administer the questionnaire was obtained, in compliance with the ethical code of the Italian Association for Psychology (AIP), and it was approved by the IRB of the University of Torino. Thereafter, permission to administer the surveys to the students during their classes was requested from the different faculty professors contacted. The 1964 Declaration of Helsinki, as well as the rules of the Italian AIP, was respected. In compliance with the ethical regulations of the University Ethics Committee, written informed consent was obtained from every participant.

6.3 | Measures

6.3.1 | Self-efficacy for learning and performance

The self-efficacy subscale of the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) was used to measure students' self-efficacy for learning and performance. There are 8 items in this subscale (e.g., "I'm certain I can master the skills being taught in this class"), which were rated on a 5-point Likert scale (1 = "Not at all true for me," 5 = "Very true for me"). The mean of all the item scores was calculated to give a final score, with a higher score indicating higher self-efficacy. For the current research, the Cronbach's alpha, which is the most common indicator of the reliability coefficient (internal consistency), was 0.81.

6.3.2 | Regulation strategies of learning activities

The regulation strategies subscale of the Inventory of Learning Patterns of Students (Vermunt & Donche, 2017) was administered to measure students' regulation strategies. This subscale has 3 dimensions: (1) self-regulation (5 items, e.g., "To test my learning progress, I try to answer questions about the subject matter that I make up myself"; Cronbach's alpha = 0.71); (2) external regulation (5 items, e.g., "I study according to the instructions given in the study materials or provided by the teacher"; Cronbach's alpha = 0.64); and (3) a lack of regulation (4 items, e.g., "I realize that it is not clear to me what I have to remember and what I do not have to remember"; Cronbach's alpha = 0.60). Participants were asked to rate each item on a 5-point Likert scale (1 = "I seldom or never do this,"

TABLE 1 Means, standard deviations, and correlations of the variables ($N = 374$)

Variables	1	2	3	4	5	6	7	8
1. Gender	–							
2. Age	0.07	–						
3. Study mode	0.13*	0.21***	–					
4. Self-efficacy for learning and performance	0.08	0.03	−0.02	–				
5. Self-regulation	0.10	0.04	0.04	0.23***	–			
6. External regulation	−0.14**	−0.09	0.06	0.07	0.13*	–		
7. Lack of regulation	0.03	−0.03	0.02	−0.30***	0.07	0.13*	–	
8. GPA	−0.17**	−0.05	−0.11*	0.16**	0.13*	−0.07	−0.17**	–
M	0.39	19.86	0.05	3.64	14.14	16.40	9.00	25.93
SD	0.49	1.51	0.23	0.66	3.71	2.98.	3.64	2.83

Note: Gender: 0 = female, 1 = male; Study mode: 0 = full-time, 1 = part-time.

*$p < .05$; **$p < .01$; ***$p < .001$.

5 = "I almost always do this"). The sums of all the items in each subscale were calculated to give the final scores. For the current research, the Cronbach's alpha was 0.64.

6.3.3 | Academic performance

A self-reported GPA was taken as the indicator of each student's academic performance. In Italian universities, a student's GPA ranges from 0 to 30, and the minimum score required to pass an exam is 18.

6.4 | Statistical analysis

All the data analysis was conducted in SPSS 22.0 (IBM Corp, Armonk, NY, USA). First, since the missing data (questions where students did not provide an answer) comprised less than 1% of the total, they were replaced by the series means (Little & Rubin, 2002). Basic analyses were administered to preliminarily explore the correlations between variables. Then, PROCESS (Model 4), a widely used SPSS macro developed by Hayes (2018), was employed to examine the mediating role of regulation strategies of learning activities on the relationship between students' learning and performance self-efficacy and their academic performance. Last, the 95% confidence intervals (CI) of the indirect effects of all the subdimensions of regulation strategies of learning were generated by adapting the bootstrap method. The bias-corrected bootstrap sample size was 5000. If zero is excluded in the 95% CI, an indirect effect exists.

7 | RESULTS

7.1 | Descriptive statistics and correlations

The descriptive analysis results and the correlation matrix are presented in Table 1 and indicate that most of the key variables studied were significantly correlated with each other. To be specific, students' self-efficacy for learning and performance was positively associated with the self-regulation of learning activities ($r = 0.23$, $p < .001$), while negatively correlated with a lack of regulation ($r = -0.30$, $p < .001$). Students who had higher levels of self-efficacy ($r = 0.16$, $p < .01$) and who adopted more self-regulation strategies ($r = 0.13$, $p < .05$) tended to have better academic performance (GPAs), while students who lacked regulation strategies often had lower GPAs ($r = -0.17$, $p < .01$). In addition, female students seemed to perform better with regard to academic activities ($r = -0.17$, $p < .01$), while at the same time they tended to adopt more external regulation strategies ($r = -0.14$, $p < .01$). Full-time students generally had higher GPAs than part-time students ($r = -0.11$, $p < .05$).

7.2 | The mediating role of regulation strategies of learning activities

The mediating roles of all three dimensions of regulation strategies (i.e., self-regulation, external regulation, and a lack of regulation) were tested. Figure 1 and Table 2 show the results of the mediating effects analysis.

First, students' self-efficacy for learning and performance positively predicted self-regulation ($\beta = 0.23$, $p < .001$), which further positively predicted students' GPAs ($\beta = 0.15$, $p < .01$). The 95% CI generated by employing the bootstrap method did not include zero (estimated effect = 0.04, 95% CI = [0.01, 0.07]). Therefore, students' self-efficacy exerted a significant effect on their academic performance via the mediating role of self-regulation.

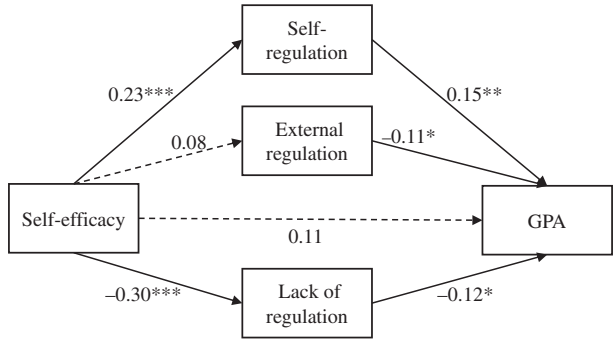

FIGURE 1 The mediating model ($N = 374$). All the regression coefficients are standardized. Student's gender, age, and study mode were included as control variables but not illustrated in the figure to make the picture concise. *$p < .05$. **$p < .01$. ***$p < .001$

TABLE 2 Standardized indirect effects and their 95% confidence intervals

Model path	Estimated effect	95% CI	
		Lower	Upper
Self-efficacy → Self-regulation → GPA	0.03	0.01	0.07
Self-efficacy → External regulation → GPA	−0.01	−0.03	0.03
Self-efficacy → Lack of regulation → GPA	0.04	0.01	0.07

Second, although students' GPAs were negatively predicted by their external regulation ($\beta = -0.11$, $p < .05$), the relationship between students' self-efficacy and external regulation was not significant ($\beta = 0.08$, $p > 0.05$), and zero was included in the 95% CI (estimated effect = −0.01, 95% CI = [−0.03, 0.03]), which indicated a non-significant mediating role of external regulation between self-efficacy and GPA.

Last, self-efficacy negatively predicted a lack of regulation ($\beta = -0.30$, $p < .001$), which, in turn, negatively predicted students' GPAs ($\beta = -0.12$, $p < .05$). Zero was excluded in the 95% CI (estimated effect = 0.04, 95% CI = [0.01, 0.07]). Thus, a lack of regulation played a mediating role in the relationship between students' self-efficacy and their academic performance.

8 | DISCUSSION

The purpose of the present study was to further understand the associations between self-efficacy, academic achievements, and regulation strategies for learning and performance among first-year students, after their transition in HE. Most of our hypotheses were confirmed. However, the results should be taken with caution, as the effects found were estimated to be quite small. In general, our results show that among the first-year students studied HE, who were enrolled in different subjects, self-efficacy for learning and achievement was related to the use of regulatory strategies and had a positive impact on their academic outcomes.

8.1 | First hypothesis: Correlation between variables

The first hypothesis of this research was the following: a correlation will exist between self-efficacy for learning and performance, the regulation of learning activities, and academic outcomes. The descriptive analysis

results and the correlation matrix indicated that most of the key variables studied were significantly correlated with each other, supporting our hypothesis. Such correlations were expected and might indicate that, during transition to HE, students' self-efficacy for learning and performance has an impact on their regulation strategies and their academic outcomes. These findings are consistent with the conception of self-efficacy, within which beliefs that students have about themselves are a key element in the exercise of control and personal agency and are strong determinants and predictors of the level of accomplishment that individuals finally attain (Bandura, 1986).

8.1.1 | Self-efficacy and learning regulation strategies

To be specific, the results revealed that students' self-efficacy for learning and performance in transition to HE was positively associated with the self-regulation of learning activities, while negatively correlated with a lack of regulation. These results were expected and confirm those in previous research. Several studies have highlighted associations between self-efficacy in students and the use of self-regulation strategies in learning activities (e.g., Panadero, 2017). A recent review of studies conducted among secondary school and HE students has shown that students' self-efficacy beliefs in education promote the use of self-regulatory strategies, such as monitoring and evaluation (Panadero et al., 2017). Students with high self-efficacy for learning and performance tend to engage in self-regulation behaviours, for instance, setting goals, using effective learning strategies, monitoring their comprehension, and evaluating their goal progression (Schunk & DiBenedetto, 2015). In addition, consistent with our results, first-year HE students' conceptions of learning have been found to have a direct influence on regulation strategies and, in turn, on self-efficacy (Ferla et al., 2008). A reciprocal relation might exist between self-efficacy for learning and performance and the use of self-regulation strategies: the stronger the beliefs that students hold about their own success, the more they may adopt self-regulation strategies in order to control their learning processes.

8.1.2 | Self-efficacy and academic achievements

The results showed that students who had higher levels of self-efficacy in transition to HE and who adopted more self-regulation strategies tended to have better academic performance (GPAs), while students who lacked regulation strategies often had lower GPAs. That is, students who have higher self-efficacy with regard to their study capabilities might employ more self-regulation strategies in learning and perform better in academic activities. In turn, students who have lower self-efficacy can be characterized by a lack of regulation in learning and might achieve lower results in academic activities. These findings are in line with previous research. Panadero and colleagues (2017) stated that self-efficacy is one of the major predictors of student performance, and various research conducted within HE contexts has shown the direct and indirect effects of students' self-efficacy on academic outcomes (Lane et al., 2004; Schunk, 2003). Self-regulation is associated with higher academic achievements, while a lack of regulation is linked with lower academic achievements (Vermunt, 2005). Also, during the first year in HE, self-efficacy is found to be associated with achieving significantly better results (Byrne et al., 2014), and in university contexts, self-efficacy beliefs have a predictive role in future academic outcomes (Lane et al., 2004). Babenko and Oswald (2019) argued that students with higher self-efficacy might achieve better results because they assign more importance to performance and mastery goals. In addition to the existing links between self-efficacy and regulation strategies (Panadero, 2017) and between self-regulation and higher academic outcomes (Vermunt, 2005), self-efficacy might be related to higher achievement in academic outcomes, with academic performance, in part, being influenced by students' beliefs about what they have learned and can use with regard to a specific field (Pajares, 1997).

8.1.3 | Controlled variables: Gender and time mode

The results from our study revealed that female students might perform better in academic activities, although they tend to adopt more external regulation strategies. Previous literature on the association between students' gender and regulation strategies for learning among university students has shown contrasting results. In some studies, female students have been found to use more self-regulation strategies (i.e., rehearsal, organization, metacognition, time management skills, elaboration, effort, help-seeking strategies, utility value, and performance anxiety) than males (Virtanen & Nevgi, 2010). In turn, other research has found no significant differences among females and males in the use of regulation strategies for learning (Pérez et al., 2017) and no gender differences regarding academic outcomes in HE, although female students report more anxiety related to performance. A review focused on gender differences and academic achievements highlighted that, in general, female students perform to a higher level and achieve better educational outcomes, and this could be attributed to the fact that female students tend to adapt much better to the expectations of the school context (Hadjar et al., 2014). Female students seem to possess more characteristics considered important for educational success, such as conformity, cooperation, and submission (Hadjar et al., 2014), and maybe for this reason, they are found to employ more external regulation strategies and to experience more success than their male peers in HE. However, the differences in results regarding regulation strategies and academic performance among male and female students can be attributed to the different contexts in which research has been conducted (e.g., different cultures, different numbers of years in HE) and may need further in-depth analysis in the future.

Regarding the time mode, the results from our study revealed that full-time students generally had higher GPAs than part-time students. This result was expected and confirms the results of previous studies on the relationship between the amount of time dedicated to study at university and academic performance. A significant difference has been found between the effect of long and short study time behaviours of students on academic performance. Also, students who live far from their universities and have long commutes tend to visit their universities less often and have lower academic achievements. Huie and colleagues (2014) found a mediation role of regulation strategies on the relationship between the time spent studying and the achievements of students in their first year of HE (Huie et al., 2014). Our finding seems to indicate that the amount of time that students dedicate to study matters and may have an impact on their academic achievements. Also, it highlights that part-time students in the first year of HE could be particularly at risk of experiencing academic failure (e.g., lower grades, delay in degree completion, university drop-out).

8.2 | Second hypothesis: The mediating role of regulation strategies

The second hypothesis of this research was the following: the three dimensions of regulation strategies (i.e., self-regulation, external regulation, and a lack of regulation) will mediate the relationship between students' self-efficacy and academic performance. The mediating roles of these three dimensions of regulation strategies were tested, partially confirming our hypothesis.

First, students' self-efficacy for learning and performance in transition to HE positively predicted self-regulation, which further positively predicted students' GPAs. Students' self-efficacy during early months in HE exerted a significant effect on their academic performance of first year in university via the mediating role of self-regulation. Second, although students' GPAs of first year in university were negatively predicted by their external regulation, the relationship between students' self-efficacy and external regulation was not significant, which indicated a non-significant mediating role of external regulation between self-efficacy and GPA. Last, self-efficacy negatively predicted a lack of regulation, which, in turn, negatively predicted students' GPAs. A lack of regulation played a mediating role in the relationship between students' self-efficacy in transition to HE and their academic performance of first year in university.

These findings represent the most important contribution of this study to the existing literature on the transition to HE and the role of self-efficacy and regulatory strategies on university students' beliefs and performance. Specifically, the results show that students' self-efficacy during their first months on HE via the mediating role of self-regulation exerted a significant positive effect on their academic performance in their first year at university. Also, a lack of self-regulation has a negative effect on the relationship between students' self-efficacy during the transition period on HE and their academic performance in their first year of university. In turn, external regulation has a non-significant mediating role between self-efficacy and GPA.

To the best of our knowledge, little research has previously explored the mediating role of regulation strategies on the relationship between students' self-efficacy beliefs about their learning and performance and their achievements in academic activities. In a study conducted among undergraduate university students, Komarraju and Nadler (2013) found that effort regulation partially mediated the relationship between self-efficacy and GPA, indicating that self-efficacy may play an essential function by facilitating the use of students' self-control and persistence abilities, which are crucial for academic performance. Our study results add to this finding, analysing the role of each of the three variables of regulation and highlighting the role of regulation as a mediator of the relationship between self-efficacy and academic achievements.

Specifically, in students with high self-efficacy, self-regulation strategies in learning might exert an effect on such beliefs, resulting in a positive impact on academic outcomes and confirming the predictive role of self-efficacy on GPA (Komarraju & Nadler, 2013). Also, whether students have low self-efficacy and experience difficulties or a lack of regulation with regard to their learning and performance might have a negative impact on their academic achievements, confirming the predictive role of self-efficacy on GPA (Komarraju & Nadler, 2013).

Conversely, the contribution of external regulation in the relationship between self-efficacy and GPA seems to be non-significant. This means that students with high self-efficacy do not have lower or higher levels of external regulation in comparison with other students. External regulation has a significant effect on GPA, but it is not a significant mediator in the relationship between self-efficacy and GPA. One possible explanation for this non-significant path between self-efficacy and external regulation is that some other variables exist that moderate the relationship between self-efficacy and external regulation. We can hypothesize that external regulation was not predicted by self-efficacy, probably because potential moderators might exist between these variables. Literature shows that students' self-efficacy beliefs can determine their perceptions of the learning environment. Also, students' perceptions of the classroom environment have been found to have effects on learning regulation (Yerdelen & Sungur, 2019): for instance, classroom challenge perceptions are positively related to external regulation. The learning environment can be influenced by teachers' beliefs, styles, and behaviours and can impact students' learning. A longitudinal study in tertiary education has shown that, when the educational context offers explicit regulation instead of inviting the students to regulate themselves and teachers pay no explicit attention to fostering processing or regulation strategies, students score higher on external regulation than self-regulation (Severiens et al., 2001). We suggest that future research directions should investigate the potential moderator roles of students' perceptions of the learning environment and teacher styles in the relationship between self-efficacy and external regulation in HE.

9 | LIMITATIONS AND FUTURE RESEARCH

Some limitations of the present work should be discussed. First, the data are cross-sectional, and, therefore, it is not possible to draw longitudinal correlations to examine to what degree variables predict other variables over time or directionality with regard to the associations between variables. Moreover, several studies have pointed to some biases that can stem from the use of mediation within a cross-sectional framework (Maxwell et al., 2011). Thus, future researchers could use a longitudinal design to test these longitudinal relations and their directionality, which might help us understand how relationships between the variables unfold over time.

Regarding the non-significant path between self-efficacy and external regulation, our sample size is relatively small, so the variables may fall into a narrow range with regard to the moderators, meaning that within this range, the relationship between self-efficacy and external regulation is non-significant, while outside of it, it is. We did not investigate the moderators of the relationship between self-efficacy and external regulation in our research. Future studies should explore such moderators with a bigger sample size.

In addition, social desirability may have biased the results and also our findings. The measurement of this variable through an appropriate questionnaire would make it possible to introduce it into the analyses as a control variable. And gender was measured in the current study only in a binary approach that ignores the emerging different gender identifications among young people. Future studies could consider other options (e.g., "neither male nor female") and further explore the differences in our main variables studied between these and binary genders if the sample size is large enough. Finally, the homogeneous characteristics of the sample could also be drawbacks. The current sample, which only studies Italian first-year college students, may undermine the generalizability of our results to other groups and/or to other cultures, too. Thus, the use of other samples in future research is recommended and would be helpful with regard to testing the generalizability of our findings in the future.

10 | PRACTICAL AND POLICY IMPLICATIONS

The present paper offers an in-depth exploration of variables that intervene in the transition of students from secondary school to university, analysing the associations between self-efficacy, academic achievements, and regulation strategies for learning and performance. The findings of this study could be significant both for university institutions and educational researchers in HE.

For university institutions, the results confirm the importance of self-efficacy during transition and the mediating role of regulation strategies on students' academic achievements and represent an opportunity for HE institutions to consider, and eventually rethink, the interventions and resources they provide to first-year students in order to facilitate the successful transition from secondary school. As research on interventions with regard to students' beliefs has demonstrated, educational programmes have the possibility to enhance students' self-efficacy. In a review of intervention programmes aimed at enhancing students' self-efficacy in HE, Van Dinther and colleagues (2011) found that enactive mastery experiences can be considered the most powerful source for creating a strong sense of efficacy. As suggested by Zimmerman (2000), a combination of components of students' self-regulation, such as goal setting and self-reflection, can provide students with the opportunity to perceive their learning progress, which can lead to a mastery experience. In addition, researchers recommend that institutions organize programmes that provide students with authentic tasks and set a "safe" environment for improving the classroom climate in order to enhance students' learning experiences (Van Dinther et al., 2011).

For educational researchers, this study provides in-depth knowledge about the effect of non-cognitive factors that intervene in the transition from secondary school to university. In light of the results that have emerged, it would be interesting to focus any future research on the longitudinal data collection of students' academic achievements, self-efficacy, and regulation strategies in order to better understand the development trajectories of students' adjustments to HE. We also suggest that future research directions should investigate potential moderators of the relationship between self-efficacy and external regulation in HE.

11 | CONCLUSION

The present study aimed to offer an in-depth exploration of the associations between self-efficacy, academic achievements, and regulation strategies for learning and performance among first-year students in HE. Although the transition of students to HE has been receiving increasing international attention from both university

institutions and researchers, there is still a dearth of research on this topic for specific variables. Results have shown correlation between most of the study variables, and the mediating roles of self-regulation and a lack of regulation in the relationship between self-efficacy and academic achievements. Further longitudinal research might be conducted for a better understanding of the role of the three variables with regard to regulation strategies for learning and performance in order to enhance students' adjustment, well-being, and success within the HE context. Future research directions should also investigate potential moderators of the relationship between self-efficacy and external regulation in HE.

CONFLICT OF INTEREST

Author's declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support this study are available from the corresponding author upon reasonable request.

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