

## Research Article

# Students' Persistence and Academic Success in a First-Year Professional Bachelor Program: The Influence of Students' Learning Strategies and Academic Motivation

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The present study explores whether students' learning strategies and academic motivation predict persistence and academic success in the first year of higher education. Freshmen students in a professional bachelor program in teacher education were questioned on their learning strategy use and motivation at the start and at the end of the academic year. Students' learning strategies were assessed using the inventory of learning styles-SV. Motivation was measured using scales from the self-regulation questionnaire and the academic motivation scale. Gender and students' prior education were incorporated as control variables. Logistic regression analyses and general linear modelling were applied to predict persistence and academic success, respectively. In each case a stepwise approach in data analysis was used. Results on persistence indicate that lack of regulation and amotivation at the start of the year are significant predictors. For academic success, results showed that relating and structuring, lack of regulation, and lack of motivation at the end of the year are meaningful predictors. Overall, our study demonstrates that learning strategies and motivation have a moderate explanatory value regarding academic success and persistence, and that these effects remain even after controlling for the influence of background variables.

## 1. Introduction

Institutions for higher education nowadays are confronted with a number of complex, educational difficulties. The so-called democratization of higher education has not only led to a worldwide increase in student numbers [1], but has also been accompanied by a diversification of the student population [2, 3]; in particular in higher education contexts in which an open access policy is applicable. At the same time, dropout remains high, and study success continues to be problematic [4–6]. Meeting the educational needs of this heterogeneous population and increasing retention and throughput rates is an important challenge for higher education [7, 8].

To cope with these challenges, institutions for higher education increasingly devote attention to the support of

freshmen students and have begun designing coaching initiatives accordingly. A good part of these initiatives target students' motivation and/or the strategies they apply when engaging in learning. Not only has previous research convincingly demonstrated these factors to be related to study success (e.g., [7, 9–13]), but they also seem among the few factors in a broad range of predictors that institutions can actively have an influence on.

Nevertheless, questions still remain on the relation between learning strategies, motivation, and performance. The vast majority of previous research has adopted some form of grades (be it single grades or grade point average) (e.g., [9, 14, 15]) or self-report measures as outcome variables (e.g., [16–18]). However, it can be argued that the main aim of freshmen coaching programs is not primarily to increase students' grades, but to support them in persisting

in the program and/or pass course modules. However, there is not that much available research that explicitly explores the relation between motivation, the quality of learning, and alternative outcome variables such as dropout or the amount of course-modules that students have passed.

In addition, at least in Europe, the introduction of the European credit transfer system (ECTS) has somewhat impaired the predominant concept of a standardized curriculum that is completed within a relatively fixed period of time, in favor of increased flexibility. It is increasingly observed that not all students take the same course modules during the same academic year, enroll in a full program, or adopt the same study pace. For students in this context attaining credits is becoming a more important aim, this raises questions as to whether, or in this context GPA should be retained as the optimal or only a reference point for comparing students' performance.

Finally, almost all the research on the relation between motivation, learning, and academic performance has been carried out with university students (e.g., [9]). Programs at university colleges, resulting in the attainment of a professional bachelor degree, differ from the academic setting at the university by being more practice or vocation oriented. It could be hypothesized that this orientation requires students to acquire different learning strategies to be successful. Up to date, however, few studies have tackled the relation between learning strategies, motivation, and student performance in the specific setting of a university college.

Therefore, in the current study we want to explore the relation between motivation, learning strategies, and student performance in the first year of a professional bachelor program in teacher education. Students' persistence and the ratio between the number of credits a student obtained and the number of credits he or she was enrolled in (further referred to as academic success) are adopted as outcome variables. Results of the study may not only advance our insights in the relation between motivation, learning, and performance, but it may also provide some suggestions for the design of coaching activities for freshmen students.

## 2. Theoretical Frameworks

Two theoretical frameworks were chosen by this study to represent "the skill and the will" in predicting academic performance [19]. The cognitive processing strategies and metacognitive regulation strategies from the learning pattern framework were chosen to explore students' learning strategies [19, 20]. To map students' motivation, self-determination theory was incorporated [21, 22]. These models were selected, not only because they provide contemporary and complex viewpoints on learning and motivation, but also because they both incorporate dimensions that indicate problems in learning or motivation, notably memorizing, lack of regulation and amotivation. Given the focus of the current study on first-year students and on persistence/dropout, this was regarded as an added value. In addition, the learning strategy components incorporated in the learning pattern model also includes an

application-oriented strategy (concrete processing), making the model especially suitable for research in the context of a more vocation-oriented professional bachelor program.

*2.1. Learning Strategies in the Learning Pattern Model.* The learning pattern model was designed in an attempt to provide a more comprehensive and integrated account of learning by bringing together four different learning components, namely, cognitive processing strategies, regulation strategies, conceptions of learning, and orientations to learning [23, 24]. Cognitive processing strategies and meta-cognitive regulation strategies are sometimes subsumed under the more overarching concept of learning strategies [20, 23]. Based on students' preferences for specific strategies, conceptions, and orientations, the model distinguishes between a meaning oriented pattern, a reproduction-oriented pattern, and application-oriented pattern and an undirected pattern. Originally Vermunt and colleagues referred to their model as a learning style model [24]. However, due to the association between learning styles and innate and stable personality characteristics they later started using the concept of learning patterns [19, 20, 25]. To avoid confusion in terminology, we will consistently use the term learning patterns in this paper. For a detailed description of the full model, we refer to the review article by Vermunt and Vermetten [20]. In the current study, only the learning strategies, the cognitive processing strategies and the meta-cognitive regulation strategies are incorporated (see also Table 1).

*Processing strategies* refer to those thinking strategies and study skills that students possess and apply to process subject matter. Five such strategies are incorporated: relating and structuring, critical processing, memorizing, analyzing, and concrete processing. Relating and structuring and critical processing are seen as indicators of deep processing or meaning oriented learning, while memorizing and analyzing point towards a stepwise approach in processing or a reproduction orientation. Concrete processing is linked to a vocation orientation.

*Regulation strategies* are those activities students use to steer their cognitive processing. Within the learning pattern model, three such strategies are incorporated, self-regulation, external regulation, and lack of regulation. They refer to students' preferences for the various sources that can initiate or regulate a learning process. Self-regulated students have a preference for regulating the learning process themselves, while externally regulated students prefer to depend on the teacher or learning material for this. Students who lack regulation experience problems with the regulation of their learning process.

A few studies explored the relationship between learning patterns or learning strategies as conceived within this model and academic outcomes. Boyle and colleagues [26] found that relating and structuring, critical processing, analyzing, and self-regulation were positively related to GPA in the higher years of university. However, all correlation coefficients were small. Donche and Van Petegem [27] investigated whether learning patterns predicted GPA with first year professional bachelor students in addition to several background

TABLE 1: Learning strategies and their meaning as conceived in the learning pattern model.

Learning component	Learning dimension	Meaning
Processing strategies	Deep processing	
	(i) Relating and structuring	The extent to which students actively relate aspects of the content
	(ii) Critical processing	The extent to which students adopt a critical angle
	Stepwise processing	
	(i) Analyzing	The extent to which students methodically process the learning content
	(ii) Memorizing	The extent to which students memorize the learning content
Regulation strategies	Concrete processing	The extent to which students attempt to apply the content to concrete situations
	Self regulation	The extent to which students actively steer their own learning process
	External regulation	The extent to which students rely on teaching staff or the learning material to steer their learning process
	Lack of regulation	Lack of clarity on how to steer their learning process

variables. They found analyzing, concrete processing, and external regulation to be positive predictors of GPA, while lack of regulation and intake of knowledge negatively predicted this outcome. The model including only the learning pattern dimensions explained 16% of the variance in GPA. A Study by Vermunt found that self-regulation as well as external regulation was related to higher achievement. Lack of regulation, on the other hand, was linked to lower performance [28]. Beishuizen and Stoutjesdijk [29] demonstrated that university students with a meaning oriented learning pattern, containing deep processing and self-regulation, outperformed students with a reproduction-oriented learning pattern, the latter including, amongst others, a preference for memorizing, analyzing, and external regulation. Outcome variable in this study was students' exam scores for a specific, innovative, computer-supported learning environment.

To our knowledge, up to now only three studies were carried out that included similar outcome measures as the ones adopted in the current study. Busato and colleagues carried out two studies with first year university students in which learning patterns were related to the amount of study-points (credits) that students obtained. Their first study found a significant moderate, negative correlation between academic success and the undirected learning pattern, including lack of regulation, in three of the five cohorts that participated in the study [30]. None of the other learning patterns were significantly related to academic success. Their second study, with three cohorts, generally confirmed these results, although in this study negative correlations between the undirected learning pattern and academic success tended to be small [31].

In addition, a single study by Coertjens and colleagues [32] explored the relationship between learning patterns, academic motivation, self-efficacy, and several background variables and dropout with first year students in a professional bachelor program. The model including only learning patterns explained a mere 3% of the variance in dropout among first year students. Results demonstrated that the reproduction-oriented learning pattern was a significant negative predictor of dropout. An initial effect of the undirected pattern disappeared when self-efficacy was added to the model.

Based on previous research on the relation between learning patterns and academic performance, it can be concluded that the most salient relation exists between undirected learning and lower academic performance. Results on other learning patterns are unequivocal. However, a significant part of the previous research only reported results on the level of entire learning patterns, making it difficult to discern which specific learning strategies predict academic performance. Also, few studies up to now have targeted outcome measures such as dropout or academic success or explored the interrelations in the context of a professional bachelor program.

**2.2. Academic Motivation.** Self-determination theory (SDT) is a macromotivational theory that builds on the classical, distinction between intrinsic and extrinsic motivation [33] and has been frequently used in research in educational contexts [34]. It is a multidimensional model that distinguishes between the quantity and quality of motivation [17, 35]. Regarding the quality of motivation, SDT makes a distinction between autonomous and controlled motivation. Students who are autonomously motivated for learning engage in learning behaviour out of feelings of choice or volition. Underlying motives range from personal interest (internal regulation) or perceptions of value or relevance (Identified regulation). In contrast, in the case of controlled motivation, learning behaviour is predominantly driven by feelings of pressure. These can originate from within students themselves through feelings of shame, pride, or guilt (introjected regulation), or they can be initiated by external pressures such as expectancies, rewards, or punishments (external regulation).

The quantity of motivation is incorporated in SDT through the concept of amotivation. Students who are amotivated lack motivation altogether [36]. They are apathetic and have little concern for their studies. They will exhibit very few learning activities, and, when they do so, they seem to lack the ability to regulate their study behaviour and predominantly make use of surface strategies [21]. This lack of motivation, according to SDT, partially stems from low capacity beliefs, related to low feelings of self-efficacy.

Research shows that students who are autonomously motivated persist longer, are better in organising their learning activities, are more concentrated, engage in deeper learning, achieve higher grades, and feel better than students who are driven by controlled motivation [21, 34, 37]. A recent metaanalysis on the psychological correlates of GPA with university students generally confirmed these findings [9]. Across all incorporated studies, intrinsic/autonomous motivation proved to be a small significant and positive correlate of GPA, while extrinsic/controlled motivation was not significantly associated with GPA. However, results are not always unequivocal. A study by Baker found neither autonomous motivation, controlled motivation, or amotivation to be related to GPA with second-year university students [38]. Some studies have used the relative autonomy index (RAI) as predictor. The RAI captures individuals' level of autonomous motivation relative to their level of controlled motivation or amotivation by adding weights to students' scores on specific motives and subsequently averaging these scores to obtain a single measurement of relative autonomous motivation [39]. Higher scores on the RAI have found to be related to higher grades [39, 40].

A few studies have related academic motivation from a self-determination theory's perspective to dropout. A study by Vallerand and Bissonnette [41] with high school students demonstrated that students who dropped out had lower scores on autonomous motivation and higher scores on amotivation. A second study also showed that higher scores on the RAI predicted lower intentions to drop out [42]. This was further evidenced in a study with high school students by Hardre and Reeve in which academic motivation explained 27% of the variance in dropout intentions [43]. The aforementioned study by Coertjens and colleagues, using actual dropout as an outcome variable, reports a significant positive link between amotivation and dropout. However, the effect disappeared after learning patterns, and background variables were added to the model [32].

Concluding, we can state that autonomous motivation tends to be positively related to academic performance, while amotivation seems to predict negative outcomes such as dropout. Controlled motivation tends to be unrelated to achievement. Although the research on the relation between performance and academic motivation is more abundant in comparison to that on the relation with learning patterns, some caveats still exist. For instance, the use of the RAI to a degree obscures the relation between specific motives and academic performance. Moreover, much of the research on the relation with dropout has been carried out in the context of high school. Finally, to our knowledge, no studies have explicitly tackled the relationship between motivation and the attainment of credits (academic success).

### 3. Research Questions

The current study aims to explore whether or not academic motivation and learning strategies predict persistence/dropout and academic success in the first year of a professional bachelor program in teacher education. As

dropout can occur during the academic year, students' academic motivation and learning strategy use at the start of the academic year were used to predict persistence. Since research has demonstrated that students significantly change their preferences for learning strategies or motivation during their freshmen year [44], we deemed it more appropriate to use students' motivation and learning strategy use at the end of the academic year as predictors for academic success. In accordance with previous research, we also included two background variables that have consistently shown to be related to academic performance, gender, and prior education as control variables (e.g., [7, 9, 27, 45, 46]). By doing so, we hope to provide a more accurate image of the unique contribution of learning strategies and motivation in predicting academic performance. Summarizing, the current study addressed the following research questions.

- (i) (RQ1) Do students' learning strategies and motives at the start of the first year of higher education predict their persistence in their first year?
- (ii) (RQ2) Do students' learning strategies and motives at the end of the first year of higher education predict their academic success in their first year?
- (iii) (RQ3) To what degree do students' learning strategies and motives predict their persistence and academic success in their first year, after controlling for gender and prior education?

## 4. Research Methods

*4.1. Short Overview of the Educational System in Flanders.* In Flanders, the Dutch speaking part of Belgium, mandatory education is organized between the ages of six and eighteen [47]. Primary education is aimed at children from six to twelve years old. Secondary education is intended for young people aged from twelve to eighteen. It is comprised of three stages, each spanning two years. The majority of teaching periods in the first stage is devoted to the core curriculum. From the second stage on, different educational types can be distinguished based on their educational aims. *General secondary education* emphasizes broad general education and aims to provide a very firm foundation for passing on to tertiary education. In *technical secondary education* and *secondary arts education*, most attention is devoted to general and technical-theoretical subjects (or arts practice). Afterwards, students can exercise a profession or pass on to tertiary education. *Vocational secondary education* is a practice-oriented type of education in which student are prepared for a specific occupation in addition to receiving general education. Each type of education encompasses various courses or fields of study. At the end of each schooling year, all students receive an "orientation certification", clarifying their options for the next academic year. Three such certificates exist. The *A-certificate* allows students to continue to the next grade in their current course. The *B-certificate* allows students to continue to the next grade, although not in the same course. To pass to the next grade, students have to change course and thereby also

TABLE 2: Cross tabulation of persistence and participation in data gathering at end of year.

Participated in data gathering at end of year		Persisted in program		Total
		No	Yes	
No	Actual	230	231	461
	Statistically expected	158	303	
Yes	Actual	70	338	408
	Statistically expected	142	266	

TABLE 3: Distribution of background variables.

Student factor	Dimensions	N	Valid percentage of population
Gender	Male	266	33%
	Female	607	67%
Prior education	Normal trajectory	275	36%
	Repeated one or more grades	66	9%
	Changed courses one or several times	274	35%
	Repeated one or more grades and changed courses one or several times	158	20%

possibly change between educational types. If students want to continue in the courses they are currently enrolled in, they have to retake their grade. The *C-certificate* forces students to retake their grade, regardless of whether or not they change course. In any case, students can also voluntarily choose to change course or educational type. Students holding a degree in secondary education have unlimited access to higher education. Neither the school, the type of education or course of study play a part in this, which makes the student population in higher education in general is relatively divers.

In the Flemish higher education system, two types of initial teacher training are provided. On the one hand, a three-year professional bachelor program is organized at university colleges. It prepares students for a job in kindergarten, primary education, or the lower years of secondary education. On the other hand, a specific teacher training program is set up for students who have already obtained a diploma in higher or adult education. This teacher education program is provided by universities and centers for adult education. It provides students with the certification to teach in the higher grades of secondary education in the domain in which they attained their initial diploma. Both types of teacher education lead to the same diploma, namely, the qualification of teacher [48]. The current study only pertains to students in the first type of teacher education.

**4.2. Sample.** Participants in the current study were first year students enrolled in a professional bachelor program in teacher education in Belgium. 873 students (87%) participated in the data gathering at the start of the year. 408 students (46%) filled in a questionnaire at the end of the academic year. This difference in participation rate is probably for most part due to dropout. Cross tabulation (Table 2) and a Pearson  $\chi^2$ -test confirmed that students who did not take part in the second data gathering moment were overrepresented in the dropout category, and students who did participate overrepresented in the persistence category ( $\chi^2 = 103,679$ , sign  $\leq 0.001$ ).

The age of students ranged between 18 and 49 years with an average age of 19,9 years. Over 95% of the first year students were younger than 25 years old at the start of the program. The distribution of students across the background variables incorporated in the design is represented in Table 3. *Prior education* alludes to whether the student encountered any study delays during his or her prior education, and whether or not students changed courses during secondary education. It can be discerned from Table 3 that the majority of students were female and had encountered some sort of “hurdle” in their secondary education.

**4.3. Research Instruments.** Students were questioned on their habitual learning strategies and motives at the start and at the end of the academic year.

To measure *students' learning strategy preferences* the inventory of learning styles-short version (ILS-SV) was administered [49]. This instrument is a revised and reduced version of Vermunt's inventory of learning styles [23]. The ILS-SV is composed of 30 items, measuring students' use of five different processing strategies (relating and structuring, critical processing, memorizing, analyzing, and concrete processing) and three regulation strategies (self-regulation, external regulation, and lack of regulation).

*Autonomous and controlled motivation* from the perspective of self-determination theory was measured using the Dutch version of the academic self-regulation questionnaire (SRQ-A) [17, 50]. A translated scale from the academic motivation scale (AMS) was used to map *amotivation* [36]. All items were rated on a five-point Likert scale, ranging from “I seldom or never do this” to “I almost always do this” for processing strategies and from “Totally agree” to “Totally disagree” for regulation strategies and motivational regulations. Reliabilities for all scales at the two data-gathering moments of our study are represented in Table 4.

In Flanders and the Netherlands the combination of the ILS-SV, the SRQ-A, and the amotivation scale from the AMS is known as the learning and motivational questionnaire,

TABLE 4: Reliabilities for scales pertaining to the ILS-SV, SRQ-A, and AMS.

	Scale	$\alpha$ start	$\alpha$ end
ILS-SV	Processing strategies		
	Relating and structuring	.73	.69
	Critical processing	.68	.71
	Analyzing	.66	.61
	Memorizing	.61	.72
	Concrete processing	.64	.61
	Regulation strategies		
	Self-regulation	.69	.74
	External regulation	.61	.63
	Lack of regulation	.73	.80
SRQ-A	Controlled motivation	.79	.80
	Autonomous motivation	.86	.85
AMS	Amotivation	.76	.75

LEMO) [51]. It is conceived as a short and quick diagnostic tool aimed at providing information on motives and learning strategy use to students and teachers alike. When the LEMO is used in educational practice, it is often embedded in coaching initiatives for first year students.

*Persistence* (the opposite of dropout) was conceived as to whether or not a student reenrolled in the same program for the next academic year, be it in the first year of the program, the second year of the program or through an individualized program. Persistence is therefore a dichotomous variable. The definition of persistence was mainly chosen because students tend to not inform the university college when they drop out of the program. Therefore reenrollment for the next academic year is the first occasion the university college is sure as to whether or not a student has dropped out of the program.

*Academic success* is defined as the ratio between the number of study credits a student obtained after the first year and the total amount of credits the student was enrolled in during that first year. In theory, 60 credits are needed to pass the first year, although the ECTS-system and the increasing flexibility tend to diminish the importance of this value. Not all students enroll in the full program, and it is easier for students to fail or drop out of specific course modules and retake those courses the next academic year without losing too much of their study progress. To take into account this flexibility and the resulting individual programs, we opted to use a ratio instead of the absolute value of credits obtained as Busato and colleagues did [30, 31]. Thus, a student who chooses to enroll for only 45 credits, but manages to obtain all these credits will score higher academic success compared to a student who enrolled for 60 credits, but only attained 45 credits and consequently failed for the remaining 15 credits.

Arguably, a partial overlap exists between the two outcome variables, as an academic success of 0 may indicate that a student did not obtain any credits or dropped out of the program. However, this includes students who dropped out of the program after the examination periods in June or September. Students who dropped out of the program during

the academic year are not included, because these students did not participate in the data gathering at the end of the academic year. Information in Table 2 points out that this is the case for 70 students (17% of the sample used for the analyses on academic success).

*4.4. Data Gathering and Data Analysis.* Data were gathered on motivation and learning strategy use at the start and the end of the academic year, more specifically in October and May. In both occasions, questionnaires were administered during mandatory classes to obtain a maximal response rate. Students not attending were invited to fill in an online version of the questionnaire. Background variables and information on credits or re-enrolment were obtained through the student administration office.

Logistic regression was applied for analyses with persistence as dependent variable, and general linear modelling was used for analyses on academic success. In each case, a stepwise strategy in data analysis was used. In a first step, the “general” effects of processing strategies, regulation strategies and motivation on persistence or academic success were investigated. In a second step, significant predictors from the first step were brought together into a more encompassing model. Next, the background variables were added to this model. Effect sizes were computed, using Nagelkerke  $R^2$  for the logistic regression and  $R^2$  for the general linear models. In a final step, each significant learning strategy and motivational regulation from the previous model was separately and successively added to a null model containing only the background variables as predictors. Changes in model fit or partial  $F$ -tests were used to assess whether or not these variables significantly predicted the outcome variables and improved model-fit in addition to the background variables. This final step, thus, provides information of the “unique” contribution of motivational dimensions or learning strategies on persistence or academic success after controlling for background variables.

## 5. Results

In a first step, cognitive processing strategies were included as predictors for persistence. Likelihood chi-square test (Change in model  $\chi^2 = 13,429$ ,  $P = 0.02$ ) indicated that this model significantly fitted the data better than a model without predictors (null model). Analyses show that analyzing is the single cognitive processing strategy that significantly predicts persistence. Students who thoroughly work themselves through the learning content have a higher chance of persisting in their first year ( $\beta = 0.237$ ,  $P = 0.03$ ). The model explained only 1% in variance of persistence.

Next, only the regulation strategies were included in the model. This model only marginally significantly fitted the data better than the null-model (Change in model  $\chi^2 = 6,904$ ,  $P = 0.08$ ). Lack of regulation proved to be the single significant regulation strategy. Students who experience problems in regulating their learning process have a higher chance of dropping out ( $\beta = -0.237$ ,  $P = 0.01$ ). This model also explained 1% in variance.

In a next step, a model with only motivational regulations as predictor for persistence was computed. This model had a significant better model fit over the null model (Change in model  $\chi^2 = 21,483$ ,  $P < 0.001$ ). Analyses demonstrated that students who lack motivation have a lower chance of persisting ( $\beta = -0.604$ ,  $P < 0.001$ ). Motivational factors alone explained 4% in variance.

Subsequently, cognitive, metacognitive, and motivational variables were brought together in a single model. This model fitted the data significantly better (Change in model  $\chi^2 = 21,800$ ,  $P < 0.001$ ). However, only lack of motivation was retained as significant predictor ( $\beta = -0.552$ ,  $P < 0.001$ ). Lack of regulation proved significant at the 0.01 level ( $-0.154$ ,  $P = 0.01$ ). The entire model explains about 4% in of the variation in persistence.

In a final step, the two background variables were added to this model, resulting in a significantly improved model-fit over the nullmodel (Change in model  $\chi^2 = 32,776$ ,  $P < 0.001$ ). Gender was found to be a significant predictor. Female students have a higher chance of persisting in their first year ( $\beta = 0.369$ ,  $P = 0.035$ ). Amotivation remained the single significant predictor at the 0.05 level ( $\beta = -0.477$ ,  $P = 0.004$ ). The predictive value of lack of regulation remained marginally significant ( $\beta = -0.177$ ,  $P = 0.069$ ). This model explained 6% of the variance in persistence. As a final test for the predictive value of motivational regulations and learning strategies, each of the variables was subsequently inputted into a nullmodel already containing the background variables, and changes in Chi-square were computed. These resulted in a significant improvement in model fit for amotivation (Change in  $\chi^2 = 12,336$ ,  $P < 0.001$ ), a marginal improvement for lack of regulation (Change in  $\chi^2 = 3,705$ ,  $P = 0.05$ ), but no significant improvement for analyzing (Change in  $\chi^2 = 1,395$ ,  $P = 0.238$ ).

Results of the linear regression analysis with cognitive processing strategies as independent variables and academic success as dependent indicated that relating and structuring significantly predicted academic success ( $b = 0.065$ ,  $t(393) = 2.572$ ,  $P = 0.01$ ). The total model explains 4% in variance

of academic success. For regulation strategies, both external regulation ( $b = 0.044$ ,  $t(395) = 2.746$ ,  $P = 0.006$ ) and lack of regulation ( $b = -0.053$ ,  $t(395) = -4.054$ ,  $P < 0.001$ ) were found to be significant predictors, explaining 6% in variance. Students who are more teacher-dependent when learning obtain more credits, while students who report problems in regulating their learning processes acquire less credits. When the motivational dimensions were imputed as predictors for academic success, only a single significant predictor emerged. Students who have higher scores on amotivation attain a lower academic success ( $b = -0.078$ ,  $t(393) = -3.484$ ,  $P < 0.001$ ). Motivational dimensions explained 5% in variance. If the significant predictors from the previous models are combined into a single model, they all remain significant. The model explained 9% of the variance in academic success. When student characteristics were inputted as independent variables, gender, again, proved a significant predictor. Female students acquire a larger portion of the credits, they were enrolled in ( $b = -0.127$ ,  $t(393) = -4.694$ ,  $P < 0.001$ ). Most of the significant predictors from previous analyses were retained as predictors. Only external regulation became a marginally significant predictor. The final model explained 10% in the variance of academic success. Partial  $F$ -test indicated that successively adding, relating, and structuring ( $R^2 = 0.043$  change  $F(1, 396)$ ,  $P < 0.001$ ) lack of regulation ( $R^2 = 0.081$  change  $F(1, 394)$ ,  $P < 0.001$ ) and amotivation ( $R^2 = 0.10$  change  $F(1, 393)$ ,  $P = 0.003$ ) to a model already containing gender as predictor, in each case, significantly increased  $R^2$ -values.

## 6. Conclusions and Discussion

The aim of our study was to explore whether or not students' learning strategies and academic motivation predicted persistence and academic success in the first year of higher education and to investigate whether this predictive value remained after controlling for two background variables, namely gender and prior education.

Looking at the impact of academic motivation on persistence and academic success, it has to be concluded that, in both cases, amotivation is the single significant motivational predictor in our final models. These results are in line with studies on dropout conducted by Vallerand and colleagues [41, 42] and, to a certain degree, with Coertjens and colleagues [32]. These findings therefore also provide additional support for the assertion that students' motivation is an important factor to consider when researching dropout or academic performance [7, 9, 12]. However, our study also further refines results from previous research. Although, the use of the relative autonomy index in previous research (e.g., [42]) was able to demonstrate that students with less self-determined motivation had a higher chance of dropping out it remained less clear whether it was the quality or the quantity of academic motivation that mattered most. Our results unequivocally point towards the latter. For persisting in a program or obtaining credits in the first year, it does not seem to matter what type of motivation you have, as long as you have enough motivation. This is in contrast with previous

research on the relation between academic motivation and GPA or other performance measures, where predominantly a link was found with high quality motivation, that is, autonomous or intrinsic motivation (e.g., [9, 17, 39, 40]).

Results on the predictive value of learning strategies demonstrate that few to none of the learning strategies predict persistence, once they are combined into a single model with motivation and/or background variables. Only a marginal effect of lack of regulation could be discerned. On the other hand, two learning strategies were found to predict academic success, more specifically relating and structuring and lack of regulation. The effect of the latter seems in line with the results reported by Busato and colleagues [30, 31], adopting a similar variable as a performance measure. The significance of relating and structuring for academic performance was only reported by Boyle and colleagues [26], be it in the prediction of GPA. It is comforting to find that at least some aspects of deep processing or meaning-oriented learning predict academic success, since this type of learning is often advocated as the preferred way of engaging in learning in higher education [52, 53]. In addition, external regulation proved to be a marginally significant predictor of academic success. “Doing what the teachers tell you to do” seems an efficient strategic approach for academic success, especially when confronted with the uncertainty of the first year in higher education [44]. Finally, it is interesting to note that, despite the more vocation-oriented context of university college, concrete processing as a strategy did not play a significant role in predicting our outcome variables. This result differs from the result of the study by Donche and colleagues who found that a preference for this strategy predicted GPA scores in a professional bachelor context [27]. Future research could devote attention to the specific role these strategies play in academic performance in a professional bachelor setting.

One of the strong points of our study is that it attempted to predict multiple measures of academic performance based on a similar set of predictors in a similar context. This allows for some comparisons across outcome variables and provide some preliminary hypotheses for further research. First, less variance was explained by motivational factors and study strategies in dropout compared to academic success. This seems to be in line with other lines of research who point towards financial factors [7], academic, and social integration [13] or socioeconomic status [27] as primary predictors of persistence. However, given the fact that these factors are not easily influenced by teachers or coaching initiatives, it seems that, overall, institutions in higher education can only exert a small or tentative influence on students’ decisions to drop out of a program. A somewhat larger impact can be expected on students’ passing their course modules. Second, if institutions for higher education do want to influence students’ performance by targeting motivation and learning strategies, a different focus should be maintained according to aims of the initiatives. If reduction of dropout is the primary aim, initiatives should center around maintaining motivation. If the priority is helping students pass course-modules, the focus should not solely be on motivating students, but also supporting them in

acquiring regulatory skills. This could be done, for instance, through process oriented instruction [54]. The marginally significant predictive value for external regulation suggests that, notwithstanding that self-regulation is an important end goal for higher education, it might be feasible to initially provide first year students with a more structured and regulated environment. Some recent research points in that direction [55]. Third, It has to be concluded that in predicting persistence and success, dimensions indicating a “lack of” are most instrumental. As stated earlier, this is not in line with findings from research using single grades or GPA as a dependent variable. This seems to point towards differential effects according to the outcome variable(s) incorporated. More research using similar variables to predict multiple outcome measures is definitely needed to enhance our understanding of how factors influencing different measures of academic performance.

Our results demonstrate the value and limitations of learning strategies and motivational regulations in predicting so-called “hard” measures of student performance such as persistence or academic success. Effect sizes especially regarding persistence were small. Effect sizes on academic success were moderate in nature and resemble those reported in earlier studies [30, 31]. However, we concur with Richardson that small effect sizes are not necessarily unimportant for educational practice [9]. In this case, we argue, that learning and motivation provide one of the few student factors that have an impact on teaching and coaching, through the design of the learning environment or coaching initiative. It, therefore, seems at least as important to understand what motives or learning strategies play a role in academic outcomes.

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