

# A systematic review of factors related to first-year students' success in Dutch and Flemish higher education

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## Abstract

This systematic review presents an overview of factors which play an important role in explaining first-year grade point average (GPA), the number of obtained credits (EC), and persistence in Dutch and Flemish higher education. Thirty-nine peer-reviewed articles were included, mostly Dutch studies using samples of university students. We found that ability factors, prior education characteristics, learning environment characteristics and behavioural engagement indicators were most successful in explaining success. While prior education and behavioural engagement were related to GPA, EC and persistence, the results differed depending on which outcome variable was used in the other predictor categories. Ability and learning environment mattered most as GPA and EC predictors. Personality characteristics, motivational factors, and learning strategies were mainly important for GPA. Demographic factors mattered most for EC, and psychosocial factors for EC and persistence. Recommendations for future research are provided based on this review's results.

**Keywords:** review, academic achievement, persistence, first-year students, higher education

## 1 Introduction

Increased enrolment in higher education in countries in the West in the last ten years has resulted in greater diversity in the first-year student population in terms of ability, demographic factors, and prior education. Simultaneously, increasingly many new students experience difficulties in meeting academic requirements (Beerkens-Soo & Vossensteyn, 2009; Trautwein & Bosse, 2017). The first year is an important transition phase where

many social and academic adaptations happen (e.g., Kyndt, Donche, Trigwell, & Lindblom-Ylänne, 2017). That dropout rates in the first year are substantially higher than those in subsequent years is a well-known phenomenon, and students who do not perform well in their first year are more likely to drop out later or to take more time to graduate (Beerkens-Soo & Vossensteyn, 2009; Flemish Government, 2014; McKenzie, Gow, & Schweitzer, 2004). As in many other Western countries, substantial numbers of dropouts are common in the Netherlands and Flanders, the Dutch-speaking part of Belgium. Thirty to 40 percent of first-year students in higher education in the Netherlands do not continue to the second year of the programme they started (Dutch Inspectorate of Education, 2017). Only 40 percent of higher education students entirely pass their first year in Flanders (Van Daal, Coertjens, Delvaux, Donche, & Van Petegem, 2013). Greater insight into the factors which influence academic success in the first year of higher education is therefore needed.

This review study provides an overview of student success correlates in the Netherlands and Flanders. Firstly, this review adds to the current literature on higher education because it provides a context-specific overview of factors which explain student success. Dutch and Flemish researchers can use the findings as an overview of existing research and as a starting point for new research. Secondly, the study shows how success predictors have a differential impact on student success depending on the country/region (the Netherlands or Flanders), education level (professional or university education), and the outcome measure used (grade point average (GPA), number of obtained credits (EC), or persistence). Although the practical implications are not the main focus of this review, higher education institutions

can use this overview of determinants of student success to gain greater insight into the likely reasons for possible high dropout rates and low achievement in their degree programmes and for guidance if they wish to improve the first-year experience or the information provided to prospective students.

### **1.1 Research context: Professional and university education in the Netherlands and Flanders**

In contrast to the Anglo-Saxon system, both the Netherlands and Flanders have a binary system of higher education, consisting of professional and university education. This permits comparison of correlates of student success between these two levels. To our knowledge, this comparison has not been made before, even though there are potential differences between the two types regarding student success correlates, due to the differences in learning environment and student population. In the Netherlands and Flanders in general (i.e., notwithstanding differences between individual degree programmes), the subject matter at universities is more abstract and less practical than at professional education, the teaching speed is higher, more independent learning is expected from students, and large-scale lectures are more common. The focus in professional education lies on training students for a specific profession, which is usually clear in advance. Accordingly, internships are a prominent part of the four-year curriculum there, whereas at universities it is common only to do an internship (or a research project) at the end of a degree programme (University of Groningen, 2017). Furthermore, there are a great many systematic student differences between university and professional education in the Netherlands. More specifically, compared to first-year professional education students, first-year university students are younger, more likely to have moved away from their parental home, and the student population consists of fewer students with a migrant background, fewer first-generation students, and more international students (Van den Broek et al., 2017). In addition, there are differences in the disciplines studied: More uni-

versity students than professional education students pursue a science degree programme (39% and 26% respectively) (Van den Broek et al., 2017).

It is also interesting to compare student success correlates between the Netherlands and Flanders, because despite the shared language and distinction between professional and university education, the two education systems have an important difference related to access. The education system in the Netherlands is highly differentiated: After eight years of primary education, students pursue secondary education at different levels. To obtain access to a degree programme at a research university, students have to graduate from the six-year pre-university track, with specific sub-track requirements for various programmes, or they have to hold a professional higher education degree, with additional requirements in some cases. To study a higher professional degree, a five-year senior general secondary education track or a diploma from senior vocational education is required, again with additional requirements in some cases. The secondary education system in Flanders also consists of different tracks, but in contrast to the Dutch post-secondary educational system, the Flemish system can be qualified as an open access system: Successful completion of any type of secondary education allows a student to enter any degree programme in higher education without having to pass an entrance test (except in engineering, medicine, and dentistry) (Vlaamse Overheid, 2008). There is no ability tracking in Flemish mainstream secondary education, nor is there a focus within secondary education on study tracks with specific coursework (e.g., a science and technology track and an economics track). This might result in a more diverse first-year population in Flanders than in the Netherlands, and might imply that student factors such as ability and prior education, e.g., level of secondary education and secondary school coursework, are more influential in Flanders than in the Netherlands. For example, if a Dutch student wants to pursue a university degree in chemistry, he or she has to have a pre-university diploma, with completed coursework in the

study track nature and technology. If a Flemish student, however, wants to study chemistry at a university, he or she can access this programme with any secondary school diploma (i.e., general, technical, art, or vocational education). Consequently, whereas the Dutch chemistry programme has a student population mainly consisting of pre-university nature and technology students (and maybe some students who transferred after having completed the first year of a professional education chemistry programme), the Flemish programme will have students who are more diverse in their educational background.

### 1.2 Different outcomes measures

A drawback of many national and international studies of student success is that they often only use one or two outcome variables, namely GPA and/or persistence against dropout. In the Dutch and Flemish contexts, however, three outcome variables matter with respect to first-year student success: GPA, EC, and persistence (i.e., continuing to the second year of a degree programme). Choosing a specific outcome measure can have great consequences for the results achieved. This can be explained by the notion that outcome measures in themselves differ substantially from each other. A student's GPA is an indicator of his or her achievement level, whereas the number of ECs is an indicator of study progress, because it indicates how far the student has progressed in his or her degree programme (European Union, 2015). In the first year, if a student obtains all 60 ECs, which represents a full-time academic year, his or her progress is optimal. Some students mainly care about passing their courses and not about how high their grades are, and consequently only put in the minimum effort required to pass – this indicates the relatively low motivation to excel found among Dutch students (OECD, 2016), known in Dutch terms as *'zesjescultuur'*. Persistence is yet another distinct measure of success: students with high GPAs who have obtained all their credits might deliberately decide to stop their studies for several reasons – e.g., having chosen the wrong degree programme – whereas students who achieve lower GPAs and/or ECs

in their first year might decide to persist if they still meet the minimum requirements to continue (Van den Broek et al., 2017). Accordingly, different processes play a role in explaining how high a person's GPA is, how many credits he or she obtains, and whether he or she drops out. Due to these differences in the success measures, it is important to include all three in order to investigate the extent to which predictors affect them differently. This will contribute to a more detailed understanding of student success predictors.

### 1.3 The current study

Following on, this systematic review will seek to create a comprehensive picture of Dutch and Flemish student success correlates in the first year of higher education. We are also interested in differences between these regions, differences between professional and university education, and any differential effects on outcome variables used in measuring student success. The following two research questions are central to this review:

- Which factors are important correlates of first-year student success (GPA, EC, and persistence) in higher education in the Netherlands and Flanders?
- Are there any notable differences in the correlates between the Netherlands and Flanders, between professional education and university education, and based on outcome variable (GPA, EC, or persistence)?

In addition, we aim to identify the theoretical frameworks underlying these empirical studies to gain a better understanding of the different theoretical strands of research from which the correlates are drawn. Finally, we describe limitations and gaps in the current body of research on first-year student success in the Netherlands and Flanders and make recommendations for future research.

## 2 Theoretical background

The conceptual framework which serves as a starting point for this review is based on an input-throughput-output model used by, for instance, Jansen and Bruinsma (2005). This type of model also underlies Tinto's theory of student attrition (Tinto, 1993), Braxton, Milem,

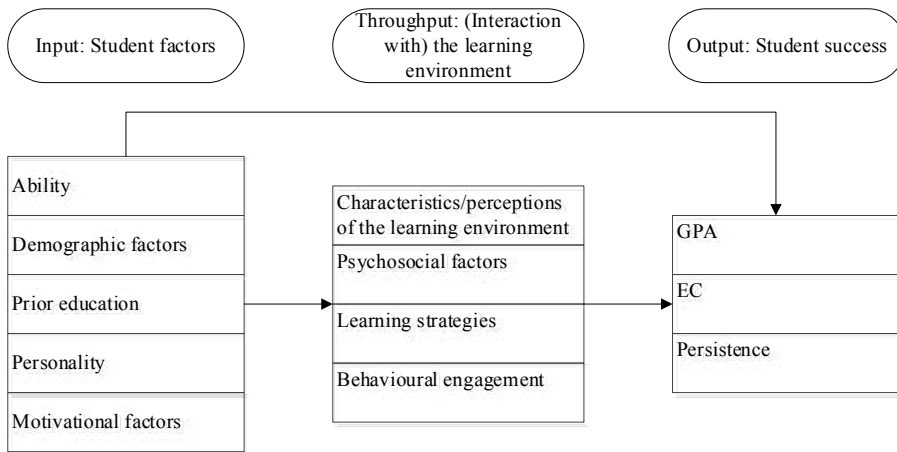


Figure 1  
Schematic representation of the conceptual framework

and Sullivan's (2000) revision of Tinto's theory in which they refined elements in the model, and Biggs' 3P-model (presage, process, and product) (Biggs, Kember, & Leung, 2001). The model states that students begin their studies with specific student entry characteristics (input) such as ability, demographic factors, and a certain type of prior education. We list these under the term 'student factors'. During their first year, students interact with and experience a specific learning environment (throughput). This allows us to gather characteristics and perceptions of the learning environment as well as factors related to the students' interaction with their learning environment, such as learning strategies and behavioural engagement. Finally, the output factors are the three outcomes of student success: GPA, EC, and persistence. A conceptual framework providing an overview of all categories and related factors is presented in Figure 1.

In the following sections, we will briefly describe the five student factors and the four factors related to (the students' interaction with) the learning environment, by defining the most important constructs within each factor and their theoretical background.

### 2.1 Ability, demographic factors, and prior education

Secondary school GPA is the most consistent universal predictor of achievement in higher education (e.g., Richardson, Abraham, &

Bond, 2012). Since secondary school GPA scores are easier to collect than a standardised measure of ability such as an intelligence test, many studies of higher education success use secondary school GPA as an ability indicator. The demographic characteristics commonly included in achievement studies in higher education are gender, age, socioeconomic status (SES), and ethnic background. Due to the differentiation in secondary education in the Netherlands and Flanders, access to higher education is possible through different pathways, meaning that students who enter postsecondary education differ according to their prior education. These differences can either be differences in the prior education level or differences in secondary school coursework, i.e., the focus of the study track (the Netherlands) or the combination of subjects (Flanders) a student has chosen.

### 2.2 Personality

Previous research has also investigated the relationship between personality traits and academic achievement. Personality traits are important in explaining achievement because although cognitive ability predicts what a student *can* do (i.e., maximum performance), personality contributes to the prediction of what a student *will* do (i.e., typical performance) (Furnham & Chamorro-Premuzic, 2004). The most widely used framework of personality is the five-factor model (FFM) of

personality (McCrae & Costa, 1997), also known as the Big Five dimensions of personality, the five dimensions being agreeableness, conscientiousness, neuroticism, extraversion, and openness to experience. Another personality characteristic influencing achievement is procrastination, i.e., 'to voluntarily delay an intended course of action despite expecting to be worse off for the delay' (Steel, 2007, p. 66). Research shows that procrastination has sufficient temporal and situational stability to warrant being considered a personality trait (Steel, 2007).

### 2.3 Motivational factors

Motivational variables are often used in studies of higher education success. Common motivation theories related to academic achievement are: a) theories on self-efficacy and self-concept, b) theories on reasons for engagement, and c) the expectancy-value theory (Eccles & Wigfield, 2002). Self-efficacy theories concern an individual's belief in how successful he or she will be in performing a certain task (Bandura, 1997). As such, these first type of theories relate achievement to an individual's efficacy and outcome expectations. A prominent theory within the second type of motivation theories (those focusing on reasons for people to engage in certain tasks) is the self-determination theory (Ryan & Deci, 2000). The distinction between intrinsic and extrinsic motivation is important in this theory, i.e., performing an activity for sheer interest or fun (intrinsic), or to obtain or avoid something (extrinsic). Goal theory is another theory related to reasons for engagement. Research on the relationship between goals and achievement tends to incorporate the distinction between performance and mastery goals. Performance goals can further be divided into performance-approach and performance-avoidance goals (Elliot & Church, 1997). Lastly, expectancy-value theory relates achievement to the individual's expectancy and task value beliefs.

### 2.4 Characteristics and perceptions of the learning environment

Learning environment characteristics are factors outside of the student's control. Impor-

tant and well-studied characteristics include quantity of instruction, perceived quality of the learning environment, and teaching approach. The quantity of instruction can be measured by, for example, the number of contact hours in the programme (Bruinsma & Jansen, 2005). Perceived quality of the learning environment can include, among other things, the students' perceptions of the ability of their teachers, the clarity of goals and standards, and the quality of assessment (Ramsden, 1991). Previous research indicates that student perceptions are reasonably reliable indicators of instructional quality (Pasarella, Seifert, & Whitt, 2008). Another important learning environment characteristic is teaching approach. Whereas a teacher-centred learning environment (i.e., lectures for large numbers of students with a focus on transmitting knowledge) was long the standard teaching approach in postsecondary education, in recent years teachers have taken a more student-centred approach (Davidson, Major, & Michaelsen, 2014). A student-centred teaching environment is characterised by a focus on student learning rather than on teacher teaching (Cannon & Newble, 2000). An example of such a student-centred approach is problem-based learning (PBL) where students learn through the process of facilitated problem-solving (Hmelo-Silver, 2004). Over the last ten years student-centred approaches to teaching have become increasingly common in Europe (De Jong & Pieters, 2006; OECD, 2012).

### 2.5 Psychosocial factors

Psychosocial factors pertain to the way students interact with and experience the higher education environment. In this regard, these factors combine student and learning environment characteristics. Most research on psychosocial factors in higher education draws on Tinto's (1975) theory of student attrition which focuses on academic integration (e.g., a student's identification with academic norms and values), social integration (e.g., having good relationships with peers), institutional integration (e.g., feeling at home in the institution), and goal commitment (i.e., commitment to obtaining a degree) as predic-

tors of retention (Richardson et al., 2012). Tinto's original model (1975) was revised after critical response, and the new model (Tinto, 1993) has been used as a framework for many studies (Pascarella & Terenzini, 2005). Comparable constructs of academic and social integration are academic and social adjustment which refers to the ability to cope with the academic and social demands of the postsecondary environment (Baker & Siryk, 1989; Trautwein & Bosse, 2017). Alongside academic and social adjustment, personal-emotional adjustment and institutional attachment are often employed, as these four types together form the Student Adaptation to College Questionnaire (Baker & Siryk, 1989), a widely used scale to measure adjustment. Other psychosocial constructs which have been the topic of investigation are social support and satisfaction with the degree programme (e.g., Suhre, Jansen, & Harskamp, 2007).

### 2.6 Learning strategies

Learning strategies such as cognitive and metacognitive strategies are important factors in higher education related to academic engagement which can also contribute to student success. Metacognitive strategies refer to the processes regarding one's understanding and regulation of thinking, learning, and performance. Examples of metacognitive strategies are planning, monitoring, and evaluation (Pintrich & De Groot, 1990).

Cognitive strategies can often be classified as either deep or surface learning strategies. Deep learning strategies are, for example, critical reading and elaboration, where the focus is to understand the study material and to make connections between the material and other knowledge or previous experiences. Surface learning strategies are concerned with reproducing the learning material without understanding. Memorising is an example of a surface learning strategy.

In this learning strategies category we also include studies in which authors refer to the tradition of learning patterns (Vermunt, 2005). In this tradition, research often discusses concrete processing. Concrete processing refers to studying in an application-oriented

way, making connections between learning content and specific situations (Vermunt, 2005).

Learning conceptions refer to the way in which students understand the nature of learning (Loyens, Rikers, & Schmidt, 2007). These conceptions stem from the students' experiences with learning and participation in education (Marton & Säljö, 1997). Although learning conceptions differ from learning strategies, they are often studied in conjunction with learning strategies. In Vermunt's learning pattern model (Vermunt & Vermetten, 2004), for example, learning strategies and learning conceptions are used together to form learning patterns.

### 2.7 Behavioural engagement

It is commonly thought that student characteristics (such as personality traits and motivation) and learning environment characteristics (such as student-centred teaching) affect academic achievement through their impact on the students' engagement with learning. Student engagement has been a popular construct in higher education research in the last ten years (Zepke, 2017a) and refers to a student's involvement in education (Zepke, 2017b). Here, the focus is on behavioural engagement. Compared to cognitive and emotional engagement, behavioural engagement is highly visible because it consists of observable indicators such as attendance, time spent on task, active participation, and preparation (Christenson, Stout, & Pohl, 2012; Fredricks, Blumenfeld, & Paris, 2004). Examples of behavioural engagement factors which might be significant in higher education are class attendance, self-study time, active participation in class, and professional learning activities in problem-based learning.

## 3 Method

### 3.1 Database searches

We used search terms in line with the aims of our review to find relevant articles. Since our review concerns higher education research in the Netherlands and Flanders, we used '(university OR "higher education") AND (Netherlands OR Dutch OR Flanders OR Belgi-

um OR Flemish OR Belgian)’. Furthermore, any relevant studies had to have an outcome measure indicating academic success, thus GPA, EC, or persistence (or the reverse, dropout). Therefore, we added ‘(“stud\* success” OR achiev\* OR perform\* OR “drop\* out” OR complet\* OR persist\* OR retention OR attain\* OR attrition OR progress\*)’ to the search terms. The databases used in our search were ERIC, PsychINFO, Web of Science and SocIndex.

### 3.2 Criteria for selecting studies

Nine inclusion criteria were applied for article selection (see Table 1).

We chose 2000 as the earliest year for our search because studies over 17 years old would be considered outdated. The eighth inclusion criterion concerned the scope of our review. This review study focuses on first-year students’ characteristics in general and the features of the learning environment. We therefore excluded articles which focused only on specific groups of students without reporting the results of the whole group, e.g., studies only on students with a migrant background, international students, or only female or male students. Papers which looked at all bachelor’s degree students and did not exclusively focus on first-year students were also excluded. To assess the quality of the article, we applied the ‘eight principles of scientific research’ of the American Educational

Research Association (2008, see Table I in the Appendix).

### 3.3 Initial and full-text screening

Articles from the list of hits from each database were screened by title and abstract. When an article’s abstract met the inclusion criteria or when the abstract did not provide sufficient information to decide whether or not the article met the criteria, the article received full-text screening. In total, 133 articles survived the initial title and abstract screening. These included 19 duplicates, leaving 114 articles for full-text screening. During full-text screening the main consideration was whether the article met all the inclusion criteria. The 114 articles were divided between the authors. To ensure the reliability of screening, 15 articles were screened by two authors. Since in all 15 cases the authors independently agreed on whether to include the article, each remaining article was checked by one author. Full-text screening resulted in the exclusion of 76 articles, leaving only 38 studies which met the inclusion criteria. During data extraction, the article reference lists were screened for any articles missed during the database search. One such relevant article was found. After full text screening, this article also met the inclusion criteria. Thus, this review includes a total of 39 articles. Figure 2 shows the flowchart of the selection process.

Table 1  
*Inclusion criteria*

Inclusion criterion	Number of articles excluded for not meeting this criterion
1. The article has been peer-reviewed and published in an academic journal	4
2. The data has been collected in 2000-2015	8
3. The data has been collected in a Dutch or Flemish higher education institution	5
4. The sample consisted of first-year students	27
5. The outcome variable was GPA, EC, or persistence (or dropout)	21
6. The sample size was larger than 30	1
7. The data was original	5
8. The independent variables were within the scope of our review	4
9. The article meets the quality criteria by AERA (2008)*	1

\* See Table I in the Appendix

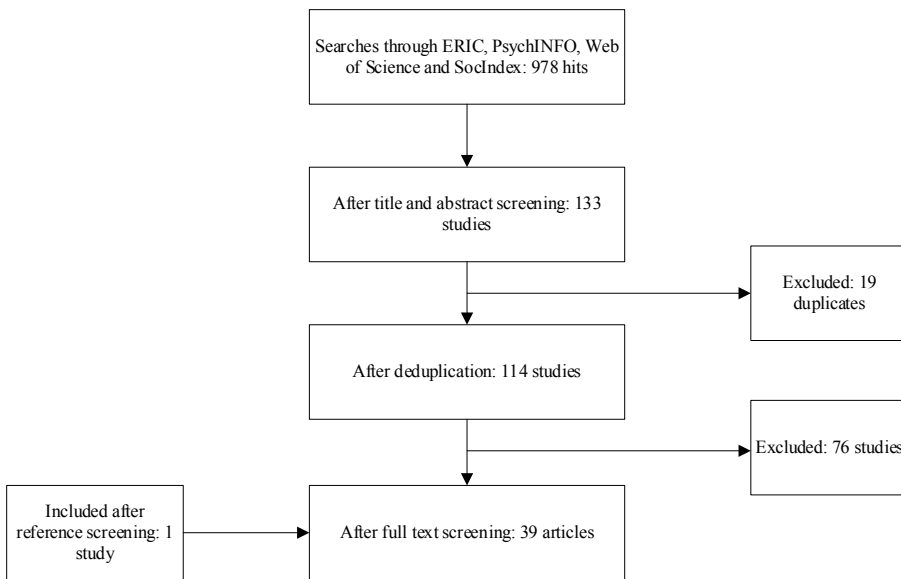


Figure 2  
Flowchart of the paper selection process

### 3.4 Data extraction

We developed an extraction table (or coding scheme) in which the following descriptive and analytical data was collected from each included article: general information (authors, title, year, journal, country/region); research question(s); aim(s) of the study; theoretical framework (e.g., the theories behind the research); education level (university, professional, or both); sample size; degree programme of the students in the sample (e.g., ‘economics’ if all students were studying economics, or ‘several programmes from five universities’ if students were sampled from any programme at five universities); design of the study and type of analysis; outcome variables; independent variables; main results; and, if applicable, possible relevant other results.

### 3.5 Data synthesis

As discussed above, our theoretical and analytical framework was based on an input-throughput-output model (see Figure 1), in which we integrated nine categories of academic success correlates. As a first step in synthesising our data, we categorised all independent variables used in the 39 studies. Variables that did not fit perfectly into a category were placed within the most closely

related category, e.g., ‘mathematics GPA in secondary school’ was categorised as an ability factor, as it can be considered a sublevel of the secondary school GPA ability factor. Variables that did not fit into any existing category were ICT skills (De Wit, Heerwegh, & Verhoeven, 2012), results of a mathematics test (Fonteyne et al., 2015), results of a mathematics and language test (Pinxten et al., 2015), and career guidance GPA and first grade (Te Wierik, Beishuizen, & Van Os, 2015). These variables were excluded from the analysis. This data synthesis gave an overview of all investigated variables in the Netherlands and Flanders by category. Second, for each variable in each study we noted if the variable was (positively or negatively) significantly related to student success, i.e., to GPA, EC, and/or persistence, while noting whether the correlate concerned the Netherlands or Flanders and whether the sample was of professional education or university students. Third, a more comprehensive picture was constructed of variables most consistently related to academic outcomes, also showing whether these were outcome-specific, region-specific, or specific to one of the education levels. This was achieved by counting the number of positive, negative, and non-significant relationships and placing



them together in one table per category. To allow us to compare results, any variables only investigated by one study were excluded from these tables.

## 4 Results

### 4.1 Characteristics of the included studies

Table II of the Appendix gives an overview of the characteristics of the 39 included studies and their main findings. Most studies were published recently, i.e., in the 2010s (69%). Ten percent were published between 2000 and 2006 and 21 percent from 2006 to 2010.

More than three quarters of all studies took place in the Netherlands (30 of 39). Most studies were based on a sample of university students (30), eight studies focused on professional education, and one included a mixed sample. Almost half of the studies (44%) used a sample of students from several degree programmes. The most frequently used outcome measure was number of ECs, present in 28 studies. As students in Flanders can apply for a certain number of credits at the beginning of the year, the Flemish studies did not use ECs as an absolute measure, but instead used the proportion of obtained credits in comparison

Table 2  
*Frequency and percentage of inclusion of categories in the studies*

Categories	Number of Dutch studies	Number of Flemish studies	Total number of studies
1. Ability	17 (57%)	3 (33%)	20 (51%)
2. Demographic factors	17 (57%)	6 (67%)	23 (59%)
3. Prior education	9 (30%)	6 (67%)	15 (38%)
4. Personality	4 (13%)	1 (11%)	5 (13%)
5. Motivation	16 (53%)	6 (67%)	22 (56%)
6. Characteristics and perceptions of the learning environment	15 (50%)	0 (0%)	15 (38%)
7. Psychosocial factors	11 (37%)	3 (33%)	14 (36%)
8. Learning strategies	8 (27%)	2 (22%)	10 (26%)
9. Behavioural engagement	9 (30%)	1 (11%)	10 (26%)

Table 3  
*The extent of integration of different categories within the studies*

Extent of integration of categories	Number of Dutch studies	Number of Flemish studies	Total number of studies
Background factors only (1, 2, and/or 3)	0 (0%)	1 (11%)	1 (3%)
Background factors (1, 2, 3) + factor(s) from one other category	9 (30%)	3 (33%)	12 (31%)
Background factors (1, 2, 3) + factor(s) from two other categories	9 (30%)	2 (22%)	11 (28%)
Background factors (1, 2, 3) + factor(s) from three other categories	2 (7%)	0 (0%)	2 (5%)
Background factors (1, 2, 3) + factor(s) from four other categories	3 (10%)	0 (0%)	3 (8%)
No background factors + factor(s) from one category	2 (7%)	1 (11%)	3 (8%)
No background factors + factor(s) from two categories	2 (7%)	1 (11%)	3 (8%)
No background factors + factor(s) from three categories	3 (10%)	1 (11%)	4 (10%)
Total	30 (100%)	9 (100%)	39 (100%)

Table 4  
*Overview of theoretical frameworks used in the studies*

Theoretical framework	Number of Dutch studies	Number of Flemish studies	Total number of studies
No explicit theoretical framework	13	4	17
Tinto's model of student attrition	8	0	8
Eclectic: multiple theories	2	1	3
Vermunt's learning pattern model	2	1	3
Expectancy-value theory	1	1	2
Walberg's educational productivity model	2	0	2
Social constructivism	2	0	2
Career-decision models	0	1	1
Self-determination theory	0	1	1
Total	30	9	39

to the attempted credits. GPA was used in 14 studies, and persistence in 13 studies. Sixteen studies used more than one outcome variable. Most studies were cross-sectional. The most frequently used methods of analysis were path analysis and regression analysis (46% and 38% respectively). Other analyses used were several methods to compare groups, multilevel analysis, correlation, and cluster analysis. Table 2 presents an overview of the categories included in the studies. Variables concerning ability, demographic factors, and motivation were included in more than half of all Dutch studies. In Flemish studies, demographic factors, prior education characteristics, and motivation were included in two-thirds of studies. In all 39 studies, the most frequently investigated categories were demographics (59%), motivation (56%), ability (51%), prior education (38%), learning environment (38%), and psychosocial factors (36%). Regarding the extent of integration of different categories, we found that many studies used background variables (i.e., ability, demographic factors, and prior education) and variables from one (31%) or two (28%) other categories (see Table 3). More comprehensive studies, i.e., studies that used variables from three or more categories, were less common.

We also looked at the theoretical frameworks used in the studies. As Table 4 demonstrates, the majority of papers were not explicitly

based on a theory. The theoretical framework or background in these studies consisted of a discussion of previous research. Of the 22 studies that explicitly discussed a theory as a foundation, the most common was Tinto's (1993) model of student attrition: used in eight studies. Other theories used more than once were Vermunt's learning pattern model (Vermunt & Vermetten, 2004; Vermunt & Donche, 2017), expectancy-value theory (Eccles & Wigfield, 2002), Walberg's (1984, 1986) educational productivity model, and Vygotsky's (1978) social constructivism.

#### 4.2 Data synthesis

Below we describe the results by category presented in Table III of the Appendix. This table shows for each variable the number of positive, negative, and non-significant relationships with the three student success outcomes found in each of the two regions and in each of the two types of higher education.

##### *Ability*

According to ability indicators, secondary school GPA was the most important predictor of GPA, EC, and persistence in Dutch and Flemish university education. All 16 studies using secondary school GPA found positive effects. No professional education studies used secondary school GPA. Secondary school mathematics GPA also showed posi-

tive relationships with all three outcome variables in two Dutch university studies. Intelligence, which was investigated by two studies, did not give a consistent result: A Dutch university study found a positive effect on GPA and EC, but a Flemish study using a mixed sample of university and professional education students found no significant relationship with persistence.

#### *Demographic characteristics*

All Dutch and Flemish studies using samples of professional education students (six studies) showed that female students performed better than male students. In studies using a university sample, only one study found a significant gender effect on GPA (whereas four studies found no effect), four studies found an effect on EC (whereas six studies found no effect), and two studies found an effect on persistence (whereas four studies did not). Flemish studies more often found a gender effect than Dutch studies and always in favour of female students. Age was only investigated by Dutch studies, with one non-significant relationship and one negative relationship with GPA found in university samples. Regarding ECs, one non-significant and two negative relationships were found in university samples. A study using a sample of professional education students found no relationship between age and EC. Hence, any significant effects found for age were in favour of younger students. Two Flemish studies showed positive relationships between SES and GPA and EC, and one positive and one non-significant relationship with persistence. Two non-significant results were found for GPA, in addition to one positive relationship with EC in two Dutch university studies using SES. For ethnic background, three out of four Dutch university studies which investigated the relationship between being a majority student and obtaining credits found that majority students obtained more credits. Regarding GPA, one Dutch university study found no relationship and another a positive relationship. Only one of these studies also looked at persistence as an outcome: This was also positively related to being a majority student.

#### *Prior education*

The students' prior education level was positively related to GPA, EC, and persistence in three Dutch university studies, showing that students who entered university after completing pre-university education performed better than students who transferred to university after one year of professional education. In professional education students, the relationship with prior education was less clear-cut: Two Dutch studies found that students who entered professional education after completing pre-university education obtained more ECs than students from general secondary education, and that students from general secondary education obtained more ECs than students from vocational education. However, two other Dutch studies found no relationship. Another Dutch study found no relationship between prior education level and persistence, whereas a Flemish study did find a relationship between prior education level and persistence. Furthermore, the students' coursework in secondary education consistently predicted GPA, EC, and persistence in university, with more frequent positive results for students who had taken a science-oriented track (three Dutch and two Flemish studies) and for students who had taken more hours of mathematics and Greek and Latin (three Flemish studies).

#### *Personality characteristics*

In the two Dutch studies and one Flemish study investigating the Big Five personality characteristics, conscientiousness was the most consistent predictor of academic success: It was positively related with GPA in a Dutch university sample, with EC in professional education samples in the Netherlands and Flanders, and with persistence in a Dutch professional education sample. Only in a Dutch university sample conscientiousness was found to have no relation to EC. The personality characteristics of agreeableness, extraversion, neuroticism, and openness mainly revealed non-significant relationships with student success. Procrastination was negatively related to EC in samples of both professional education and university education students in the Netherlands.

### *Motivational characteristics*

*Self-efficacy theories.* In terms of students' confidence in their own competence, we found that self-efficacy was related to GPA and EC in two Dutch and two Flemish studies. Relationships between academic self-concept and all three outcomes were also all positive, as shown by three Flemish university studies. Another construct related to self-efficacy and self-concept investigated in more than one study was fear of failure. This was negatively related to GPA and EC in samples of Dutch university and professional education students respectively.

*Reasons for engagement.* Intrinsic motivation was positively related to GPA, EC, and persistence in two Dutch university studies. It was positively related to GPA and EC, but not persistence in three Flemish university studies. A Flemish study using a sample of professional education students found no relationship with EC or persistence. Extrinsic motivation was consistently not related to all outcomes in both Dutch and Flemish studies. Study motivation showed mostly positive effects on EC (in three out of four Dutch university studies, and in one Flemish professional education study) and persistence (in two out of three Dutch university studies). Two Dutch university studies looked at motivation to be involved in extracurricular activities and found a negative relationship with GPA, but no relationship with EC and persistence. Lack of motivation, investigated by one Dutch and one Flemish professional education study, was negatively related to EC and persistence.

*Expectancy-value theory.* Only Dutch university studies used the expectancy-value theory (Eccles & Wigfield, 2002). Expectancies related positively with GPA and EC in three studies, whereas the results for values and affects varied. For values, the four relevant studies found one positive and one non-significant result for GPA and the same for EC. For affects, one study found no relationship with GPA, while another study found a positive relationship with EC.

### *Characteristics and perceptions of the learning environment*

The characteristics of the learning environ-

ment were investigated only in Dutch studies, mostly of university education. Regarding quantity of instruction, results showed that the heavier the study load, the lower the students' GPA at university (two studies), and the higher the number of contact hours, the higher the students' GPA at university (two studies) and number of ECs in professional education (one study). Regarding quality aspects of the learning environment, two university studies found a positive relationship between perceived quality of assessment and GPA. Regarding the perceived quality of the organisation of the programme, one study found a positive relationship with GPA, and another found a non-significant one (both at university). A student-centred learning environment (e.g., problem-based) had positive effects on obtaining ECs by Dutch university students in two out of three studies. A small number of studies focused on preparation for university in secondary school. A positive relationship between the perceived fit between secondary school and university and EC was found in two studies. In addition, one of two studies found a positive effect when the learning environment of school and university resembled each other. Finally, two studies that focused on learning skills preparation in school found varying results: A professional education study found a negative result on EC and a university education study found a positive result on EC but no relationship with persistence.

### *Psychosocial factors*

Two studies using samples of university students, one Dutch and one Flemish, used Baker and Siryk's (1989) four aspects of adjustment – academic, social, and personal-emotional adjustment and institutional attachment. In addition, one Flemish study using a mixed sample of professional education and university students looked at academic adjustment. The results showed that academic adjustment and institutional attachment had the most positive relationships with GPA, EC, and persistence. In the Flemish study social adjustment was unrelated to GPA and EC, but positively related to persistence. Personal-emotional adjustment was unrelated to

GPA in either study, but positively related to EC in the Dutch study and positively related to persistence in the Flemish study. Two other Dutch studies measured academic integration which is conceptually comparable to academic adjustment. The sample of professional education students found a positive relationship between academic integration and EC, and the sample of university students found positive relationships with EC and persistence. Finally, two Dutch university studies looked into degree programme satisfaction and found that students who were more satisfied with their degree programme obtained more credits and were more likely to persist with the programme.

#### *Learning strategies*

Four Dutch studies and one Flemish study looked at the learning strategy self-regulation and reported more non-significant relationships between self-regulation and student success than positive ones: Only two Dutch university studies found positive relationships, one with GPA and one with EC. Regarding external regulation, a Dutch university education study found a negative relationship with GPA, a Dutch professional education study found no relationship with EC and persistence, and one Flemish professional education study found a positive relationship with EC, but no relationship with persistence. Lack of regulation, however, showed consistent negative relationships with GPA (Dutch university sample) and EC and persistence (Dutch and Flemish professional education samples).

Only non-significant results were found for deep learning in one Flemish professional education study and three Dutch university studies. Two subcategories of deep learning, relating and structuring and critical processing, however, did show positive relationships with GPA in a Dutch university study. A Flemish professional education study found a positive relationship with EC for relating and structuring, but not with persistence. Critical processing was not related to Flemish professional education students' EC and persistence. Analysing was not related to university students' GPA or professional students' EC, but only to professional education students'

persistence. Furthermore, surface learning was unrelated to EC and persistence among Dutch professional education students, and negatively related to GPA among Flemish university students. Memorising, a subcategory of surface learning, showed no significant relationships in either Dutch university students or Flemish professional education students. Concrete processing was unrelated to Flemish professional education students' EC or persistence, but positively related to GPA among Dutch university students.

Finally, two Dutch university studies looked at conceptions of learning: One study showed that students with a conception of learning as knowledge construction obtained a higher GPA, while the other study found no effect on persistence. Likewise, a conception of learning as a cooperative process was negatively related to GPA in one, but unrelated to persistence in the other.

#### *Behavioural engagement*

Only Dutch studies investigated the effects of indicators of behavioural engagement on academic results. Attendance, both lecture attendance (two studies) and tutorial attendance (three studies), showed consistent positive relationships with GPA and EC. In addition, tutorial attendance was consistently related to persistence. Observed learning activities (two studies) were also positively related to GPA, EC, and persistence. Regular study behaviour was positively related to persistence in both studies that investigated it, but only one of these found a positive relationship with EC. Self-study time (four studies) was positively related to professional education students' EC, to university students' GPA and persistence, and to university students' EC in one out of two studies.

## **5 Conclusion and discussion**

This review aimed to give an overview of important correlates of first-year achievement (GPA and EC) and persistence in higher education in the Netherlands and Flanders. By doing so, we show the current standings of Dutch and Flemish research into first-year higher education students' success and iden-

tify limitations and gaps in the current body of research, in order to make recommendations for future research.

### **Most important findings**

Thirty-nine peer-reviewed articles were included in this review. Most of them were Dutch (30) and most focused on university education (30). The most frequently studied categories were demographic characteristics and motivational factors. Ability (predominantly secondary school GPA) was also often studied. Dutch researchers tended to study learning environment characteristics and engagement relatively often in their studies, whereas Flemish authors relatively more often studied demographic characteristics and motivation. Most studies (17; 44%) were based on previous research instead of an explicit theoretical framework, i.e., a specific theory or model. The (by far) most commonly used theoretical model was Tinto's (1993) model of student attrition (21%). This is not unexpected, since Tinto's model is very well-suited for first-year student success research because it focuses on integration – a very important concept, especially when entering a new educational environment. In addition to Tinto, there were no clear trends in use of theoretical models in the Dutch and Flemish peer-reviewed articles. It seems, therefore, that there are no strong theoretical traditions in either the Netherlands or Flanders when it comes to research on first-year success: Researchers mainly build on previous research on their subject of interest without making the theoretical framework explicit.

Overall, for some factors we found evidence of a relationship with all outcomes of student success. This was most notably the case for the relationship between secondary school GPA and secondary school coursework with university student success, both in the Netherlands and in Flanders: Students who had higher grades in secondary school and took more science and mathematics subjects attained better results at university and were more likely to continue to the second year. This relationship with secondary school GPA was expected as it is a very consistent universal predictor of higher education suc-

cess (e.g., Richardson et al., 2012). The impact of taking up more science and mathematics in secondary school on success in higher education does not appear often or systematically in international empirical research, even though there are indications that it is an important factor in other countries as well. For example, Long, Iatarola, and Conger (2009) note that in the United States, secondary schools leave many students ill-prepared for mathematics courses in higher education. Many university degree programmes in the sciences and social sciences have mathematics-related courses; this may explain why a secondary school background in science and mathematics contributes to higher achievement at university.

Conscientiousness, intrinsic motivation, academic adjustment, lack of regulation, attendance and observed learning activities were also related to all outcomes, although these results were based on a smaller number of studies. The clear impact of conscientiousness is in line with Poropat's (2009) meta-analysis of personality factors which showed that conscientiousness is the most important personality trait when it comes to predicting academic performance. The effect of intrinsic motivation matches the findings of many studies of motivation which conclude that intrinsic motivation is linked to achievement (Clark, Middleton, Nguyen, & Zwick, 2014; Guiffrida, Lynch, Wall, & Abel, 2013). In contrast, international research findings regarding extrinsic motivation are not consistent: Sometimes extrinsic motivation was negatively related to achievement, sometimes positively, and sometimes no relationship was found (Clark et al., 2014). In our review, however, none of the studies using extrinsic motivation found a significant relationship with success outcomes. Finding that academic adjustment was a solid predictor in our review is not unexpected, since prior literature consistently showed the pivotal role of academic adjustment in predicting achievement (McKenzie & Schweitzer, 2001) and persistence (Kennedy, Shekley, & Kehrhahn, 2000) in higher education. Social adjustment, in contrast, was not always found to be a significant predictor of GPA in the

literature (McKenzie & Schweitzer, 2001; Petersen, Louw, & Dumont, 2009), which is in line with our results regarding social adjustment. We found that a lack of regulation was negatively related to all success outcomes in both university and professional education, but, surprisingly, we also found that self-regulation was not related to success in five of the seven investigated relationships. We expected to find more positive results, in line with research showing the importance of metacognitive strategy use such as self-regulation (Credé & Phillips, 2011; Richardson et al., 2012; Robbins et al., 2004). It is important to note, however, that the significant relationships found between self-regulated learning strategies and achievement concerned university samples. This may point to a difference between professional education and university education in the sense that self-regulated learning may be relatively more important in university education – or at least self-regulated learning skills are only reflected in GPA and EC at university education. More research about the value of different types of regulation and their relationship to success at different levels of higher education would be very welcome. Lastly, the importance of attendance and observed learning activities showed that behavioural engagement matters. Astin's theory of student involvement (1999) already demonstrated the importance of engagement, and more recent research corroborates this. Class attendance, for example, has been reported to add to the prediction of grades in higher education over intelligence and personality traits (e.g., Conard, 2006; Farsides & Woodfield, 2003). Determining student success on the basis of stable entry characteristics of students is clearly too simplistic; the complex interplay of the learning environment and engagement plays an influential role. It is precisely this interplay that opens up important avenues for interventions to foster student success.

Looking at the learning strategies category, we found non-significant relationships with all three outcomes for deep learning and for the surface learning strategy memorising. This was surprising, as the literature shows both positive and negative results for these factors

(e.g., Richardson et al., 2012). A possible explanation for these non-significant results could be that questionnaires typically ask students about their use of preferred or usual strategies, whereas the use of learning strategies likely depends on external characteristics such as the study task at hand or the particular course (Vermunt & Donche, 2017). Sometimes deep learning and sometimes surface learning is rewarded: Different evaluation approaches may thus influence a student's strategy use (Vermunt, 2005). This nuance is lost when researchers look generally at students' use of strategies to explain very broad outcome measures such as first-year GPA, number of credits obtained, and persistence.

We found consistent relationships with GPA and EC for several factors across both regions and education levels: These were self-efficacy, fear of failure, expectancies, and number of contact hours. Results regarding self-efficacy, fear of failure, and expectancies are in line with the international higher education literature (Jones, Paretti, Hein, & Knott, 2010; Richardson et al., 2012; Robbins et al., 2004). Regarding contact hours, however, research was found reporting no effects or even negative effects from quantity of contact hours (e.g., Schmidt et al., 2010). Moreover, the connection between number of contact hours and achievement is not sufficiently meaningful without knowing how those hours are being spent. Similar to the case for self-study (an engagement variable), quality – i.e., how time is spent rather than how much time is spent – may matter more than quantity (Plant, Ericsson, Hill, & Asberg, 2005). The fact that we did see a connection between contact hours and achievement in our review can be explained as follows: 'Very little class contact may result in a lack of clarity about what students should be studying, a lack of a conceptual framework within which subsequent study can be framed, a lack of engagement with the subject, a lack of oral feedback on their understanding, and so on' (Gibbs, 2010, p. 22). In line with this, even though they found negative effects resulting from the number of contact hours, Schmidt et al. (2010) also suggested that a minimum number of lectures is important.

Extensive lecturing, however, should be avoided so that sufficient time is available for self-study: Their study found that time available for self-study was related to graduation rate and study duration. In our review, we also found that self-study time was positively related to success outcomes in four of the five investigated relationships.

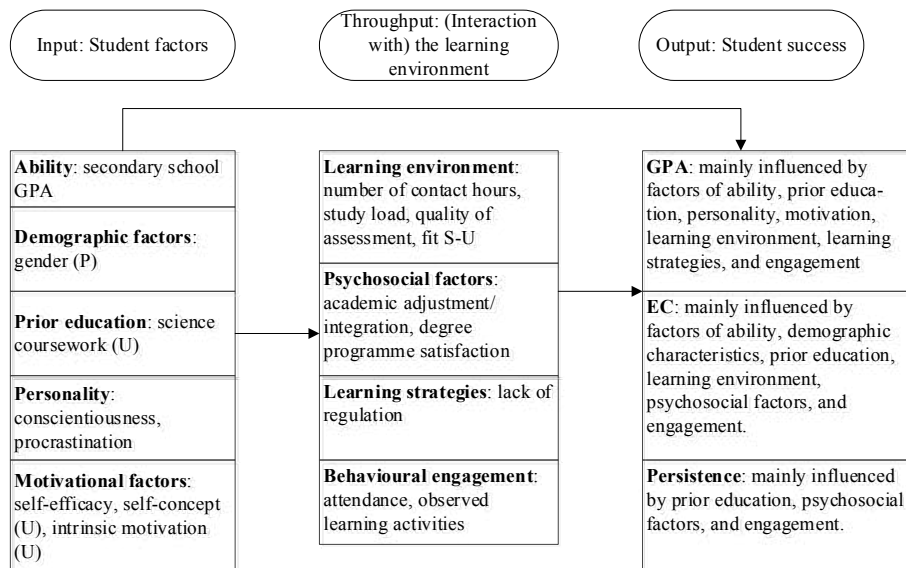
For degree programme satisfaction, we found significant relationships with EC and persistence which is in line with previous literature showing that programme satisfaction was related to persistence (De Buck, 2009; Yorke & Longden, 2007).

### 5.2 Differential results based on outcome measure

In most cases, each factor was investigated by only a small number of studies (usually two or three), making it impossible to draw conclusions for each predictor regarding differential results based on the relevant outcome measure – GPA, EC, or persistence. At the category level, however, we did see some trends. The ability category showed many significant relationships, mostly with GPA and EC. Demographic factors appeared in only a little more than half of instances as

significant predictors of success, but when they did they mostly related to EC. Prior education was a useful category in that it revealed many significant relationships with all outcomes. These were all significant in Flemish studies; 13 out of 16 were in Dutch studies. A little less than half of relationships in the personality category were significant – most with relation to GPA. The motivation category showed many significant results and a clear pattern: Almost 80 percent of investigated relationships with GPA were significant, while two-thirds were significant with EC, and substantially less than half of those with persistence. The learning environment characteristics category also revealed many relationships with GPA and EC; Only one study used persistence as an outcome variable when investigating a learning environment factor (in this case learning skills preparation in secondary school) and this relationship was not significant. Just over half of the investigated relationships with psychosocial variables were significant. This was mainly the case for EC and for persistence. The learning strategies category only revealed significant results in 17 of 44 investigated relationships, mostly with GPA. Last-

Figure 3  
Overview of the main findings: most important factor or factors within each category and influential categories per outcome variable



Note. P = professional education; U = university education; S = secondary education



ly, the engagement category showed many positive relationships with all outcomes.

To conclude, motivational factors seemed to be most important in determining the level of students' grades. Learning strategies were not often related to student success but when they were, they were mainly related to GPA. Personality characteristics were also mainly related to GPA. Demographic factors were particularly important for explaining the number of credits students obtain. Psychosocial factors mattered most when predicting both the number of credits and whether students persisted with higher education, matching well with Tinto's model of attrition (1975) in which psychosocial variables predicted whether a student would drop out. Ability and learning environment characteristics were mainly important for achievement (GPA and EC) but not for persistence. Prior education and engagement were equally important for all outcomes.

Figure 3 presents an overview of the main findings, showing the most important factor or factors per category and listing categories which revealed many significant relationships for each outcome of student success.

### **5.3 Differences based on country/region and education level**

With regard to the categories and the number of relationships found within categories for each country/region, our results indicate that demographic factors and prior education are somewhat more often related to success in Flanders, which could be attributable to the open access system, but the number of Flemish studies is too low to draw firm conclusions.

Although more research is needed, some differences can be seen between studies on professional education and those on university education. One difference stands out in particular: Gender was consistently related to EC and persistence in professional education students (9 out of 9 investigated relationships), whereas for university students it only revealed an impact in one third of instances (7 out of 21). International research since 2000 has consistently shown that female students outperform male students in higher education (e.g., Conger & Long, 2010; Hillman & Robinson, 2016;

Richardson et al., 2012), although the gender gap found in higher education is not as great as that found in primary and secondary education (Voyer & Voyer, 2014). Our results indicate, at least in the Netherlands and Flanders, that the gender gap is greater in professional education than in university education. Other differences found were that the level of prior education, personality factors, and factors in the learning strategies category were more often related to success outcomes in university than in professional education.

### **5.4 Limitations of Dutch and Flemish first-year student success research**

Many articles did not clearly define constructs and/or did not describe thoroughly how the constructs were measured. Moreover, different names were sometimes given to constructs with similar definitions. For example, Meeuwisse, Severiens and Born (2010) defined informal peer interaction as interaction among students regarding personal matters, whereas Severiens and Wolff (2008) labelled this exact same definition as informal social integration. Furthermore, authors used the same term for constructs defined (and measured) in different ways. Kamphorst, Hofman, Jansen, and Terlouw (2013, p. 647), for example, defined self-regulation rather broadly as 'the extent to which a person perceives him/herself as capable of exercising influence over motivation, thinking, emotions, and the behaviour that is connected to these factors', whereas Vanthournout, Gijbels, Coertjens, Donche, and Van Petegem (2012, p. 3), following Vermunt's learning pattern model, referred to 'the extent to which students actively steer their own learning process'. These differences in naming and defining constructs, as well as differences in the operationalisation of constructs, make it difficult to evaluate and compare previous research findings. Furthermore, rather than using (inter)nationally validated instruments, many studies used instruments developed by the researchers themselves, making it even more difficult to compare results between different studies.

Another issue concerns the outcome variables used in the studies. We found that the

presence and strength of a relationship with academic success can depend on how academic success is measured. Motivational factors, for example, were related to GPA twice as often as they were to persistence. Also, most studies used EC as the only outcome measure which was reflected in the general results: The clearest evidence concerns the relationship with EC, whereas for only a few variables is there a clear relation to persistence. It would be worthwhile for more studies to use multiple outcome variables to investigate differential effects.

### 5.5 Limitations of this review

A limitation of this review study is that the number of Flemish studies matching the inclusion criteria was too low to compare factors between Dutch and Flemish studies in predicting students' success in the first year. A reason for this is that only peer-reviewed papers in academic journals were included. A great deal of cross-sectional and longitudinal Flemish research on first-year student success is published in books or in academic research reports (e.g., Donche, Coertjens, Van Daal, De Maeyer, & Van Petegem, 2013; Donche & Van Petegem, 2011; Van Daal et al., 2013; Van Esbroeck et al., 2001). It would have been interesting to examine whether differences exist between the Netherlands and Flanders attributable to the different systems, i.e., the Flemish higher education system which is accessible from all levels of secondary education, and the Dutch higher education system which is less accessible because of secondary education level and coursework requirements.

A second limitation can be found in our decision to only include factors in the analysis investigated by at least two studies, to allow us to compare results. This excluded some interesting factors which were only investigated by one study, such as employment, self-esteem, attributional style, study choice process in secondary school, and attention paid to skill development in the curriculum.

A third limitation is that this review is a narrative synthesis and not a meta-analysis. Although a meta-analysis would have provi-

ded stronger evidence, we decided not to perform a meta-analysis because we would have needed information which was not present in many of the studies. Consequently, this would have led to the exclusion of many studies. Another meta-analysis assumption which could not be met was that underlying constructs are the same. Many variables we included in the results were investigated by just two studies. Furthermore, as discussed above, the studies operationalised constructs in many different ways. A meta-analysis would have meant focusing only on variables investigated by many studies which would have led to a substantive loss of information.

As in many reviews, results might be distorted by publication bias. However, many of the studies we included contained multiple variables with no significant relationships with some of the outcomes. Hence, non-significant results was not a reason for non-publication. Nevertheless, it would have been interesting to also include policy reports, book chapters, papers published in professional literature, and PhD and Master's theses. Including these would have increased the number of student success correlates from which we could draw conclusions.

The fact that many studies included multiple independent variables did, however, cause another limitation. The simultaneous study of the impact of several variables on a given outcome (e.g., in stepwise regression analysis) may have concealed the effects of individual predictors. Fortunately, a large majority of papers which used regression analysis also included correlation matrices so the potential distortion in this regard was limited.

Finally, we did not consider differences between fields of study. Some studies which used a sample of students from different degree programmes also performed separate analyses for each programme and found small differences between them (e.g., Vermunt, 2005). However, for reasons of efficiency we only looked at general findings.

### 5.6 Recommendations for future research

Some influential variables found in international research were barely present in the

Dutch and Flemish studies, such as the need for cognition and mastery and performance goals. It would be interesting if Dutch and Flemish researchers take specific note of these variables for future research. We also found that some categories were investigated more often in the Netherlands, while others were studied more often in Flanders. None of the Flemish studies included engagement or learning environment variables, whereas in Dutch studies relatively little attention was paid to prior education. Flemish and Dutch researchers could investigate these relatively understudied topics, since they all showed a relationship with academic success. Relevant findings regarding prior education in the Netherlands, for example, include results reported by Arnold showing that students who took an economics track in secondary school performed worse in an economics degree in university than students who took a science track in secondary school (e.g., Arnold, 2013; Arnold & Rowaan, 2014). If more studies confirm the existence of similar problems regarding secondary school coursework in preparation for university degree programmes, this would have substantial implications in practice. In Flanders, engagement and learning environment factors should be widely included in research, as we saw great potential for these factors as a predictor of GPA, EC, and persistence in Dutch studies.

Furthermore, future research should consider the conceptual and methodological issues which came to light in this review, namely that too often constructs are not clearly defined and/or measured by newly developed instruments. This seems to be important in obtaining reliable and comparable data, and consequently building a comprehensive picture of what matters for student success and the extent to which certain factors have a higher impact in certain countries or education systems. Thus, it would be extremely helpful if researchers would use uniform definitions for factors and use the same instruments when investigating the same factors. Nevertheless, translation problems remain and adaptations to context are sometimes necessary as some items may not be appropriate in certain contexts.

In this study, we were not able to draw a reliable comparison between the Netherlands and Flanders. It would be interesting to design a large-scale comparative study to investigate possible differences in academic success predictors between these two regions, especially as these differences might be attributable to the closed versus open access system. Variables which proved in this review to be consistently related to academic outcomes could be included in such research, as well as variables with less conclusive results or only results for one or two success outcomes, raising a question mark over their overall impact. Also, it would be interesting to take a systematic look at possible differences between fields of study, as some studies found that some factors were only related to students' outcomes in some degree programmes or found differences in the strength of the relationship (e.g., Kamphorst, Hofman, Jansen, & Terlouw, 2012; Vermunt, 2005).

The same is the case for comparing professional education and university education. We only found that gender was more important in professional than university education. If the existence of differences in other categories is systematically investigated, we would gain insight in what makes professional students and university students successful in the first year. This would most likely help institutions in customising their first-year programmes to their students' needs. Moreover, it could provide useful information for secondary school counsellors in helping secondary school students decide whether professional or university education suits them best.

A fruitful step to strengthen research and further theory development on the impact of different factors on student success in Dutch and Flemish higher education would be to develop an instrument repository with validated original or translated Dutch instruments. This repository would be open for use by researchers in this field. Further, it seems important to establish more collaborations between researchers at different higher education institutions, so that large-scale studies can be more collaboratively designed.

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\* These references are included in the systematic review.

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## Samenvatting

**Inzicht in de verklaringbasis voor studiesucces bij eerstejaarsstudenten in Nederland en Vlaanderen. Een overzichtsstudie**

Deze overzichtsstudie biedt inzicht in factoren die belangrijk zijn bij het verklaren van studiesucces van eerstejaarsstudenten in het Nederlandse en Vlaamse hoger onderwijs. De resultaten, gebaseerd op 39 wetenschappelijke studies, toonden aan dat bekwaamheidsfactoren, kenmerken van de vooropleiding, de leeromgeving in het hoger onderwijs, en studentbetrokkenheid het meest succesvol waren in het verklaren van studiesucces. De waarde van verklarende factoren verschilde binnen

veel categorieën van predictoren naar gelang de uitkomstmaat van studiesucces. Bekwaamheid en kenmerken van de leeromgeving waren met name belangrijk wanneer de uitkomstmaat het gemiddeld cijfer (GPA) of aantal studiepunten (EC) was. Persoonlijkheid, motivatiefactoren, en leerstrategieën speelden voornamelijk een rol in het verklaren van GPA. Demografische factoren waren vooral belangrijk voor EC, en psychosociale factoren voor EC en retentie. Kenmerken van de vooropleiding en studentbetrokkenheid, tot slot, waren ongeveer gelijkmatig aan alle drie de uitkomstmaten gerelateerd. Op basis van de resultaten van deze overzichtsstudie formuleren we aanbevelingen voor toekomstig onderzoek.

**Kernwoorden:** overzichtsstudie, studiesucces, retentie, eerstejaarsstudenten, hoger onderwijs

## Appendix

Table I

*The eight principles of scientific research as defined by AERA (2008)*

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- A. Development of a logical, evidence-based chain of reasoning
  - B. Methods appropriate to the questions posed
  - C. Observational or experimental designs and instruments that provide reliable and generalisable findings
  - D. Data and analysis adequate to support findings
  - E. Explication of procedures and results clearly and in detail, including specification of the population to which the findings can be generalised
  - F. Adherence to professional norms of peer review
  - G. Dissemination of findings to contribute to scientific knowledge
  - H. Access to data for re-analysis, replication, and the opportunity to build on findings\*
- 

\*As we did not perform a meta-analysis, we did not request data for each article.

Table II  
Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Out-come variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Baars, Bijank, Tonnaer, & Jolles (2015)	Netherlands / Professional education / Hospitality business	Regression	EC	<i>Demographic:</i> age, gender <i>Prior education:</i> level of prior education <i>Learning strategies:</i> attention, planning, self-control and self-monitoring	No explicit theoretical framework. Research on executive functions is discussed.	Attention, planning, and self-control and self-monitoring were predictive of EC. The effect of lack of self-control and self-monitoring was larger in male students than in female students.
Beyers & Goossens (2002)	Flanders / University / Psychology	Correlation	GPA Peris-tence	<i>Psychosocial:</i> academic adjustment, social adjustment, personal-emotional adjustment, institutional attachment, total adjustment	No explicit theoretical framework. Studies that used the Student Adaptation to College Questionnaire (SACQ) in the North American context are discussed.	There were modest correlations between academic, social, and personal-emotional adjustment, institutional attachment, total adjustment and attrition after a year. Academic adjustment was only related to GPA after one semester, not after a year.
Bruinsma (2003)	Netherlands / University / Several programmes	Path analysis	EC	<i>Ability:</i> secondary school GPA <i>Demographic:</i> gender, age <i>Motivation:</i> expectancies, values, affects	<i>Expectancy-value theory:</i> expectancy-value-affect model according to Pintrich and de Groot (1990).	Students with higher expectancies, values, and affects used more deep learning strategies, but deep learning was not related to the number of EC. Expectancies, age - younger students obtained more EC -, and secondary school GPA had an effect on EC.
Bruinsma & Jansen (2005)	Netherlands / University / Science programmes	Multilevel analysis	GPA	<i>Learning strategies:</i> deep learning <i>Ability:</i> secondary school GPA <i>Motivation:</i> expectancies	Educational productivity model by Walberg (1984; 1986).	Secondary school GPA, expectancies, and quantity of instruction (study load and number of contact hours) were related to GPA in two cohorts. These relationships were positive, except for study load, which was negatively related to GPA. Quality of assessment was related to GPA in one cohort.
Bruinsma & Jansen (2007)	Netherlands / University / Science programmes	Multilevel analysis	GPA	<i>Ability:</i> secondary school GPA <i>Demographic:</i> age, SES <i>Motivation:</i> expectancies, values, affects	Educational productivity model by Walberg (1984; 1986).	Students with a higher secondary school GPA, higher expectancies, who became more motivated at the end of the year, who had less study load, more contact hours, and who rated the quality of assessment and classroom climate higher obtained a higher GPA.
				<i>Psychosocial:</i> support by peers		

Table II  
Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
De Feyter, Caers, Vigna, & Berings (2012)	Flanders / Professional education / Business administration	Regression	EC	<p><i>Personally:</i> neuroticism, extraversion, openness, agreeableness, conscientiousness</p> <p><i>Motivation:</i> self-efficacy, academic motivation</p>	No explicit theoretical framework. The Big Five personality characteristics are discussed, in particular neuroticism and conscientiousness, as well as coping strategies, self-efficacy (Bandura, 1997), and achievement motivation.	Personally factors were better predictors of performance than academic motivation. Conscientiousness and extraversion predicted academic motivation, but only for highly conscientious students did this effect lead to a higher performance. Extraversion had a negative direct effect on performance. Agreeableness, neuroticism, and self-efficacy had a positive direct effect on performance. The effect of neuroticism on performance was moderated by self-efficacy.
De Koning, Loyens, Rikers, Smeets, & Van der Molen (2012)	Netherlands / University / Psychology	Regression	EC GPA	<p><i>Ability:</i> secondary school GPA, Intelligence</p> <p><i>Demographic:</i> gender, nationality, age</p> <p><i>Prior education:</i> prior education</p> <p><i>Personally:</i> neuroticism, extraversion, openness, agreeableness, conscientiousness</p> <p><i>Behavioural engagement:</i> observed learning activities, self-study time</p>	No explicit theoretical framework. Research on factors that predict student achievement in higher education and research on problem-based learning is discussed.	Students with higher scores on observed learning activities and lower scores on neuroticism and openness obtained more EC and had a higher GPA. Self-study time, extraversion (negative effect), and conscientiousness only influenced GPA. From the background variables, prior education influenced EC and GPA. Students from pre-university education obtained more credits and had a higher GPA. Secondary school GPA and intelligence (word matrix and non-verbal abstraction) only influenced GPA.
De Koning, Loyens, Rikers, Smeets, & Van der Molen (2014)	Netherlands / University / Psychology	ANCOVA	EC GPA	<p><i>Learning environment:</i> BSA</p>	No explicit theoretical framework. Research about BSA and factors such as self-study time and learning activities are discussed.	The pre-BSA cohort obtained a significantly higher GPA and a higher number of EC than the BSA cohort.

Table II  
 Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
De Wit, Heerwegh, & Verhoeven (2012)	Flanders / University / All programmes at one university	Regression	EC GPA	<i>Ability</i> : secondary school GPA <i>Demographic</i> : gender, SES	No explicit theoretical framework.  The theoretical background is developed by discussing four studies which focused on educational attainment.	Predictors of persistence were secondary school hours of mathematics, ambivalence towards the study choice (negative effect), secondary school GPA, and secondary school hours of classical languages. Predictors of study efficiency (i.e., percentage of exams passed, comparable to EC) and GPA were secondary school GPA, secondary school hours of mathematics, ambivalence towards the study choice (negative effect), secondary school hours of classical languages, intrinsic motivation, and the education level of the parents.
Ferla, Vaicke, & Schuyten (2010)	Flanders / University / Psychology and educational sciences	Path analysis	GPA	<i>Motivation</i> : academic self-efficacy, self-efficacy for self-regulation, academic self-concept, perceived level of understanding, mastery goals, performance achievement goals, avoidance goals  <i>Learning strategies</i> : deep learning, surface learning  <i>Behavioural engagement</i> : persistence	Eclectic.  Theories surrounding the following constructs are discussed: academic self-concept, academic self-efficacy, achievement motivation, learning approaches, perceived level of understanding, and self-efficacy for self-regulated learning.	Academic self-efficacy substantially predicted GPA. Persistence (positive effect) and surface learning (negative effect) also predicted GPA. Perceived level of understanding (negative effect), self-efficacy for self-regulated learning, mastery goals, and performance approach goals influenced persistence, and perceived level of understanding negatively influenced surface learning.
Fonteyne et al. (2015)	Flanders / University / Psychology and educational sciences	Regression	Persistence	<i>Demographic</i> : gender  <i>Prior education</i> : level of prior education, secondary school hours of mathematics, secondary school track  <i>Other (not used in this review)</i> : mathematics test	No explicit theoretical framework.  The Flemish educational context is discussed, followed by the relationship between background characteristics and success. Finally, the context of statistics courses is described.	The basic mathematics test, together with prior education, explained 20% of the variance in passing the first year. Students from general secondary education programmes passed more often than students from technical, arts, or vocational secondary education programmes. Students from programmes with a higher focus on science and classical languages passed more often than students from a programme with a focus on social sciences, languages, and economics. Students who took more hours of mathematics in secondary school passed more often.

Table II

## Overview of characteristics and main results of the included studies (continued)

Author (Year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Germeljs & Verschuren (2006)	Flanders / University and professional education / Several programmes at several institutions	Regression	Persistence	Ability: cognitive ability Demographic: gender <i>Prior education</i> : career decisional tasks during secondary school (orientation to choice, self-exploratory behaviour, broad exploratory behaviour, in-depth exploratory behaviour, decisional status, commitment) <i>Psychosocial</i> : academic adjustment, commitment, choice actualisation in higher education	Theory on career decision-making models.	Choice actualisation, commitment, and academic adjustment influenced the odds of passing the first year. Passing the first year could not be directly predicted from students' coping with the career decisional tasks at the end of grade 12.
Jansen & Suhre (2010)	Netherlands / University / Law	Path analysis	EC Persistence	Ability: secondary school GPA <i>Motivation</i> : study motivation <i>Learning environment</i> : time management preparation in secondary school, learning skills preparation in secondary school <i>Psychosocial</i> : degree programme satisfaction <i>Behavioural engagement</i> : regular study behaviour, tutorial attendance	No explicit theoretical framework. Various variables are described, sometimes referring to the theories behind these variables. The study describes how study skills are taught, which ones are needed, and how they are related to success and stress. Also, some other factors related to study behaviour, achievement, and persistence are discussed.	EC is affected by degree programme satisfaction, tutorial attendance, and secondary school GPA. Dropout is negatively influenced by degree programme satisfaction. Preparation in time management and learning skills positively affected motivation and study behaviour and thereby enhanced academic achievement.
Kamphorst, Holman, Jansen, & Terlouw (2012)	Netherlands / Professional education / Several programmes at five institutions	Path analysis	EC	Demographic: gender <i>Prior education</i> : level of prior education <i>Motivation</i> : intention to persist <i>Learning environment</i> : contact hours, preparation through active learning skills in secondary school, preparation of academic knowledge and skills in secondary school <i>Psychosocial</i> : satisfaction with active learning, satisfaction with academic knowledge and skills, integration <i>Behavioural engagement</i> : independent study hours	Ecclectic. Tinto's model of attrition (1975; 1993) and Becher's (1994) theory on academic tribes are used. Furthermore, other factors related to achievement are discussed (active learning, academic knowledge and skills, time spent on the task, satisfaction with the course).	Intention to persist was the strongest predictor of EC. Other predictors were gender (in favour of females), preparation through active learning (negative effect), contact hours, independent study hours, satisfaction with academic knowledge and skills, and integration. The models that explained EC differed per study field.

Table II  
Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Kamphorst, Hofman, Jansen, & Ter-louw (2013)	Netherlands / University / Several programmes at one institution	Path analysis	EC	Personality: procrastination Motivation: intrinsic value, perceived competence Learning strategies: deep learning, self-regulation	No explicit theoretical framework. Competence-based education is discussed related to concepts such as self-regulation, motivation, deep approach to learning, and meaning-directed learning. A conceptual model in which the variables are included is presented.	EC is positively influenced by perceived competence and negatively by procrastination. Intrinsic value and self-regulation affected procrastination negatively. Self-regulation, deep learning, and intrinsic value affected perceived competence.
Kamphorst, Hofman, Jansen, & Ter-louw (2015)	Netherlands / Professional education / Engineering	Path analysis, t-test	EC Persistence	Demographic: gender Psychosocial: academic integration	Tinto's model of attrition. In addition, gender is discussed, related to STEM-courses.	Female students were more successful than male students in terms of EC obtainment and retention. For both men and women, academic integration predicted EC.
Loyens, Rikers, & Schmidt (2007)	Netherlands / University / Psychology	Path analysis	Persistence	Motivation: motivation to learn, self-perceived inability to learn Learning strategies: knowledge construction, cooperative learning, self-regulated learning, authentic problems	Social constructivism. Conceptions of learning are discussed in relation to constructivism. Four assumptions are discussed: deep understanding, cooperative learning, metacognitive skills to set academic learning goals, authentic ill-structured problems.	Self-study time and conceptions of knowledge construction as constructivist were related to observed learning activities. Self-perceived inability to learn and motivation to learn led to self-study time. Observed learning activities and self-study time were related to dropout. Conceptions of knowledge construction were related to learning activities, and self-perceived inability to learn and motivation to learn were related to self-study time.
Meeuwisse, Severens, & Born (2010)	Netherlands / University / Several programmes at four universities	Path analysis	EC	Demographic: majority or minority Learning environment: activating learning environment Psychosocial: sense of belonging	Tinto's model of attrition.	In the model for all students, EC was influenced by sense of belonging. Sense of belonging was influenced by formal teacher interaction, formal peer interaction, and informal peer interaction. Learning environment was related to all types of interaction.



Table II

## Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Pinxten, De Fraine, Van den Noortgate, Van Damme, Boonen, & Vanlaar (2015)	Flanders / University / Several programmes at several universities	Regression	Persistence	Demographic: gender, SES  <i>Prior education</i> : weekly hours of mathematics, science, economics, classical, and modern languages  <i>Motivation</i> : academic self-concept, occupational interests, future aspirations	Expectancy-value theory (Eccles, 2005).	Students with better scores on mathematics and language tests at the end of secondary education and who had more hours of mathematics, science, and classical languages in secondary school were more likely to pass the first year. Controlled for secondary school achievement and subject uptake, female students, higher SES students, and students with a more positive self-concept were more likely to succeed.
Rientjes, Beaussart, Grohert, Niemanisverdriet, & Kommers (2012)	Netherlands / University / Business programmes at several universities	Regression	EC GPA	<i>Psychosocial</i> : academic adjustment, social adjustment, personal-emotional adjustment, institutional attachment, perception of the faculty, study support, students' satisfaction with social life, financial support	Tinto's model of attrition.	GPA and EC were influenced by academic adjustment and (to a smaller extent) by institutional attachment. In addition, EC was affected by personal-emotional adjustment and perception of the faculty.
Sevensens & Schmidt (2009)	Netherlands / University / Psychology	Path analysis, ANOVA	EC	<i>Learning environment</i> : extent of problem-based learning (PBL) focus  <i>Psychosocial</i> : formal academic integration, informal academic integration, formal social integration, informal social integration	Tinto's model of attrition.	Students in a problem-based learning environment had higher formal and informal academic integration and higher formal social integration. PBL was also directly related to EC. Formal social integration positively affected EC, whereas informal academic integration negatively affected EC.
Sevensens & Wolff (2008)	Netherlands / University / Several programmes	Path analysis	EC GPA	<i>Demographic</i> : gender, SES, majority or minority	Tinto's model of attrition.	Female students and students from a higher SES obtained more EC, but did not have a higher GPA. Majority students obtained more EC and had a higher GPA than minority students.
Stegers-Jager, Cohen-Schaldanus, & Thermen (2012)	Netherlands / University / Medicine	Path analysis	GPA	<i>Motivation</i> : intrinsic goal orientation, task value, self-efficacy  <i>Learning strategies</i> : elaboration, organisation, metacognition, time management, effort regulation  <i>Behavioural engagement</i> : lecture attendance, tutorial attendance, completion of study assignments	No explicit theoretical framework. The study is mainly based on the MSLQ (Motivated Strategies for Learning Questionnaire; Pintrich & De Groot, 1990).	Intrinsic goal orientation, task value, and self-efficacy were positively related to GPA. All learning strategies except organisation were positively related to GPA.

Table II  
 Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Suhre, Jansen, & Harskamp (2007)	Netherlands / University / Law	Path analysis	EC Persistence	Ability: secondary school GPA Motivation: study motivation Psychosocial: degree programme satisfaction, perception of faculty contacts	Tinto's model of attrition. In addition, the model of effective learning (Carroll, 1963; Slavin, 1995; Trigwell & Prosser, 1996) is discussed.	Secondary school GPA, study motivation, degree programme satisfaction, regular study behaviour, and tutorial attendance all influenced a student's number of obtained credits and persistence. Degree programme satisfaction, tutorial attendance, and regular study behaviour mattered most.
Suhre, Jansen, & Torenbeek (2013)	Netherlands / University / Law	Path analysis	GPA first semester	Ability: secondary school GPA Motivation: fear of failure, goal-setting Learning environment: perceived degree programme organization, perceived transparency of examinations, perceived orientation quality	No explicit theoretical framework. However, the study is guided by concepts and principles from goal motivation theory and cognitive evaluation theory (Covington, 2000; Ryan & Deci, 2000).	First semester GPA was positively related to secondary school GPA, goal setting, perceived degree programme organization, and perceived transparency of examinations. Fear of failure was negatively related to first semester GPA.
Te Wierik, Beishuizen, & Van Os (2015)	Netherlands / Professional education / Several programmes	T-test, regression	EC	Prior education: level of prior education Learning environment: career guidance	Tinto's model of attrition.	The cohort that had career guidance implemented in the curriculum obtained more credits than previous cohorts that did not. Level of prior education also predicted EC.
Torenbeek, Jansen, & Hofman (2009)	Netherlands / University / Several programmes	Path analysis	EC	Ability: secondary school GPA Learning environment: perceived fit between secondary and university education	Social constructivism: Vygotsky's social development theory.	Satisfaction with the fit between secondary and university education had a positive effect on EC. Secondary school GPA influenced the satisfaction with the fit and EC.
Torenbeek, Jansen, & Hofman (2010)	Netherlands / University / Several programmes	Path analysis	EC	Ability: secondary school GPA Demographic: gender, employment Motivation: motivation Learning environment: resemblance between teaching and learning environment at school and university, expectations of and orientation to university education Psychosocial: contact with teachers, contact with students, adjustment Behavioural engagement: class attendance, self-study time	Eclectic. Tinto's model of attrition, Nicholson's (1990) transition model, and the educational productivity model by Walberg (1984; 1986) are used.	EC was affected by secondary school GPA, class attendance, and self-study time. Motivation positively influenced attendance and study time; employment negatively influenced these factors. Resemblance between teaching and learning environments at school and university positively affected attendance and study time and negatively affected adjustment, i.e., when students perceived the learning environment to be similar to that of secondary school, they attended more classes, but when they experienced little need for adjusting to university, they spent less time studying.

Table II  
 Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Torenbeek, Jan- sen, & Hofman (2011a)	Netherlands / University / Several programmes	MANCOVA	EC	Ability; secondary school GPA	No explicit theoretical framework.	Secondary school GPA was a strong predictor of EC. In humanities and social sciences programmes, secondary school GPA also predicted the perceived fit. In the humanities and social sciences, students from secondary schools with strong teacher control obtained more EC.
Torenbeek, Jan- sen, & Hofman (2011b)	Netherlands / University / Several programmes	Path analysis	EC	Ability; secondary school GPA  <i>Learning environment:</i> student-centeredness of teaching approach, basic skills development, collaboration skills development, higher order skills development, perceived fit between secondary and university education	No explicit theoretical framework.  Previous research is used as background.	EC was positively influenced by secondary school GPA, the perceived fit, and teaching approach - a higher secondary school GPA, being more satisfied with the fit, and more student-centred teaching led to more credits. The perceived fit was positively affected by secondary school GPA and attention to basic and collaboration skills. The perceived fit was negatively affected by teaching approach and higher order skills, i.e., more student-centred teaching and more attention to higher order skills led to less satisfaction with the fit.
Torenbeek, Jan- sen, & Hofman (2011c)	Netherlands / University / Several programmes	Regression	EC	Ability; secondary school GPA  <i>Demographic:</i> gender  <i>Learning environment:</i> type of fit secondary and university education (less student-centred at university, match, more student-centred, much more student-centred)	No explicit theoretical framework.  Previous research is used as background.	Secondary school GPA was positively related to EC. Less student-centred teaching at university was negatively related to EC; more student-centred teaching was positively related to EC. A comparable approach at secondary school and university and much more student-centred teaching at university were unrelated to EC.

Table II  
Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Van Bragt, Bakx, Bergen, & Croon (2010)	Netherlands / Professional education / Several programmes	Regression	EC Persistence	<i>Demographic:</i> gender <i>Prior education:</i> prior education <i>Personality:</i> extraversion, agreeableness, conscientiousness, emotional stability, autonomy  <i>Learning strategies:</i> personal orientations on learning (constructive self-regulation, reproductive external regulation, ambivalence and lack of regulation), study approach (meaningful integrative approach, superficial approach)	Model for learning styles (Vermunt, 1996).	Women earned more credits and continued their studies more often than men. Conscientiousness was positively related to credit attainment and persistence, and ambivalence and lack of regulation related negatively to these outcomes.
Van Soom & Donche (2014)	Flanders / University / STEM programmes	Cluster analysis, ANOVA	EC GPA first semester	<i>Ability:</i> secondary school GPA <i>Demographic:</i> gender <i>Prior education:</i> secondary school study track  <i>Motivator:</i> autonomous motivation, controlled motivation, academic self-concept	Self-determination theory (SDT; Deci & Ryan, 2000).	Secondary school GPA, autonomous motivation, and academic self-concept were positively related to GPA and EC. Female students and students from a traditional secondary school track (i.e., with more focus on science and classical languages) had a higher GPA and obtained more credits.
Vanthounout, Gijbels, Coerftens, Donche, & Van Petegem (2012)	Flanders / Professional education / Teacher education	Regression, path analysis	EC Persistence	<i>Demographic:</i> gender <i>Motivator:</i> autonomous motivation, controlled motivation, amotivation  <i>Learning strategies:</i> processing strategies (relating and structuring, critical processing, analysing, memorizing, concrete processing), regulation strategies (self-regulation, external regulation, lack of regulation)	Model for learning styles (Vermunt, 1996; Vermunt & Vermetten, 2004)  Self-Determination Theory (Deci & Ryan, 2000).	Amotivation was the only motivational factor related to persistence and EC. There was a marginal effect of lack of regulation on persistence. Relating and structuring, lack of regulation, and external regulation were related to EC.

Table II  
 Overview of characteristics and main results of the included studies (continued)

Author (year)	Region of study / Level of education / Degree programme	Analysis	Outcome variables	Independent variables used in the study	Theoretical framework	Main findings (pertaining to the review)
Vermeunt (2005)	Netherlands / University / Several programmes	Correlation	GPA first semester	<p><i>Demographic:</i> age, gender</p> <p><i>Prior education:</i> highest level of completed prior education</p> <p><i>Motivation:</i> learning orientations (personally interested, certificate-oriented, self-test oriented, vocation-oriented, ambivalent)</p> <p><i>Learning strategies:</i> processing strategies (relating and structuring, critical processing, memorising and rehearsing, analysing, concrete processing), regulation strategies (self-regulation, external regulation, lack of regulation), conceptions of learning (construction of knowledge, intake of knowledge, use of knowledge, stimulating education, co-operative learning)</p>	Model for learning styles (Vermeunt, 1996).	<p>Meaning-directed learning was positively associated with GPA, whereas reproduction-directed and undirected learning was negatively associated with GPA. Application-directed learning was not clearly related to GPA. Self-regulation was positively related to GPA, whereas external regulation and lack of regulation was negatively related to GPA. Relations between learning strategies and conceptions and GPA differed in different disciplines.</p>
Visser, Korthagen, & Schoonenboom (2015)	Netherlands / Professional education / Teacher education	Path analysis	EC	<p><i>Personality:</i> procrastination</p> <p><i>Motivation:</i> attributional style, self-efficacy, dispositional optimism, self-esteem, lack of motivation, fear of failure</p>	<p>No explicit theoretical framework.</p> <p>Previous research is used as background (including concepts such as self-efficacy (Bandura, 1997)).</p>	<p>EC was influenced by self-efficacy (positive effect), procrastination, and self-esteem (negative effect). Lack of motivation and fear of failure influenced procrastination.</p>

Table III  
Positive (+), negative (-), and non-significant (NS) relationships with the three student success outcomes, presented by category

Variable (n Dutch and Flemish studies)	Level (n studies)	Ability indicators			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		Dutch studies	Dutch studies	Dutch studies	GPA	Credits	Persistence	
Secondary school GPA (14D; 2F)	Prof (0)	GPA	Credits	Persistence	GPA	Credits	Persistence	
	Uni (16)	5+	10+	3+	2+	2+	1+	23+
Secondary school mathematics GPA (2D)	Prof (0)							
	Uni (2)	1+	2+	1+				4+
Intelligence (1D; 1F)*	Prof (1)							1NS
	Uni (2)	1+	1+					1NS
Total positive, negative, and non-significant relationships per region and outcome		7+	13+	4+	2+	2+	1+; 2NS	
Total per region		24+			5+; 2NS			29+; 2NS

\*One study had a sample which consisted of both professional and university education students: These results are counted in both the professional and university results row.

*Demographic factors*

Table III.2

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Gender: female (12D; 6F)*	Prof (6)		4+	2+		1+	2+	9+
	Uni (13)	3NS	3+; 5NS	2NS	1+; 1NS	1+; 1NS	2+; 2NS	7+; 14NS
Age (4D)	Prof (1)		1NS					1NS
	Uni (3)	1NS; 1-	1NS; 2-					2NS; 3-
SES (2D; 2F)	Prof (0)							
	Uni (4)	2NS	1+		1+	1+	1+; 1NS	4+; 3NS
Nationality: majority (4D)	Prof (0)							
	Uni (4)	1+; 1NS	3+; 1NS	1+				5+; 2NS
Total positive, negative, and non-significant relationships per region and outcome		1+; 7NS; 1-	11+; 8NS; 2-	3+; 2NS	2+; 1NS	3+; 1NS	5+; 3NS	
Total per region		15+; 17NS; 3-			10+; 5NS			25+; 22NS; 3-

\*One study had a sample which consisted of both professional and university education students: These results are counted in both the professional and university results row.

Table III.3  
*Prior education*

Variable ( <i>n</i> ) Dutch and Flemish studies)	Level ( <i>n</i> ) studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Level of prior education (6D; 1F)	Prof (4)		2+; 2NS	1NS			1+	3+; 3NS
	Uni (3)	1+	2+	1+				4+
Secondary school track (science) (3D; 2F)	Prof (0)							
	Uni (5)	2+	3+	2+	1+	1+	1+	10+
Secondary school hours of mathematics (3F)	Prof (0)							
	Uni (3)				1+	1+	3+	5+
Secondary school hours of classical languages (3F)	Prof (0)							
	Uni (3)	3+	7+; 2NS	3+; 1NS	2+	2+	3+	7+
Total positive, negative, and non-significant relationships per region and outcome					4+	4+	8+	
Total per region		13+; 3NS			16+			29+; 3NS



Table III.4  
*Personality characteristics*

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Agreeableness (2D; 1F)	Prof (2)		1NS	1NS		1+		1+; 2NS
	Uni (1)	1NS	1NS					2NS
Conscientiousness (2D; 1F)	Prof (2)		1+	1+		1+		3+
	Uni (1)	1+	1NS					1+; 1NS
Extraversion (2D; 1F)	Prof (2)		1NS	1NS		1NS		3NS
	Uni (1)	1-	1NS					1NS; 1-
Neuroticism (2D; 1F)	Prof (2)		1NS	1NS		1+		1+; 2NS
	Uni (1)		1+					1+
Openness (2D; 1F)	Prof (2)		1NS	1NS		1NS		3NS
	Uni (1)	1-	1-					2-
Procrastination (2D)	Prof (1)		1-					1-
	Uni (1)		1-					1-
Total positive, negative, and non-significant relationships per region and outcome		1+; 1NS; 2-	2+; 7NS; 3-	1+; 4NS		3+; 2NS		7+; 14NS; 5-
	Total per region	4+; 12NS; 5-			3+; 2NS			

Table III.5  
Motivational factors

Variable (n Dutch and Flemish studies)	Level (n studies)	Dutch studies				Flemish studies				Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence			
Self-efficacy (2D; 2F)	Prof (2)		1+			1+			2+	
	Uni (2)	1+					1+		2+	
Self-concept (3F)	Prof (0)									
	Uni (3)				3+				5+	
Fear of failure (2D)	Prof (1)		1-			1+		1+	1-	
	Uni (1)	1-							1-	
Intrinsic motivation (2D; 4F)	Prof (1)					1NS		1NS	2NS	
	Uni (5)	1+	2+	1+	3+	3+	2NS	10+; 2NS		
Extrinsic motivation (2D; 2F)	Prof (1)					1NS		1NS	2NS	
	Uni (3)	1NS	2NS	1NS	1NS	1NS		6NS		
Study motivation (4D; 1F)	Prof (1)					1+			1+	
	Uni (4)		3+; 1NS	2+; 1NS					5+; 2NS	
Extra-curricular motivation (2D)	Prof (0)									
	Uni (2)	1-	2NS	1NS					3NS; 1-	
Lack of motivation (1D; 1F)	Prof (2)		1-			1-			3-	
	Uni (0)									
Expectancies (3D)	Prof (0)									
	Uni (3)	2+	1+						3+	
Values (4D)	Prof (0)									
	Uni (4)	1+; 1NS	1+; 1NS						2+; 2NS	
Affects (2D)	Prof (0)									
	Uni (2)	1NS	1+						1+; 1NS	
Total positive, negative, and non-significant relationships per region and outcome										
Total per region		17+; 12NS; 4-				14+; 8NS; 2-				31+; 20NS; 6-

Table III.6  
Learning environment

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> stu- dies)	Dutch studies				Flemish studies				Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence			
Number of contact hours (3D)	Prof (1)									
	Uni (2)	2+	1+					1+		2+
Study load (2D)	Prof (0)									
	Uni (2)	2-								2-
Quality of assessment (2D)	Prof (0)									
	Uni (2)	2+								2+
Quality of organisation (2D)	Prof (0)									
	Uni (2)	1+, 1NS								1+, 1NS
Student-centred learning environment (3D)	Prof (0)									
	Uni (3)									2+, 1NS
	Prof (0)									2+
Perceived fit between school and university (2D)	Prof (0)									
	Uni (2)									2+
Resemblance between learning environment of school and university (2D)	Prof (0)									
	Uni (2)									1+, 1NS
Learning skills preparation in school (2D)	Prof (1)									1-
	Uni (1)									1+, 1NS
Total positive, negative, and non-significant relationships per region and outcome		5+; 1NS; 2-	7+; 2NS; 1-					1NS		
										12+; 4NS; 3-
Total per region										12+; 4NS; 3-

Table III.7

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> studies)	Psychosocial factors			Flemish studies	Total positive, negative, and non-significant relationships per variable and level		
		Dutch studies	Flemish studies					
Academic adjustment (1D; 2F)*	Prof (1)	GPA	Credits	Persistence	GPA	Credits	Persistence	1+
	Uni (3)	1+	1+		1NS		1+	1+
	Prof (1)	1+	1+					3+; 1NS
Academic integration (2D)	Uni (1)		1+	1+				1+
	Prof (0)							2+
Social adjustment (1D; 1F)	Uni (2)	1NS	1NS		1NS		1+	1+; 3NS
	Prof (0)							
Personal-emotional adjustment (1D; 1F)	Uni (2)	1NS	1+		1NS		1+	2+; 2NS
	Prof (0)							
Institutional attachment (1D; 1F)	Uni (2)	1+	1+		1NS		1+	3+; 1NS
	Prof (0)							
Degree programme satisfaction (2D)	Uni (2)	2+	2+	2+				4+
	Prof (0)							
Total positive, negative, and non-significant relationships per region and outcome		2+; 2NS	7+; 1NS	3+	4NS		5+	
Total per region		12+; 3NS			5+; 4NS			17+; 7NS

\*One study had a sample which consisted of both professional and university education students: These results are counted in both the professional and university results row.

Table III.8 Learning strategies

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persistence	
Self-regulation (4D; 1F)	Prof (2)							
	Uni (3)	1+	1NS	1NS		1NS	4NS	
	Prof (2)		1+	1NS		1+	1NS	2+; 1NS
External regulation (2D; 1F)	Uni (1)	1-					1-	1+; 3NS
	Prof (2)							
Lack of regulation (2D; 1F)	Uni (1)		1-	1-		1-	1-	4-
	Prof (2)							
Deep learning (3D; 1F)	Uni (1)	1-					1-	1-
	Prof (1)		1NS	1NS				2NS
Relating and structuring (1D; 1F)	Uni (3)		2NS		1NS			3NS
	Prof (1)					1+	1NS	1+; 1NS
Critical processing (1D; 1F)	Uni (1)	1+				1NS	1+	1+
	Prof (1)							2NS
Analysing (1D; 1F)	Uni (1)							1+
	Prof (1)	1+				1NS	1+	1+; 1NS
Surface learning (1D; 1F)	Uni (1)							1NS
	Prof (1)	1NS		1NS	1-			2NS
Memorising (1D; 1F)	Uni (1)							1-
	Prof (1)							2NS
Concrete processing (1D; 1F)	Uni (1)	1NS				1NS	1NS	1NS
	Prof (1)							2NS
Conception of learning as knowledge construction (2D)	Uni (1)	1+				1NS	1+	1+
	Prof (0)							
Conception of learning as cooperative (2D)	Uni (2)	1+		1NS				1+; 1NS
	Prof (0)							
Total positive, negative, and non-significant relationships per region and outcome		1-	5+; 2NS; 3-	1NS	1NS	2+; 5NS; 1-	1NS; 1-	1NS; 1-
		6+; 15NS; 5-	1+; 6NS; 1-	7NS; 1-	1NS; 1-	1+; 6NS; 1-	1+; 6NS; 1-	9+; 27NS; 8-
Total per region					3+; 12NS; 3-			

Table III.9  
*Behavioural engagement*

Variable ( <i>n</i> Dutch and Flemish studies)	Level ( <i>n</i> studies)	Dutch studies			Flemish studies			Total positive, negative, and non-significant relationships per variable and level
		GPA	Credits	Persistence	GPA	Credits	Persis- tence	
Lecture attendance (2D)	Prof (0)							
	Uni (2)	1+	1+					2+
Tutorial attendance (3D)	Prof (0)							
	Uni (3)	1+	2+					6+
Observed learning activities (2D)	Prof (0)							
	Uni (2)	1+	1+					3+
Regular study behaviour (2D)	Prof (0)							
	Uni (2)		1+; 1NS					3+; 1NS
Self-study time (4D)	Prof (1)		1+					1+
	Uni (3)	1+	1+; 1NS					3+; 1NS
Total positive, negative, and non-significant relationships per region and outcome		4+	7+; 2NS					7+
Total per region		18+; 2NS						18+; 2NS